



Report to: Markham Subcommittee

Meeting Date: June 26, 2024

SUBJECT: Swan Lake- 2023 Water Quality Status and Updates
PREPARED BY: Robert Muir, Environmental Services, Ext. 2357
Zahra Parhizgari, Environmental Services, Ext. 2867

RECOMMENDATION:

1. THAT the report entitled “Swan Lake- 2023 Water Quality Status and Updates” be received;
2. AND THAT Staff continue to implement the Long-term Management Plan for Swan Lake approved by Council in December 2021, including advancement of submerged aquatic vegetation, research into chloride treatment, and flow diversion evaluation (previously in Phases 2 and 3 of the Plan);
3. AND THAT Staff report back annually on water quality results and evaluation of adapted Core and Complementary measures for consideration in Phase 2 of the Plan through the Markham Sub-Committee with the participation of the Friends of Swan Lake Park;
4. AND THAT the next review of the Plan will be in 2025 (after the completion of Phase 1 and other measures as listed under item 2) with consideration for a workshop in 2026;
5. AND THAT Staff be authorized and directed to do all things necessary to give effect to this resolution.

PURPOSE:

The purpose of this report is to present:

- 2023 water quality results and implemented measures;
- Scope of work for 2024; and
- Report on the community meeting held on March 25, 2024

BACKGROUND:

On November 16, 2021, Staff provided a report and presentation to the Markham Subcommittee titled [Swan Lake Water Quality Management Plan](#), outlining the history of Swan Lake management activities up to that point and a Long-Term Management Plan for Swan Lake Water Quality (the Plan) for the next 25 years. The Plan was developed based on a scientific evaluation of issues and opportunities for lake management and an assessment of several lake management measures designed with input from stakeholders (see here for [Meeting Minutes](#)).

The Swan Lake Long-Term Management Plan follows an adaptive management approach, through which management activities would be adjusted to maximize benefits and minimize

impacts. The Council endorsed this phased approach on December 14, 2021 (see here for [General Committee Meeting Minutes](#) and [Council Meeting Minutes](#)).

As per resolutions 7, 8, and 9 of the December 14, 2021 meeting, Staff have met the Friends of Swan Lake Park and the Markham Subcommittee annually to report on the water quality results and evaluation of the adapted measures (see here for Markham Subcommittee Report and Presentation in [2022](#) and [2023](#)).

The following Discussion presents the 2023 water quality results and a description of the scope of work for the 2024 activities.

At the 2023 Sub-Committee meeting, the sub-committee requested that Staff hold a public meeting to communicate the Swan Lake water quality improvement program to City residents. This meeting was held on March 25, 2024, a summary of which is also provided in this report.

DISCUSSION:

2023 Water Quality Results and Implemented Measures

The Phase 1 Core Measures completed in 2023 include:

- Annual monitoring
- Enhanced geese management
- Fish management

Staff collected water quality data through the Swan Lake monitoring program from January to December 2023. These data provide insight into long-term trends in water quality and help determine the need for and impact of chemical treatment of Swan Lake (see Attachment A for the 2023 Annual Report).

Contractors completed geese management by chasing (“hazing”) geese, oiling eggs, and managing nests. The hazing frequency was modified in 2021 to focus on the migration seasons. The increased hazing frequency (starting in mid-August) effectively reduced the number of geese present at different times of the day to about 50% of the geese numbers in 2020. As part of the enhance program, resident geese were relocated away from the Lake.

A fish inventory and removal campaign were completed to remove bottom-dwelling fish, which could interfere with the chemical treatment efficacy. Only three fish species were caught in the Lake through this intensive effort: Common Carp (non-native), Brown Bullhead, and Fathead Minnow.

The management activities in 2023 focused on the significant nutrient loadings identified in the Long-Term Plan (i.e., fish management to reduce internal loads from the lake bottom and geese management to reduce external loads).

In addition, some Phase 2 and 3 Complementary and Alternative Measures were brought forward in 2023, including:

- Planting of submerged aquatic vegetation
- Research into chloride removal technologies
- Feasibility of flow diversion

After reviewing the 2022 water quality results by the City's limnologist consultant, it was determined that the introduction of submerged aquatic vegetation (macrophytes) should be advanced to Phase 1 so that beneficial plant communities can compete with and help mitigate algae (phytoplankton) growth. Macrophytes will increase water clarity, which in turn, enhances their own growing conditions. The TRCA was hired in 2023 and planted wild celery in four fenced areas on the north side of the Lake.

Discussion with York University continued to enhance the methodology for a pilot project using biochar for the removal of chloride from water. York University is in the process of acquiring additional research funding and contract review in preparation for this project.

In 2023, a consultant was hired to conduct a technical analysis of stormwater flow diversion scenarios for the catchment area contributing to the Lake. The consultant has completed a background review and collected additional field data to adequately characterize the stormwater system in the catchment area and is currently developing a hydrologic and hydraulic model.

2024 Scope of Work

a. Phase 1 Core Measures

In 2024, the planned Phase 1 Core measures will continue, including water quality monitoring, geese management, and fish management. The scope of geese management was expanded in 2022 to further reduce the number of resident and migratory geese.

The Long-Term Plan includes provisions for a chemical treatment program every three to five years as the measure that will have the most immediate and tangible effect on water quality in the Lake. A chemical treatment using PAC was completed in 2021. The second chemical treatment is currently being planned for May-June of 2024.

b. Introducing Submerged Plants

Planting more submerged aquatic vegetation will continue in 2024 to increase water clarity. The 2024 chemical treatment will help improve clarity, providing an excellent opportunity for the plants to establish and propagate.

c. Chloride Removal using Biochar

Contract negotiation is underway with York University to develop biochar adsorption techniques to remove chloride from Swan Lake. In 2024, the researchers will characterize Swan Lake water and conduct lab-scale units to test the biochar's efficiency in this process.

d. Flow Diversion Study

The flow diversion study will be completed in 2024 and will provide information on any feasible scenario for flow diversion, and potential impacts and mitigation measures for any capacity-related impacts projected in the study area. The result of this analysis will be used to determine the potential benefits of each scenario on chloride concentration in the Lake.

This analysis will be of a technical nature and depending on the outcome and other considerations (e.g., system ownership), a Municipal Class Environmental Assessment-type study may be required to engage all stakeholders and identify a preferred alternative.

Community Meeting

During the May 11, 2023, Markham Subcommittee meeting, the sub-committee requested that a public information meeting be held to explain the Swan Lake Water Quality Improvement program to interested residents.

This meeting was held on March 25, 2024, at the Markham Museum to:

- Provide details of the water quality improvement program;
- Provide details of the park's improvement program;
- Share achievements of the program since it started;
- Inform the public about upcoming activities in 2024;
- Discuss ways to get involved in improving water quality and habitat health;
- Provided updates on the Shoreline Restoration project and its continuing role supporting water quality improvement as a first priority;
- Answer any questions the public may have.

The meeting witnessed an impressive turnout with over 120 community members in attendance. A Power Point presentation was delivered, effectively communicating the program details and its positive results. The active participation and expressed appreciation from the community for the work completed by Environmental Services and Operations Staff was truly heartening and appreciated. The presentation and display boards can be found in Attachment B.

FINANCIAL CONSIDERATIONS:

No financial impact.

HUMAN RESOURCES CONSIDERATIONS:

Not applicable.

ALIGNMENT WITH STRATEGIC PRIORITIES:

This report aligns with the areas of strategic focus as follows:

- **Safe, Sustainable, & Complete Community:** the proposed strategy will support the enhancement of the natural environment and built form through sustainable integrated planning, infrastructure management and services.
- **Stewardship of Money & Resources:** the strategy proposed will provide a reasonable cost-effective level of service.

BUSINESS UNITS CONSULTED AND AFFECTED:

Not applicable.

RECOMMENDED BY:

Eddy Wu,
Director, Environmental Services

Morgan Jones,
Commissioner, Community Services

ATTACHMENTS:

Attachment A - 2023 Annual Water Quality Report

Attachment B- Community Meeting Presentation and Display Boards

Attachment A- 2023 Annual Water Quality Report

Attachment B- Community Meeting Presentation and Display Boards



Swan Lake

Annual Meeting with Markham Subcommittee

Environmental Services

Authors: Robert Muir, Manager, Stormwater

Zahra Parhizgari, Sr. Environmental Engineer, Stormwater

June 26, 2024

Agenda

- Background
- Completed Work
- Ongoing Work
- Public Information Meeting
- 2024 Plan and Recommendations





Background

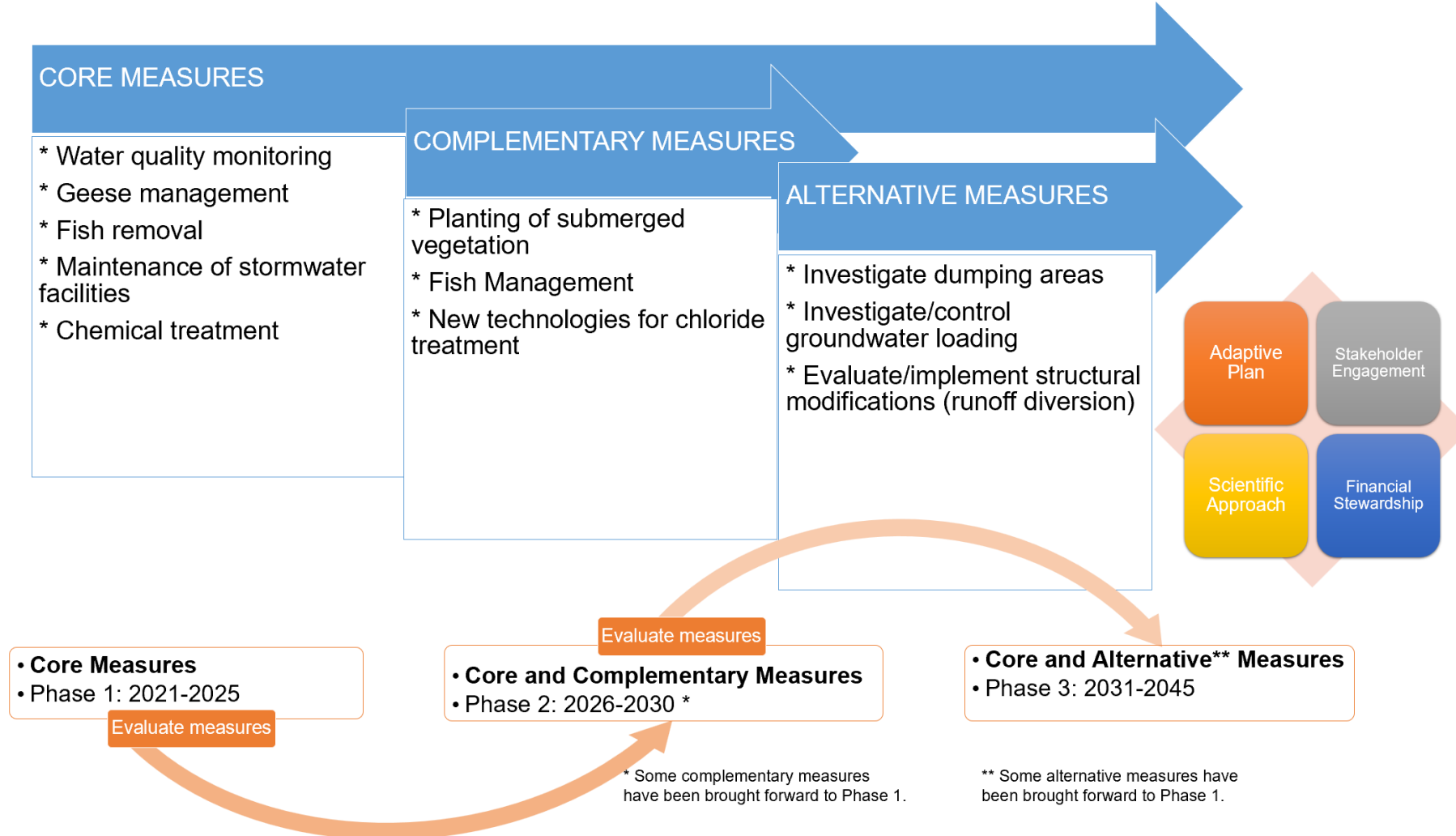
Location and History

- Gravel pit in the 1960s and 1970s; construction waste dump in the early 1980s
- Lake formed when pumping for the gravel pit ceased operations
- Drainage area is fully developed, serviced by two stormwater management ponds and three oil and grit separators
- Closed system, prone to build-up of nutrients and algae growth
- Winter maintenance increases chloride concentration
- Water quality issues from 2010 and possibly earlier
- Active management of water quality since 2013 (Phoslock treatment, followed by geese management and monitoring)





Long Term Management Plan (2021)





2023 Council Resolutions

That the General Committee consider the following motion passed at the May 11, 2023, Markham Sub-Committee meeting:

1. That the report entitled “Swan Lake- 2022 Water Quality Status and Updates” be received; and,
2. That Staff continue to implement the Long-term Management Plan for Swan Lake approved by Council in December 2021, including advancement of submerged aquatic vegetation, research into chloride treatment, and flow diversion evaluation (previously in Phases 2 and 3 of the Plan); and,
3. That Staff report back annually on water quality results and evaluation of adapted Core and Complementary measures for consideration in Phase 2 of the Plan through the Markham Sub-Committee with the participation of the Friends of Swan Lake Park; and,
4. That the next review of the Plan will be in 2026 (after completion of Phase 1 and other measures as listed under item 2) and that a workshop of independent industry experts be considered after completion of Phase 1, and;
5. That the deputation from Fred Peters be received, and further;
6. That Staff be authorized and directed to do all things necessary to give effect to this resolution.

It was also recommended Staff hold a public meeting to communicate the Swan Lake water quality improvement program to City residents.



Completed Work



2023 Measures

Activity	Phase 1 Core Measures (Years 1-5)
Water quality monitoring and annual reporting to Subcommittee	<input checked="" type="checkbox"/>
Enhanced Geese management	<input checked="" type="checkbox"/>
Removal of benthic-dwelling fish	<input checked="" type="checkbox"/>
Maintenance of stormwater management facilities	<input checked="" type="checkbox"/>
Community Engagement	<input checked="" type="checkbox"/>
Shoreline planting / Improvements	<input checked="" type="checkbox"/>
Planting of submerged plants *	<input checked="" type="checkbox"/>
New technologies for chloride treatment *	<input checked="" type="checkbox"/> Planning underway
Fish management plan and fish stocking	Pending improved water quality
Flow Diversion Feasibility Study **	Underway

* Originally planned for Phase 2

** Originally planned for Phase 3

Water Quality Monitoring

- Important for understanding issues and planning mitigation measures and adapting the plan based on the results
- Includes chemistry and biology
- Water level logger and staff gauge
- Measurements and samples by City staff
- Analysis by accredited laboratories
- Regular site inspections and observations
- External experts hired for review and updates

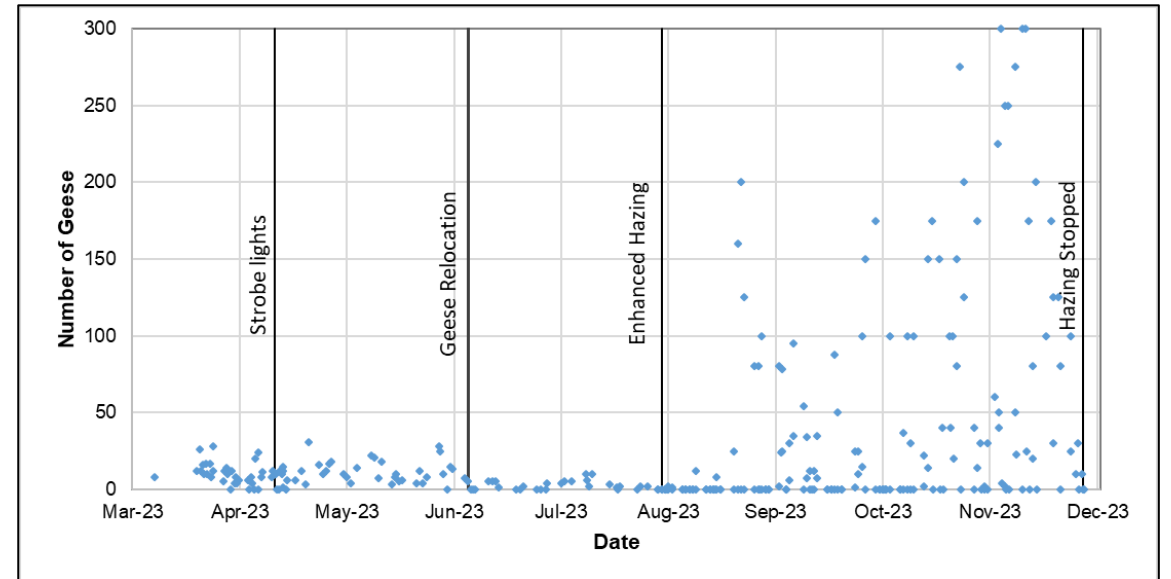
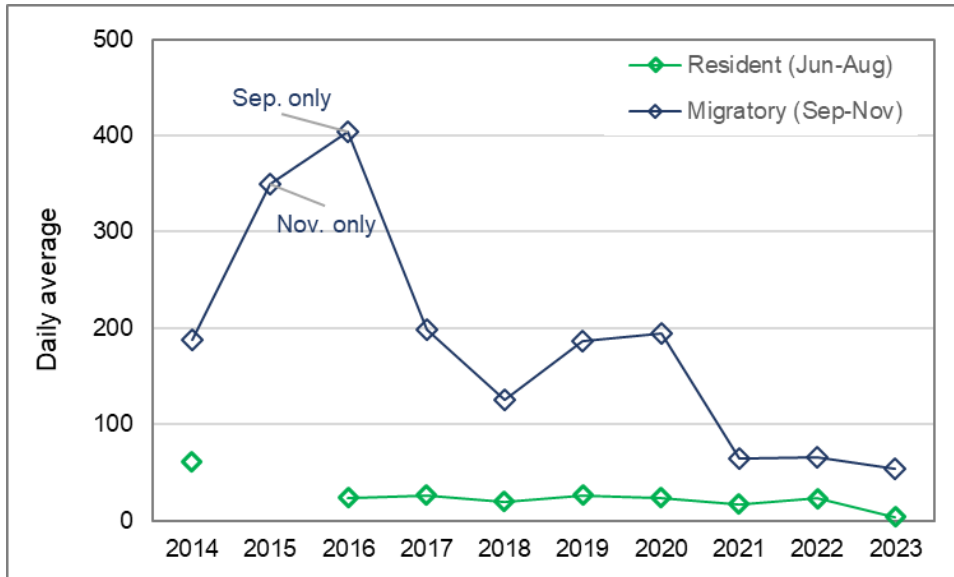


Geese Management

- Geese relocation and hazing and egg/nest management
- Increased hazing frequency and geese relocation reduced the number of geese present at different times of the day
- No evidence of strobe lights being effective



Swan Lake Geese Count Survey QR Code



* Some assumptions have been made in calculating the daily average for each year to fill in data gaps.

Fish Management

- Removal of bottom-dwelling fish (to avoid disturbance of sediment)
- Fish inventory (Common Carp, Brown Bullhead, and Fathead Minnow)
- Fish management plan and fish stocking pending improved water quality and planting of submerged aquatic vegetation



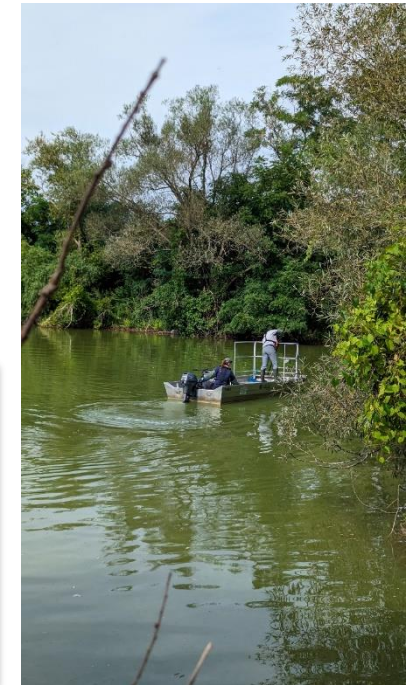
Storm System Maintenance

- Blocked outlet from Swan Club OGS was cleared
- Pond assumption discussions underway



Submerged Aquatic Vegetation Planting

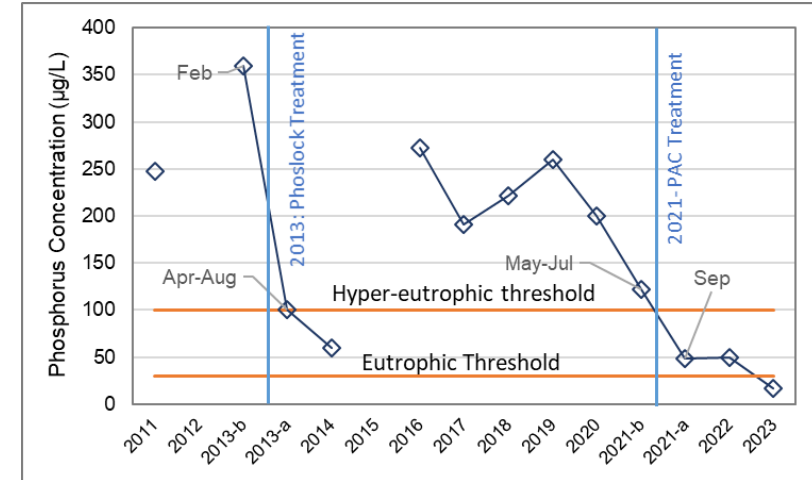
- Planned for Phase 2 of the Long-Term Plan to help solidify the sediment and provide fish habitat.
- Moved to Phase 1 after a review of 2022 water quality results by our limnologist consultant
- Submerged aquatic vegetation (macrophytes) can compete with and help mitigate algae (phytoplankton) growth
- Macrophytes will increase water clarity, which in turn, enhances their own growing conditions.
- TRCA planted wild celery in five fenced locations on the north site



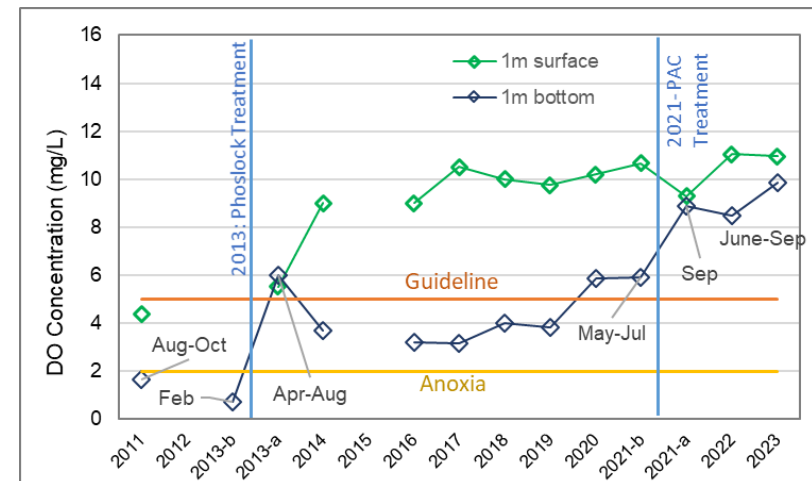


Water Quality- Nutrients and Oxygen

- Total Phosphorus:
 - Average under 30 µg/L during growing season
 - Decreased significantly after each treatment
- Total Nitrogen:
 - Average about 0.6 mg/L during growing season (limit 1.2)
 - Dominant forms not bioavailable
- Dissolved Oxygen:
 - Surface concentration > 8.5mg/L all year
 - Bottom concentration mostly > 8mg/L (except one reading)
 - Increased compared to previous years
 - Continuous measurement at depth started; data need verification



Phosphorus



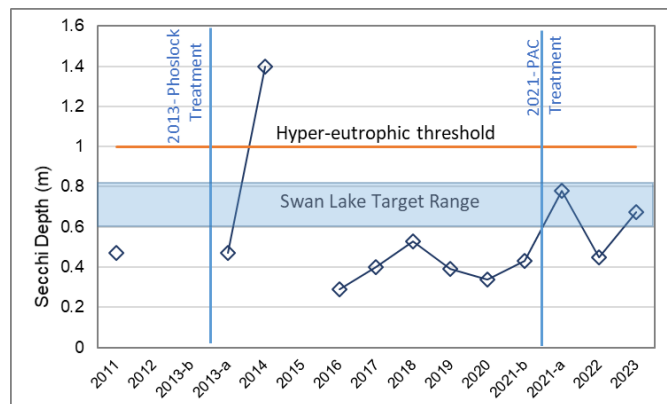
Dissolved Oxygen

Water Quality- Algae and Clarity

- Algal growth:
 - Cyanobacteria cell numbers significantly lower than 2022
 - Chlorophyll-a within the eutrophic state
 - Surface bloom not occurring since treatment
- Clarity:
 - Above >0.6 until July; Low clarity after July
 - Growing-season average within target



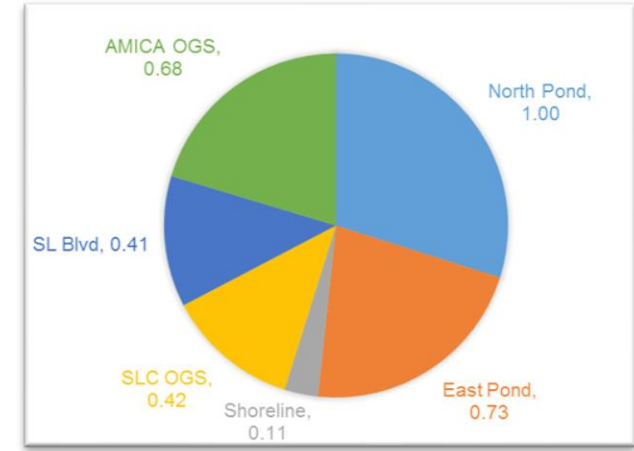
Algal bloom before treatment
(photo from July 2020)



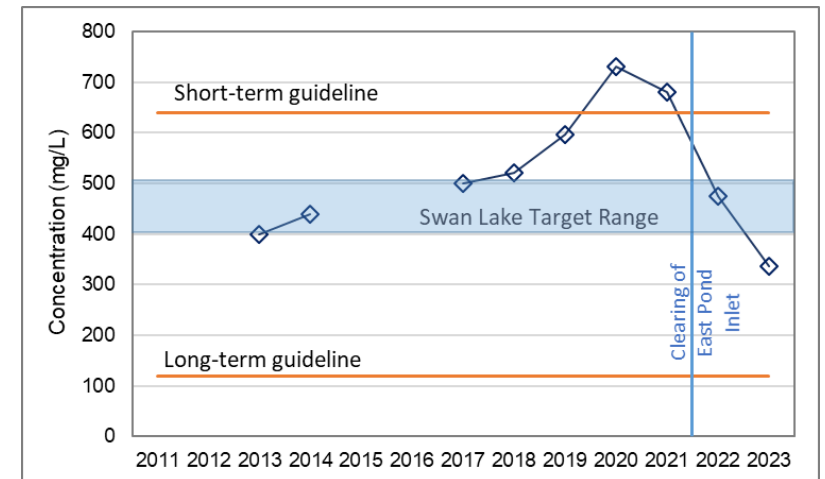
No surface bloom since treatment (photo from July 2023)

Winter Maintenance and Chloride Concentration

- Salt Usage:
 - Swan Lake Village Corporation
 - City roads
 - Residents north of the Lake
 - AMICA Corporation to the south
- Chloride Estimates: runoff sample collections and water balance
- Contribution higher during ~2018-2021 when the inlet to East pond was blocked but decrease significantly since 2021.
- Current chloride concentrations below Swan Lake targets



Initial estimate of chloride contribution to the Lake (tonne/yr) from each source based on modeled flows and salt usage data
Values will be refined through the Flow Diversion Study.

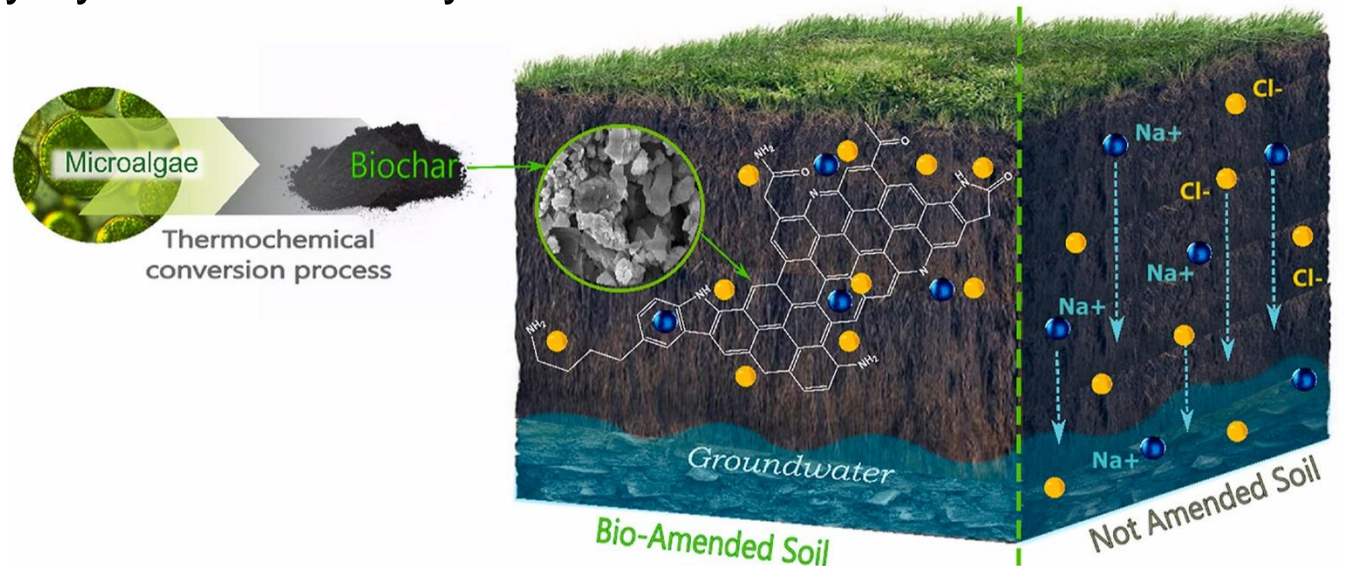




Ongoing Work

Assessment of New Technologies for Chloride Treatment

- Initially planned for 2027 at a cost of 50K
- Advanced to 2024
- Lab-scale units to test the biochar efficiency
- Refined scope of work with researchers
- Application for NSERC grant underway by York University

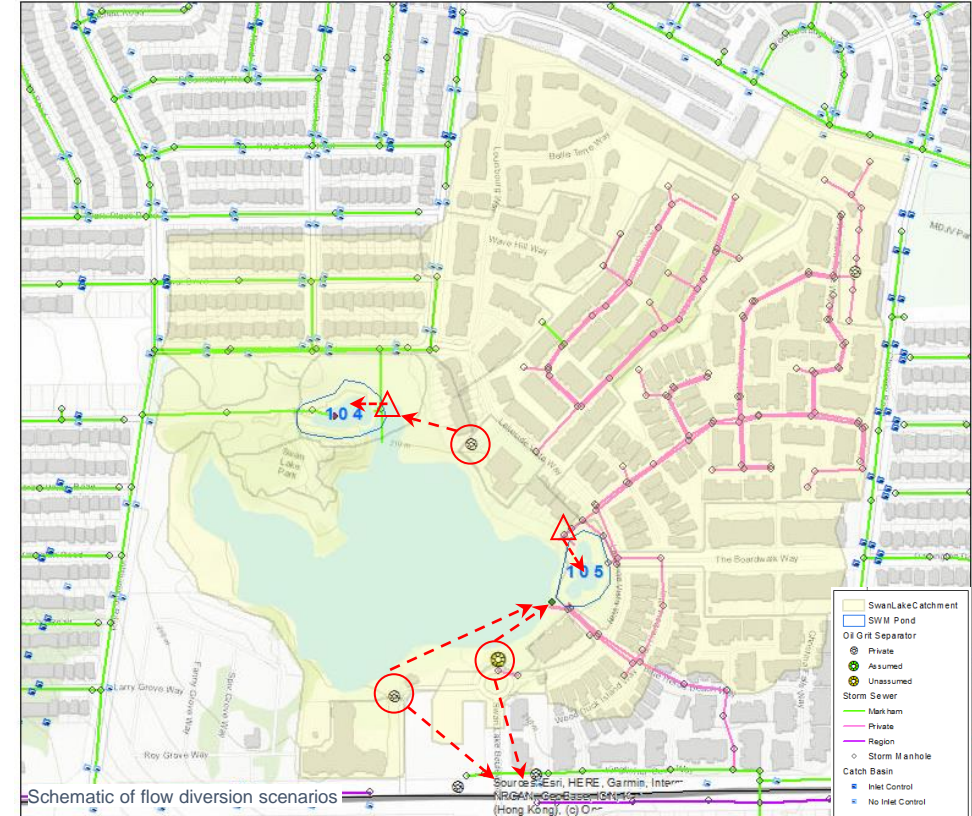


Flow Diversion Feasibility Study

- Alternative measure in Phase 3: evaluate/design structural modifications such as lake water recirculation and stormwater redirection
- FOSLP proposed to reduce Swan Lake's role in the 'local stormwater management regime' by rerouting the flows ... in order to control chloride concentrations.
- Flow Diversion Feasibility Study initiated:
 - Technical analysis to assess the feasibility of rerouting flows to determine if the infrastructure within Swan Lake can support the proposed changes.
 - Data collection/digitization of private sewer infrastructure completed.
 - Consultant was hired in 2023; model development underway.
 - Study to be completed by end of 2024.
- Further studies may be required to engage all stakeholders (including private landowners and York Region) and identify a preferred alternative.

Flow Diversion Feasibility Study - Scenarios

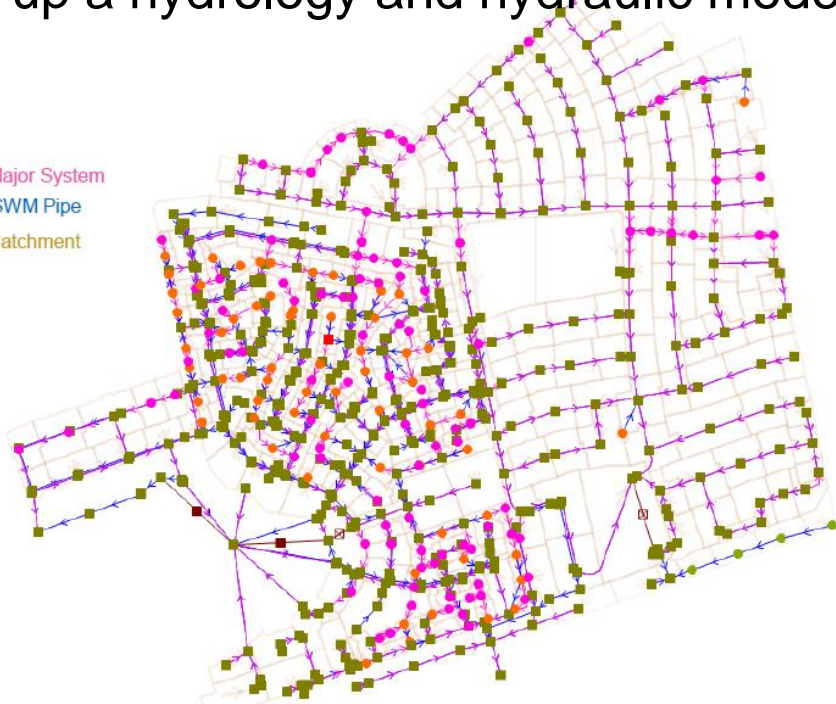
Source	Scenario
AMICA OGS and Swan Lake Blvd OGS	Redirect flows to 16 th Ave sewer
	Redirect flows to Lake Outlet
	Redirect the first-flush (most pollutant-laden runoff) in a small diversion sewer
Swab Lake Club OGS	Redirect flow to North Pond Splitter
East Pond and North Pond	Adjust the flow splitter weir to reduce flow bypass to the Lake
	Expanding the storage capacity to reduce flow bypass to the Lake *
Foundation Drain Collectors	Redirecting flows toward Swan Lake to supply potentially cleaner, cool groundwater
Combination of the above scenarios	



* To consider if the redirecting scenarios increases flood risk and if less costly than any sewer capacity upgrades

Flow Diversion Feasibility Study - Modelling

- Background review
- Field investigations (identify downspout connections to sewer, confirmation of sewer elevations, chloride sampling)
- Flow and rainfall monitoring
- Setting up a hydrology and hydraulic model





Public Information Meeting



Meeting Objective

- Provide details of the water quality improvement program
- Share achievements of the program since it started
- Inform the public about upcoming activities in 2024
- Discuss ways to get involved in improving water quality and habitat health
- Answer any questions the public may have
- Operations staff provided updates on the Shoreline Restoration project and its continuing role supporting water quality improvement as a priority

Meeting Outcome

- Meeting on March 25, 2024, at Markham Museum Transportation Hall
- Over 120 residents attended the meeting
- A Power Point presentation was delivered on program details and its positive results
- Active participation and expressed appreciation from the community





2024 Plan and Recommendations

2024 / 2025 Planned Activities

CORE MEASURES:

- Water quality monitoring and annual reporting to Subcommittee
- Geese and fish management
- Community engagement
- Chemical treatment in 2024
- Shoreline restoration (Operations)*
- Continue pond assumption process
- 5-year review in 2025

Research by Trent University on Rare Earth Elements

* In 2024, staff will submit 2025 capital budget request to construct permanent goose exclusion fencing and plantings to further support water quality improvements.

COMPLEMENTARY AND ALTERNATIVE MEASURES:

- Planting of Submerged Aquatic Vegetation
- Flow Diversion Feasibility Study
- Assessment of New Technologies for Chloride Treatment





Recommendations

1. THAT the report entitled “Swan Lake- 2023 Water Quality Status and Updates” be received;
2. AND THAT Staff continue to implement the Long-term Management Plan for Swan Lake approved by Council in December 2021, including advancement of submerged aquatic vegetation, research into chloride treatment, and flow diversion evaluation (previously in Phases 2 and 3 of the Plan);
3. AND THAT Staff report back annually on water quality results and evaluation of adapted Core and Complementary measures for consideration in Phase 2 of the Plan through the Markham Sub-Committee with the participation of the Friends of Swan Lake Park;
4. AND THAT the next review of the Plan will be in 2025 (after the completion of Phase 1 and other measures as listed under item 2) with consideration for a workshop in 2026;
5. AND THAT Staff be authorized and directed to do all things necessary to give effect to this resolution.



Questions?



Swan Lake

Annual Meeting with Markham Subcommittee

June 26, 2024



A scenic photograph of a lake with a large tree in the center, surrounded by lush greenery and reeds in the foreground. In the background, there are buildings and a blue sky with scattered clouds.

Swan Lake Water Quality Monitoring 2023 Annual Report

February 2024

Project Number: 23032



Prepared By:

Zahra Parhizgari, M.Sc., P.Eng. PMP
Environmental Engineer, Stormwater

Reviewed By:

Robert J. Muir, M.A.Sc., P.Eng.
Manager, Stormwater

Tammy Karst-Riddoch, Ph.D.
Senior Aquatic Scientist, AECOM Canada

Executive Summary

Background

Swan Lake is situated in the City of Markham at the intersection of Sixteenth Avenue and Williamson Road. Swan Lake has an approximate area of 5.5 ha and a maximum water depth of 4.5 m (from the edge of the Lake at 210 MASL). A gravel pit in the 1960s and 1970s, Swan Lake is currently a community feature with multiple trails and urban development surrounding it.

Several issues were discovered with Swan Lake in 2010, including high phosphorus levels and significant algal blooms during the summer months, which led to low oxygen levels and degraded fish habitats. A Phoslock treatment was administered in 2013 to reduce the phosphorus levels and algal blooms in Swan Lake.

In 2019, the City of Markham conducted a study to define a Water Quality Management Strategy for Swan Lake. The Strategy, finalized in July 2020, recommended a chemical treatment in 2021.

In August 2021, 13 tonnes of Poly Aluminum Chloride (PAC) were applied to the Lake in a controlled manner over several days.

The Swan Lake Long-Term Management Plan was received by the Markham Sub Committee in November 2021 and approved by the Council in December 2021. It describes a phased adaptive approach, including provisions for chemical treatment every three years. Activities planned for 2022 included enhanced geese management, fish removal, water quality monitoring, and investigation of additional measures to improve water quality in the Lake.

Water quality monitoring of Swan Lake has been conducted almost annually since the first treatment in 2013 to track water quality and the continued effectiveness of the treatment. The collected data presented in this report is part of the ongoing monitoring program that will allow for continuous assessment of the water quality in Swan Lake and will be used to implement and adapt the Long-Term Management Plan for Swan Lake.

Since 2022, sampling for chloride measurement has also been conducted at several locations to determine the relative contribution of each source to the Lake.

In 2023, a DO logger was installed at the Dock to record the diurnal oxygen cycle in the Lake.

This report discusses observations at the monitored stations in the Lake throughout 2023.

Results- Lake Water Quality

Water quality is regularly monitored at two shoreline sites: the Dock and the Bridge, on a bi-weekly basis (from April to November). Samples and measurements are taken at 0.5 m or 1m increments for the depth of the lake. A level logger is used to record the water level in the Lake.

The following paragraphs provide the monitoring results for the 2023 monitoring period, as well as annual summaries of available data from 2011 to 2023. The figures include plots of measured dissolved oxygen (DO), water clarity, phosphorus concentration, chloride concentration, and geese count.

Targets

Phosphorus concentration and clarity were compared to the eutrophication thresholds and/or the interim targets developed for Swan Lake through the 2019 Water Quality Management Strategy. For DO and chloride, Federal and/or Provincial water quality Guidelines or Objectives are shown for perspective. It

should be noted that Swan Lake is not a natural waterbody, and there is no requirement for it to comply with these guidelines and objectives. Where technically and economically feasible, the City will aim to meet these guidelines and objectives to protect and enhance the aquatic environment.

Dissolved Oxygen (DO), Temperature, and pH

The minimum dissolved oxygen concentration required for the protection of warm water fish is 5 mg/L for water temperatures up to 20 °C, and 4 mg/L for temperatures above 20 °C. DO concentrations for the 1m from the surface and 1m from the bottom layers are shown below.

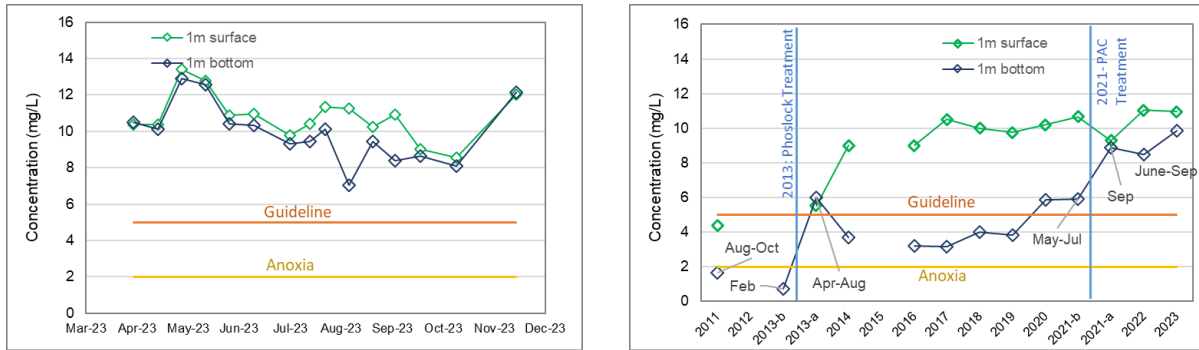
Measured day-time surface concentrations were above the DO guideline throughout 2023 (above 8.5 mg/L). DO concentration at the bottom layer was also above the guideline.

Lower DO concentrations could have lethal or sub-lethal (physiological and behavioral) effects on fish; however, some fish can acclimate to lower oxygen levels and survive concentrations between 1 and 3 mg/L.

Measured day-time DO levels did not indicate anoxia during the sampling events, but its decline at the bottom of the water column could suggest that if the stratification persisted, it could have led to anoxic episodes (at night when respiration occurs), contributing to the release of nutrients from the sediments. Such potential occurrence would, however, be less severe than pre-treatment conditions as implied from the annual trend of day-time surface and bottom concentrations.

Continuous measurement of DO from August to November indicated that DO concentrations have a diurnal pattern. However, the exact extent could not be determined due to frequent fouling of the logger. Further measurements and verification of data with alternative monitoring devices will be conducted to quantify night-time DO more accurately.

Figure ES-2: 2023 Monitoring Results and 2011-2023 Annual Results- Dissolved Oxygen



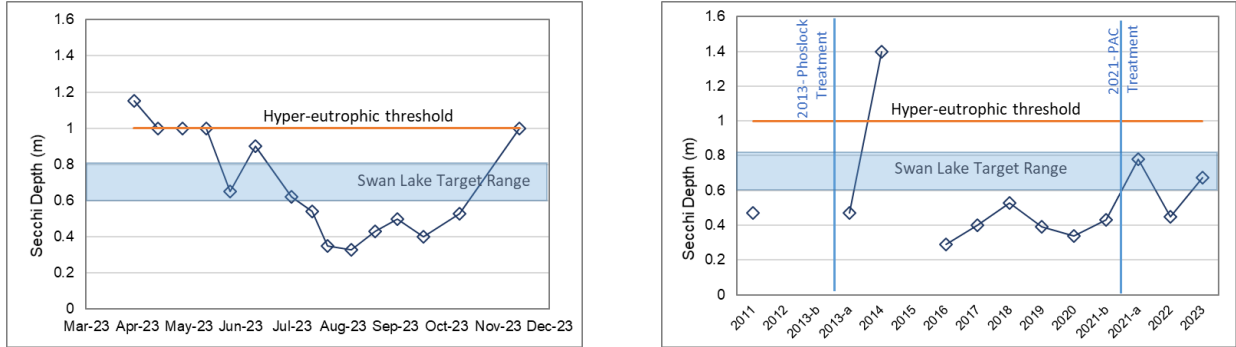
Note 1: DO concentrations are shown at 1 m from the surface (average of 0.5 and 1 m) and 1 m from the bottom (average of two bottom depths).
Note 2: Historical data are shown for the average growing period (June-Sep) unless otherwise indicated.

The pH measured at the lab ranged from 8.4 to 9.3 throughout the year. High pH is consistent with high levels of algae. Algae take up carbon dioxide, a weak acid, from the water for photosynthesis, causing the water to become more basic (higher pH).

Water Transparency (Secchi Depth)

Secchi depth represents water transparency, which declines when the algae level increases. In the trophic state classification scheme, growing period average water clarity of under 1 m is the threshold for a hyper-eutrophic condition. The proposed interim target for Swan Lake is 0.6-0.8 m based on correlation with the phosphorus target. In 2023, water clarity met or exceeded the target from April to the end of June. Water clarity declined to below 0.4 m in August before it increased in November to 1 m.

Figure ES-3: 2023 Monitoring Results and 2011-2023 Annual Results- Secchi Depth

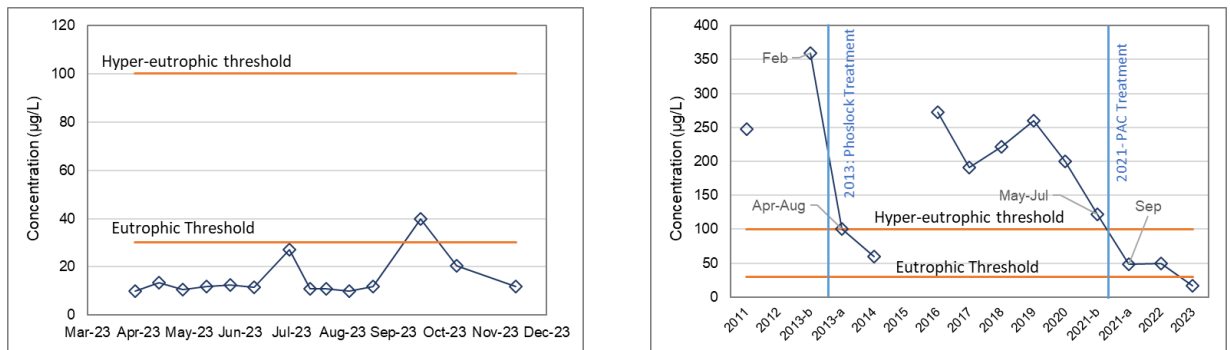


Phosphorus and Nitrogen Concentrations

Phosphorus concentration is the most important indicator of the trophic state in Swan Lake. It is an indication of how prone the Lake is to algae growth.

Phosphorus concentrations above 100 µg/L represent a hyper-eutrophic condition, which lead to high algae concentrations. In 2023, total phosphorus concentration in the top 0.5 and 1.5 m depths averaged under 20 µg/L during the growing season (under the 30 µg/L threshold for eutrophic condition, and well below the interim target of 50-100 µg/L). There was significant improvement in phosphorus concentrations after treatment by Phoslock and PAC.

Figure ES-1: 2023 Monitoring Results and 2011-2023 Annual Results- Total Phosphorus



Note 1: The 2023 values are averages of samples collected at 0.5 and 1.5 m from the surface.
Note 2: Annual concentrations are summaries of the growing period (June-Sep) unless otherwise indicated.

In 2023, total nitrogen concentrations over the growing season averaged about 0.60 mg/L (below the 1.2 mg/L threshold for a hyper-eutrophic condition). In 2022, ammonia and nitrate concentrations (the forms available for uptake by biota) were generally very low (except in April and November), and nitrogen was mainly present as organic matter.

Chloride Concentration

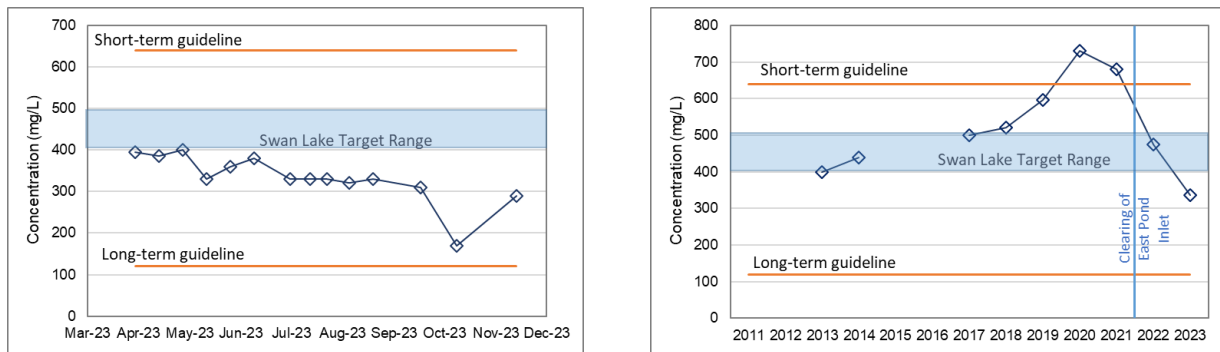
Chloride concentration has been increasing in urban lakes as a result of de-icer application for winter maintenance of roads and walkways. Chloride does not biodegrade, readily precipitate, volatilize, or bioaccumulate. It does not adsorb readily onto mineral surfaces and therefore when introduced, concentrations remain high in surface water.

Chloride guidelines developed for generic environmental data include a long-term guideline (120 mg/L) and a short-term guideline (640 mg/L). The long-term guideline has been developed to protect all

organisms (present in Canadian aquatic systems) against negative effects during chronic indefinite exposure. The short-term guideline aims to protect most species against lethality during a sudden hike in chloride concentration for an acute short period (24-96 hrs). These guidelines may be over-protective for areas with an elevated concentration of chloride and associated adapted ecological community. For such circumstances, it has been suggested that site-specific (higher) targets be derived considering local conditions such as water chemistry, background concentrations, and aquatic community structure. The interim target for chloride is 400-500 mg/L consistent with 2013-2014 values.

In 2023, chloride levels were below the target and declined considerably compared to 2022, continuing previous declines since 2020. This is likely due to dilution by cleaner water.

Figure ES-4: 2023 Monitoring Results and 2011-2023 Annual Results- Chloride

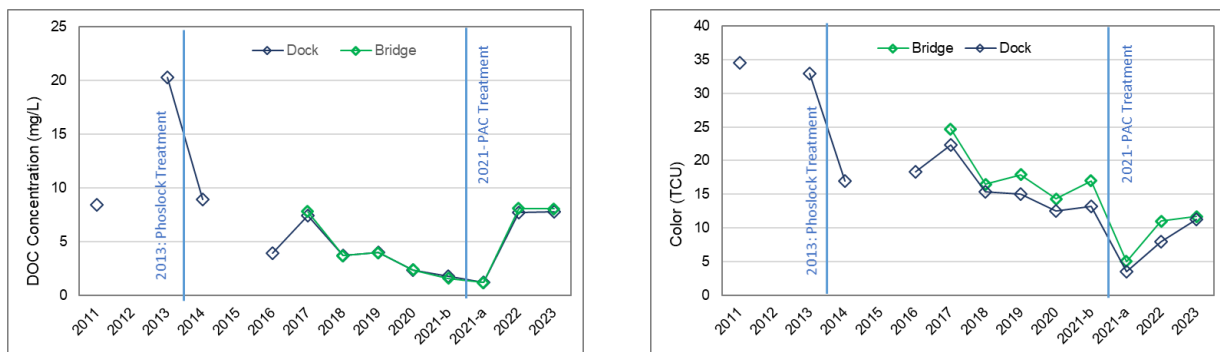


In 2023, water samples were collected from various inlets to the Lake and analyzed for chloride. These data will be used to update the chloride mass balance following the completion of the Flow Diversion Feasibility Study currently underway.

Dissolved Organic Carbon and Color

Dissolved organic carbon (DOC) and colour indicate the organic content of lake water. In 2023, DOC ranged between 7 and 9 mg/L, with color change from 7 to 18 TCU at both stations. DOC in 2022 and 2023 was considerably higher than in previous years, even before treatment. The increase may potentially be associated with the remnants of Phragmites in the Lake, as the roots were not removed.

Figure ES-5: 2011-2023 Annual Results- DOC and Color



Geese Count

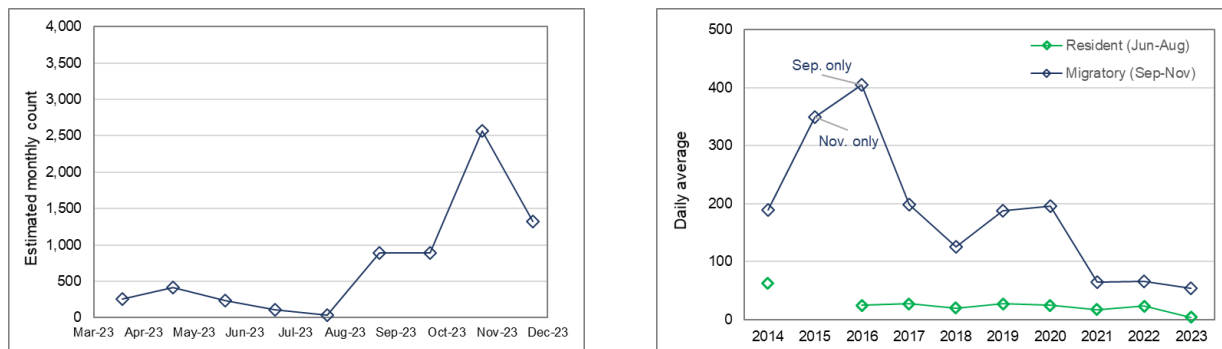
Geese are the primary external source of nutrients in the Lake. Therefore, active geese management is completed annually. The geese control program started in 2014, focusing on resident geese. The program extended to the management of migratory geese in 2016.

The 2023 program included a hazing program in the Spring, with an expanded version starting in mid-August to mid-December, nest management and geese relocation, and the installation of nine strobe lights on the Lake and adjacent stormwater ponds.

In 2023, the increased hazing efforts were very effective in reducing the number of migratory geese visiting the Lake, similar to those achieved in 2021 and 2022 when the extended program was implemented. Fewer geese were counted in August and September of 2023 compared to previous years, likely due to the prolonged warm weather conditions and delayed migration.

The strobe lights did not have any noticeable impact on the counts. The geese count data helped provide more certainty in the results, and were used to more effectively schedule hazing efforts.

Figure ES-6: 2023 Monitoring Results and 2011-2023 Annual Results- Geese Count



Note 1: 2023 data are the sum of counts in each month, compensated for days with no count.

Note 2: Annual trends are shown as daily averages of counts over June-August and September to November, representing resident and migratory geese, respectively.

Algal Growth

In 2023, limited surface scums were observed along the shoreline around the Dock, as well as in the northern bay at the Bridge site. While the Lake was dominated by phytoplankton from late June, surface scums were not widespread.

Samples were collected and sent to the laboratory for cyanobacteria analysis. Test results showed higher diversity and significantly lower total counts compared to 2022.

Seven samples were analyzed for cyanobacteria between April and September. The total cyanobacteria cell count was below or close to Health Canada’s indicator value for the potential production of cyanotoxins of 50,000 cells/mL, except in July (three and five times higher at the Dock and the Bridge, respectively). The average chlorophyll-a for the three samples collected in June and August from the Dock station was about 22 µg/L, within the eutrophic state.

Several algal blooms with potentially toxic cyanobacteria were observed in years before 2011; however, testing completed before 2011 and following treatment (2013-2016) did not detect any Microcystin in the water. In 2016, a bloom was tested and resulted in a Microcystin concentration of 73 µg/L. Extended blooms were observed at several sites in 2018; however, cell density was at half of WHO’s threshold for significantly increased human health risk due to toxins. These results suggest that in most years, toxin-producing cyanobacteria are not the dominant form of phytoplankton in Swan Lake.

In recent years, Abraxis tests have resulted in Microcystin levels below the recreational limit (20 µg/L, recently updated to 10 µg/L).

Summary and Recommendations

Overall, the management activities in recent years that focused on the significant nutrient loadings identified in the water quality improvement study (i.e., chemical treatment and fish management to reduce internal loads and geese management to reduce external loads), were effective at improving water quality in the Lake as shown in reduced phosphorus concentrations and improved dissolved oxygen levels. These improvements represent a positive step towards improving the aquatic habitat in the Lake and meeting the long-term water quality goals.

In 2023, chloride levels decreased considerably compared to 2021 and 2022, likely due to clearing the blockage at the East Pond inlet, which resulted in lower catchment flows from the inlet bypass to the Lake. Dilution by cleaner water could have contributed to lower chloride concentrations in the Lake.

While internal and external source controls successfully reduced nutrient concentrations, the Lake was dominated by phytoplankton, and water clarity did not improve. This could be partly due to the absence of submerged aquatic vegetation (SAV), which has been replaced by phytoplankton (algae) due to low water clarity. To ameliorate this condition, in June 2023, an SAV planting initiative was implemented in four fenced areas along the north shore of the Lake as a pilot project.

The 2024 monitoring program will follow the recommendation of the Long-Term Management Plan. The second round of chemical treatment will be implemented in 2024, and additional planting of SAVs and studies and research on strategies to reduce chloride concentration in the Lake will be initiated.

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1. Introduction

Swan Lake is situated in the City of Markham at the intersection of Sixteenth Avenue and Williamson Road, as shown below in Figure 1. Swan Lake has an approximate area of 5.5 ha and a maximum water depth of 4.5 m (from the deepest point to the Lake edges at 210m). Formerly a gravel pit in the 1960s and 1970s, Swan Lake is currently a community feature with multiple trails and urban development.

Several issues were discovered with Swan Lake in 2010, including high phosphorus levels and significant algal blooms during the summer months, which led to low oxygen levels and degraded fish habitats. A Phoslock treatment was administered in 2013 to reduce the phosphorus levels and algal blooms in Swan Lake.

In 2019, the City of Markham conducted a study to define a Water Quality Management Strategy for Swan Lake. The Strategy, which was finalized in July 2020, recommended chemical treatment starting in 2021.

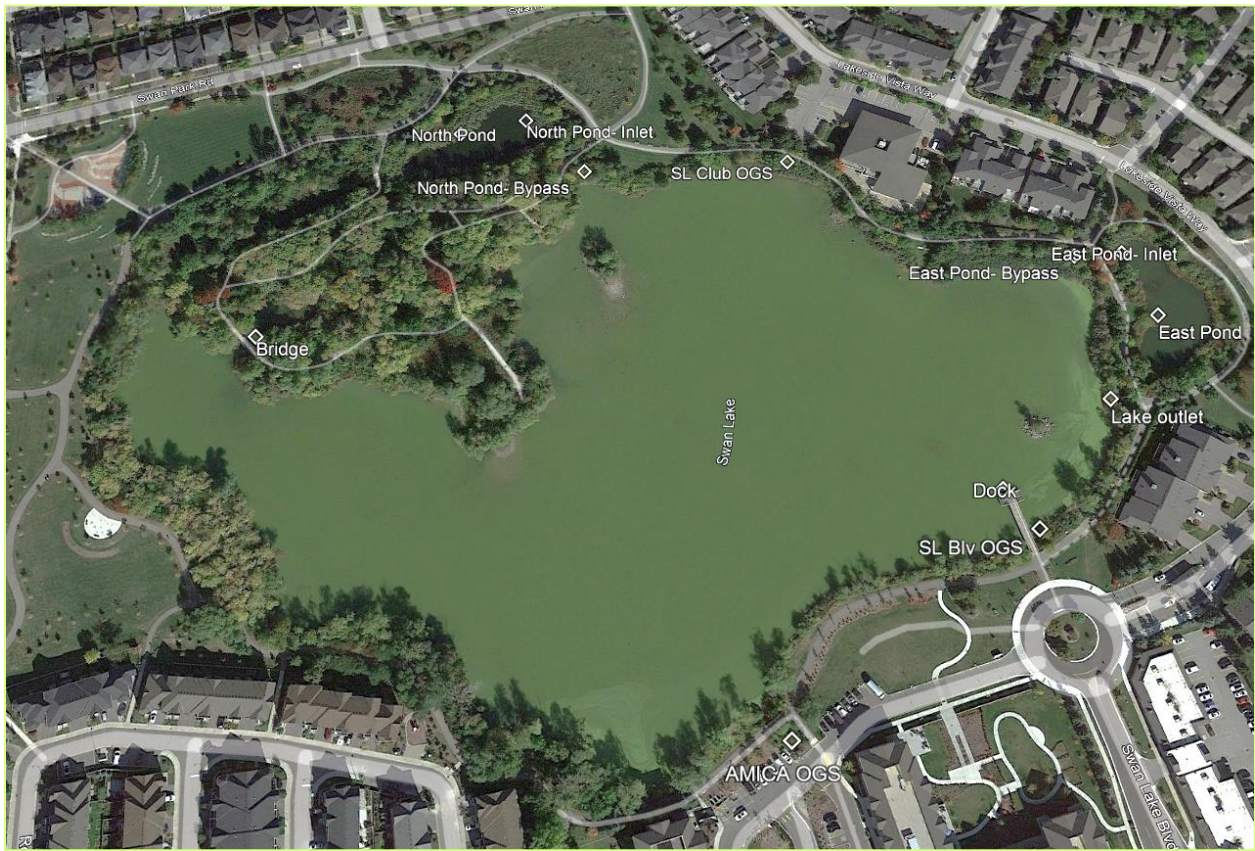
In August 2021, 13 tonnes of Poly Aluminum Chloride (PAC) were applied to the Lake in a controlled manner over several days.

The Swan Lake Long-Term Management Plan was received by Markham Sub Committee in November 2021 and approved by the Council in December 2021. It describes a phased adaptive approach, including provisions for chemical treatment every three years. Activities planned and completed for 2023 included enhanced geese management, fish removal, and water quality monitoring, as well as investigation of additional measures to improve water quality in the Lake.

Water quality monitoring of Swan Lake has been conducted annually since treatment in 2013 in order to track water quality and the effectiveness of management activities. The 2023 monitoring results presented in this report are part of the ongoing monitoring program that will allow for continuous assessment of the water quality in Swan Lake and help establish a long-term plan for the treatment of Swan Lake.

In 2023, sampling for chloride measurement was also conducted at several locations to determine the relative contribution of each source to the Lake.

Figure 1: Swan Lake and Runoff Monitoring Stations



2. Monitoring Program

2.1 Annual Water Quality Monitoring

2.1.1 Locations

Water quality was monitored at two shoreline sites, the Dock, and the Bridge, as shown in Figure 1. On average, the water depth at the Dock is approximately 2.5 meters, which allows it to represent Swan Lake as a whole. The water depth at the bridge is about 0.5 meters, and it is used to represent the conditions of the shallow bays around Swan Lake. Field testing and sampling for laboratory analysis were completed at both sites to ensure the water conditions at Swan Lake were properly represented.

During the bi-weekly monitoring, samples and measurements were taken at 0.5 m or 1 m increments for the depth of the Lake. The dock site was the deeper of the two sites, allowing for sampling and monitoring from 0.5 – 2.5 m, whereas the bridge site was shallow and sampling was typically only achievable under the surface, slightly above the bottom of the Lake to avoid sediment contamination.

When the water level dropped to around 2 m, samples were not collected from the 2.5 m depth at the Dock station.

2.1.2 Duration and Frequency

In 2023, water quality was monitored bi-weekly from April to November.

A total of 14 sampling events were completed.

2.1.3 Parameters and Methodology

Vertical water quality profiling, water transparency readings (Secchi depth), and photographic documentation were performed during each site visit.

Field testing was done utilizing an YSI ProODO meter to determine the temperature and dissolved oxygen (DO) at each sampling interval over the vertical profile of the lake. To ensure accurate readings, the meter and probe were stored in a proper carrying bag and regularly calibrated as instructed in the handheld quick-start guide.

A HOBOWare U26 oxygen logger was mounted at the Dock on May 29, 2023, and recorded the DO and temperature of the water every 15 minutes throughout the day. Before the first use, the logger was calibrated for DO at 100% saturation and 0% saturation (using a sodium sulfite solution). An anti-fouling guard was also installed on the sensor cover to protect against fouling. The sensor was placed 1m above the lake bed at the same location as the level logger.

Water transparency was measured as part of the field testing at both the dock and bridge monitoring sites. Transparency was measured using a Secchi disk by lowering it into the water while rotating the handle until the black and white pattern of the Secchi disk was no longer visible. The water depth read from the Secchi disk was then recorded as the transparency (i.e., water clarity).

Water samples for laboratory testing were taken using a horizontal water sampler at different depths. Parameters analyzed at various stations and times included:

- Nutrients including total and ortho phosphorus, ammonia, nitrate, nitrite, Total Kjeldahl Nitrogen (TKN)
- Chloride, color, Dissolved Organic Carbon (DOC), pH
- Phytoplankton (taxonomic identification and counts of cyanobacteria)

Observations of Swan Lake were noted, and photographs were taken during each monitoring/inspection site visit. Photographs provide a way to record the condition of vegetation and algae around Swan Lake. Completed inspection forms and photos can be found in Appendix A.

2.1.4 Targets and Thresholds

Generic thresholds for eutrophic and hyper-eutrophic conditions in the lakes are provided in Table 1.

Table 1: Eutrophic State Classification

Parameter	Eutrophic Condition	Hyper-eutrophic Condition
Secchi Depth (m)	1-2.1	<1
Total Phosphorus (µg/L)	31-100	100
Total Nitrogen (mg/L)	0.65-1.20	>1.20
Chlorophyll a (µg/L)	9.1 – 25	> 25

The 2019 Water Quality Management Strategy proposed a set of interim targets for Swan Lake to be used as triggers for management actions if the triggers are tripped in two consecutive years. Numerical values were defined for total phosphorus (100 µg/L) and Secchi depth (0.6-0.8 m, as updated in 2021 based on correlation with the phosphorus target).

For DO and chloride, Federal and/or Provincial water quality Guidelines¹ or Objectives² were considered for perspective. It should be noted that Swan Lake is not a natural waterbody, and there is no requirement for it to comply with these limits. Where technically and economically feasible, the City will aim to meet these limits to protect and enhance the aquatic environment.

The minimum dissolved oxygen concentration required for the protection of warm water fish is 5 mg/L for water temperatures up to 20 °C, and 4 mg/L for temperatures above 20 °C. Lower concentrations could have lethal or sub-lethal (physiological and behavioral) effects on fish. However, some fish can acclimate to lower oxygen levels and survive concentrations between 1 and 3 mg/L.

Chloride guidelines developed based on generic environmental data include a long-term guideline (120 mg/L) and a short-term guideline (640 mg/L). The long-term guideline has been developed to protect all organisms (present in Canadian aquatic systems) against negative effects during indefinite exposure. The short-term guideline will protect most species against lethality during a sudden hike in chloride concentration for a short period (24-96 hrs). These guidelines may be over-protective for areas with an elevated concentration of chloride and associated adapted ecological community. For such circumstances, it has been suggested that site-specific (higher) targets be derived considering local conditions such as water chemistry, background concentrations, and aquatic community structure. The interim target for chloride is 400-500 mg/L consistent with 2013-2014 values.

For Cyanotoxins, the Health Canada guideline for recreational activities was updated from 20 µg/L to 10 µg/L in 2022³. The 2022 guidelines also provide indicator values for the potential production of cyanotoxins including:

- Total cyanobacteria cells: 50,000 cells/mL
- Total cyanobacterial biovolume: 4.5 mm³/L

¹ Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life (<http://ceqg-rcqe.ccmec.ca/en/index.html>)

² Ontario Provincial Water Quality Objectives (PWQO) (<https://www.ontario.ca/page/water-management-policies-guidelines-provincial-water-quality-objectives#section-13>)

³ Health Canada, 2022. Guidelines for Canadian Recreational Water Quality, Cyanobacteria and their Toxins, Ottawa, Ontario.

- Total chlorophyll a: 33 µg/L

2.2 Runoff Monitoring

In the Swan Lake catchment, salt application for winter maintenance is mainly completed by the City’s Road department and the Swan Lake Village Corporation.

Winter maintenance of 1 km of the catchment roads and sidewalks is completed by the City of Markham. The City prescribes and tracks the quantity of salt distributed to the City roadways based on current and future forecast models and temperatures to determine the required action and material usage in compliance with the desired level of service and O.Reg. 239/02 requirements.

The remaining roads and parking areas, as well as private walkways and driveways, are serviced privately. As per the Village Amenities Committee (VAC), the Village Corporation employs “a qualified, reputable cleaning and maintenance service employing Smart About Salt principles to plow/shovel and their insurance recommends the de-icing methods of rock salt, applied as necessary to maintain their insurance and mitigate potential claim”.

Chloride in salting materials is readily dissolved in water and transported overland by runoff or infiltrated into soils, contaminating groundwater and surface water. A fraction of chloride in applied road salt is retained by soil and is not observed in surface runoff. As a result, salt loading to surface water occurs primarily in winter and spring during melt conditions but continues through the summer and fall via the discharge of impacted groundwater, dry deposition of dust to the lake surface, non-point source runoff washing dry salt from land surfaces. Salt accumulated in the ponds could also be discharged into the Lake through the flushing of stormwater ponds.

In 2023, water samples were collected from various inlets to the Lake to quantify and determine the relative contribution of each source to chloride concentration in Swan Lake. Samples were collected from both ponds’ inlets, as well as outfalls from the ponds and OGS’s to the Lake. Samples were also collected from the shoreline runoff and Swan Lake Blvd.

The outfalls were not flowing during some sampling events, in which case, samples were collected from the pool of water present. There was no flow/ visible water at the outfall from the Swan Club’s OGS, and therefore, no sample was collected at this location. As a result, the City requested that the Swan Club clear out the blockage from this OGS to restore its treatment capacity. The OGS and its outlet were cleaned in late July 2023.

Conductivity was also measured in a number of samples, as this parameter can be used as a surrogate for chloride. Samples were collected during four snowmelt events from January to March 2022.

2.3 Water Level Monitoring

The water level was monitored using HOBOWare U20 Water logger mounted at the Dock. The data logger records the pressure and temperature of the water every 15 minutes. The measured pressure is compensated using a baro-logger to calculate water depth. Missing data were calculated using the methodology developed in 2022.

3. Results

3.1 2023 Water Quality

The following sections discuss water quality results in 2023.

3.1.1 Dissolved Oxygen and Temperature

Table 2 provides the measured DO profile over the 2023 monitoring period. At the Dock station, all measured day-time surface concentrations were above 8.5 mg/L throughout 2023. At 1.5- 2 m depth, the DO was also above 8 mg/L, except on one occasion, but never under 2 mg/L, which would be indicative of anoxic conditions. All measurements at the Bridge indicated a DO concentration of above 7.5 mg/L.

Table 2 also provides measured temperature profiles in 2023, indicating warm water throughout the depth in the summer months.

Profiles of temperature and dissolved oxygen (see Figure 2) indicate that Swan Lake was transiently stratified in June and July (when temperature decline is greater than 1 °C per m of depth). Transient stratification can cause reduced mixing/aeration and lead to anoxia with the release of nutrients from the sediments.

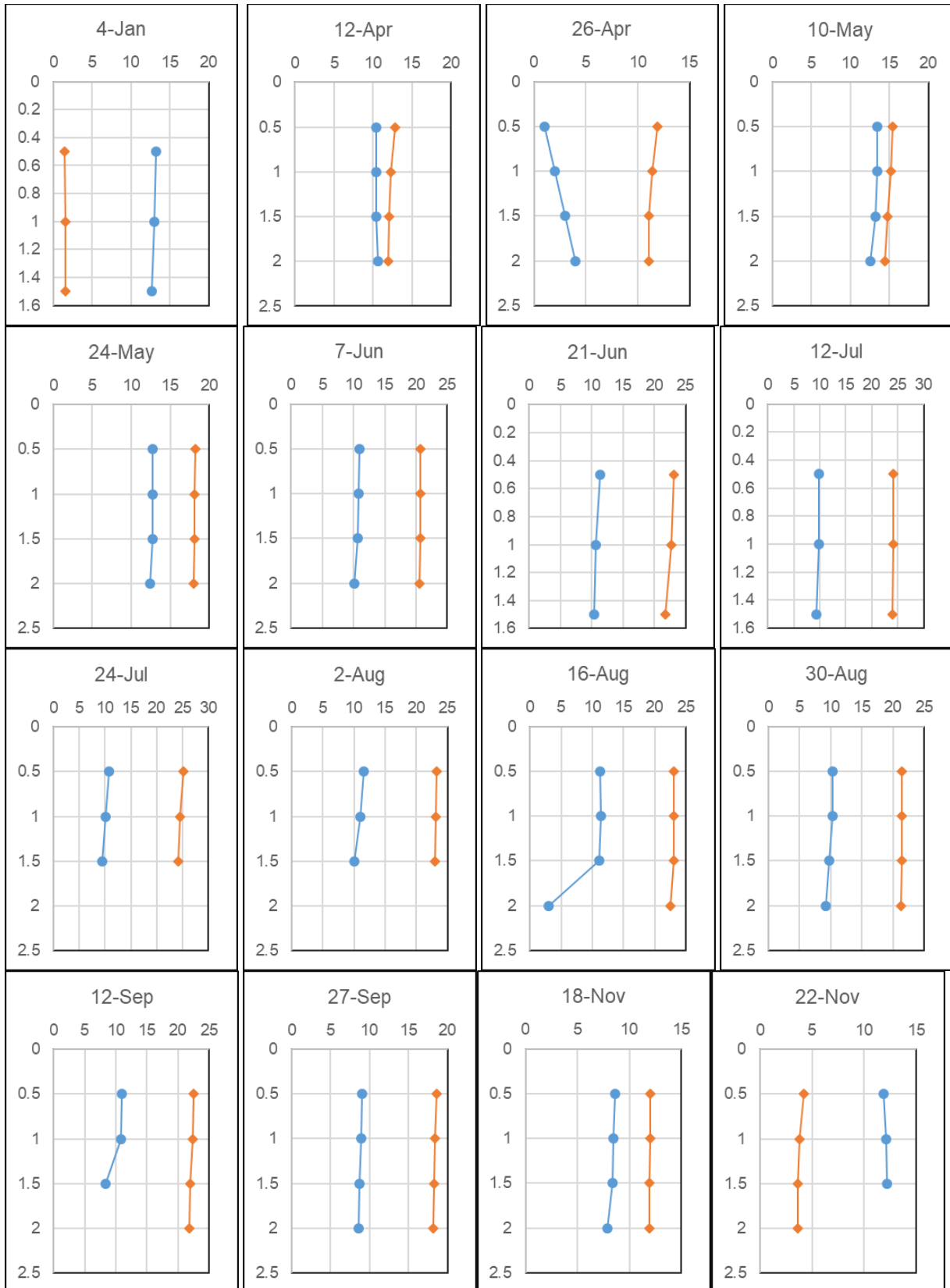
In 2023, in addition to using the YSI ProODO meter for bi-weekly measurements of temperature and dissolved oxygen (DO) over the vertical profile, a continuous logger was also used to measure the diurnal changes in DO. DO increases during daylight hours when photosynthesis occurs and decreases at night when respiration continues but photosynthesis does not.

Continuous measurement of DO from August to November indicated that DO concentrations have a diurnal pattern. However, the exact extent could not be determined due to frequent fouling of the logger. Frequent visits were done to the Lake to clean the sensor, as fouling occurred regularly, resulting in some inaccurate or no readings. A second U26 logger was rented and used for a week to test the accuracy of the City's logger. Further measurements and data verification with alternative monitoring devices will be conducted to quantify night-time DO more accurately in 2024.

Table 2: Measured DO and Temperature

Date	DO Concentration (mg/L)					Temperature (°C)				
	Bridge	Dock				Bridge	Dock			
	Depth (m)	Depth (m)				Depth (m)	Depth (m)			
	0.5	0.5	1	1.5	2	0.5	0.5	1	1.5	2
1/4/2023	13.7	13.2	13.0	12.7	-	0.6	1.5	1.6	1.6	-
4/12/2023	9.6	10.4	10.4	10.4	10.7	13.0	12.8	12.3	12.1	11.9
4/26/2023	9.1	10.4	10.4	10.2	10.1	10.7	11.9	11.4	11.1	11.1
5/10/2023	11.6	13.4	13.4	13.2	12.6	-	15.4	15.2	14.8	14.4
5/24/2023	10.1	12.8	12.8	12.7	12.4	17.6	18.2	18.1	18.1	18.0
6/7/2023	11.4	10.9	10.8	10.7	10.1	19.4	20.7	20.7	20.7	20.6
6/21/2023	10.9	11.3	10.6	10.3	-	24.5	23.2	22.8	21.8	-
7/12/2023	11.2	9.8	9.7	9.3	-	23.3	24.2	24.1	24.0	-
7/24/2023	11.0	10.7	10.1	9.5	-	23.7	25.1	24.4	24.1	-
8/2/2023	8.7	11.6	11.1	10.1	-	21.1	23.3	23.2	23.0	-
8/16/2023	7.8	11.2	11.3	11.1	3.0	22.1	23.1	23.0	23.0	22.5
8/30/2023	8.5	10.3	10.3	9.7	9.2	21.1	21.4	21.4	21.4	21.3
9/12/2023	9.1	11.0	10.9	8.4	-	22.4	22.5	22.3	22.0	21.8
9/27/2023	8.5	9.1	9.0	8.8	8.6	17.6	18.6	18.4	18.3	18.2
10/18/2023	7.5	8.6	8.5	8.4	7.9	11.6	12.0	12.0	11.9	11.9
11/22/2023	11.2	11.9	12.1	12.2	12.1	4.0	4.2	3.8	3.6	3.6

Figure 2: Temperature (orange) and DO (blue) Profile at the Dock Station



Note: The vertical axis shows depth (m), while the horizontal axis represents both Temperature (°C) and DO (mg/L).

3.1.2 Water Transparency

A robust measure of algal biomass is the measurement of the Secchi disk depth or transparency.

Table 3 summarizes the results of the water transparency readings. Transparency at the Dock station was above 0.6 m until mid July but dropped to below 0.6 m until late November. The proposed interim target for Swan Lake is 0.6-0.8 m. Water transparency at the Bridge site was generally equal to the water depth.

Table 3: 2023 Secchi Depth Results (m)

Date	Dock	Bridge
12-Apr	1.15	0.58
26-Apr	1	0.6
10-May	1	0.5
24-May	1	0.5
7-Jun	0.65	0.4
21-Jun	0.9	0.3
12-Jul	0.62	0.4
24-Jul	0.54	0.4
2-Aug	0.35	0.3
16-Aug	0.33	0.35
30-Aug	0.43	0.4
12-Sep	0.5	0.35
27-Sep	0.4	0.33
18-Nov	0.53	0.37
22-Nov	1	0.3

3.1.3 Nutrients Concentrations

Samples collected during each visit were tested for Total Phosphorus (TP), Orthophosphate, Total Kjeldahl Nitrogen (TKN), Nitrate, Nitrite, and Ammonia. The results can be found in Figure 3 for the Dock site and Figure 4 for the Bridge site. The Certificates of Analysis from Bureau Veritas Laboratories are in Appendix B. Nutrient concentrations are shown for the depths sampled.

Total phosphorus concentration at 0.5 and 1.5 m depths averaged under 20 µg/L during the growing season and throughout the year (below the 30 µg/L threshold for a eutrophic condition).

The summer peak in total phosphorus (September 27) occurred during a dry period. There was a concurrent increase in orthophosphate (but not ammonia) that may suggest that there was a pulse of nutrient release from the sediments due to anoxia. Other potential mechanisms include wind-driven suspension of nutrient-rich sediments, increased rates of decomposition of organic matter, or germination of resting cells in the sediments.

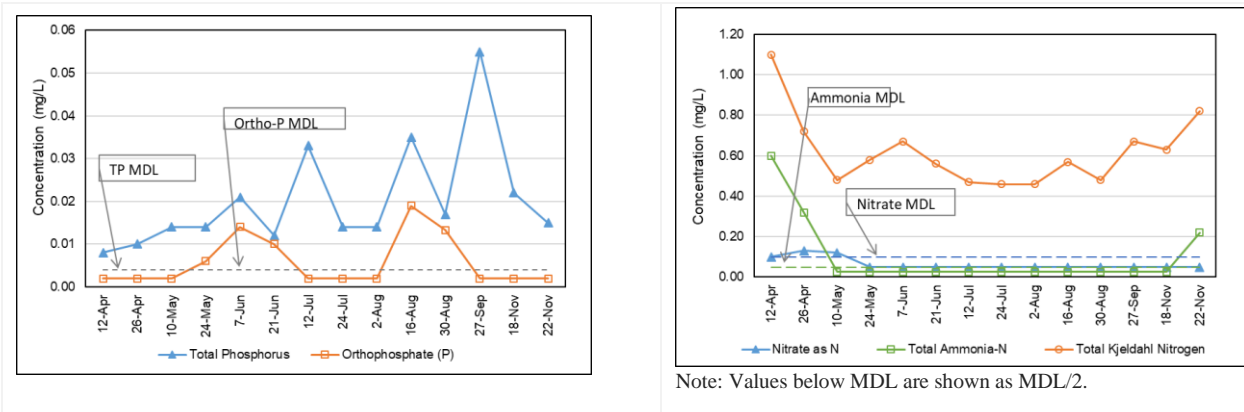
Total nitrogen concentrations over the growing season averaged about 0.60 mg/L (below the 1.2 mg/L threshold for a hyper-eutrophic condition). Total concentrations at the Bridge site averaged 0.62 mg/L. Ammonia and nitrate are the directly-bioavailable forms, with Ammonia being the most usable form for algae. In 2023, Ammonia and Nitrate concentrations were generally close to or below Method Detection Limit (MDL), and nitrogen was mainly present as organic compounds (i.e., TKN less Ammonia) with the exception of spring samples. Bioavailable nutrient pulses (orthophosphate and ammonia) in late summer and fall are consistent with the release of these nutrients due to episodic anoxia and decomposition of organics, including algae.

Elevated nitrate and ammonia in early spring are common in eutrophic waterbodies due to colder water temperatures and lack of uptake by plants and algae. Spring increase in total phosphorus as nitrate and ammonia/TKN (and transparency) decline suggests increasing spring algal activity, peaking in late June.

Figure 3: 2023 Measured Nutrients Concentrations - Dock Site



Figure 4: 2023 Measured Nutrients Concentrations - Bridge Site



3.1.4 pH

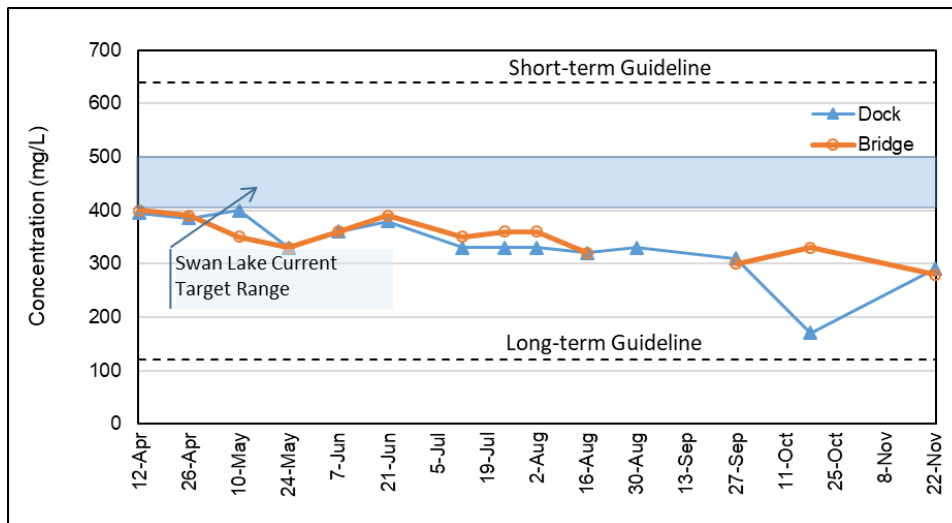
pH measured at the lab ranged from 7.9 to 9.5 throughout the year, with higher values measured between June and August, reflecting high algae production.

3.1.5 Chloride in Lake and Runoff

Surface samples collected during each visit were also analyzed for Chloride, as summarized in Figure 5. Water quality testing results indicated that the samples contained between 170 and 400 mg/L of Chloride. In 2023, chloride levels decreased considerably compared to 2021 and 2022, likely due to clearing the blockage at the East Pond inlet, which resulted in lower catchment flows from the inlet bypass to the Lake.

Chloride guidelines developed based on generic environmental data include a long-term guideline (120 mg/L) and a short-term guideline (640 mg/L). The interim target for chloride is 400-500 mg/L consistent with 2013-2014 values. In 2023, all samples met these targets.

Figure 5: Chloride Concentrations in Swan Lake in 2023



In 2023, water samples were collected from various inlets to the Lake and analyzed for chloride.

These data, along with scattered data from previous years, are shown in Table 4. Based on this limited dataset, chloride concentration in the spring runoff from the pond catchments is about 1000 mg/L (median of pond inlet measurements, except for January 13th). This concentration would not usually end up in the Lake, except through the East Pond bypass when the pond inlet was blocked. At other times, the bypass would carry ‘cleaner’ water (after the first flush), with concentrations around 200 mg/L. Flows from the ponds to the Lake have an average concentration of 350 mg/L (average of pond and outlet concentrations).

The runoff collected from the Swan Lake Blvd. OGS contained an average of about 2000 mg/L of chloride, while from the AMICA OGS had a concentration of about 450 mg/L. Samples were also collected from the shoreline runoff, which resulted in very low chloride concentrations (about 25 mg/L). The OGS at Swan Club did not have any flow through the outfall due to a blockage. The OGS and its outlet to the Lake were cleared in July 2023.

These data will be used to update the chloride mass balance following the completion of the Flow Diversion Feasibility Study, which is currently underway.

Table 4: Chloride Concentrations in Runoff

Date	Inflow to Ponds		Bypass from Pond to Lake	Inflow to Lake from Ponds				Inflows to Lake from OGS	
	East Pond	North Pond	East Pond	East Pond- in pond	From south	North Pond- in pond	Road	Swan Lake Blvd.	AMICA
3/20/2012 *	577	673		572		56			
3/26/2021	957	98.5		343		199			
4/11/2021		79	131		673				
1/13/2022	13200**							3160	
2/15/2022	2340	2120					326	836	360
3/6/2022	380	410		410		180		1200	610
3/16/2022	3700	3100						4800	470
3/24/2022	1200	1100	150					1900	240
4/6/2022	2800		350						1100
1/18/2023	2000	1200	240						120
2/8/2023	3900	650							450
2/9/2023	360	340			960		120	420	300
3/24/2023	1300	630							
Median/average	1029/ 1360		180/210	335/384				1550/ 2053	405/ 456

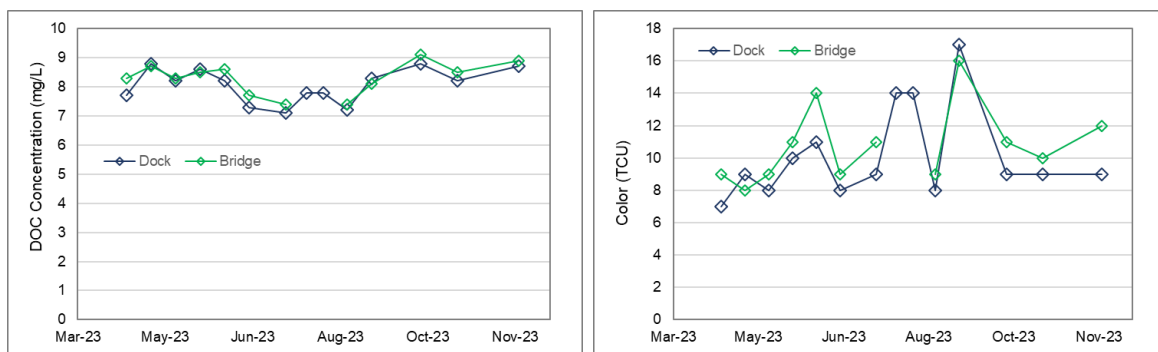
* Data were used cautiously since the exact location of samples and sampling conditions are not known.

** Standing water, not used in calculations.

3.1.6 DOC Concentrations and Color

Surface samples collected during each visit were also analyzed for Dissolved Organic Carbon (DOC), and Color. The results are summarized in Figure 6. Increased DOC and colour may be associated with high decomposition rates releasing DOC, e.g., from the remnants of Phragmites removed from shoreline.

Figure 6: Measured DOC and Color in 2023



3.1.7 Algae Growth

In 2021, samples were collected before and after chemical treatment and sent to the laboratory for phytoplankton and cyanobacteria identification. Test results are summarized in Figure 7 below, and show a significant reduction in concentrations following the treatment, potentially due to the particle scavenging characteristics of the treatment chemicals. Phytoplankton density increased almost five weeks post-treatment to values comparable to pre-treatment levels.

In 2022, limited algae scum was observed in early June, and while the Lake was dominated by phytoplankton for the remainder of the monitoring period, surface scums were not widespread. Four sets of samples were collected from the Lake between August and December for phytoplankton identification, as shown in Figure 8. These results should be considered with caution due to lab errors in the identification of *Microcystis*. In general, the 2022 results showed lower diversity and higher total counts compared to 2021.

Abraxis tests were performed on June 29, July 14, and August 11, 2022 and resulted in Microcystin levels below the recreational limit (recently updated to 10 µg/L). Nonetheless, the presence of known toxin producers at high cell densities suggests that cyanotoxins can potentially occur at elevated concentrations that exceed recreational guidelines. Toxin concentrations can vary tremendously over small spatial and temporal scales, and it is, therefore, possible that higher concentrations occurred elsewhere in the Lake or at different times.

In 2023, seven samples were analyzed for cyanobacteria identification. The results are shown in Figure 9 and indicate significantly lower cell counts compared to 2022. Cell counts in August and September decreased from about 2,000,000 cells/mL in 2022 to 50,000 cells/mL in 2023. The dominant genera of *Microcystis* (Chroococcales order) and *Cylindrospermopsis* (Nostocales order) stayed as such in both 2022 and 2023, with several genera of the Synechococcales order also growing in high percentages in 2023.

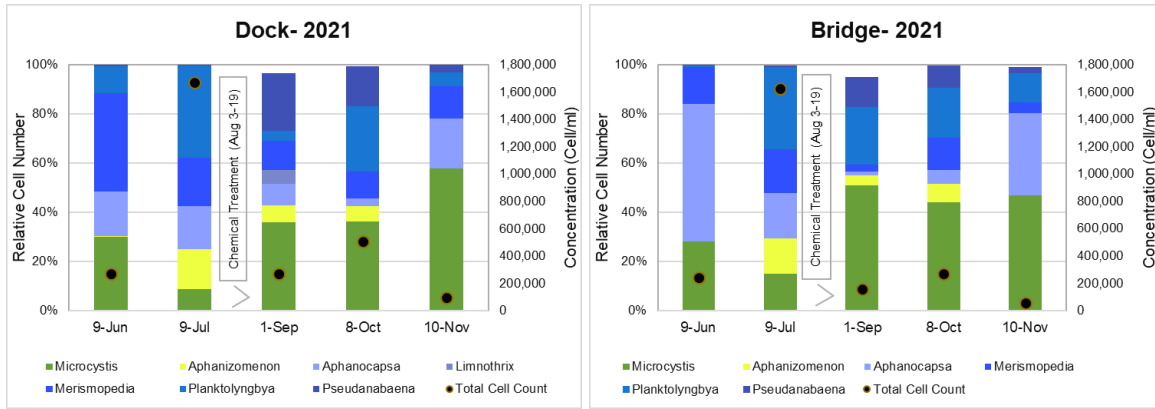
Besides the actual identification and counting of cells, the extraction and analysis of chlorophyll-a (chl-a), which is the green algal pigment used in photosynthesis, is also a measure of algae biomass.

Concentrations of chl-a and its magnesium-free derivative, pheophytin-a (pheo-a), were measured in three samples from the Dock and the Bridge in 2023. The average of chl-a for the three samples collected in June and August from the Dock station was about 22 µg/L, within the eutrophic state.

Table 5: Chlorophyll Measurement (µg/L) in 2023

Date	Parameter	Dock	Bridge
6/7/2023	Chlorophyll a	11	-
	Chlorophyll c	-	-
	Pheophytin a	1.2	-
6/21/2023	Chlorophyll a	3.3	-
	Chlorophyll c	-	-
	Pheophytin a	4	-
8/16/2023	Chlorophyll a	53	74
	Chlorophyll c	5.4	3.3
	Pheophytin a	12	14

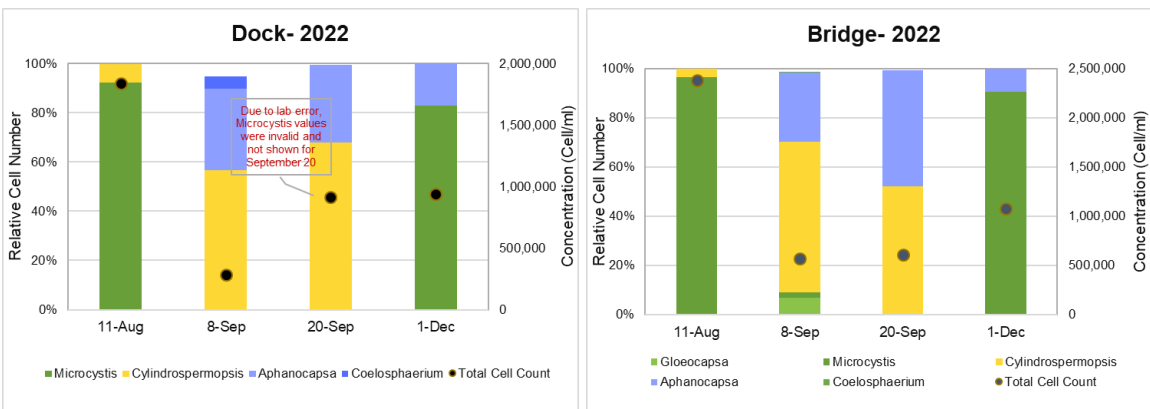
Figure 7: Planktonic Cyanobacteria Population in Swan Lake in 2021



Other genera present at less than 3% include: Planktothrix and Coelosphaerium

Other genera present at less than 3% include: Aphanothece, Gomphosphaeria, Phormidium, Planktothrix and Limnothrix

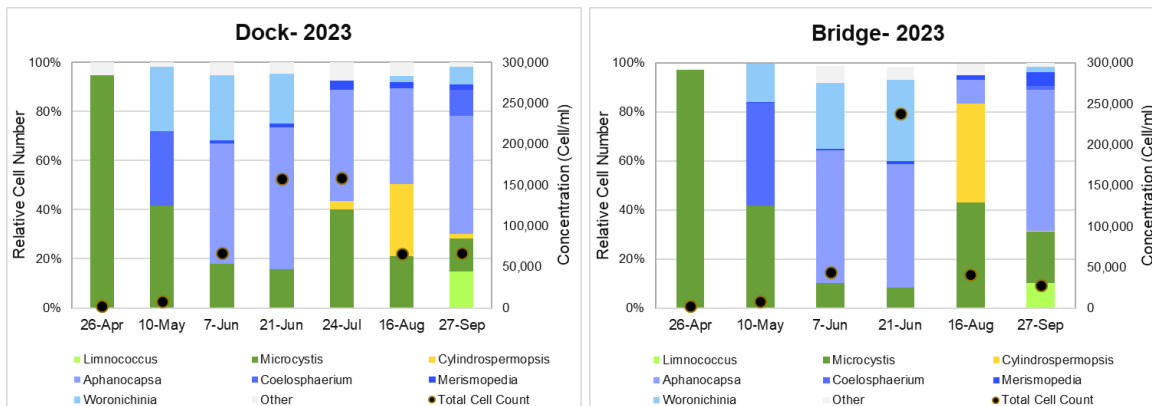
Figure 8: Planktonic Cyanobacteria Population in Swan Lake in 2022



Other genera present at less than 3% include: Gloeocapsa, Anabaena, Oscillatoria and Merismopedia

Other genera present at less than 3% include: Anabaena, Oscillatoria, Coelosphaerium and Merismopedia

Figure 9: Planktonic Cyanobacteria Population in Swan Lake in 2023



Other genera present at less than 3% include: Gloeocapsa, Gomphosphaeria, Anabaena, Aphanizomenon, Woronichinia, Chroococcus, Glaucospira, Leptolyngbya, Snowella

Other genera present at less than 3% include: Gloeocapsa, Gomphosphaeria, Pseudanabaena, Chroococcus, Glaucospira, Microchaete, Snowella

3.2 2023 Water Level

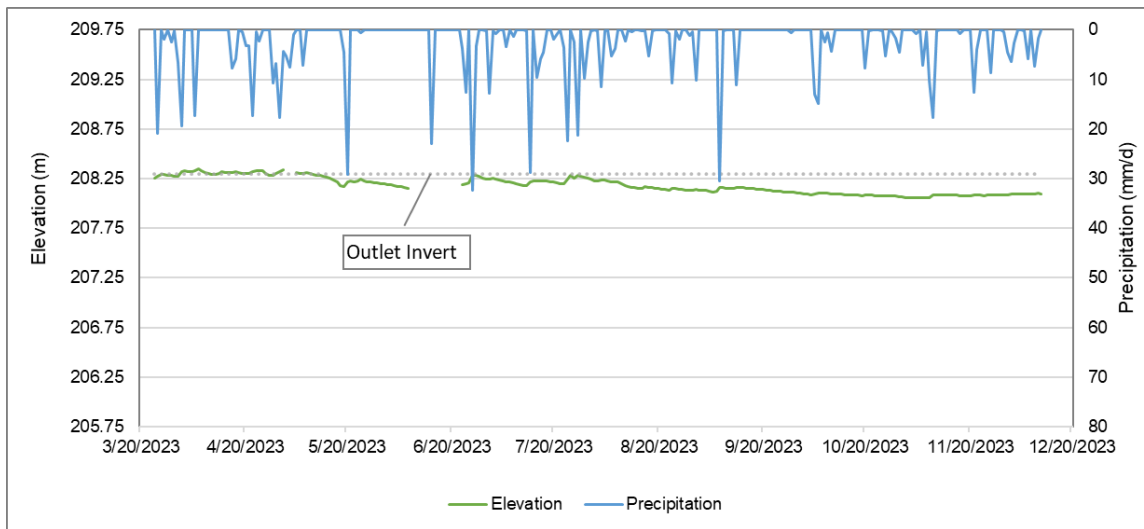
In 2023, the calculated water level changed from a max of 208.35 m in May to a low of 208m in November. Total precipitation in 2023 was 733 mm, as recorded at the Markham Museum station.

The maximum water level recorded or estimated between 2017 and 2023 ranged from 208.25 m to 208.48, when total precipitation ranged from 670 to 934 mm.

In addition to 2022 and 2023 being relatively dry years, the clearing of the blockage at the East Pond inlet resulted in lower flows from the inlet bypass to the Lake relative to recent years, further lowering the water level in Swan Lake. Extended dry periods in June 2023 coincide with the approximate time of stratification.

Calculated water level and daily precipitation data from the nearby rain gauge are shown in Figure 10.

Figure 10: Lake Elevation Records and Precipitation in 2023



3.3 Water Quality Trends

Water quality monitoring of Swan Lake has been conducted annually since treatment in 2013 to track water quality and the effectiveness of implemented mitigation measures.

The following paragraphs and Figure 11 provide a summary of water quality trends for the period of monitoring.

Dissolved Oxygen (DO)

Historical records of DO and temperature profile show that Swan Lake thermally stratifies during the summer despite its shallow depth. Anoxic conditions were observed at depths below 2 m, to as high as 1 to 1.5 m (in 2016). The majority of surface concentrations have been above 5 mg/L since 2014. In 2023, day-time surface concentrations at the Dock station were above 10 mg/L. DO concentration at the bottom layer was also above the guideline, except for one measurement at 3 mg/L. DO concentrations, however, have a diurnal pattern, often decreasing at night. The extent of the nighttime decline will be determined with further monitoring.

Water Clarity (Secchi Depth)

In Swan Lake, Secchi depth has typically been quite low throughout the summer, but it increases in November, reflecting the end of the growing period for phytoplankton. The average annual values

shown in Figure 11 are all below 1 m, except in 2014 and 2021, following chemical treatment. In 2023, water clarity was above 0.6 m until the mid July but dropped to below 0.6 m for the remainder of the monitoring period until late November.

Total Phosphorus (TP)

Average growing period (May - September) TP concentrations indicated hyper-eutrophic conditions in all monitored years except for the post-treatment years, 2013 and 2014, as well as 2021 to 2023. There was no monitoring in 2015.

Nitrogen Compounds

Total nitrogen concentration over the growing period has been above the 1.2 mg/L threshold for a hyper-eutrophic condition, except in the post-treatment year, 2014, and in 2021 to 2023. Nitrogen is, however, not believed to be the limiting nutrient for eutrophication in Swan Lake (i.e., the nutrient that elicits the largest response in algae growth).

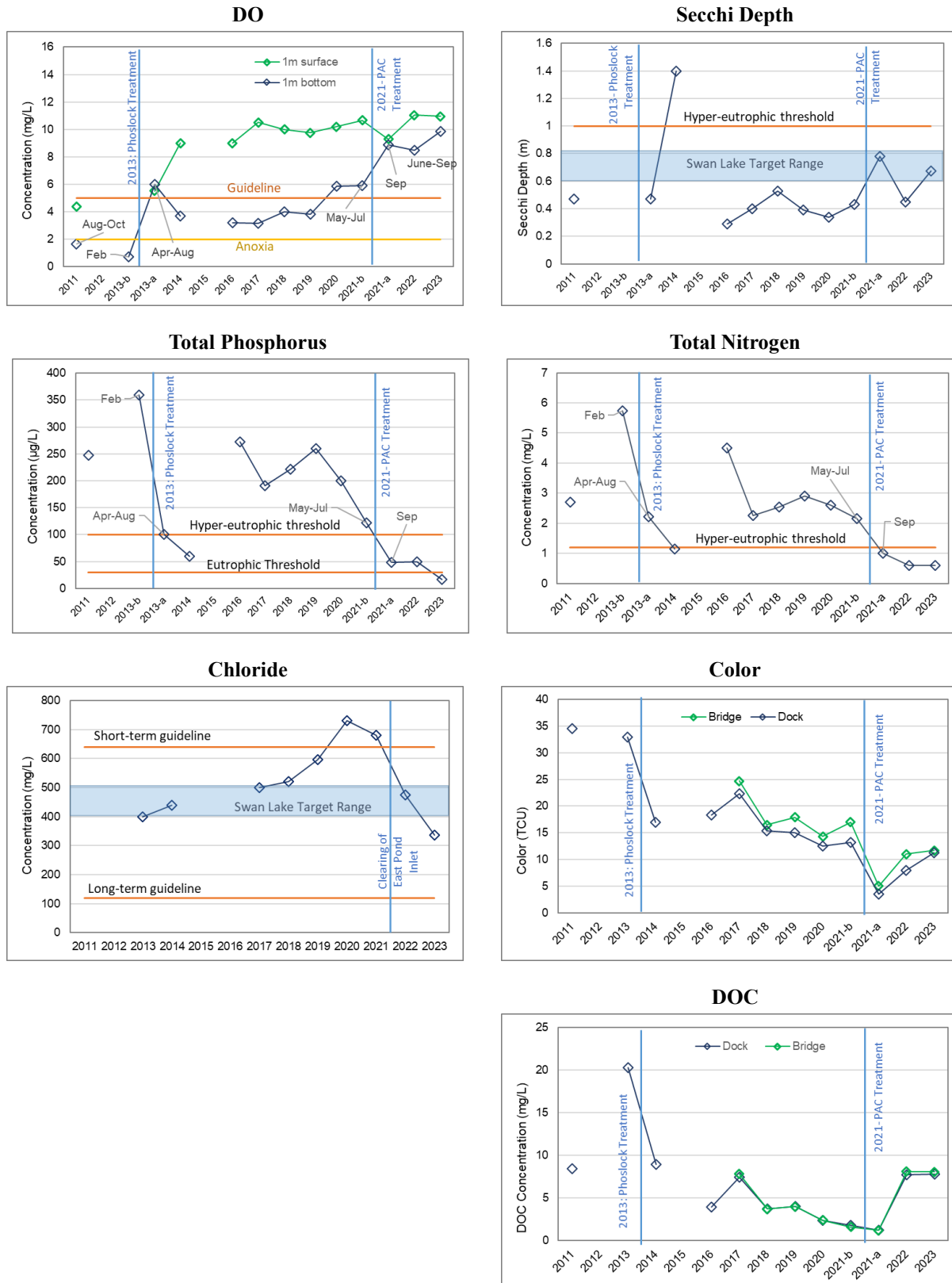
Inorganic nitrogen compounds (NO_2 , NO_3 , and NH_3) have often been below detection limits, indicating relatively low levels of bioavailable nitrogen concentrations. In 2023, ammonia and nitrate concentrations were generally very low (except in April), and nitrogen was mainly present as organic matter.

Chloride

Chloride concentrations were increasing in Swan Lake over the past few years with a slight drop in 2021. Removing the blockage at the East Pond inlet resulted in lower flows from the inlet bypass to the Lake, lowering chloride concentration in Swan Lake in 2022 and 2023.

The Long-Term Management Plan for the Lake suggests that the main mechanism for lowering chloride levels would be source control. Emerging technologies (chloride removal using biochar) and the feasibility of flow redirection are being studied in 2024.

Figure 11: Historical Water Quality Results (Growing-Season Averages)



Algae Blooms and Cyanobacteria

Table 6 provides a summary of the observed algae blooms in the Lake over the years. It also shows any tests conducted to measure toxins (mainly in terms of Microcystin concentration) in the Lake water.

Table 6: Records of Algae Blooms and Toxicity

Year/Period	Algae Blooms Observation	Toxicity Test Result
Before 2011	Several blooms of cyanobacteria were observed	Microcystin concentration under detection limit
2013-2016	No apparent cyanobacteria proliferation and blooms; no resident concern related to the Lake's water quality	Microcystin concentration under detection limit
2016	A bloom was detected at one location	Microcystin concentration of 73 µg/L in one sample tested (recreational guideline is 20 µg/L)
2017	No bloom was observed	-
2018	Extended blooms were observed at several sites	Not tested for toxicity; cell density was at half of WHO's threshold for significantly increased risk for human health
2019	Extended blooms were observed at several sites	Microcystin toxicity was measured with test strips; all samples were below 10 µg/L
2020	Blooms were observed at several sites	Microcystin toxicity was measured with test strips; all samples were below 10 µg/L
2021	Blooms were observed at several sites before treatment; the high biomass was inhibited by the August PAC treatment; however, by October, cyanobacteria were as high as in previous summers and falls.	Not tested for toxicity
2022	Surface scum were not widespread; Lab results showed lower diversity and higher total counts compared to 2021.	Microcystin toxicity was measured with test strips; all samples were below 10 µg/L
2023	Surface scum were not widespread; Lab results showed higher diversity and significantly lower total counts compared to 2022.	Not tested for toxicity

While internal and external source controls in 2023 successfully reduced nutrient concentrations to below the specified targets, in 2023, the Lake was dominated by phytoplankton, and water clarity improvements were modest. This could be partly due to the absence of submerged aquatic vegetation (SAV), which has been replaced by phytoplankton (algae) due to historically high concentrations of total phosphorus. SAV compete with algae for nutrients and light, and the establishment of SAV growth may help to reduce phytoplankton blooms over the growing season.

SAV would prevent sediment resuspension, take up nutrients, and act as habitat for zooplankton, which in sufficient densities would help control algal blooms. The return of SAV could be key to shifting the lake to a clear state and, this shift seems unlikely without active bio-manipulation to break the cycle of high turbidity- phytoplankton dominance – high turbidity⁴. Therefore, in 2023, the TRCA was contracted to implement a SAV planting pilot project in four fenced areas along the north shore of the Lake. Further planting may be considered following the 2024 chemical treatment.

⁴ Scheffer, M. Alternative Attractors of Shallow Lakes. *The Scientific World* (2001) 1, 254-263.

4. Geese Management

4.1 Geese Management Approach

Geese reduction at Swan Lake is necessary due to the nutrient load they contribute to the Lake.

In 2023, the geese management program was completed by two external contractors.

Border Control Bird Dogs, an external consultant, was hired to chase (i.e., ‘haze’) terrestrial geese by border collies (including the Toogood Pond, where they also performed egg oiling). Program activity frequency was modified in 2021 to focus on the migration seasons. The frequent geese chasing would encourage the geese to relocate to a quieter place and reduce the number of resident geese at Swan Lake.

The Toronto Region Conservation Authority (TRCA) was hired to relocate resident geese from Swan Lake (and Mount Joy Park) and to remove the nests and eggs from the area.

The strobe lights purchased in 2020 at the request of Friends of Swan Lake Park were also installed on the Lake and the two adjacent stormwater management ponds. Strobe lights work by using a solar-powered LED light that flashes every two seconds and is intended to disrupt the geese’s sleep patterns and discourage them from staying on the Lake.

4.2 Geese Count

In 2023, the geese count was completed by the consultant, City staff, and volunteers from the community.

Border Control Bird Dogs recorded the number of geese observed during each visit. Staff counted the number of geese every two weeks, coinciding with the water quality sampling site visits.

Staff also developed a geese count App using ArcGIS Survey123, which a number of residents used to record geese count and note other wildlife observations.

4.3 Results

Figure 12 illustrates the number of geese counted at Swan Lake throughout the 2023 monitoring period.

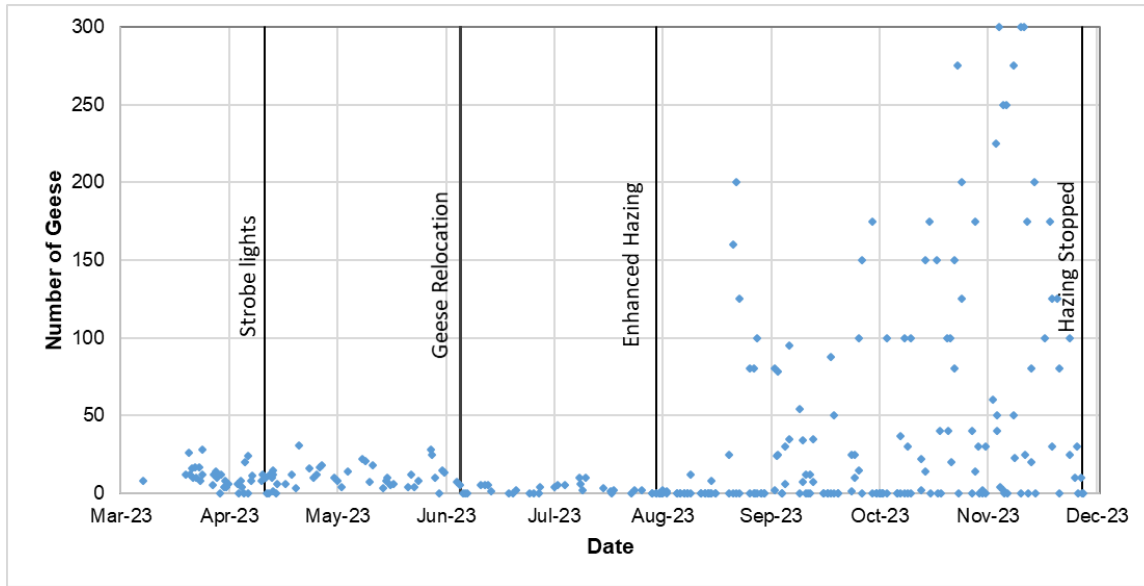
In this figure, a significant increase in geese numbers is evident when they migrate south; however, the increased hazing frequency (starting on August 15) effectively reduced the number of geese present at different times of the day. Fewer geese were counted in August and September of 2023 compared to previous years, likely due to the prolonged warm weather conditions and delayed migration.

Following the enhanced hazing, daily numbers dropped to below 300 and remained much lower than in previous years. Any impact that strobe lights might have had on the geese count is not readily evident from the data. Limited data are available for June and July when hazing was not occurring.

In addition, seven nests and 38 eggs were managed at Swan Lake in April.

In total, 40 Canada Geese were rounded up from Swan Lake and Mount Joy Park on June 14 and 21, 2023.

Figure 12: 2023 Geese Count Results

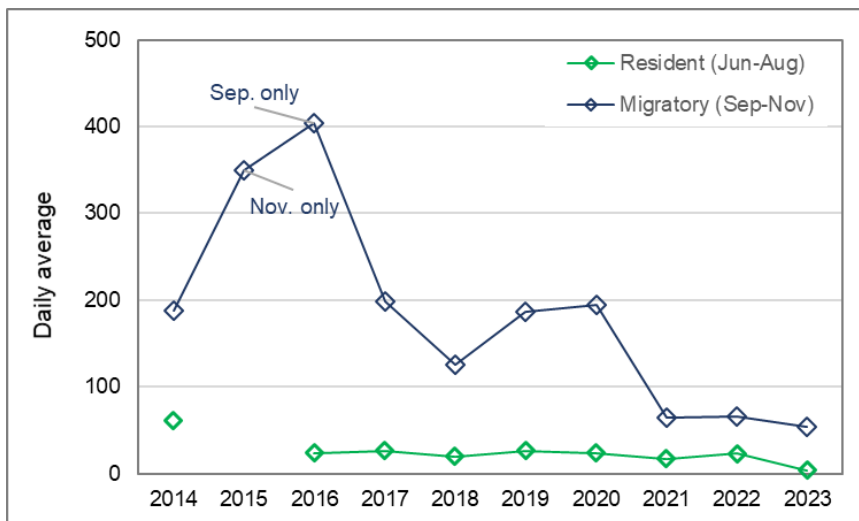


4.4 Historical Trends

Active geese management has been completed annually since 2014. The geese management program focused on resident geese at the beginning and extended to the management of migratory geese in 2016.

Daily Averages of counts are shown for each year in Figure 13. Data are summarized for June to August and September to November, representing resident and migratory geese, respectively. Despite a general increase in geese population in Southern Ontario, the numbers at Swan Lake have been controlled over the past years.

Figure 13: Historical Geese Counts



5. Other Management Activities

5.1 Fish Inventory and Removal

The Long-Term Management Plan for Swan Lake (2021) has a provision for managing bottom-dwelling fish to reduce sediment disturbance.

Similar to 2021 and 2022, the City hired the TRCA in 2023 to complete a fish inventory and removal operation.

In 2021, three fish species were captured across five different sampling events. The three species were Brown Bullhead (*Ameiurus nebulosus*), which were relocated to Milne Dam, Common Carp (*Cyprinus carpio*), which were euthanized, and Fathead Minnow (*Pimephales promelas*), which were returned to the Lake.

The same three fish species as in 2021 were captured during one electrofishing sampling event and one netting sampling event on August 23 and 24, 2022. In 2022, the TRCA was informed by the Ontario Ministry of Natural Resources and Forestry (OMNRF) that a Fish Stocking license would not be granted due to the possibility of disease transfer. Instead, OMNRF requested that both Common Carp and Brown Bullhead be euthanized.

An electrofishing day on August 21, 2023, resulted in the capture of the same three fish species, with the addition of the non-native goldfish.

A summary of the results for both years is shown in Table 7. The timing of the sampling (April vs. August) likely influenced the catch because water temperatures are warmer in August, and fish are less active in cold water. The use of nets could explain some variations in counts, e.g., fewer fathead minnows in 2023 when nets were not used.

Table 7: Fish Species Collected from Swan Lake

Date	Fish Species	Number of Fish
April 2021 (3 days electrofishing + 2 days nets)	Brown Bullhead	210
	Common Carp	7
	Fathead Minnow	>10,000
August 2022 (1 day electrofishing, 1 day nets)	Brown Bullhead	80
	Common Carp	20
	Fathead Minnow	875
August 2023 (1 day electrofishing)	Brown Bullhead	84
	Common Carp	103
	Fathead Minnow	14
	Goldfish	2

5.2 Shoreline Restoration

As part of the Parks Refresh program for Swan Lake, herbicides were used on the Phragmites/common reeds in Swan Lake and the two stormwater management ponds, followed by physical removal by an amphibious vehicle in 2022. The herbicide application, which was carried out by licensed contractors working on behalf of the TRCA, was repeated in the spring of 2023.

5.3 Submerged Aquatic Vegetation Planting

Phase 2 of the Long-Term Plan included provisions for introducing native submerged plants in Swan Lake to help solidify the sediment and provide fish habitat.

After a review of 2022 water quality results by the City's limnologist consultant, it was determined that the introduction of submerged aquatic plants (macrophytes) should be advanced to Phase 1 of the plan so that beneficial plant communities can compete with and help mitigate algae (phytoplankton) growth. Macrophytes will increase water clarity, which, in turn, enhances their own growing conditions. Aquatic plantings will complement existing management activities.

The planting of SAVs was implemented in June 2023 in four fenced areas along the north shore of the Lake as a pilot project.

6. Summary and Conclusions

6.1 Summary of Monitoring Results

Through the Swan Lake monitoring program, data were collected in 2023. The collected data provide insight into long-term trends in water quality and will also help determine the need for and impact of management activities on Swan Lake.

Dissolved oxygen, temperature, and water transparency were measured at two stations through bi-weekly site visits. Profiles of temperature and dissolved oxygen indicated that Swan Lake was thermally stratified in June and July. The minimum dissolved oxygen concentration required for the protection of warm water fish is 5 mg/L, which was met in the surface water and the bottom layer, except on one occasion based on day time measurements. DO concentration have a diurnal pattern and the extent will be determined with further monitoring.

pH measured at the lab ranged from 7.9 to 9.5, with higher values measured between June and August, indicative of high algae concentration.

Transparency at the Dock station was above 0.6 m until the end of July but dropped to below 0.6 m for the remainder of the monitoring period until late November. The proposed interim target for Swan Lake is 0.6-0.8 m based on correlation with the phosphorus target.

Water samples were analyzed for nutrients (phosphorus and nitrogen compounds). Total phosphorus concentration in the 0.5 and 1.5m depth averaged under 20 µg/L during the growing season (June-July) and throughout the year (below the 30 µg/L threshold for eutrophic conditions).

Total nitrogen concentrations over the growing season averaged about 0.6 mg/L (below the 1.2 mg/L threshold for a hyper-eutrophic condition).

Chloride concentrations in the Lake were within the target range specified for the Lake (between 170 and 400 mg/L), and were considerably lower than 2021 values, continuing the prior declining trend.

Chloride concentrations were also measured in stormwater runoff to the ponds and the Lake (from ponds, OGS's, and overland flow) during snow melt and spring freshet. The data will be used to update the chloride balance and determine the relative contribution of each source to chloride concentration in Swan Lake.

In 2023, limited surface scum was found at both the Dock and Bridge sampling sites; however, the Lake was dominated by phytoplankton. Samples analyzed for cyanobacteria indicated lower total counts than 2022.

The water level at the logger location changed from a maximum of 208.35 m in May to 208 in November.

6.2 Management Activities

In 2023, geese management was completed by chasing (i.e., 'hazing') terrestrial geese by border collies and egg oiling, as well as nest management and geese relocation in the spring. Program frequency was modified in 2021 to focus on the migration seasons. Nine strobe lights were also maintained on the Lake and the two stormwater management ponds. The increased hazing frequency (starting on August 15) effectively reduced the number of geese present at different times of the day to about 40% of numbers in 2020, and lower than those in 2022. Any impact that strobe lights might have had on the geese count is not readily evident.

Fish management and the removal of bottom-dwelling fish was completed by the TRCA, and 80 Brown Bullhead and 1000 Common Carp were captured and euthanized. A limited number of Fathead Minnow were captured and released to the Lake.

As part of the shoreline restoration program, a second application herbicides were used on the Phragmites/common reeds in Swan Lake and the two stormwater management ponds.

A pilot project was implemented to plant Submerged Aquatic Vegetation in four fenced areas along the north shore of the Lake to improve water clarity.

6.3 Conclusions

Based on the measured nutrient concentrations in 2023, Swan Lake is classified as mesotrophic for total phosphorus (as well as nitrogen, but not for transparency; see Table 1 for definitions).

Figure 14 provides a summary of phosphorus concentrations for all the years with available data.

Overall, the management activities in 2021-2023 that focused on the significant nutrient loadings identified in the water quality management plan (i.e., chemical treatment and fish management to reduce internal loads and geese management to reduce external loads), were effective at improving water quality in the Lake as shown by reduced phosphorus concentrations and improved dissolved oxygen levels, and lower densities of cyanobacteria. These improvements represent a positive step towards improving the aquatic habitat in the lake and meeting the long-term water quality goals.

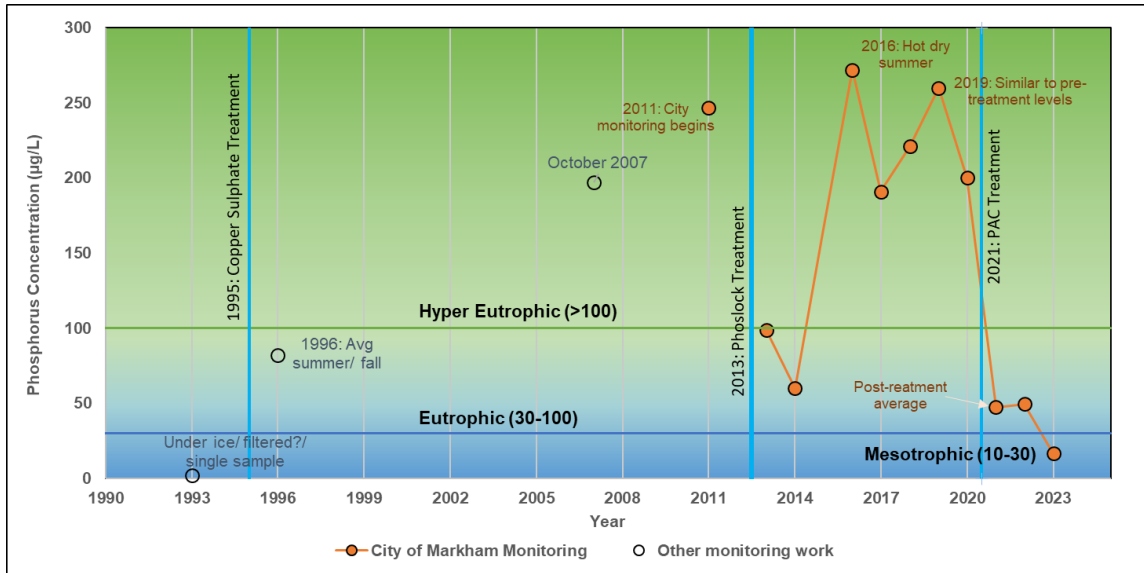
In 2022 and 2023, chloride levels decreased considerably compared to 2021, likely due to clearing the blockage at the East Pond inlet, which resulted in lower catchment flows from the inlet bypass to the Lake.

While internal and external source controls successfully reduced nutrient concentrations, the Lake was dominated by phytoplankton, and water clarity did not improve. This could be partly due to the absence of submerged aquatic vegetation (SAV), which has been replaced by phytoplankton (algae) due to low water clarity. The planting of SAVs stated in June 2023 as a pilot project to help improve water clarity.

The 2024 monitoring program will follow the recommendation of the Long-Term Management Report. Continuous dissolved oxygen monitoring will continue to evaluate potential anoxic episodes at night and better determine periods of transient stratification and bottom anoxia as they relate to internal nutrient loads.

Additional measures that will be implemented in 2024 include a chemical treatment, further planting of SAV, evaluation of cost and feasibility of treatment options to reduce chloride concentration, and research into using biochar for chloride removal.

Figure 14: Trophic State Classification for Swan Lake based on Phosphorus Concentration





Appendix A : Swan Lake Water Quality Inspection Forms

Swan Lake Water Quality Monitoring

Date:	January 18, 2023	Inspectors	ZP, RM
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Station: Dock

Time:	10:25		
Secchi Disk Reading (m)		Staff Gauge Reading (cm)	39
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m			
1 m			
1.5 m			
2 m			
2.5 m			



Station: Bridge

Time:			
Secchi Disk Reading (m)			
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth			

Geese Observations





Dock	
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	
Geese and wildlife notes	

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS	No Sample	
AMICA OGS	No Sample	
Swan Club OGS		

Lake Outlet	Low Flow Sample	
East Pond Inlet	Low Flow Sample	
East Pond Bypass	Low Flow Sample	
North Pond Inlet	Low Flow Sample	

North Pond Bypass	No Sample		
Runoff Notes			



Swan Lake Water Quality Monitoring

Date:	February 8, 2023	Inspectors	ZP, SS
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Station: Dock

Time:	10:11		
Secchi Disk Reading (m)		Staff Gauge Reading (cm)	
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m			
1 m			
1.5 m			
2 m			
2.5 m			



Station: Bridge

Time:	10:52		
Secchi Disk Reading (m)			
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth			




**Geese Observations**

Dock	
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	
Geese and wildlife notes	

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS	No Sample	
AMICA OGS	Low Flow Sample	
Swan Club OGS	No Sample	
Lake Outlet	No Sample	
East Pond Inlet	Low Flow Sample	
East Pond Bypass	No Sample	
North Pond Inlet	No Sample	

North Pond Bypass	Low Flow Sample	
Runoff Notes		



Swan Lake Water Quality Monitoring

Date:	February 9, 2023	Inspectors	Zp
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Station: Dock

Time:	10:55		
Secchi Disk Reading (m)		Staff Gauge Reading (cm)	
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m			
1 m			
1.5 m			
2 m			
2.5 m			



Station: Bridge

Time:			
Secchi Disk Reading (m)			
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth			




Geese Observations

Dock	
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	
Geese and wildlife notes	

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS	High Flow Sample	
AMICA OGS	High Flow Sample	
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass	High Flow Sample	
North Pond Inlet		

North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	March 24, 2023	Inspectors	ZP, SS
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Station: Dock

Time:	09:44		
Secchi Disk Reading (m)		Staff Gauge Reading (cm)	
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m			
1 m			
1.5 m			
2 m			
2.5 m			



Station: Bridge

Time:			
Secchi Disk Reading (m)			
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth			

Geese Observations

Dock	2
Open Water/ West	2
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	
Geese and wildlife notes	4 geese on rooftop





East Pond



Mostly frozen

North Pond

Mostly frozen

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS	No Sample	
AMICA OGS	No Sample	
Swan Club OGS	No Sample	
Lake Outlet	High Flow Sample	
East Pond Inlet	Low Flow Sample	
East Pond Bypass	Low Flow Sample	

North Pond Inlet		
North Pond Bypass	Low Flow Sample	
Runoff Notes	Samples from standing water at ponds	

Swan Lake Water Quality Monitoring

Date:	April 12, 2023	Inspectors	ZP, SS
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Station: Dock

Time:	10:22		
Secchi Disk Reading (m)	1.15	Staff Gauge Reading (cm)	48
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	10.36	97.8	12.8
1 m	10.35	96.8	12.3
1.5 m	10.38	96.5	12.1
2 m	10.65	98.6	11.9
2.5 m			



Station: Bridge

Time:			
Secchi Disk Reading (m)	5.8		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	9.55	90.7	13



Geese Observations

Dock	2
Open Water/ West	3
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	1
Geese and wildlife notes	

East Pond

Inlet open. down trees




North Pond

Water half way inlet



Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	April 26, 2023	Inspectors	ZP, TN
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Station: Dock

Time:	10:07		
Secchi Disk Reading (m)	1	Staff Gauge Reading (cm)	50
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	10.4	96.4	11.9
1 m	10.35	94.5	11.4
1.5 m	10.17	92.4	11.1
2 m	10.11	91.9	11.1
2.5 m			





Station: Bridge

Time:	11:10		
Secchi Disk Reading (m)	0.6		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	9.11	82	10.7



Geese Observations

Dock	
Open Water/ West	
Southeast Island	5
Open Water/ East	
Bridge	
Northern Island	2
Geese and wildlife notes	6 swans


East Pond



North Pond



Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	May 10, 2023	Inspectors	ZP, DJ
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Station: Dock

Time:	10:42		
Secchi Disk Reading (m)	1	Staff Gauge Reading (cm)	48
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	13.38	133.8	15.4
1 m	13.44	133.9	15.2
1.5 m	13.23	130.7	14.8
2 m	12.56	122.9	14.4
2.5 m			

Station: Bridge

Time:	11:53		
Secchi Disk Reading (m)	0.5		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	11.61	116.3	

Geese Observations

Dock	0
Open Water/ West	0
Southeast Island	0
Open Water/ East	0
Bridge	
Northern Island	
Geese and wildlife notes	

East Pond

Inlet clear





North Pond

High water



Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		

North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	May 24, 2023	Inspectors	ZP, DJ
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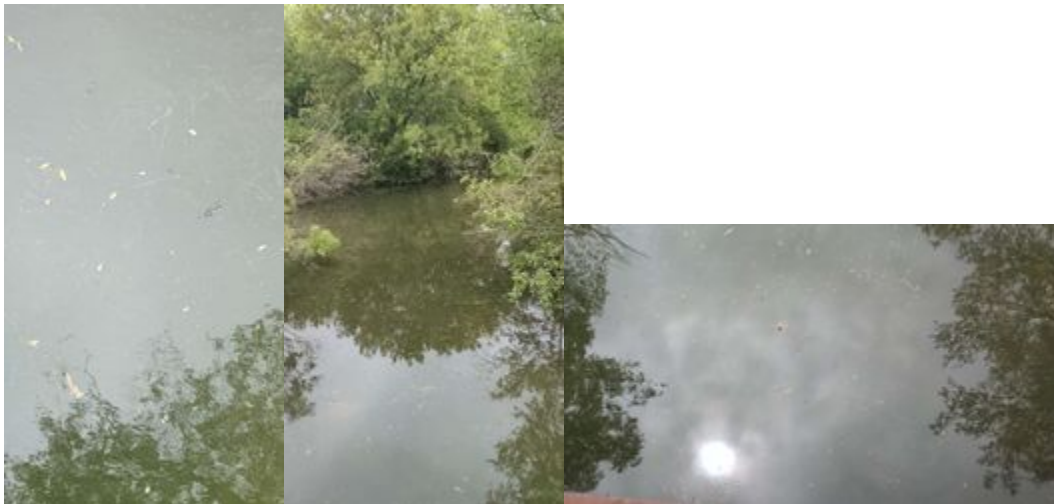
Station: Dock

Time:	11:17		
Secchi Disk Reading (m)	1	Staff Gauge Reading (cm)	
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	12.75	135.3	18.2
1 m	12.8	135.4	18.1
1.5 m	12.71	134.5	18.1
2 m	12.4	131.4	18
2.5 m			



Station: Bridge

Time:	12:18		
Secchi Disk Reading (m)	0.5		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	10.13	106.9	17.6



Geese Observations





Dock	13
Open Water/ West	
Southeast Island	
Open Water/ East	3
Bridge	
Northern Island	
Geese and wildlife notes	3 adults and 10 geeslings, no fencing


East Pond

inlet flowing

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		

North Pond Inlet		
North Pond Bypass		
Runoff Notes		



Swan Lake Water Quality Monitoring

Date:	June 7, 2023	Inspectors	ZP, DJ
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Station: Dock

Time:	10:27		
Secchi Disk Reading (m)	0.65	Staff Gauge Reading (cm)	32
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	10.92	121.7	20.7
1 m	10.8	120.3	20.7
1.5 m	10.72	119.5	20.7
2 m	10.12	112.5	20.6
2.5 m			



Station: Bridge

Time:	10:56		
Secchi Disk Reading (m)	0.4		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	11.43	124.4	19.4



Geese Observations

Dock	
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	10
Northern Island	
Geese and wildlife notes	

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

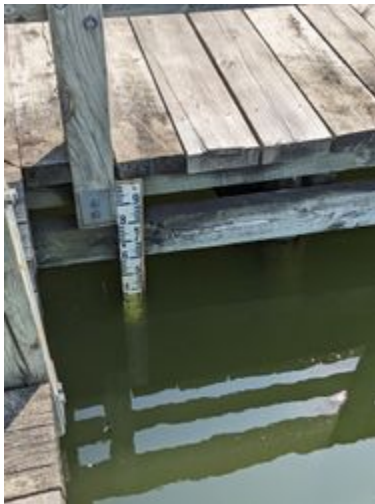
Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	June 21, 2023	Inspectors	ZP, DJ
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Station: Dock

Time:	10:54		
Secchi Disk Reading (m)	0.9	Staff Gauge Reading (cm)	38
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	11.33	132.8	23.2
1 m	10.61	123.2	22.8
1.5 m	10.34	117.5	21.8
2 m			
2.5 m			



Station: Bridge

Time:	11:41		
Secchi Disk Reading (m)	0.3		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	10.88	130.5	24.5

Geese Observations

Dock	0
Open Water/ West	0
Southeast Island	0
Open Water/ East	0
Bridge	
Northern Island	
Geese and wildlife notes	


East Pond

Low water. Inlet clear



North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		



Swan Lake Water Quality Monitoring

Date:	July 12, 2023	Inspectors	ZP, AW
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Station: Dock

Time:	11:07		
Secchi Disk Reading (m)	0.62	Staff Gauge Reading (cm)	36
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	9.79	116.7	24.2
1 m	9.74	115.9	24.1
1.5 m	9.33	110.8	24
2 m			
2.5 m			





Station: Bridge

Time:	12:03		
Secchi Disk Reading (m)	0.4		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	11.15	130.7	23.3





Geese Observations

Dock	
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	
Geese and wildlife notes	

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	July 24, 2023	Inspectors	Z.P. & D.J.
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Station: Dock

Time:	10:49		
Secchi Disk Reading (m)	0.54	Staff Gauge Reading (cm)	39.5
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	10.72	129.9	25.1
1 m	10.121	121.1	24.4
1.5 m	9.45	112.5	24.1
2 m			
2.5 m			



Station: Bridge

Time:	11:57		
Secchi Disk Reading (m)	0.4		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	11	130	23.7



Geese Observations

Dock	6
Open Water/ West	
Southeast Island	
Open Water/ East	

Bridge	
Northern Island	
Geese and wildlife notes	


East Pond

Inlet is clear of debris. There is algae present.



North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		

North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	August 2, 2023	Inspectors	ZP, AW
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Station: Dock

Time:	10:53		
Secchi Disk Reading (m)	0.35	Staff Gauge Reading (cm)	40
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	11.6	132.1	23.3
1 m	11.08	129.7	23.2
1.5 m	10.12	118	23
2 m			
2.5 m			



Station: Bridge

Time:	11:38		
Secchi Disk Reading (m)	0.3		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	8.74	98.3	21.1



Geese Observations

Dock	0
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	
Northern Island	


Geese and wildlife notes	1 Blue Heron, 2 green heron, mallards at Dock
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East Pond



North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		 <p>The 'Lake Outlet' section contains three photographs. The top photo shows a concrete structure with a metal grate in a body of water, surrounded by tall green reeds. The middle photo shows a concrete structure with a metal grate and a small circular opening, with water flowing through it. The bottom photo shows a concrete structure with a metal grate in a body of water, surrounded by tall green reeds.</p>

East Pond Inlet			
East Pond Bypass			
North Pond Inlet			
North Pond Bypass			
Runoff Notes			



Swan Lake Water Quality Monitoring

Date:	August 16, 2023	Inspectors	ZP & DJ
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Station: Dock

Time:	09:53		
Secchi Disk Reading (m)	0.33	Staff Gauge Reading (cm)	36
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	11.23	131.2	23.1
1 m	11.31	131.9	23
1.5 m	11.1	129.4	23
2 m	3	34	22.5
2.5 m			



Station: Bridge

Time:	10:49		
Secchi Disk Reading (m)			
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	7.79	89.3	22.1



Geese Observations

Dock	0
Open Water/ West	
Southeast Island	
Open Water/ East	
Bridge	0
Northern Island	
Geese and wildlife notes	

East Pond

Inlet clear



North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	August 30, 2023	Inspectors	ZP, RM
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Station: Dock

Time:	10:49		
Secchi Disk Reading (m)	0.43	Staff Gauge Reading (cm)	32
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	10.25	115.8	21.4
1 m	10.26	116	21.4
1.5 m	9.74	110	21.4
2 m	9.16	103.3	21.3
2.5 m			



Station: Bridge

Time:	11:22		
Secchi Disk Reading (m)	0.4		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	8.51	95.7	21.1



Geese Observations

Dock	0
Open Water/ West	0
Southeast Island	0
Open Water/ East	0
Bridge	
Northern Island	

Geese and wildlife notes	
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East Pond

Inlet clear not flowing; bypass has some algae



North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		



Swan Lake Water Quality Monitoring

Date:	September 12, 2023	Inspectors	ZP, RA
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Station: Dock

Time:	13:14		
Secchi Disk Reading (m)	0.5	Staff Gauge Reading (cm)	36
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	10.97	126.4	22.5
1 m	10.87	125.1	22.3
1.5 m	8.38	95.8	22
2 m	52.5	466	21.8
2.5 m			



Station: Bridge

Time:	14:02		
Secchi Disk Reading (m)	0.35		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	9.12	105.3	22.4



Geese Observations

Dock	0
Open Water/ West	0
Southeast Island	0
Open Water/ East	0
Bridge	0
Northern Island	0
Geese and wildlife notes	1 swan

East Pond

North Pond

Inlet halfway submerged



Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		



Swan Lake Water Quality Monitoring

Date:	September 27, 2023	Inspectors	ZP, RA
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Station: Dock

Time:			
Secchi Disk Reading (m)	0.4	Staff Gauge Reading (cm)	30
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	9.06	96.8	18.6
1 m	8.95	95.3	18.4
1.5 m	8.75	93	18.3
2 m	8.55	90.9	18.2
2.5 m			



Station: Bridge

Time:			
Secchi Disk Reading (m)	0.33		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	8.54	89.3	17.6



Geese Observations

Dock	0
Open Water/ West	0
Southeast Island	0
Open Water/ East	0
Bridge	0
Northern Island	0
Geese and wildlife notes	0

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		

Swan Lake Water Quality Monitoring

Date:	October 18, 2023	Inspectors	ZP, RA
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Station: Dock

Time:	10:16		
Secchi Disk Reading (m)	0.53	Staff Gauge Reading (cm)	28
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	8.62	80	12
1 m	8.5	78.8	12
1.5 m	8.38	77.5	11.9
2 m	7.85	72.7	11.9
2.5 m			

Station: Bridge

Time:	11:11		
Secchi Disk Reading (m)	0.37		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	7.52	69	11.6

Geese Observations

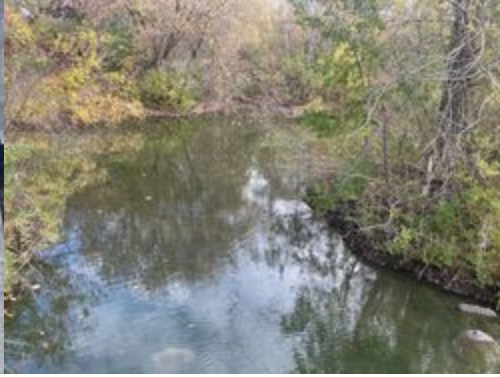
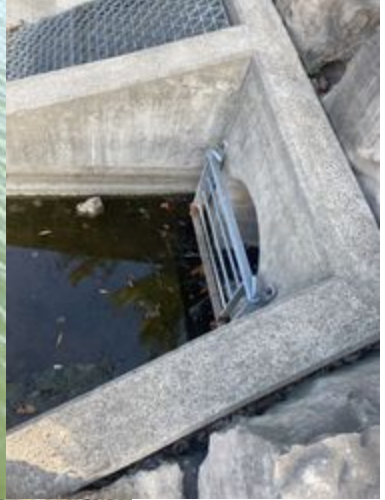
Dock	0
Open Water/ West	0
Southeast Island	
Open Water/ East	
Bridge	0
Northern Island	
Geese and wildlife notes	

East Pond

North Pond

Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		



Swan Lake Water Quality Monitoring

Date:	November 22, 2023	Inspectors	ZP, RA
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Station: Dock

Time:	10:21		
Secchi Disk Reading (m)	1	Staff Gauge Reading (cm)	26
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m	11.9	91.4	4.2
1 m	12.1	91.8	3.8
1.5 m	12.18	91.9	3.6
2 m	12.13	91.5	3.6
2.5 m			



Station: Bridge

Time:	11:05		
Secchi Disk Reading (m)	0.3		
Depth	Dissolved oxygen (mg/L)	Oxygen Saturation (%)	Temperature (C)
0.5 m or max depth	11.18	85.1	4



Geese Observations

Dock	0
Open Water/ West	0
Southeast Island	0
Open Water/ East	
Bridge	0
Northern Island	
Geese and wildlife notes	No geese 1 swan

East Pond



North Pond



Runoff Sampling (Snowmelt and Spring Freshet)

Swan Lake Blvd OGS		
AMICA OGS		
Swan Club OGS		
Lake Outlet		
East Pond Inlet		
East Pond Bypass		
North Pond Inlet		
North Pond Bypass		
Runoff Notes		





Appendix B : Certificates of Analysis



Your P.O. #: PB22006
 Your Project #: spring-2022
 Site Location: Swan Lake
 Your C.O.C. #: 638250

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/01/23
 Report #: R7481416
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C318266

Received: 2023/01/19, 15:07

Sample Matrix: Water
 # Samples Received: 5

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	5	N/A	2023/01/23	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	2	N/A	2023/01/20	CAM SOP-00414	SM 23 2510 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your P.O. #: PB22006
Your Project #: spring-2022
Site Location: Swan Lake
Your C.O.C. #: 638250

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/01/23
Report #: R7481416
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C318266

Received: 2023/01/19, 15:07

Encryption Key

Heba Gamal
Project Manager
23 Jan 2023 18:27:34

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C318266
Report Date: 2023/01/23

City of Markham
Client Project #: spring-2022
Site Location: Swan Lake
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		UVT321		UVT322		UVT323			UVT324		
Sampling Date		2023/01/18 10:54		2023/01/18 10:44		2023/01/18 10:49			2023/01/18 10:52		
COC Number		638250		638250		638250			638250		
	UNITS	East Pond Bypass	RDL	AMICA GS	RDL	LAKE Outlet	RDL	QC Batch	East Pond Inlet	RDL	QC Batch

Inorganics											
Conductivity	umho/cm								6800	1.0	8460700
Dissolved Chloride (Cl-)	mg/L	240	3.0	120	2.0	810	10	8460650	2000	20	8460650
RDL = Reportable Detection Limit QC Batch = Quality Control Batch											

Bureau Veritas ID		UVT325		
Sampling Date		2023/01/18 11:03		
COC Number		638250		
	UNITS	North Pond Inlet	RDL	QC Batch
Inorganics				
Conductivity	umho/cm	4100	1.0	8460700
Dissolved Chloride (Cl-)	mg/L	1200	15	8460650
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C318266
Report Date: 2023/01/23

City of Markham
Client Project #: spring-2022
Site Location: Swan Lake
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	0.7°C
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Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C318266

Report Date: 2023/01/23

QUALITY ASSURANCE REPORT

City of Markham

Client Project #: spring-2022

Site Location: Swan Lake

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8460650	Dissolved Chloride (Cl-)	2023/01/23	NC	80 - 120	105	80 - 120	ND, RDL=1.0	mg/L	2.8	20
8460700	Conductivity	2023/01/20			101	85 - 115	ND, RDL=1.0	umho/cm	0.41	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)





BUREAU
VERITAS

Bureau Veritas Job #: C318266
Report Date: 2023/01/23

City of Markham
Client Project #: spring-2022
Site Location: Swan Lake
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Custody Tracking Form



T638250

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: East Pond Bypass
Last Sample: North Pond Inlet
Sample Count: 5

Relinquished By				Received By			
Zahra Parhizgan	Z. Parhizgan	Date	2023/01/23	MARK ASAB		Date	2023/01/19
		Time (24 HR)	12:00			Time (24 HR)	15:07
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Zahra Parhizgan 1

Rush Immediate Test Food Residue

Micro Food Chemistry

***** LABORATORY USE ONLY *****

Received At:

Labeled By:

Verified By:

Lab Comments:

19-Jan-23 15:07
Grace (Hongmei) Zhao

C318266
RUK ENV-2028

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
N	N	Y	0	0	2
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

COR FCD-00383/3



Your P.O. #: PB22006
 Your Project #: spring-2022
 Site Location: SWAN LAKE
 Your C.O.C. #: 650893

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/02/14
 Report #: R7509487
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C339473

Received: 2023/02/09, 15:52

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	3	N/A	2023/02/14	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	3	N/A	2023/02/13	CAM SOP-00414	SM 23 2510 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your P.O. #: PB22006
Your Project #: spring-2022
Site Location: SWAN LAKE
Your C.O.C. #: 650893

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/02/14
Report #: R7509487
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C339473

Received: 2023/02/09, 15:52

Encryption Key

Grace (Hongmei) Zhao
Project Manager
14 Feb 2023 16:44:43

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C339473
Report Date: 2023/02/14

City of Markham
Client Project #: spring-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VAH942		VAH943		VAH944		
Sampling Date		2023/02/08 10:25		2023/02/08 10:35		2023/02/08 10:40		
COC Number		650893		650893		650893		
	UNITS	AMICA-OGS	RDL	EP-IN	RDL	NP-IN	RDL	QC Batch
Inorganics								
Conductivity	umho/cm	1800	1.0	12000	1.0	2500	1.0	8499994
Dissolved Chloride (Cl-)	mg/L	450	5.0	3900	40	650	7.0	8499938
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								



BUREAU
VERITAS

Bureau Veritas Job #: C339473
Report Date: 2023/02/14

City of Markham
Client Project #: spring-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.7°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C339473

Report Date: 2023/02/14

QUALITY ASSURANCE REPORT

City of Markham

Client Project #: spring-2022

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8499938	Dissolved Chloride (Cl-)	2023/02/14	NC	80 - 120	102	80 - 120	ND, RDL=1.0	mg/L	2.6	20
8499994	Conductivity	2023/02/13			100	85 - 115	ND, RDL=1.0	umho/cm	0.22	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)



BUREAU
VERITAS

Bureau Veritas Job #: C339473
Report Date: 2023/02/14

City of Markham
Client Project #: spring-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Custody Tracking Form

eCOC Number
7650893

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

Relinquished By				Received By			
Zahra Parhizgani	Z. parhizgani	Date	2023/02/08	RUPINDER	Rupinder	Date	2022/02/09
		Time (24 HR)	11:00			Time (24 HR)	15:52
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information			
Sampled By (Print)	# of Coolers/Pkgs	Rush <input type="checkbox"/>	Immediate Test <input type="checkbox"/>
Zahra parhizgani	1	Micro <input type="checkbox"/>	Food Residue <input type="checkbox"/>
			Food Chemistry <input type="checkbox"/>

*** Laboratory Use Only ***			
Received At	Lab Comments:	Custody Seal	
	09-Feb-23 15:52	Present (Y/N)	Intact (Y/N)
Labeled By	Grace (Hongmei) Zhao	Present (Y/N)	Temperature °C
	AVI ENV-409	Y	1 2 3
Verified By	C339473	N	6 5 6
		Drinking Water Metals Preservation Check Done (Circle) YES NO	



Your P.O. #: PB22006
 Your Project #: spring-2022
 Site Location: SWAN LAKE
 Your C.O.C. #: 653633

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/02/14
 Report #: R7509460
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C340919

Received: 2023/02/10, 15:15

Sample Matrix: Water
 # Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Chloride by Automated Colourimetry	6	N/A	2023/02/14	CAM SOP-00463	SM 23 4500-Cl E m

Remarks:

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your P.O. #: PB22006
Your Project #: spring-2022
Site Location: SWAN LAKE
Your C.O.C. #: 653633

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/02/14
Report #: R7509460
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C340919

Received: 2023/02/10, 15:15

Encryption Key

Grace (Hongmei) Zhao
Project Manager
14 Feb 2023 16:20:52

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C340919
Report Date: 2023/02/14

City of Markham
Client Project #: spring-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VAP507			VAP508	VAP509		VAP510		VAP511		
Sampling Date		2023/02/09 10:30			2023/02/09 10:35	2023/02/09 10:40		2023/02/09 10:45		2023/02/09 10:50		
COC Number		653633			653633	653633		653633		653633		
	UNITS	EP-South	RDL	QC Batch	EP-Inlet	NP-IN	RDL	SL-BLV	RDL	AMICA-OGS	RDL	QC Batch

Inorganics												
Dissolved Chloride (Cl-)	mg/L	960	10	8501836	360	340	4.0	120	1.0	300	4.0	8501872
RDL = Reportable Detection Limit QC Batch = Quality Control Batch												

Bureau Veritas ID		VAP512		
Sampling Date		2023/02/09 10:55		
COC Number		653633		
	UNITS	SLB-OGS	RDL	QC Batch

Inorganics				
Dissolved Chloride (Cl-)	mg/L	420	5.0	8501872
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C340919
Report Date: 2023/02/14

City of Markham
Client Project #: spring-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C340919

Report Date: 2023/02/14

QUALITY ASSURANCE REPORT

City of Markham

Client Project #: spring-2022

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8501836	Dissolved Chloride (Cl-)	2023/02/14	NC	80 - 120	104	80 - 120	ND, RDL=1.0	mg/L	0.40	20
8501872	Dissolved Chloride (Cl-)	2023/02/14	NC	80 - 120	104	80 - 120	ND, RDL=1.0	mg/L	2.5	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)



BUREAU
VERITAS

Bureau Veritas Job #: C340919
Report Date: 2023/02/14

City of Markham
Client Project #: spring-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Your P.O. #: PB22006
 Your Project #: SPRING-2022
 Site Location: SWAN LAKE
 Your C.O.C. #: 675575

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/03/31
 Report #: R7569608
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C385756

Received: 2023/03/27, 15:00

Sample Matrix: Water
 # Samples Received: 5

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	5	N/A	2023/03/31	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	3	N/A	2023/03/29	CAM SOP-00414	SM 23 2510 m

Remarks:

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* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your P.O. #: PB22006
Your Project #: SPRING-2022
Site Location: SWAN LAKE
Your C.O.C. #: 675575

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/03/31
Report #: R7569608
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C385756

Received: 2023/03/27, 15:00

Encryption Key

Grace (Hongmei) Zhao
Project Manager
31 Mar 2023 15:45:34

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VJY196		VJY197			VJY198			VJY199		
Sampling Date		2023/03/24 10:00		2023/03/24 10:00			2023/03/24 10:05			2023/03/24 10:10		
COC Number		675575		675575			675575			675575		
	UNITS	Lake Outlet	RDL	EP-IN	RDL	QC Batch	EP-Bypass	RDL	QC Batch	NP-IN	RDL	QC Batch
Inorganics												
Conductivity	umho/cm	1100	1.0	5100	1.0	8579952				2700	1.0	8579952
Dissolved Chloride (Cl-)	mg/L	280	5.0	1300	10	8579810	180	1.0	8579810	630	5.0	8579810
RDL = Reportable Detection Limit QC Batch = Quality Control Batch												

Bureau Veritas ID		VJY200		
Sampling Date		2023/03/24 10:15		
COC Number		675575		
	UNITS	NP-Bypass	RDL	QC Batch
Inorganics				
Dissolved Chloride (Cl-)	mg/L	120	1.0	8579810
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C385756
Report Date: 2023/03/31

City of Markham
Client Project #: SPRING-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.7°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C385756

Report Date: 2023/03/31

QUALITY ASSURANCE REPORT

City of Markham
Client Project #: SPRING-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8579810	Dissolved Chloride (Cl-)	2023/03/31	NC	80 - 120	93	80 - 120	ND, RDL=1.0	mg/L	1.8	20
8579952	Conductivity	2023/03/29			100	85 - 115	ND, RDL=1.0	umho/cm	NC	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C385756
Report Date: 2023/03/31

City of Markham
Client Project #: SPRING-2022
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastasiya Hamanov, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Custody Tracking Form



T675575

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: Lake Outlet
Last Sample: NP-Bypass
Sample Count: 5

Relinquished By				Received By			
Print Zahra Parhizgari	Sign Z Parhizgari	Date 2023/03/24	Time (24 HR) 11:15	Print RAMANDEEP KAUR	Sign Jaman	Date 2023/03/27	Time (24 HR) 15:00
Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM	Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM
Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM	Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM

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Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Rush Immediate Test Food Residue
 Micro Food Chemistry

*** LABORATORY USE ONLY ***

Received At Lab Comments:

Labeled By

Verified By

27-Mar-23 15:00
Grace (Hongmei) Zhao
C385756
AJH ENV-1678

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	5	5	4

Drinking Water Metals Preservation Check Done (Circle) YES NO

COR FCD-00383/3



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 684376

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/04/20
 Report #: R7595991
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3A3337

Received: 2023/04/13, 15:13

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity	2	N/A	2023/04/17	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry	3	N/A	2023/04/17	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/04/18	CAM SOP-00412	SM 23 2120C m
Conductivity	3	N/A	2023/04/17	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/04/14	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/04/18	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/04/18	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	3	2023/04/15	2023/04/17	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/04/18	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	2	2023/04/17	2023/04/17	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2023/04/17	2023/04/18	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/04/17	2023/04/18	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 684376

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/04/20
Report #: R7595991
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3A3337

Received: 2023/04/13, 15:13

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Grace (Hongmei) Zhao
Project Manager
20 Apr 2023 17:55:18

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C3A3337

Report Date: 2023/04/20

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VNR311		VNR312			VNR313		
Sampling Date		2023/04/12 10:30		2023/04/12 11:00			2023/04/12 10:45		
COC Number		684376		684376			684376		
	UNITS	S105	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	0.59	8611966	0.60	0.050	8611966	0.61	0.050	8611966
Colour	TCU	7	8612491	9	2	8612491			
Conductivity	umho/cm	1600	8610020	1600	1.0	8610020	1600	1.0	8610020
Total Kjeldahl Nitrogen (TKN)	mg/L	1.0	8612166	1.1	0.10	8611566	1.1	0.10	8611566
Dissolved Organic Carbon	mg/L	7.7	8609063	8.3	0.40	8609063			
Orthophosphate (P)	mg/L	ND	8612255	ND	0.004	8612255	ND	0.004	8612255
pH	pH	8.10	8610030	8.09		8610030	8.09		8610030
Total Phosphorus	mg/L	0.010	8612198	0.008	0.004	8612198	0.011	0.004	8612198
Alkalinity (Total as CaCO ₃)	mg/L	110	8610027	120	1.0	8610027			
Dissolved Chloride (Cl ⁻)	mg/L	390	8610178	400	5.0	8610178	400	5.0	8610178
Nitrite (N)	mg/L	ND	8610026	ND	0.010	8610026	ND	0.010	8610026
Nitrate (N)	mg/L	0.11	8610026	0.10	0.10	8610026	0.12	0.10	8610026
Nitrate + Nitrite (N)	mg/L	0.11	8610026	0.10	0.10	8610026	0.12	0.10	8610026
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.									



BUREAU
VERITAS

Bureau Veritas Job #: C3A3337
Report Date: 2023/04/20

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.0°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3A3337

Report Date: 2023/04/20

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8609063	Dissolved Organic Carbon	2023/04/14	94	80 - 120	98	80 - 120	ND, RDL=0.40	mg/L	17	20		
8610020	Conductivity	2023/04/17			102	85 - 115	ND, RDL=1.0	umho/cm	0.89	25		
8610026	Nitrate (N)	2023/04/18	95	80 - 120	106	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8610026	Nitrite (N)	2023/04/18	99	80 - 120	107	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8610027	Alkalinity (Total as CaCO3)	2023/04/17			96	85 - 115	ND, RDL=1.0	mg/L	0.78	20		
8610030	pH	2023/04/17			102	98 - 103			0.33	N/A		
8610178	Dissolved Chloride (Cl-)	2023/04/17	NC	80 - 120	104	80 - 120	ND, RDL=1.0	mg/L	0.083	20		
8611566	Total Kjeldahl Nitrogen (TKN)	2023/04/18	98	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	4.1	20	102	80 - 120
8611966	Total Ammonia-N	2023/04/18	95	75 - 125	98	80 - 120	ND, RDL=0.050	mg/L	4.9	20		
8612166	Total Kjeldahl Nitrogen (TKN)	2023/04/18	103	80 - 120	97	80 - 120	ND, RDL=0.10	mg/L	6.7	20	97	80 - 120
8612198	Total Phosphorus	2023/04/18	97	80 - 120	101	80 - 120	ND, RDL=0.004	mg/L	3.0	20	110	80 - 120
8612255	Orthophosphate (P)	2023/04/18	95	80 - 120	100	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8612491	Colour	2023/04/18			101	80 - 120	ND, RDL=2	TCU	NC	25		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).




BUREAU
VERITAS

Bureau Veritas Job #: C3A3337
Report Date: 2023/04/20

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Eva Pranjic


Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Custody Tracking Form



Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By				Received By			
Zahra Parhizgari <i>Print</i>	<i>Sign</i>	Date	2023/04/12	KALGI SOLADHARA <i>Print</i>	<i>Sign</i>	Date	2023/04/13
		Time (24 HR)	HH:MM			Time (24 HR)	15:13
<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD	<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD	<i>Print</i>	<i>Sign</i>	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Zahra Parhizgari 1

Rush Immediate Test Food Residue

Micro Food Chemistry

***** LABORATORY USE ONLY *****

Received At Lab Comments:

Labeled By

Verified By

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	5	6	4

Drinking Water Metals Preservation Check Done (Circle) **YES** **NO**

BV

13-Apr-23 15:13
Grace (Hongmei) Zhao
C3A3337

JDK ENV-1141

COR FCD-00383/3



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 691881

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/05/04
 Report #: R7615054
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3B9124

Received: 2023/04/27, 15:03

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity	2	N/A	2023/05/03	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry	3	N/A	2023/05/01	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/05/01	CAM SOP-00412	SM 23 2120C m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/05/02	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/05/02	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/05/01	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/04/29	2023/05/03	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/05/02	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/05/02	2023/05/03	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/05/02	2023/05/03	CAM SOP-00407	SM 23 4500-P I

Remarks:

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 691881

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/05/04
Report #: R7615054
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3B9124

Received: 2023/04/27, 15:03

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Grace (Hongmei) Zhao
Project Manager
04 May 2023 17:27:02

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VQY246	VQY247			VQY248		
Sampling Date		2023/04/26 10:15	2023/04/26 11:00			2023/04/26 10:30		
COC Number		691881	691881			691881		
	UNITS	S105	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics								
Total Ammonia-N	mg/L	0.29	0.32	0.050	8639090	0.28	0.050	8639090
Colour	TCU	9	8	2	8631396			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.87	0.72	0.10	8641115	0.69	0.10	8641115
Dissolved Organic Carbon	mg/L	8.8	8.7	0.40	8639489			
Orthophosphate (P)	mg/L	ND	ND	0.004	8634648	ND	0.004	8634648
pH	pH	8.19	8.16		8637265			
Total Phosphorus	mg/L	0.011	0.010	0.004	8641014	0.016	0.004	8641014
Alkalinity (Total as CaCO ₃)	mg/L	110	110	1.0	8637259			
Dissolved Chloride (Cl ⁻)	mg/L	390	390	5.0	8637243	380	5.0	8637243
Nitrite (N)	mg/L	ND	ND	0.010	8637205	ND	0.010	8637205
Nitrate (N)	mg/L	0.15	0.13	0.10	8637205	0.14	0.10	8637205
Nitrate + Nitrite (N)	mg/L	0.15	0.13	0.10	8637205	0.14	0.10	8637205
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



BUREAU
VERITAS

Bureau Veritas Job #: C3B9124
Report Date: 2023/05/04

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.3°C
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Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3B9124

Report Date: 2023/05/04

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8631396	Colour	2023/05/01			100	80 - 120	ND,RDL=2	TCU	1.3	25		
8634648	Orthophosphate (P)	2023/05/02	92	80 - 120	97	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8637205	Nitrate (N)	2023/05/01	93	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8637205	Nitrite (N)	2023/05/01	96	80 - 120	102	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8637243	Dissolved Chloride (Cl-)	2023/05/01	NC	80 - 120	97	80 - 120	ND, RDL=1.0	mg/L	5.4	20		
8637259	Alkalinity (Total as CaCO3)	2023/05/03			99	85 - 115	ND, RDL=1.0	mg/L	5.9	20		
8637265	pH	2023/05/03			101	98 - 103			0.54	N/A		
8639090	Total Ammonia-N	2023/05/02	99	75 - 125	99	80 - 120	ND, RDL=0.050	mg/L	11	20		
8639489	Dissolved Organic Carbon	2023/05/02	90	80 - 120	93	80 - 120	ND, RDL=0.40	mg/L	0.72	20		
8641014	Total Phosphorus	2023/05/02	99	80 - 120	101	80 - 120	ND, RDL=0.004	mg/L	2.3	20	104	80 - 120
8641115	Total Kjeldahl Nitrogen (TKN)	2023/05/03	95	80 - 120	91	80 - 120	ND, RDL=0.10	mg/L	5.8	20	98	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3B9124
Report Date: 2023/05/04

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

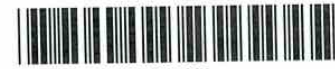
Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Custody Tracking Form



T691881

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By				Received By			
Print Zahra Parhizgar	Sign Z Parhizgar	Date	2023/04/26	Print Grace Zhao	Sign Grace Zhao	Date	2023/04/27
		Time (24 HR)	13:30			Time (24 HR)	15:03
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print)

of Coolers/Pkgs:

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

Zahra Parhizgar

1

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

27-Apr-23 15:03

Grace (Hongmei) Zhao

Verified By



C3B9124

MUM ENV-931

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	3	2	2
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

COR FCD-00383/3

Page 1 of 1



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 691886

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/05/12
 Report #: R7626738
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3B9134

Received: 2023/04/27, 15:03

Sample Matrix: Water
 # Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Phytoplankton (1)	2	N/A	N/A		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by York-Durham Region Environmental Laboratory, 901 McKay Rd. , Pickering , ON, L1W 3A3



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 691886

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/05/12
Report #: R7626738
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3B9134

Received: 2023/04/27, 15:03

Encryption Key

Grace (Hongmei) Zhao
Project Manager
12 May 2023 17:59:57

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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**BUREAU
VERITAS**

Bureau Veritas Job #: C3B9134
Report Date: 2023/05/12

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VQY302	VQY303	
Sampling Date		2023/04/26 10:15	2023/04/26 10:30	
COC Number		691886	691886	
	UNITS	S105	S205	QC Batch
Miscellaneous Parameters				
Subcontract Parameter	N/A	ATTACHED	ATTACHED	8402891
QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C3B9134
Report Date: 2023/05/12

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.3°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3B9134
Report Date: 2023/05/12

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Grace (Hongmei) Zhao, Project Manager

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York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 104220

Work ID:

C3B9134

Description: C3B9134

Client: Bureau Veritas Laboratories

Report To: Grace Zhao

Profile: Non-regulated Water Sampling

Bureau Veritas Canada

Sampled By: Zahra Parhizgari

6740 Campobello Rd

Sample Count: 2

Mississauga, ON L5N 2L8

Canada

Authorized by: Sarah Ostler, Group Leader

Workorder Summary

Analysis Results Comments

10422001 (1) - Microcystis

Estimate

10422001 (1) - Total Cells

Estimate

10422002 (2) - Microcystis

Estimate

10422002 (2) - Total Cells

Estimate



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 104220

Work ID:

C3B9134

Analytical Results

Lab ID: 10422001	Sample ID: 1	Criteria: N/A	Date Received: 4/28/2023
Matrix: Water	Location: S105		Date Collected: 4/26/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Chroococcus	12	cells/mL		1	1		04/28/2023	05/12/2023	
Gleocapsa	31	cells/mL		1	1		04/28/2023	05/12/2023	
Gomphosphaeria	63	cells/mL		1	1		04/28/2023	05/12/2023	
Microcystis	1900	cells/mL		1	1		04/28/2023	05/12/2023	*
Total Cells	2000	cells/mL		1	1		04/28/2023	05/12/2023	*

Lab ID: 10422002	Sample ID: 2	Criteria: N/A	Date Received: 4/28/2023
Matrix: Water	Location: S205		Date Collected: 4/26/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Chroococcus	4	cells/mL		1	1		04/28/2023	05/12/2023	
Gleocapsa	12	cells/mL		1	1		04/28/2023	05/12/2023	
Gomphosphaeria	47	cells/mL		1	1		04/28/2023	05/12/2023	
Microchaete	16	cells/mL		1	1		04/28/2023	05/12/2023	
Microcystis	2600	cells/mL		1	1		04/28/2023	05/12/2023	*
Total Cells	2700	cells/mL		1	1		04/28/2023	05/12/2023	*

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



Custody Tracking Form



T691886-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S205
Sample Count: 2

Relinquished By				Received By			
Print Zahra Parkizgari	Sign Z. Parkizgari	Date 2023/04/26	Time (24 HR) 13:30	Print [Signature]	Sign [Signature]	Date 2023/04/27	Time (24 HR) 15:03
Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM	Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM
Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM	Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): # of Coolers/Pkgs:

Rush Immediate Test Food Residue
 Micro Food Chemistry

*** LABORATORY USE ONLY ***

Received At:

Labeled By:

Verified By:

Lab Comments:
 27-Apr-23 15:03
 Grace (Hongmei) Zhao
 C3B9134
 MUM ENV-931

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	3	2	2

Drinking Water Metals Preservation Check Done (Circle) YES NO

BVH 675913



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 699299

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/05/18
 Report #: R7634724
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3D4808

Received: 2023/05/11, 15:56

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity	2	N/A	2023/05/16	CAM SOP-00448	SM 23 2320 B m
Chloride by Automated Colourimetry	1	N/A	2023/05/15	CAM SOP-00463	SM 23 4500-CI E m
Chloride by Automated Colourimetry	1	N/A	2023/05/17	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/05/12	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/05/16	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/05/12	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/05/12	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/05/15	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/05/12	2023/05/16	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/05/15	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/05/12	2023/05/15	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/05/12	2023/05/15	CAM SOP-00407	SM 23 4500-P I

Remarks:

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 699299

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/05/18
Report #: R7634724
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3D4808

Received: 2023/05/11, 15:56

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Grace (Hongmei) Zhao
Project Manager
18 May 2023 16:18:59

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VUE010			VUE011			VUE012		
Sampling Date		2023/05/10 10:30			2023/05/10 10:45			2023/05/10 11:00		
COC Number		699299			699299			699299		
	UNITS	S105	RDL	QC Batch	S115	RDL	QC Batch	S205	RDL	QC Batch

Inorganics										
Total Ammonia-N	mg/L	ND	0.050	8661695	ND	0.050	8661695	ND	0.050	8661695
Colour	TCU	8	2	8661935				9	2	8661935
Conductivity	umho/cm	1500	1.0	8662426				1500	1.0	8662426
Total Kjeldahl Nitrogen (TKN)	mg/L	0.47	0.10	8663019	0.49	0.10	8663019	0.48	0.10	8663019
Dissolved Organic Carbon	mg/L	8.2	0.40	8662117				8.3	0.40	8662117
Orthophosphate (P)	mg/L	ND	0.004	8662231	ND	0.004	8662231	ND	0.004	8662231
pH	pH	8.27		8662431				8.15		8662431
Total Phosphorus	mg/L	0.010	0.004	8662271	0.011	0.004	8662271	0.014	0.004	8662271
Alkalinity (Total as CaCO3)	mg/L	99	1.0	8662412				100	1.0	8662412
Dissolved Chloride (Cl-)	mg/L	400	5.0	8663735				350	4.0	8663704
Nitrite (N)	mg/L	ND	0.010	8662338	ND	0.010	8662338	ND	0.010	8662338
Nitrate (N)	mg/L	0.14	0.10	8662338	0.14	0.10	8662338	0.12	0.10	8662338
Nitrate + Nitrite (N)	mg/L	0.14	0.10	8662338	0.14	0.10	8662338	0.12	0.10	8662338

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



BUREAU
VERITAS

Bureau Veritas Job #: C3D4808
Report Date: 2023/05/18

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.0°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3D4808

Report Date: 2023/05/18

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8661695	Total Ammonia-N	2023/05/12	101	75 - 125	100	80 - 120	ND, RDL=0.050	mg/L	NC	20		
8661935	Colour	2023/05/12			99	80 - 120	ND,RDL=2	TCU	0.25	25		
8662117	Dissolved Organic Carbon	2023/05/12	93	80 - 120	97	80 - 120	ND, RDL=0.40	mg/L	NC	20		
8662231	Orthophosphate (P)	2023/05/15	87	80 - 120	92	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8662271	Total Phosphorus	2023/05/15	103	80 - 120	102	80 - 120	ND, RDL=0.004	mg/L	NC	20	98	80 - 120
8662338	Nitrate (N)	2023/05/15	93	80 - 120	95	80 - 120	ND, RDL=0.10	mg/L	1.0	20		
8662338	Nitrite (N)	2023/05/15	97	80 - 120	102	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8662412	Alkalinity (Total as CaCO3)	2023/05/16			101	85 - 115	ND, RDL=1.0	mg/L	17	20		
8662426	Conductivity	2023/05/16			101	85 - 115	ND, RDL=1.0	umho/cm	3.8	25		
8662431	pH	2023/05/16			101	98 - 103			0.028	N/A		
8663019	Total Kjeldahl Nitrogen (TKN)	2023/05/15	109	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	2.1	20	98	80 - 120
8663704	Dissolved Chloride (Cl-)	2023/05/15	NC	80 - 120	104	80 - 120	ND, RDL=1.0	mg/L	0.32	20		
8663735	Dissolved Chloride (Cl-)	2023/05/17	NC	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	6.7	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3D4808
Report Date: 2023/05/18

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

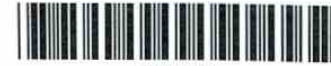
Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Custody Tracking Form



T699299

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S205
Sample Count: 3

Relinquished By				Received By			
Zahra Parhizgari <i>Zahra Parhizgari</i>	<i>Zahra Parhizgari</i>	Date	2023/05/10	KALGI SOLADMARIA <i>Kalgi</i>	<i>Kalgi</i>	Date	2023/05/11
		Time (24 HR)	11:30			Time (24 HR)	15:56
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print)

Zahra parhizgari

of Coolers/Pkgs:

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

11-May-23 15:56

Grace (Hongmei) Zhao

C3D4808

CWD ENV 1511

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	3	3	3
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

COR FCD-00383/4



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 699308

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/05/25
 Report #: R7643239
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3D4815

Received: 2023/05/11, 15:56

Sample Matrix: Water
 # Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Phytoplankton (1)	2	N/A	N/A		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by York-Durham Region Environmental Laboratory, 901 McKay Rd. , Pickering , ON, L1W 3A3



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 699308

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/05/25
Report #: R7643239
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3D4815

Received: 2023/05/11, 15:56

Encryption Key

Grace (Hongmei) Zhao
Project Manager
25 May 2023 14:25:16

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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**BUREAU
VERITAS**

Bureau Veritas Job #: C3D4815
Report Date: 2023/05/25

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VUE043	VUE044	
Sampling Date		2023/05/10 10:30	2023/05/10 11:00	
COC Number		699308	699308	
	UNITS	S105	S205	QC Batch
Miscellaneous Parameters				
Subcontract Parameter	N/A	ATTACHED	ATTACHED	8402891
QC Batch = Quality Control Batch				



BUREAU
VERITAS

Bureau Veritas Job #: C3D4815
Report Date: 2023/05/25

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.0°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3D4815
Report Date: 2023/05/25

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Grace (Hongmei) Zhao, Project Manager

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #:	104888	Work ID:	C3D4815
Description:	C3D4815	Report To:	Grace Zhao
Client:	Bureau Veritas Laboratories		Bureau Veritas Canada
Profile:	Non-regulated Water Sampling		6740 Campobello Rd
Sampled By:	Zahra Parhizgari		Mississauga, ON L5N 2L8
Sample Count:	2		Canada
Authorized by:	Jennifer Koene-Fenton, Laboratory Superintendent		

Workorder Summary

Analysis Results Comments

10488801 (1) - Coelosphaerium

Estimate

10488801 (1) - Microcystis

Estimate

10488801 (1) - Specimen A

Pseudanabaena

10488801 (1) - Specimen B

Woronichinia

Estimate

10488801 (1) - Total Cells

Only Cyanobacterial genera reported as per client request.

10488802 (2) - Coelosphaerium

Estimate

10488802 (2) - Microcystis

Estimate

10488802 (2) - Specimen A

Woronichinia

Estimate

10488802 (2) - Total Cells

Only Cyanobacterial genera reported as per client request.



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 104888

Work ID:

C3D4815

Analytical Results

Lab ID: 10488801	Sample ID: 1	Criteria: N/A	Date Received: 5/15/2023
Matrix: Water	Location: S105		Date Collected: 5/10/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Coelosphaerium	2400	cells/mL		1	1		05/15/2023	05/23/2023	*
Gleocapsa	30	cells/mL		1	1		05/15/2023	05/23/2023	
Microcystis	3300	cells/mL		1	1		05/15/2023	05/23/2023	*
Specimen A	100	cells/mL		1	1		05/15/2023	05/23/2023	*
Specimen B	2100	cells/mL		1	1		05/15/2023	05/23/2023	*
Total Cells	7900	cells/mL		1	1		05/15/2023	05/23/2023	*

Lab ID: 10488802	Sample ID: 2	Criteria: N/A	Date Received: 5/15/2023
Matrix: Water	Location: S205		Date Collected: 5/10/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Coelosphaerium	3500	cells/mL		1	1		05/15/2023	05/22/2023	*
Gleocapsa	34	cells/mL		1	1		05/15/2023	05/22/2023	
Merismopedia	24	cells/mL		1	1		05/15/2023	05/22/2023	
Microcystis	3500	cells/mL		1	1		05/15/2023	05/22/2023	*
Specimen A	1300	cells/mL		1	1		05/15/2023	05/22/2023	*
Total Cells	8300	cells/mL		1	1		05/15/2023	05/22/2023	*

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 104888

Work ID:

C3D4815

Page 1 of 1



York-Durham
Regional Environmental Laboratory

901 McKay Road, Pickering ON L1W 3A3 Toll Free: 1-877-551-8877 Local: 905-686-0041
Fax: 905-686-0664 Email: rel@durham.ca Web: www.durham.ca

C3D4815

Non-regulated Water, Wastewater, Biosolid, Soil Chain of Custody Form

Client Information		Invoice To (leave blank if same as Client)		Report to (email address)	
Company Name: Bureau Veritas Canada		Company:		1) hongmei.zhao@bureauveritas.com	
Facility Name:				2)	
Facility Address: 6740 Campobello Rd.		Quote #:		3)	
Facility Contact: Grace Zhao		PO #:		4)	
Email: hongmei.zhao@bureauveritas.com		Tel:		5)	
Project Information (if applicable)				Standard Turnaround Time (TAT) is 10 business days <input type="checkbox"/> *RUSH *Rush TAT requires lab approval in advance. Surcharge will apply.	
Description: C3D4815					

Sample(s) Information		Collection		Container			Chlorine		Apply Criteria				
Lab ID (lab use only)	Field ID	Location/Description/Comment(s)	Matrix	Type	mm-dd-yy	HH:MM	Test Group(s)	Type	Sent	Rec'd	Free	Total	(Y/N) (*1)
01	01 ^{PK}	S105	W	Surface	5-10-23	10:30	Algae/cells(Cyanobacteria)			1			
02	02 ^{PK}	S205	W	Surface	5-10-23	11:00	Algae/cells(Cyanobacteria)			1			

Sampled By: Zahra Parhizgari	Tel: _____	(1) Select One Applicable Criteria Provide Municipality / City / Description <input type="checkbox"/> Sanitary Sewer Use By-law _____ <input type="checkbox"/> Storm Sewer Use By-law _____ <input checked="" type="checkbox"/> New Water Main * _____ <input type="checkbox"/> Other _____
Relinquished By (Print/Sign): Grace Zhao	Date/Time: 2023/05/12	

LABORATORY USE ONLY

Delivery Method: Courier Drop Off YDREL Pickup

Sorted by: _____ Labelled by: _____

Checked by: _____ Proofed by: _____ WO #: 104888

Barcode: 104888

Received Date/Time: MAY 15 2023 8:28

Received By: PK

Comments: Sample is preserved, external container SEE LIMS FOR ATTACHED ANAL May 15, 2023

REL-COC-NONREG-NOV-2019-REV-1

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Custody Tracking Form



Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
 Last Sample: S205
 Sample Count: 2

Relinquished By				Received By			
Zahra Parhizgan	Z Parhizgan	Date	2023/05/10	KALGI SOLADHARA	Kalgi	Date	2023/05/11
		Time (24 HR)	14:30			Time (24 HR)	15:56
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Zahra parhizgan

2

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

***** LABORATORY USE ONLY *****

Received At

Labeled By

Verified By

Lab Comments:

11-May-23 15:56
 Grace (Hongmei) Zhao

C3D4815

SVD ENV 1511

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
y	y	y	3	3	3
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

COR FCD-00383/4



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 706256

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/05/31
 Report #: R7651035
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3E9242

Received: 2023/05/25, 14:40

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/05/29	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/05/30	CAM SOP-00412	SM 23 2120C m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/05/27	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/05/30	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2023/05/26	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	2	N/A	2023/05/29	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/05/26	2023/05/26	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/05/29	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/05/29	2023/05/30	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/05/29	2023/05/30	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 706256

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/05/31
Report #: R7651035
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3E9242

Received: 2023/05/25, 14:40

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Grace (Hongmei) Zhao
Project Manager
31 May 2023 16:01:09

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C3E9242

Report Date: 2023/05/31

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		VXH735			VXH736			VXH737		
Sampling Date		2023/05/24 10:30			2023/05/24 10:45			2023/05/24 11:00		
COC Number		706256			706256			706256		
	UNITS	S105	RDL	QC Batch	S115	RDL	QC Batch	S205	RDL	QC Batch

Inorganics										
Total Ammonia-N	mg/L	ND	0.050	8690792	ND	0.050	8690792	ND	0.050	8690792
Colour	TCU	10	2	8690603				11	2	8690603
Total Kjeldahl Nitrogen (TKN)	mg/L	0.60	0.10	8690727	0.57	0.10	8690727	0.58	0.10	8690727
Dissolved Organic Carbon	mg/L	8.6	0.40	8687034				8.5	0.40	8687034
Orthophosphate (P)	mg/L	ND	0.004	8687360	ND	0.004	8687360	0.006	0.004	8687360
pH	pH	9.04		8687246				8.61		8687246
Total Phosphorus	mg/L	0.014	0.004	8690709	0.010	0.004	8690709	0.014	0.004	8690709
Dissolved Chloride (Cl-)	mg/L	330	4.0	8687418				330	3.0	8687418
Nitrite (N)	mg/L	ND	0.010	8686890	ND	0.010	8687516	ND	0.010	8686890
Nitrate (N)	mg/L	ND	0.10	8686890	ND	0.10	8687516	ND	0.10	8686890
Nitrate + Nitrite (N)	mg/L	ND	0.10	8686890	ND	0.10	8687516	ND	0.10	8686890

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



BUREAU
VERITAS

Bureau Veritas Job #: C3E9242
Report Date: 2023/05/31

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3E9242

Report Date: 2023/05/31

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8686890	Nitrate (N)	2023/05/26	102	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8686890	Nitrite (N)	2023/05/26	107	80 - 120	106	80 - 120	ND, RDL=0.010	mg/L				
8687034	Dissolved Organic Carbon	2023/05/27	98	80 - 120	101	80 - 120	ND, RDL=0.40	mg/L	0.93	20		
8687246	pH	2023/05/26			102	98 - 103			0.11	N/A		
8687360	Orthophosphate (P)	2023/05/29	78 (1)	80 - 120	98	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8687418	Dissolved Chloride (Cl-)	2023/05/29	NC	80 - 120	99	80 - 120	ND, RDL=1.0	mg/L	14	20		
8687516	Nitrate (N)	2023/05/29	97	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8687516	Nitrite (N)	2023/05/29	103	80 - 120	105	80 - 120	ND, RDL=0.010	mg/L				
8690603	Colour	2023/05/30			99	80 - 120	ND,RDL=2	TCU	4.6	25		
8690709	Total Phosphorus	2023/05/30	102	80 - 120	99	80 - 120	ND, RDL=0.004	mg/L	NC	20	102	80 - 120
8690727	Total Kjeldahl Nitrogen (TKN)	2023/05/30	102	80 - 120	103	80 - 120	ND, RDL=0.10	mg/L	12	20	99	80 - 120
8690792	Total Ammonia-N	2023/05/30	101	75 - 125	96	80 - 120	ND, RDL=0.050	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



BUREAU
VERITAS

Bureau Veritas Job #: C3E9242
Report Date: 2023/05/31

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

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Custody Tracking Form



T706256

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S205
Sample Count: 3

Relinquished By				Received By			
Print Zahra Parhizgar	Sign Z Parhizgar	Date 2023/05/24	Time (24 HR) 14:00	Print RUPINDER	Sign Rupinder	Date 2023/05/25	Time (24 HR) 14:40
Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM	Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM
Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM	Print	Sign	Date YYYY/MM/DD	Time (24 HR) HH:MM

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Triage Information

Sampled By (Print)

Zahra Parhizgar

of Coolers/Pkgs:

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

25-May-23 14:40
Grace (Hongmei) Zhao
C3E9242
RPK ENV-1715

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	4	4	3
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

COR FCD-00383/4



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 713650

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/06/20
 Report #: R7680776
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3G4182

Received: 2023/06/07, 16:30

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	3	N/A	2023/06/12	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/06/13	CAM SOP-00412	SM 23 2120C m
Conductivity	1	N/A	2023/06/08	CAM SOP-00414	SM 23 2510 m
Conductivity	2	N/A	2023/06/09	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (2)	1	N/A	2023/06/08	CAM SOP-00446	SM 23 5310 B m
Dissolved Organic Carbon (DOC) (2)	1	N/A	2023/06/09	CAM SOP-00446	SM 23 5310 B m
Chlorophyll and Pheophytin in Water (1)	1	2023/06/14	2023/06/14	CAL SOP-00273	SM 23 10200H m
Total Ammonia-N	3	N/A	2023/06/12	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (3)	3	N/A	2023/06/09	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/06/08	2023/06/09	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/06/09	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/06/09	2023/06/09	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/06/09	2023/06/09	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 713650

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/06/20
Report #: R7680776
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3G4182

Received: 2023/06/07, 16:30

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary (19th), 4000 19th Street NE , Calgary, AB, T2E 6P8
- (2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Grace (Hongmei) Zhao
Project Manager
21 Jun 2023 09:42:36

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C3G4182

Report Date: 2023/06/20

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WAM204			WAM205			WAM206		
Sampling Date		2023/06/07 10:00			2023/06/07 11:00			2023/06/07 10:30		
COC Number		713650			713650			713650		
	UNITS	S105	RDL	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.11	0.050	8715074	ND	0.050	8715074	ND	0.050	8715074
Colour	TCU	11	2	8712803	14	2	8712803			
Conductivity	umho/cm	1500	1.0	8712675	1500	1.0	8712675	1500	1.0	8712712
Total Kjeldahl Nitrogen (TKN)	mg/L	0.57	0.10	8715267	0.67	0.10	8715267	0.74	0.10	8715267
Dissolved Organic Carbon	mg/L	8.2	0.40	8713942	8.6	0.40	8713809			
Orthophosphate (P)	mg/L	0.011	0.004	8712472	0.014	0.004	8712472	ND	0.004	8712472
pH	pH	8.98		8712671	8.61		8712671			
Total Phosphorus	mg/L	0.013	0.004	8715281	0.021	0.004	8715281	0.012	0.004	8715281
Dissolved Chloride (Cl-)	mg/L	350	5.0	8712734	360	5.0	8712734	360	5.0	8712734
Nitrite (N)	mg/L	ND	0.010	8713301	ND	0.010	8713301	ND	0.010	8713301
Nitrate (N)	mg/L	ND	0.10	8713301	ND	0.10	8713301	ND	0.10	8713301
Nitrate + Nitrite (N)	mg/L	ND	0.10	8713301	ND	0.10	8713301	ND	0.10	8713301
Miscellaneous Parameters										
Chlorophyll a	ug/L	11 (1)	1.1	8740135						
Chlorophyll c	ug/L	ND (2)	1.1	8740135						
Pheophytin a	ug/L	1.2 (2)	1.1	8740135						
<p>RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit. (1) Detection limit raised due to sample volume used for analysis. Spike exceeds method criteria of 80-120% with value of 131.804%. Unable to reanalyze due to method requirements. (2) Detection limit raised due to sample volume used for analysis.</p>										



BUREAU
VERITAS

Bureau Veritas Job #: C3G4182
Report Date: 2023/06/20

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3G4182

Report Date: 2023/06/20

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8712472	Orthophosphate (P)	2023/06/09	94	80 - 120	94	80 - 120	ND, RDL=0.004	mg/L	1.5	20		
8712671	pH	2023/06/09			102	98 - 103			0.16	N/A		
8712675	Conductivity	2023/06/09			101	85 - 115	ND, RDL=1.0	umho/cm	0	10		
8712712	Conductivity	2023/06/08			101	85 - 115	ND, RDL=1.0	umho/cm	0.72	10		
8712734	Dissolved Chloride (Cl-)	2023/06/12	NC	80 - 120	91	80 - 120	ND, RDL=1.0	mg/L	1.7	20		
8712803	Colour	2023/06/13			99	80 - 120	ND, RDL=2	TCU	7.9	25		
8713301	Nitrate (N)	2023/06/09	NC	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	0.12	20		
8713301	Nitrite (N)	2023/06/09	96	80 - 120	102	80 - 120	ND, RDL=0.010	mg/L	0.22	20		
8713809	Dissolved Organic Carbon	2023/06/09	90	80 - 120	96	80 - 120	ND, RDL=0.40	mg/L	9.5	20		
8713942	Dissolved Organic Carbon	2023/06/08	94	80 - 120	97	80 - 120	ND, RDL=0.40	mg/L	4.6	20		
8715074	Total Ammonia-N	2023/06/12	107	75 - 125	100	80 - 120	ND, RDL=0.050	mg/L	NC	20		
8715267	Total Kjeldahl Nitrogen (TKN)	2023/06/09	108	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	2.7	20	100	80 - 120
8715281	Total Phosphorus	2023/06/09	102	80 - 120	104	80 - 120	ND, RDL=0.004	mg/L	17	20	98	80 - 120
8740135	Chlorophyll a	2023/06/14			132 (1)	80 - 120	ND, RDL=0.53	ug/L				
8740135	Chlorophyll c	2023/06/14					ND, RDL=0.53	ug/L				



BUREAU
VERITAS

Bureau Veritas Job #: C3G4182

Report Date: 2023/06/20

QUALITY ASSURANCE REPORT(CONT'D)

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8740135	Pheophytin a	2023/06/14					0.75, RDL=0.53	ug/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



BUREAU
VERITAS

Bureau Veritas Job #: C3G4182
Report Date: 2023/06/20

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

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York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106137

Work ID:

C3G4182

Workorder Summary

Analysis Results Comments

10613702 (2) - *Microcystis*

Estimate

10613702 (2) - *Small Unidentifiable Algae*

Estimate

10613702 (2) - *Specimen A*

Pseudanabaena

Estimate

10613702 (2) - *Specimen B*

Woronchinia

Estimate

10613702 (2) - *Total Cells*

Estimate

10613702 (2) - *Uncharacterized Algae*

Pseudofilament, irregularly shaped cluster of cells with firm mucilaginous sheath. Possibly cyanobacteria genera Hyella.



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106137

Work ID:

C3G4182

Analytical Results

Lab ID: 10613701	Sample ID: 1	Criteria: N/A	Date Received: 6/9/2023
Matrix: Water	Location: S105		Date Collected: 6/7/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	33000	cells/mL		10	1		06/09/2023	06/14/2023	*
Chroococcus	12	cells/mL		1	1		06/09/2023	06/14/2023	
Merismopedia	740	cells/mL		1	1		06/09/2023	06/14/2023	
Microcystis	12000	cells/mL		10	1		06/09/2023	06/14/2023	*
Small Unidentifiable Algae	3000	cells/mL		10	1		06/09/2023	06/14/2023	*
Specimen A	390	cells/mL		10	1		06/09/2023	06/14/2023	*
Specimen B	18000	cells/mL		10	1		06/09/2023	06/14/2023	*
Total Cells	68000	cells/mL		10	1		06/09/2023	06/14/2023	*

Lab ID: 10613702	Sample ID: 2	Criteria: N/A	Date Received: 6/9/2023
Matrix: Water	Location: S205		Date Collected: 6/7/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	24000	cells/mL		10	1		06/09/2023	06/14/2023	*
Chroococcus	6	cells/mL		1	1		06/09/2023	06/14/2023	
Merismopedia	200	cells/mL		1	1		06/09/2023	06/14/2023	
Microcystis	4600	cells/mL		10	1		06/09/2023	06/14/2023	*
Small Unidentifiable Algae	3000	cells/mL		10	1		06/09/2023	06/14/2023	*
Specimen A	550	cells/mL		1	1		06/09/2023	06/14/2023	*
Specimen B	12000	cells/mL		10	1		06/09/2023	06/14/2023	*
Total Cells	44000	cells/mL		10	1		06/09/2023	06/14/2023	*
Uncharacterized Algae	29	cells/mL		1	1		06/09/2023	06/14/2023	*

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106137

Work ID:

C3G4182

Page 1 of _____



York-Durham Regional Environmental Laboratory

901 McKay Road, Pickering ON L1W 3A3 Toll Free: 1-877-551-8877 Local: 905-686-0041

Fax: 905-686-0664 Email: rel@durham.ca Web: www.durham.ca


C3G4182

Non-regulated Water,
Wastewater, Biosolid, Soil
Chain of Custody Form *KP*

Client Information		Invoice To (leave blank if same as Client)		Report to (email address)	
Company Name: Bureau Veritas Canada		Company:		1) hongmei.zhao@bureauveritas.com	
Facility Name:		Quote #:		2)	
Facility Address: 6740 Campobello Rd.		PO #:		3)	
Facility Contact: Grace Zhao		Tel:		4)	
Email: hongmei.zhao@bureauveritas.com		Standard Turnaround Time (TAT) is 10 business days <input type="checkbox"/> *RUSH		*Rush TAT requires lab approval in advance. Surcharge will apply.	
Description: C3G4182					

Sample(s) Information			Collection				Container			Chlorine		Apply Criteria (Y/N) (*1)
Lab ID (lab use only)	Field ID	Location/Description/Comment(s)	Matrix	Type	mm-dd-yy	HH:MM	Test Group(s)	Type	Sent	Rec'd	Free	
01		S105	W	Surface	6-07-23	10:00	Algae cells (Cyanobacteria)					
02		S205	W	Surface	6-07-23	11:00	Algae cells (Cyanobacteria)					

Sampled By: <u>Zahra Parhizgari</u>	Tel: _____	(1) Select One Applicable Criteria Provide Municipality / City / Description <input type="checkbox"/> Sanitary Sewer Use By-law _____ <input type="checkbox"/> Storm Sewer Use By-law _____ <input type="checkbox"/> New Water Main _____ <input type="checkbox"/> Other _____
Relinquished By (Print/Sign): <u>Grace Zhao</u>	Date/Time: <u>2023/06/08</u>	

LABORATORY USE ONLY		
Delivery Method: Courier <input type="checkbox"/> Drop Off <input type="checkbox"/> YDREL Pickup <input checked="" type="checkbox"/>	Sorted by: _____	Labelled by: <u>KE</u>
Checked by: _____	Proofed by: _____	WO #: <u>106137</u>
		ived Date/Time: _____ ived By: <u>KE</u> ments: _____
REL-COC-NONREG-NOV-2019-REV-1		JUN 9 2023 10:47

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



Custody Tracking Form



T713650-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3 (Swan Lake)

Relinquished By				Received By			
<i>Zahra Parkizadeh</i>	<i>Z Parkizadeh</i>	Date	2023/06/07	<i>RUPINDER</i>	<i>Rupinder</i>	Date	2023/06/07
		Time (24 HR)	12:30			Time (24 HR)	16:30
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print)

Zahra Parkizadeh

of Coolers/Pkgs:

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

07-Jun-23 16:30
Grace (Hongmei) Zhao
C3G4182

RUK ENV-623

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	6	4	9

Drinking Water Metals Preservation Check Done (Circle) YES NO

COR FCD-00383/4

Page 1 of 1



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 721753

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/07/19
 Report #: R7725198
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C313522

Received: 2023/06/22, 15:33

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	3	N/A	2023/06/26	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/06/27	CAM SOP-00412	SM 23 2120C m
Conductivity	3	N/A	2023/06/24	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (2)	2	N/A	2023/06/26	CAM SOP-00446	SM 23 5310 B m
Chlorophyll and Pheophytin in Water (1)	1	2023/06/28	2023/06/29	CAL SOP-00273	SM 23 10200H m
Total Ammonia-N	3	N/A	2023/06/25	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (3)	3	N/A	2023/06/24	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/06/23	2023/06/24	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/06/25	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/06/23	2023/06/26	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/06/23	2023/06/26	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 721753

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/07/19
Report #: R7725198
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C313522

Received: 2023/06/22, 15:33

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary (19th), 4000 19th Street NE , Calgary, AB, T2E 6P8
- (2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Grace (Hongmei) Zhao
Project Manager
20 Jul 2023 11:12:29

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C313522
Report Date: 2023/07/19

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WEM682			WEM683			WEM684		
Sampling Date		2023/06/21 10:30			2023/06/21 11:00			2023/06/21 10:45		
COC Number		721753			721753			721753		
	UNITS	S105	RDL	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch

Inorganics										
Total Ammonia-N	mg/L	ND	0.050	8749009	ND	0.050	8749019	ND	0.050	8749009
Colour	TCU	8	2	8753405	9	2	8753405			
Conductivity	umho/cm	1400	1.0	8750134	1400	1.0	8750134	1400	1.0	8750134
Total Kjeldahl Nitrogen (TKN)	mg/L	0.58	0.10	8748598	0.56	0.10	8748598	0.51	0.10	8748598
Dissolved Organic Carbon	mg/L	7.3	0.40	8751105	7.7	0.40	8751103			
Orthophosphate (P)	mg/L	ND	0.004	8750120	0.010	0.004	8750120	0.010	0.004	8750120
pH	pH	9.20		8750136	8.97		8750136			
Total Phosphorus	mg/L	0.010	0.004	8748607	0.012	0.004	8748607	0.013	0.004	8748607
Dissolved Chloride (Cl-)	mg/L	380	3.0	8750087	390	3.0	8750087	380	3.0	8750087
Nitrite (N)	mg/L	ND	0.010	8750060	ND	0.010	8750060	ND	0.010	8750060
Nitrate (N)	mg/L	ND	0.10	8750060	ND	0.10	8750060	ND	0.10	8750060
Nitrate + Nitrite (N)	mg/L	ND	0.10	8750060	ND	0.10	8750060	ND	0.10	8750060

Miscellaneous Parameters										
Chlorophyll a	ug/L	3.3 (1)	1.1	8761032						
Chlorophyll c	ug/L	ND (1)	1.1	8761032						
Phaeophytin a	ug/L	4.0 (1)	1.1	8761032						

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
 (1) Detection limit raised due to sample volume used for analysis.



BUREAU
VERITAS

Bureau Veritas Job #: C313522
Report Date: 2023/07/19

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.7°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C313522

Report Date: 2023/07/19

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8748598	Total Kjeldahl Nitrogen (TKN)	2023/06/26	113	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	4.6	20	99	80 - 120
8748607	Total Phosphorus	2023/06/26	103	80 - 120	101	80 - 120	ND, RDL=0.004	mg/L	5.7	20	105	80 - 120
8749009	Total Ammonia-N	2023/06/25	96	75 - 125	97	80 - 120	ND, RDL=0.050	mg/L	NC	20		
8749019	Total Ammonia-N	2023/06/25	96	75 - 125	98	80 - 120	ND, RDL=0.050	mg/L				
8750060	Nitrate (N)	2023/06/24	101	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	0.61	20		
8750060	Nitrite (N)	2023/06/24	105	80 - 120	104	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8750087	Dissolved Chloride (Cl-)	2023/06/26	NC	80 - 120	107	80 - 120	ND, RDL=1.0	mg/L	0.18	20		
8750120	Orthophosphate (P)	2023/06/25	92	80 - 120	94	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8750134	Conductivity	2023/06/24			101	85 - 115	ND, RDL=1.0	umho/cm	0.31	10		
8750136	pH	2023/06/24			101	98 - 103			0.54	N/A		
8751103	Dissolved Organic Carbon	2023/06/26	96	80 - 120	95	80 - 120	ND, RDL=0.40	mg/L	0.99	20		
8751105	Dissolved Organic Carbon	2023/06/26	93	80 - 120	97	80 - 120	ND, RDL=0.40	mg/L	3.5	20		
8753405	Colour	2023/06/27			101	80 - 120	ND, RDL=2	TCU	NC	25		
8761032	Chlorophyll a	2023/06/29			110	80 - 120	ND, RDL=0.53	ug/L				
8761032	Chlorophyll c	2023/06/29					ND, RDL=0.53	ug/L				



BUREAU
VERITAS

Bureau Veritas Job #: C313522

Report Date: 2023/07/19

QUALITY ASSURANCE REPORT(CONT'D)

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8761032	Pheophytin a	2023/06/29					ND, RDL=0.53	ug/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C313522
Report Date: 2023/07/19

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Suwan

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

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York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106867 **Work ID:** C313522

Description: C313522

Client: Bureau Veritas Laboratories **Report To:** Hongmei Zhao

Profile: Non-regulated Water Sampling **Bureau Veritas Canada**

Sampled By: Zahra Parhizgari **6740 Campobello Rd.**

Sample Count: 2 **Mississauga, ON L5N 2L8**

Authorized by: Jennifer Koene-Fenton, Laboratory Superintendent

Workorder Summary

Sample Comments

10686701 (1) - Surface Water

Cyanobacterial specimens reported only as per client request.

10686702 (2) - Surface Water

Cyanobacterial specimens reported only as per client request.

Task Comments

10686701 - 4823393 - MBI/75325

A 10 x dilution was required to enumerate several genera. The values reported have been adjusted accordingly and are estimated values.

10686702 - 4823396 - MBI/75326

A 10 x dilution was required to enumerate several genera. The values reported have been adjusted accordingly and are estimated values.

Analysis Results Comments

10686701 (1) - Aphanocapsa

Estimate

10686701 (1) - Gleocapsa

Estimate

10686701 (1) - Gomphosphaeria

Estimate

10686701 (1) - Merismopedia

Estimate

10686701 (1) - Microcystis

Estimate

10686701 (1) - Small Unidentifiable Algae

Estimate

Report Date: 7/6/2023 3:33:58 PM

Report ID: 106867-4848748

Page 1 of 5

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106867

Work ID:

C3I3522

Workorder Summary

Analysis Results Comments

10686701 (1) - Specimen A

Pseudanabaena

Estimate

10686701 (1) - Specimen B

Aphanizomenon

10686701 (1) - Specimen C

Snowella

Estimate

10686701 (1) - Specimen D

Woronichinia

Estimate

10686702 (2) - Aphanocapsa

Estimate

10686702 (2) - Gleocapsa

Estimate

10686702 (2) - Gomphosphaeria

Estimate

10686702 (2) - Merismopedia

Estimate

10686702 (2) - Microcystis

Estimate

10686702 (2) - Small Unidentifiable Algae

Estimate

10686702 (2) - Specimen A

Pseudanabaena

10686702 (2) - Specimen B

Snowella

Estimate

10686702 (2) - Specimen C

Woronichinia

Estimate

Report Date: 7/6/2023 3:33:58 PM

Report ID: 106867-4848748

Page 2 of 5

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106867

Work ID:

C3I3522

Workorder Summary

Analysis Results Comments

10686702 (2) - Uncharacterized Algae

Single trichome observed, possibly from the genus Calothrix.

Analytical Results

Lab ID: 10686701	Sample ID: 1	Criteria: N/A	Date Received: 6/26/2023
Matrix: Water	Location: S105		Date Collected: 6/21/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Anabaena	100	cells/mL		1	1		06/26/2023	07/03/2023	
Aphanocapsa	91000	cells/mL		10	1		06/26/2023	07/03/2023	*
Chroococcus	45	cells/mL		1	1		06/26/2023	07/03/2023	
Gleocapsa	680	cells/mL		1	1		06/26/2023	07/03/2023	*
Gomphosphaeria	1800	cells/mL		10	1		06/26/2023	07/03/2023	*
Merismopedia	2400	cells/mL		10	1		06/26/2023	07/03/2023	*
Microcystis	25000	cells/mL		10	1		06/26/2023	07/03/2023	*
Small Unidentifiable Algae	2900	cells/mL		10	1		06/26/2023	07/03/2023	*
Specimen A	1100	cells/mL		1	1		06/26/2023	07/03/2023	*
Specimen B	30	cells/mL		1	1		06/26/2023	07/03/2023	*
Specimen C	430	cells/mL		1	1		06/26/2023	07/03/2023	*
Specimen D	32000	cells/mL		10	1		06/26/2023	07/03/2023	*
Total Cells	160000	cells/mL		10	1		06/26/2023	07/03/2023	

Report Date: 7/6/2023 3:33:58 PM

Report ID: 106867-4848748

Page 3 of 5

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 106867

Work ID:

C313522

Analytical Results

Lab ID: 10686702	Sample ID: 2	Criteria: N/A	Date Received: 6/26/2023
Matrix: Water	Location: S205		Date Collected: 6/21/2023
Type: Surface Water	Description:		

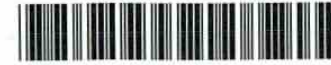
Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	120000	cells/mL		10	1		06/26/2023	07/06/2023	*
Chroococcus	24	cells/mL		1	1		06/26/2023	07/06/2023	
Gleocapsa	490	cells/mL		1	1		06/26/2023	07/06/2023	*
Gomphosphaeria	2700	cells/mL		10	1		06/26/2023	07/06/2023	*
Merismopedia	2500	cells/mL		10	1		06/26/2023	07/06/2023	*
Microcystis	20000	cells/mL		10	1		06/26/2023	07/06/2023	*
Small Unidentifiable Algae	3900	cells/mL		10	1		06/26/2023	07/06/2023	*
Specimen A	500	cells/mL		1	1		06/26/2023	07/06/2023	*
Specimen B	8600	cells/mL		10	1		06/26/2023	07/06/2023	*
Specimen C	79000	cells/mL		10	1		06/26/2023	07/06/2023	*
Total Cells	230000	cells/mL		10	1		06/26/2023	07/06/2023	
Uncharacterized Algae	21	cells/mL		1	1		06/26/2023	07/06/2023	*

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



Custody Tracking Form



T721753-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By				Received By			
<i>Zahra Parhizgari</i>	<i>Zahra Parhizgari</i>	Date	2023/06/21	<i>Alan</i>	<i>Alan</i>	Date	2023/06/22
		Time (24 HR)	13:40			Time (24 HR)	15:33
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Zahra Parhizgari *1*

Rush Immediate Test Food Residue

Micro Food Chemistry

*** LABORATORY USE ONLY ***

Received At:

Labeled By:

Verified By:

Lab Comments:

22-Jun-23 15:33
Grace (Hongmei) Zhao
C3I3522
L ENV-857

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
<i>Y</i>	<i>Y</i>	<i>Y</i>	<i>6</i>	<i>2</i>	<i>6</i>

Drinking Water Metals Preservation Check Done (Circle) **YES** **NO**

COR FCD-00383/4



Your P.O. #: PB22006
Your C.O.C. #: 732663

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/07/19
Report #: R7724533
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3K7834

Received: 2023/07/13, 15:45

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	3	N/A	2023/07/17	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/07/14	CAM SOP-00412	SM 23 2120C m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/07/14	CAM SOP-00446	SM 23 5310 B m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/07/17	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/07/14	2023/07/14	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/07/17	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/07/17	2023/07/18	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/07/17	2023/07/18	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.



Your P.O. #: PB22006
Your C.O.C. #: 732663

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/07/19
Report #: R7724533
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3K7834

Received: 2023/07/13, 15:45

Encryption Key

Grace (Hongmei) Zhao
Project Manager
19 Jul 2023 16:08:42

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WJN131	WJN132			WJN133		
Sampling Date		2023/07/12 11:30	2023/07/12 12:00			2023/07/12 11:45		
COC Number		732663	732663			732663		
	UNITS	S105	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics								
Colour	TCU	9	11	2	8789030			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.51	0.47	0.10	8793623	0.47	0.10	8793623
Dissolved Organic Carbon	mg/L	7.1	7.4	0.40	8789710			
Orthophosphate (P)	mg/L	0.006	ND	0.004	8789592	0.009	0.004	8789592
pH	pH	9.47	9.30		8789971			
Total Phosphorus	mg/L	0.030	0.033	0.004	8793403	0.024	0.004	8793403
Dissolved Chloride (Cl-)	mg/L	330	350	3.0	8790210	340	3.0	8790210
Nitrite (N)	mg/L	ND	ND	0.010	8790170	ND	0.010	8790170
Nitrate (N)	mg/L	ND	ND	0.10	8790170	ND	0.10	8790170
Nitrate + Nitrite (N)	mg/L	ND	ND	0.10	8790170	ND	0.10	8790170
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.0°C
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Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3K7834

Report Date: 2023/07/19

QUALITY ASSURANCE REPORT

City of Markham
Your P.O. #: PB22006

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8789030	Colour	2023/07/14			101	80 - 120	ND,RDL=2	TCU	0	25		
8789592	Orthophosphate (P)	2023/07/17	82	80 - 120	93	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8789710	Dissolved Organic Carbon	2023/07/14	94	80 - 120	96	80 - 120	ND, RDL=0.40	mg/L	1.9	20		
8789971	pH	2023/07/14			102	98 - 103			0.057	N/A		
8790170	Nitrate (N)	2023/07/17	103	80 - 120	101	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8790170	Nitrite (N)	2023/07/17	108	80 - 120	101	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8790210	Dissolved Chloride (Cl-)	2023/07/17	NC	80 - 120	95	80 - 120	ND, RDL=1.0	mg/L	1.8	20		
8793403	Total Phosphorus	2023/07/18	95	80 - 120	104	80 - 120	ND, RDL=0.004	mg/L	10	20	104	80 - 120
8793623	Total Kjeldahl Nitrogen (TKN)	2023/07/18	NC	80 - 120	91	80 - 120	ND, RDL=0.10	mg/L	20	20	99	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3K7834
Report Date: 2023/07/19

City of Markham
Your P.O. #: PB22006

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



Custody Tracking Form



T732663

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By			Received By		
Zahra Parhizgar	Z Parhizgar	Date: 2023/07/12 Time (24 HR): 15:00	ALM	ALM	Date: 2023/07/13 Time (24 HR): 15:45
Print	Sign	Date: YYYY/MM/DD Time (24 HR): HH:MM	Print	Sign	Date: YYYY/MM/DD Time (24 HR): HH:MM
Print	Sign	Date: YYYY/MM/DD Time (24 HR): HH:MM	Print	Sign	Date: YYYY/MM/DD Time (24 HR): HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print)

of Coolers/Pkgs:

Zahra Parhizgar

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

13-Jul-23 15:45

Grace (Hongmei) Zhao



C3K7834

N4 ENV-857

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	3	1	2
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

COR FCD-00383/4



Bureau Veritas - Partial/Rush Results

Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 738869

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/01
Report #: R7745358
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C3M1817

Received: 2023/07/25, 15:32

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/07/31	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/07/27	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/07/28	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/07/27	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/07/31	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/07/27	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/07/26	2023/07/28	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/07/27	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	1	2023/07/26	2023/07/27	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	2	2023/07/26	2023/07/28	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/07/26	2023/07/27	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Bureau Veritas - Partial/Rush Results

Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 738869

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/01
Report #: R7745358
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C3M1817

Received: 2023/07/25, 15:32

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
01 Aug 2023 16:27:02

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====
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For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WMM564		WMM565			WMM566		
Sampling Date		2023/07/24 10:30		2023/07/24 11:00			2023/07/24 10:45		
COC Number		738869		738869			738869		
	UNITS	S105	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	8815647	ND	0.050	8815647	ND	0.050	8815647
Colour	TCU	14	8812070	12	2	8812070			
Conductivity	umho/cm	1300	8815085	1300	1.0	8815085			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.47	8814719	0.46	0.10	8814719	0.43	0.10	8814719
Dissolved Organic Carbon	mg/L	7.8	8813192	6.8	0.40	8813192			
Orthophosphate (P)	mg/L	ND	8813941	ND	0.004	8813941	ND	0.004	8813941
pH	pH	9.08	8815082	8.83		8815082			
Total Phosphorus	mg/L	0.013	8813465	0.014	0.004	8813465	0.009	0.004	8813465
Dissolved Chloride (Cl-)	mg/L	330	8814256	360	4.0	8814256			
Nitrite (N)	mg/L	ND	8813820	ND	0.010	8814241	ND	0.010	8814241
Nitrate (N)	mg/L	ND	8813820	ND	0.10	8814241	ND	0.10	8814241
Nitrate + Nitrite (N)	mg/L	ND	8813820	ND	0.10	8814241	ND	0.10	8814241
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.									

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/01

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/01

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8812070	VRO	Spiked Blank	Colour	2023/07/27		97	%	80 - 120
8812070	VRO	Method Blank	Colour	2023/07/27	ND,RDL=2		TCU	
8812070	VRO	RPD	Colour	2023/07/27	NC		%	25
8813192	NS3	Matrix Spike	Dissolved Organic Carbon	2023/07/27		96	%	80 - 120
8813192	NS3	Spiked Blank	Dissolved Organic Carbon	2023/07/27		98	%	80 - 120
8813192	NS3	Method Blank	Dissolved Organic Carbon	2023/07/27	ND, RDL=0.40		mg/L	
8813192	NS3	RPD	Dissolved Organic Carbon	2023/07/27	0.27		%	20
8813465	MUM	Matrix Spike	Total Phosphorus	2023/07/28		103	%	80 - 120
8813465	MUM	QC Standard	Total Phosphorus	2023/07/27		109	%	80 - 120
8813465	MUM	Spiked Blank	Total Phosphorus	2023/07/27		103	%	80 - 120
8813465	MUM	Method Blank	Total Phosphorus	2023/07/27	ND, RDL=0.004		mg/L	
8813465	MUM	RPD	Total Phosphorus	2023/07/28	NC		%	20
8813820	C_N	Matrix Spike	Nitrite (N)	2023/07/27		90	%	80 - 120
			Nitrate (N)	2023/07/27		91	%	80 - 120
8813820	C_N	Spiked Blank	Nitrite (N)	2023/07/27		102	%	80 - 120
			Nitrate (N)	2023/07/27		93	%	80 - 120
8813820	C_N	Method Blank	Nitrite (N)	2023/07/27	ND, RDL=0.010		mg/L	
			Nitrate (N)	2023/07/27	ND, RDL=0.10		mg/L	
8813820	C_N	RPD	Nitrite (N)	2023/07/27	NC		%	20
			Nitrate (N)	2023/07/27	1.3		%	20
8813941	MJ1	Matrix Spike	Orthophosphate (P)	2023/07/27		93	%	80 - 120
8813941	MJ1	Spiked Blank	Orthophosphate (P)	2023/07/27		100	%	80 - 120
8813941	MJ1	Method Blank	Orthophosphate (P)	2023/07/27	ND, RDL=0.004		mg/L	
8813941	MJ1	RPD	Orthophosphate (P)	2023/07/27	NC		%	20
8814241	C_N	Matrix Spike [WMM565-01]	Nitrite (N)	2023/07/27		100	%	80 - 120
8814241	C_N	Spiked Blank	Nitrate (N)	2023/07/27		93	%	80 - 120
			Nitrite (N)	2023/07/27		102	%	80 - 120
			Nitrate (N)	2023/07/27		96	%	80 - 120
8814241	C_N	Method Blank	Nitrite (N)	2023/07/27	ND, RDL=0.010		mg/L	
			Nitrate (N)	2023/07/27	ND, RDL=0.10		mg/L	
8814241	C_N	RPD [WMM565-01]	Nitrite (N)	2023/07/27	NC		%	20
			Nitrate (N)	2023/07/27	NC		%	20
8814256	MJ1	Matrix Spike	Dissolved Chloride (Cl-)	2023/07/31		NC	%	80 - 120
8814256	MJ1	Spiked Blank	Dissolved Chloride (Cl-)	2023/07/31		95	%	80 - 120
8814256	MJ1	Method Blank	Dissolved Chloride (Cl-)	2023/07/31	ND, RDL=1.0		mg/L	
8814256	MJ1	RPD	Dissolved Chloride (Cl-)	2023/07/31	0.040		%	20
8814719	KJP	Matrix Spike [WMM566-02]	Total Kjeldahl Nitrogen (TKN)	2023/07/27		107	%	80 - 120
8814719	KJP	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/07/27		97	%	80 - 120
8814719	KJP	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/07/27		96	%	80 - 120
8814719	KJP	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/07/27	ND, RDL=0.10		mg/L	
8814719	KJP	RPD [WMM566-02]	Total Kjeldahl Nitrogen (TKN)	2023/07/27	11		%	20
8815082	SAU	Spiked Blank	pH	2023/07/27		102	%	98 - 103

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/01

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8815082	SAU	RPD	pH	2023/07/27	0.63		%	N/A
8815085	SAU	Spiked Blank	Conductivity	2023/07/27		102	%	85 - 115
8815085	SAU	Method Blank	Conductivity	2023/07/27	1.1, RDL=1.0		umho/cm	
8815085	SAU	RPD	Conductivity	2023/07/27	0		%	10
8815647	KPJ	Matrix Spike	Total Ammonia-N	2023/07/31		NC	%	75 - 125
8815647	KPJ	Spiked Blank	Total Ammonia-N	2023/07/31		99	%	80 - 120
8815647	KPJ	Method Blank	Total Ammonia-N	2023/07/31	ND, RDL=0.050		mg/L	
8815647	KPJ	RPD	Total Ammonia-N	2023/07/31	13		%	20
8818437	YPA	Matrix Spike	Dissolved Chloride (Cl-)	2023/07/31		NC	%	80 - 120
8818437	YPA	Spiked Blank	Dissolved Chloride (Cl-)	2023/07/31		98	%	80 - 120
8818437	YPA	Method Blank	Dissolved Chloride (Cl-)	2023/07/31	ND, RDL=1.0		mg/L	
8818437	YPA	RPD	Dissolved Chloride (Cl-)	2023/07/31	1.1		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/01

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

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Bureau Veritas - Partial/Rush Results



Custody Tracking Form



T738869-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By			Received By		
<small>Print</small> Zahra Parkhizgan	<small>Sign</small> <i>Z Parkhizgan</i>	Date 2023/07/24	<small>Print</small> Rupinder	<small>Sign</small> <i>Rupinder</i>	Date 2023/07/25
		Time (24 HR) 13:30			Time (24 HR) 15:32
<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD	<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD
		Time (24 HR) HH:MM			Time (24 HR) HH:MM
<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD	<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD
		Time (24 HR) HH:MM			Time (24 HR) HH:MM

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Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Rush Immediate Test Food Residue

Micro Food Chemistry

*** LABORATORY USE ONLY ***

Received At <input type="text"/>	Lab Comments: 25-Jul-23 15:32 Grace (Hongmei) Zhao C3M1817 AK0 ENV-1689	Custody Seal		Cooling Media		Temperature °C		
Labeled By <input type="text"/>		Present (Y/N) <input checked="" type="checkbox"/>	Intact (Y/N) <input checked="" type="checkbox"/>	Present (Y/N) <input checked="" type="checkbox"/>		1	2	3
Verified By <input type="text"/>						6	5	5
		Drinking Water Metals Preservation Check Done (Circle)				YES	NO	

Signature

COR FCD-00383/4

Page 1 of 1



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 738869

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/08/10
 Report #: R7757619
 Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3M1817

Received: 2023/07/25, 15:32

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/07/31	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/07/27	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/07/28	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (2)	2	N/A	2023/07/27	CAM SOP-00446	SM 23 5310 B m
Chlorophyll and Pheophytin in Water (1)	1	2023/08/08	2023/08/09	CAL SOP-00273	SM 23 10200H m
Total Ammonia-N	3	N/A	2023/07/31	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (3)	3	N/A	2023/07/27	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/07/26	2023/07/28	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/07/27	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	1	2023/07/26	2023/07/27	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	2	2023/07/26	2023/07/28	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/07/26	2023/07/27	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 738869

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/10
Report #: R7757619
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3M1817

Received: 2023/07/25, 15:32

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary (19th), 4000 19th Street NE , Calgary, AB, T2E 6P8
- (2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
10 Aug 2023 01:05:51

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/10

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WMM564			WMM565			WMM566		
Sampling Date		2023/07/24 10:30			2023/07/24 11:00			2023/07/24 10:45		
COC Number		738869			738869			738869		
	UNITS	S105	RDL	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch

Inorganics										
Total Ammonia-N	mg/L	ND	0.050	8815647	ND	0.050	8815647	ND	0.050	8815647
Colour	TCU	14	2	8812070	12	2	8812070			
Conductivity	umho/cm	1300	1.0	8815085	1300	1.0	8815085			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.47	0.10	8814719	0.46	0.10	8814719	0.43	0.10	8814719
Dissolved Organic Carbon	mg/L	7.8	0.40	8813192	6.8	0.40	8813192			
Orthophosphate (P)	mg/L	ND	0.004	8813941	ND	0.004	8813941	ND	0.004	8813941
pH	pH	9.08		8815082	8.83		8815082			
Total Phosphorus	mg/L	0.013	0.004	8813465	0.014	0.004	8813465	0.009	0.004	8813465
Dissolved Chloride (Cl-)	mg/L	330	4.0	8814256	360	4.0	8818437			
Nitrite (N)	mg/L	ND	0.010	8813820	ND	0.010	8814241	ND	0.010	8814241
Nitrate (N)	mg/L	ND	0.10	8813820	ND	0.10	8814241	ND	0.10	8814241
Nitrate + Nitrite (N)	mg/L	ND	0.10	8813820	ND	0.10	8814241	ND	0.10	8814241
Miscellaneous Parameters										
Chlorophyll a	ug/L	14 (1)	1.3	8843232						
Chlorophyll c	ug/L	1.9 (1)	1.3	8843232						
Pheophytin a	ug/L	>10 (2)	1.3	8843232						

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
 (1) Detection limit raised due to sample volume used for analysis.
 (2) Detection limit raised due to sample volume used for analysis. Sample exceeds operating range of this method. Low bias is likely. Sample turbidity exceeds operating range of this method. Low bias is likely.



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/10

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817

Report Date: 2023/08/10

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8812070	Colour	2023/07/27			97	80 - 120	ND,RDL=2	TCU	NC	25		
8813192	Dissolved Organic Carbon	2023/07/27	96	80 - 120	98	80 - 120	ND, RDL=0.40	mg/L	0.27	20		
8813465	Total Phosphorus	2023/07/28	103	80 - 120	103	80 - 120	ND, RDL=0.004	mg/L	NC	20	109	80 - 120
8813820	Nitrate (N)	2023/07/27	91	80 - 120	93	80 - 120	ND, RDL=0.10	mg/L	1.3	20		
8813820	Nitrite (N)	2023/07/27	90	80 - 120	102	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8813941	Orthophosphate (P)	2023/07/27	93	80 - 120	100	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8814241	Nitrate (N)	2023/07/27	93	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8814241	Nitrite (N)	2023/07/27	100	80 - 120	102	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8814256	Dissolved Chloride (Cl-)	2023/07/31	NC	80 - 120	95	80 - 120	ND, RDL=1.0	mg/L	0.040	20		
8814719	Total Kjeldahl Nitrogen (TKN)	2023/07/27	107	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	11	20	97	80 - 120
8815082	pH	2023/07/27			102	98 - 103			0.63	N/A		
8815085	Conductivity	2023/07/27			102	85 - 115	1.1, RDL=1.0	umho/cm	0	10		
8815647	Total Ammonia-N	2023/07/31	NC	75 - 125	99	80 - 120	ND, RDL=0.050	mg/L	13	20		
8818437	Dissolved Chloride (Cl-)	2023/07/31	NC	80 - 120	98	80 - 120	ND, RDL=1.0	mg/L	1.1	20		
8843232	Chlorophyll a	2023/08/09			116	80 - 120	ND, RDL=0.51	ug/L				
8843232	Chlorophyll c	2023/08/09					ND, RDL=0.51	ug/L				



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817

Report Date: 2023/08/10

QUALITY ASSURANCE REPORT(CONT'D)

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8843232	Pheophytin a	2023/08/09					ND, RDL=0.51	ug/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3M1817
Report Date: 2023/08/10

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 108737	Work ID: C3M1817
Description: C3M1817	
Client: Bureau Veritas Laboratories	Report To: Grace Zhao
Profile: Non-regulated Water Sampling	Bureau Veritas Canada
Sampled By: Zahra Parhizgari	6740 Campobello Rd
Sample Count: 1	Mississauga, ON L5N 2L8
	Canada
Authorized by: Raymond McCurdy, Laboratory Supervisor	

Workorder Summary

Sample Comments

10873701 (101) - Surface Water

Cyanobacterial specimens reported only as per client request.

Analysis Results Comments

10873701 (101) - Anabaena

Estimate

10873701 (101) - Aphanocapsa

Estimate

10873701 (101) - Merismopedia

Estimate

10873701 (101) - Microcystis

Estimate

10873701 (101) - Small Unidentifiable Algae

Estimate

10873701 (101) - Specimen A

Snowella

10873701 (101) - Specimen B

Leptolyngbya

Estimate

10873701 (101) - Specimen C

Cylindrospermopsis. Filaments approx. 2um in width. Due to the narrowness of the filament cell enumeration could not be performed. An estimated total of 5440 filaments per ml were calculated to be present in the samples. This total has not been included in the final total for cell per ml.

Report Date: 8/4/2023 10:45:43 AM

Report ID: 108737-4920992

Page 1 of 3

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 108737

Work ID:

C3M1817

Analytical Results

Lab ID: 10873701	Sample ID: 101	Criteria: N/A	Date Received: 7/27/2023
Matrix: Water	Location: S105		Date Collected: 7/24/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Anabaena	1900	cells/mL		10	1		07/27/2023	08/03/2023	*
Aphanocapsa	72000	cells/mL		10	1		07/27/2023	08/03/2023	*
Chroococcus	220	cells/mL		1	1		07/27/2023	08/03/2023	
Gomphosphaeria	110	cells/mL		1	1		07/27/2023	08/03/2023	
Merismopedia	6000	cells/mL		10	1		07/27/2023	08/03/2023	*
Microcystis	64000	cells/mL		100	1		07/27/2023	08/03/2023	*
Small Unidentifiable Algae	8000	cells/mL		100	1		07/27/2023	08/03/2023	*
Specimen A	330	cells/mL		1	1		07/27/2023	08/03/2023	*
Specimen B	1100	cells/mL		10	1		07/27/2023	08/03/2023	*
Specimen C	See Comment	cells/mL		10	1		07/27/2023	08/03/2023	*
Total Cells	150000	cells/mL		3	1		07/27/2023	08/03/2023	

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



Custody Tracking Form



T738869-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By			Received By		
<small>Print</small> Zahra Parkhizgan	<small>Sign</small> <i>Z Parkhizgan</i>	Date 2023/07/24	<small>Print</small> Rupinder	<small>Sign</small> <i>Rupinder</i>	Date 2023/07/25
		Time (24 HR) 13:30			Time (24 HR) 15:32
<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD	<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD
		Time (24 HR) HH:MM			Time (24 HR) HH:MM
<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD	<small>Print</small>	<small>Sign</small>	Date YYYY/MM/DD
		Time (24 HR) HH:MM			Time (24 HR) HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Rush Immediate Test Food Residue

Micro Food Chemistry

*** LABORATORY USE ONLY ***

Received At Labeled By Verified By

Lab Comments:
25-Jul-23 15:32
Grace (Hongmei) Zhao
C3M1817

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
0	0	0	6	5	5

Drinking Water Metals Preservation Check Done (Circle) YES NO

AK0 ENV-1689

Signature

COR FCD-00383/4

Page 1 of 1



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 744456

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/08/10
 Report #: R7758869
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3N3661

Received: 2023/08/03, 14:55

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/08/10	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/08/09	CAM SOP-00412	SM 23 2120C m
Conductivity	1	N/A	2023/08/08	CAM SOP-00414	SM 23 2510 m
Conductivity	1	N/A	2023/08/09	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/08/08	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/08/08	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/08/08	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/08/05	2023/08/09	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/08/08	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/08/08	2023/08/09	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/08/08	2023/08/09	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 744456

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/10
Report #: R7758869
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3N3661

Received: 2023/08/03, 14:55

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
10 Aug 2023 17:58:38

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====
This report has been generated and distributed using a secure automated process.

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C3N3661

Report Date: 2023/08/10

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WOZ616		WOZ617			WOZ618		
Sampling Date		2023/08/02 10:30		2023/08/02 11:00			2023/08/02 10:45		
COC Number		744456		744456			744456		
	UNITS	S105	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	8834990	ND	0.050	8834990	ND	0.050	8834990
Colour	TCU	12	8832547	23	2	8832547			
Conductivity	umho/cm	1200	8836634	1200	1.0	8836439			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.58	8838769	0.52	0.10	8838782	0.46	0.10	8838782
Dissolved Organic Carbon	mg/L	7.8	8836070	7.5	0.40	8836070			
Orthophosphate (P)	mg/L	0.012	8833555	ND	0.004	8833555	ND	0.004	8833555
pH	pH	8.33	8836631	8.34		8836443			
Total Phosphorus	mg/L	0.015	8838984	0.018	0.004	8838984	0.013	0.004	8838984
Dissolved Chloride (Cl-)	mg/L	290	8836408	290	2.0	8836408			
Nitrite (N)	mg/L	ND	8835075	ND	0.010	8836405	ND	0.010	8835075
Nitrate (N)	mg/L	ND	8835075	ND	0.10	8836405	ND	0.10	8835075
Nitrate + Nitrite (N)	mg/L	ND	8835075	ND	0.10	8836405	ND	0.10	8835075
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.									



BUREAU
VERITAS

Bureau Veritas Job #: C3N3661
Report Date: 2023/08/10

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.0°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3N3661

Report Date: 2023/08/10

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8832547	Colour	2023/08/09			103	80 - 120	ND,RDL=2	TCU	NC	25		
8833555	Orthophosphate (P)	2023/08/08	96	80 - 120	97	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8834990	Total Ammonia-N	2023/08/08	102	75 - 125	102	80 - 120	ND, RDL=0.050	mg/L	NC	20		
8835075	Nitrate (N)	2023/08/08	97	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8835075	Nitrite (N)	2023/08/08	105	80 - 120	104	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8836070	Dissolved Organic Carbon	2023/08/08	96	80 - 120	94	80 - 120	ND, RDL=0.40	mg/L	1.8	20		
8836405	Nitrate (N)	2023/08/08	97	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8836405	Nitrite (N)	2023/08/08	105	80 - 120	105	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8836408	Dissolved Chloride (Cl-)	2023/08/10	NC	80 - 120	98	80 - 120	ND, RDL=1.0	mg/L	0.060	20		
8836439	Conductivity	2023/08/09			102	85 - 115	ND, RDL=1.0	umho/cm	0.12	10		
8836443	pH	2023/08/09			102	98 - 103			1.2	N/A		
8836631	pH	2023/08/09			102	98 - 103			1.4	N/A		
8836634	Conductivity	2023/08/08			101	85 - 115	ND, RDL=1.0	umho/cm	0.35	10		
8838769	Total Kjeldahl Nitrogen (TKN)	2023/08/09	NC	80 - 120	110	80 - 120	ND, RDL=0.10	mg/L	5.2	20	104	80 - 120
8838782	Total Kjeldahl Nitrogen (TKN)	2023/08/09	NC	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	5.7	20	99	80 - 120



BUREAU
VERITAS

Bureau Veritas Job #: C3N3661

Report Date: 2023/08/10

QUALITY ASSURANCE REPORT(CONT'D)

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8838984	Total Phosphorus	2023/08/09	97	80 - 120	95	80 - 120	ND, RDL=0.004	mg/L	14	20	100	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3N3661
Report Date: 2023/08/10

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

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Custody Tracking Form



T744456

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By			Received By		
<i>Zahra Farhizgari</i>	<i>Z Farhizgari</i>	Date 2023/08/02	ACAM	<i>[Signature]</i>	Date 2023/08/03
Print	Sign	Time (24 HR) 11:00AM			Time (24 HR) 14:55
Print	Sign	Date YYYY/MM/DD	Print	Sign	Date YYYY/MM/DD
Print	Sign	Time (24 HR) HH:MM	Print	Sign	Time (24 HR) HH:MM
Print	Sign	Date YYYY/MM/DD	Print	Sign	Date YYYY/MM/DD
Print	Sign	Time (24 HR) HH:MM	Print	Sign	Time (24 HR) HH:MM

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Triage Information

Sampled By (Print)

Zahra Farhizgari

of Coolers/Pkgs:

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
<i>Y</i>	<i>Y</i>	<i>Y</i>	<i>1</i>	<i>6</i>	<i>2</i>
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

03-Aug-23 15:16

Grace (Hongmei) Zhao

C3N3661

HDK ENV-1617

COR FCD-00383/4

Page 1 of 1



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 746905

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/08/15
 Report #: R7765665
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3O0052

Received: 2023/08/09, 15:35

Sample Matrix: Water
 # Samples Received: 1

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	1	N/A	2023/08/11	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	1	N/A	2023/08/13	CAM SOP-00414	SM 23 2510 m
Total Ammonia-N	1	N/A	2023/08/15	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (1)	1	N/A	2023/08/11	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Total Kjeldahl Nitrogen in Water	1	2023/08/11	2023/08/14	CAM SOP-00938	OMOE E3516 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 746905

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/15
Report #: R7765665
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3O0052

Received: 2023/08/09, 15:35

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
15 Aug 2023 16:51:52

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager

Email: hongmei.zhao@bureauveritas.com

Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C3O0052
Report Date: 2023/08/15

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WQI057		
Sampling Date		2023/08/04 09:00		
COC Number		746905		
	UNITS	FDC	RDL	QC Batch
Inorganics				
Total Ammonia-N	mg/L	ND	0.050	8847393
Conductivity	umho/cm	460	1.0	8846880
Total Kjeldahl Nitrogen (TKN)	mg/L	0.40	0.10	8846862
Dissolved Chloride (Cl-)	mg/L	67	1.0	8845848
Nitrite (N)	mg/L	ND	0.010	8845632
Nitrate (N)	mg/L	ND	0.10	8845632
Nitrate + Nitrite (N)	mg/L	ND	0.10	8845632
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.				



BUREAU
VERITAS

Bureau Veritas Job #: C3O0052
Report Date: 2023/08/15

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	10.7°C
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Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3O0052

Report Date: 2023/08/15

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8845632	Nitrate (N)	2023/08/11	102	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8845632	Nitrite (N)	2023/08/11	83	80 - 120	103	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8845848	Dissolved Chloride (Cl-)	2023/08/11	NC	80 - 120	95	80 - 120	ND, RDL=1.0	mg/L	0.042	20		
8846862	Total Kjeldahl Nitrogen (TKN)	2023/08/14	110	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	8.4	20	91	80 - 120
8846880	Conductivity	2023/08/12			101	85 - 115	ND, RDL=1.0	umho/cm	1.0	10		
8847393	Total Ammonia-N	2023/08/15	NC	75 - 125	101	80 - 120	ND, RDL=0.050	mg/L	3.7	20		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3O0052
Report Date: 2023/08/15

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

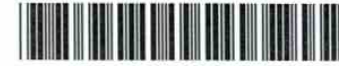
Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Custody Tracking Form



T746905-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: FDC
Last Sample: FDC
Sample Count: 1

Relinquished By				Received By			
<small>Print</small> Zahra parhizgan	<small>Sign</small> <i>Z. parhizgan</i>	Date 2023/08/09	Time (24 HR) 08:30	<small>Print</small> ANERI	<small>Sign</small> <i>Aneri</i>	Date 2023/08/09	Time (24 HR) 15:35
<small>Print</small>	<small>Sign</small>	Date YY/MM/DD	Time (24 HR) HH:MM	<small>Print</small>	<small>Sign</small>	Date YY/MM/DD	Time (24 HR) HH:MM
<small>Print</small>	<small>Sign</small>	Date YY/MM/DD	Time (24 HR) HH:MM	<small>Print</small>	<small>Sign</small>	Date YY/MM/DD	Time (24 HR) HH:MM

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Triage Information

Sampled By (Print) # of Coolers/Pkgs:

Zahra parhizgan 1

Rush Immediate Test Food Residue

Micro Food Chemistry

***** LABORATORY USE ONLY *****

Received At		Lab Comments:	Custody Seal			Cooling Media		Temperature °C		
Labeled By			Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3		
Verified By			Y	Y	Y	10	12	10		
			Drinking Water Metals Preservation Check Done (Circle) YES NO							

on melted ice

09-Aug-23 15:35

Grace (Hongmei) Zhao

C300052

RPK ENV-1701

COR FCD-00383/4



Bureau Veritas - Partial/Rush Results

Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 751425

Attention: Zahra Parhizgari
City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/24
Report #: R7780342
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C307682

Received: 2023/08/16, 12:44

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/08/17	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/08/21	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/08/17	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/08/17	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/08/18	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/08/17	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/08/16	2023/08/17	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	2	N/A	2023/08/17	CAM SOP-00461	SM 23 4500 P G m
Orthophosphate (low level)	1	N/A	2023/08/22	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/08/17	2023/08/18	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	2	2023/08/17	2023/08/19	CAM SOP-00407	SM 23 4500-P I
Total Phosphorus (Colourimetric)	1	2023/08/23	2023/08/24	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.



Bureau Veritas - Partial/Rush Results

Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 751425

Attention: Zahra Parhizgari
City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/24
Report #: R7780342
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C307682

Received: 2023/08/16, 12:44

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
24 Aug 2023 16:52:17

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====
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BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/24

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WRY052		WRY053			WRY054		
Sampling Date		2023/08/16 10:15		2023/08/16 11:00			2023/08/16 10:40		
COC Number		751425		751425			751425		
	UNITS	S105	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	8859849	ND	0.050	8859849	ND	0.050	8859849
Colour	TCU	8	8860012	9	2	8860012			
Conductivity	umho/cm	1200	8858000	1200	1.0	8858000			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.51	8858609	0.57	0.10	8858609	0.52	0.10	8858609
Dissolved Organic Carbon	mg/L	7.2	8859897	7.4	0.40	8859897			
Orthophosphate (P)	mg/L	ND	8857286	0.019	0.004	8867142	ND	0.004	8857286
pH	pH	9.08	8858004	7.96		8858004			
Total Phosphorus	mg/L	0.010	8858621	0.035	0.004	8872306	0.010	0.004	8858621
Dissolved Chloride (Cl-)	mg/L	320	8857652	320	3.0	8857652			
Nitrite (N)	mg/L	ND	8857533	ND	0.010	8857533	ND	0.010	8857533
Nitrate (N)	mg/L	ND	8857533	ND	0.10	8857533	ND	0.10	8857533
Nitrate + Nitrite (N)	mg/L	ND	8857533	ND	0.10	8857533	ND	0.10	8857533
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.									

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/24

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/24

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8857286	MJ1	Matrix Spike	Orthophosphate (P)	2023/08/17		96	%	80 - 120
8857286	MJ1	Spiked Blank	Orthophosphate (P)	2023/08/17		97	%	80 - 120
8857286	MJ1	Method Blank	Orthophosphate (P)	2023/08/17	ND, RDL=0.004		mg/L	
8857286	MJ1	RPD	Orthophosphate (P)	2023/08/17	NC		%	20
8857533	C_N	Matrix Spike	Nitrite (N)	2023/08/17		102	%	80 - 120
			Nitrate (N)	2023/08/17		89	%	80 - 120
8857533	C_N	Spiked Blank	Nitrite (N)	2023/08/17		104	%	80 - 120
			Nitrate (N)	2023/08/17		92	%	80 - 120
8857533	C_N	Method Blank	Nitrite (N)	2023/08/17	ND, RDL=0.010		mg/L	
			Nitrate (N)	2023/08/17	ND, RDL=0.10		mg/L	
8857533	C_N	RPD	Nitrite (N)	2023/08/17	NC		%	20
			Nitrate (N)	2023/08/17	NC		%	20
8857652	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2023/08/17		NC	%	80 - 120
8857652	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2023/08/17		101	%	80 - 120
8857652	ADB	Method Blank	Dissolved Chloride (Cl-)	2023/08/17	ND, RDL=1.0		mg/L	
8857652	ADB	RPD	Dissolved Chloride (Cl-)	2023/08/17	1.3		%	20
8858000	SAU	Spiked Blank	Conductivity	2023/08/17		100	%	85 - 115
8858000	SAU	Method Blank	Conductivity	2023/08/17	ND, RDL=1.0		umho/cm	
8858000	SAU	RPD	Conductivity	2023/08/17	NC		%	10
8858004	SAU	Spiked Blank	pH	2023/08/17		102	%	98 - 103
8858004	SAU	RPD	pH	2023/08/17	2.1		%	N/A
8858609	RTY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2023/08/18		109	%	80 - 120
8858609	RTY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2023/08/18		98	%	80 - 120
8858609	RTY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2023/08/18		98	%	80 - 120
8858609	RTY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2023/08/18	ND, RDL=0.10		mg/L	
8858609	RTY	RPD	Total Kjeldahl Nitrogen (TKN)	2023/08/18	5.7		%	20
8858621	MUM	Matrix Spike	Total Phosphorus	2023/08/19		94	%	80 - 120
8858621	MUM	QC Standard	Total Phosphorus	2023/08/19		101	%	80 - 120
8858621	MUM	Spiked Blank	Total Phosphorus	2023/08/19		105	%	80 - 120
8858621	MUM	Method Blank	Total Phosphorus	2023/08/19	ND, RDL=0.004		mg/L	
8858621	MUM	RPD	Total Phosphorus	2023/08/19	9.0		%	20
8859849	KPJ	Matrix Spike	Total Ammonia-N	2023/08/18		100	%	75 - 125
8859849	KPJ	Spiked Blank	Total Ammonia-N	2023/08/18		99	%	80 - 120
8859849	KPJ	Method Blank	Total Ammonia-N	2023/08/18	ND, RDL=0.050		mg/L	
8859849	KPJ	RPD	Total Ammonia-N	2023/08/18	NC		%	20
8859897	NS3	Matrix Spike	Dissolved Organic Carbon	2023/08/17		94	%	80 - 120
8859897	NS3	Spiked Blank	Dissolved Organic Carbon	2023/08/17		96	%	80 - 120
8859897	NS3	Method Blank	Dissolved Organic Carbon	2023/08/17	ND, RDL=0.40		mg/L	
8859897	NS3	RPD	Dissolved Organic Carbon	2023/08/17	2.9		%	20
8860012	GID	Spiked Blank	Colour	2023/08/21		101	%	80 - 120
8860012	GID	Method Blank	Colour	2023/08/21	ND,RDL=2		TCU	
8860012	GID	RPD	Colour	2023/08/21	9.8		%	25

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/24

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8867142	ADB	Matrix Spike [WRY053-03]	Orthophosphate (P)	2023/08/22		75 (1)	%	80 - 120
8867142	ADB	Spiked Blank	Orthophosphate (P)	2023/08/22		97	%	80 - 120
8867142	ADB	Method Blank	Orthophosphate (P)	2023/08/22	ND, RDL=0.004		mg/L	
8867142	ADB	RPD [WRY053-03]	Orthophosphate (P)	2023/08/22	8.8		%	20
8872306	SPC	Matrix Spike	Total Phosphorus	2023/08/24		100	%	80 - 120
8872306	SPC	QC Standard	Total Phosphorus	2023/08/24		101	%	80 - 120
8872306	SPC	Spiked Blank	Total Phosphorus	2023/08/24		100	%	80 - 120
8872306	SPC	Method Blank	Total Phosphorus	2023/08/24	ND, RDL=0.004		mg/L	
8872306	SPC	RPD	Total Phosphorus	2023/08/24	0		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Bureau Veritas - Partial/Rush Results



BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/24

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

Bureau Veritas - Partial/Rush Results

16-Aug-23 12:44

Grace (Hongmei) Zhao



C307682

E

Custody Tracking Form



T751425-H

; when submitting the work instructions via eCOC (electronic Chain of Custody).

or a Bureau Veritas eCOC confirmation number in the top right hand side. This

number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105

Last Sample: S115

Sample Count: 3

SPI ENV-1416

Relinquished By				Received By			
Print Zahra Parhizgari	Sign <i>Z. Parhizgari</i>	Date	2023/08/16	Print <i>[Signature]</i>	Sign <i>[Signature]</i>	Date	2023/08/16
		Time (24 HR)	12:00			Time (24 HR)	12:00
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

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Triage Information

Sampled By (Print): # of Coolers/Pkgs:

Rush Immediate Test Food Residue

Micro Food Chemistry

***** LABORATORY USE ONLY *****

Received At: Labeled By: Verified By:

Lab Comments:

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
<i>Y</i>	<i>Y</i>	<i>Y</i>	<i>22</i>	<i>22</i>	<i>22</i>

Drinking Water Metals Preservation Check Done (Circle) YES NO

#696192



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 751425

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/08/30
 Report #: R7789149
 Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C307682

Received: 2023/08/16, 12:44

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/08/17	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/08/21	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/08/17	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (2)	2	N/A	2023/08/17	CAM SOP-00446	SM 23 5310 B m
Chlorophyll and Pheophytin in Water (1)	2	2023/08/29	2023/08/29	CAL SOP-00273	SM 23 10200H m
Total Ammonia-N	3	N/A	2023/08/18	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (3)	3	N/A	2023/08/17	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/08/16	2023/08/17	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	2	N/A	2023/08/17	CAM SOP-00461	SM 23 4500 P G m
Orthophosphate (low level)	1	N/A	2023/08/22	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/08/17	2023/08/18	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	2	2023/08/17	2023/08/19	CAM SOP-00407	SM 23 4500-P I
Total Phosphorus (Colourimetric)	1	2023/08/23	2023/08/24	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 751425

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/08/30
Report #: R7789149
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C307682

Received: 2023/08/16, 12:44

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) This test was performed by Bureau Veritas Calgary (19th), 4000 19th Street NE , Calgary, AB, T2E 6P8
- (2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
30 Aug 2023 13:01:55

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/30

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WRY052		WRY053			WRY054		
Sampling Date		2023/08/16 10:15		2023/08/16 11:00			2023/08/16 10:40		
COC Number		751425		751425			751425		
	UNITS	S105	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch

Inorganics									
Total Ammonia-N	mg/L	ND	8859849	ND	0.050	8859849	ND	0.050	8859849
Colour	TCU	8	8860012	9	2	8860012			
Conductivity	umho/cm	1200	8858000	1200	1.0	8858000			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.51	8858609	0.57	0.10	8858609	0.52	0.10	8858609
Dissolved Organic Carbon	mg/L	7.2	8859897	7.4	0.40	8859897			
Orthophosphate (P)	mg/L	ND	8857286	0.019	0.004	8867142	ND	0.004	8857286
pH	pH	9.08	8858004	7.96		8858004			
Total Phosphorus	mg/L	0.010	8858621	0.035	0.004	8872306	0.010	0.004	8858621
Dissolved Chloride (Cl-)	mg/L	320	8857652	320	3.0	8857652			
Nitrite (N)	mg/L	ND	8857533	ND	0.010	8857533	ND	0.010	8857533
Nitrate (N)	mg/L	ND	8857533	ND	0.10	8857533	ND	0.10	8857533
Nitrate + Nitrite (N)	mg/L	ND	8857533	ND	0.10	8857533	ND	0.10	8857533
Miscellaneous Parameters									
Chlorophyll a	ug/L	53 (1)	8885435	74 (1)	1.3	8885435			
Chlorophyll c	ug/L	5.4 (1)	8885435	3.3 (1)	1.3	8885435			
Pheophytin a	ug/L	>12 (2)	8885435	>14 (3)	1.3	8885435			

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
 (1) Detection limit raised due to sample volume used for analysis.
 (2) Detection limit raised due to sample volume used for analysis. Sample turbidity exceeds operating range of this method. Low bias is likely.
 (3) Detection limit raised due to sample volume used for analysis. Sample exceeds operating range of this method. Low bias is likely. Sample turbidity exceeds operating range of this method. Low bias is likely.



BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/30

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	22.3°C
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Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C307682

Report Date: 2023/08/30

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8857286	Orthophosphate (P)	2023/08/17	96	80 - 120	97	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8857533	Nitrate (N)	2023/08/17	89	80 - 120	92	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8857533	Nitrite (N)	2023/08/17	102	80 - 120	104	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8857652	Dissolved Chloride (Cl-)	2023/08/17	NC	80 - 120	101	80 - 120	ND, RDL=1.0	mg/L	1.3	20		
8858000	Conductivity	2023/08/17			100	85 - 115	ND, RDL=1.0	umho/cm	NC	10		
8858004	pH	2023/08/17			102	98 - 103			2.1	N/A		
8858609	Total Kjeldahl Nitrogen (TKN)	2023/08/18	109	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	5.7	20	98	80 - 120
8858621	Total Phosphorus	2023/08/19	94	80 - 120	105	80 - 120	ND, RDL=0.004	mg/L	9.0	20	101	80 - 120
8859849	Total Ammonia-N	2023/08/18	100	75 - 125	99	80 - 120	ND, RDL=0.050	mg/L	NC	20		
8859897	Dissolved Organic Carbon	2023/08/17	94	80 - 120	96	80 - 120	ND, RDL=0.40	mg/L	2.9	20		
8860012	Colour	2023/08/21			101	80 - 120	ND, RDL=2	TCU	9.8	25		
8867142	Orthophosphate (P)	2023/08/22	75 (1)	80 - 120	97	80 - 120	ND, RDL=0.004	mg/L	8.8	20		
8872306	Total Phosphorus	2023/08/24	100	80 - 120	100	80 - 120	ND, RDL=0.004	mg/L	0	20	101	80 - 120
8885435	Chlorophyll a	2023/08/29			109	80 - 120	ND, RDL=0.52	ug/L				
8885435	Chlorophyll c	2023/08/29					ND, RDL=0.52	ug/L				



BUREAU
VERITAS

Bureau Veritas Job #: C307682

Report Date: 2023/08/30

QUALITY ASSURANCE REPORT(CONT'D)

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8885435	Pheophytin a	2023/08/29					ND, RDL=0.52	ug/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



BUREAU
VERITAS

Bureau Veritas Job #: C3O7682
Report Date: 2023/08/30

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Brad Newman, B.Sc., C.Chem., Scientific Service Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist

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York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 109964 **Work ID:** C3O7682

Description: C3O7682

Client: Bureau Veritas Laboratories **Report To:** Hongmei Zhao
Bureau Veritas Canada
6740 Campobello Rd.
Mississauga, ON L5N 2L8

Profile: Non-regulated Water Sampling

Sampled By: Zahra Parhizgari

Sample Count: 2

Authorized by: Jennifer Koene-Fenton, Laboratory Superintendent

Workorder Summary

Workorder Comments

Cyanobacterial specimens reported only as per client request.

Analysis Results Comments

10996401 (1) - Specimen A

Pseudanabaena

10996401 (1) - Specimen B

Cylindrospermopsis. Filaments approx. 2um in width. Due to the narrowness of the filament cell enumeration could not be performed. An estimated total of 19560 filaments per ml were calculated to be present in the sample. This total has not been included in the final total for cell per ml.

10996401 (1) - Specimen C

Woronichinia

10996401 (1) - Total Cells

A 10 x dilution was required to enumerate. The value reported has been adjusted accordingly and is an estimated value.

10996401 (1) - Uncharacterized Algae

Short filaments, approx. 2um in width in screw like coils possibly from the genus Romeria. Due to the narrowness of the filament cell enumeration could not be performed. An estimated total of 320 filaments per ml were calculated to be present in the samples. This total has not been included in the final total for cell per ml.

10996402 (2) - Specimen A

Pseudanabaena

10996402 (2) - Specimen B

Cylindrospermopsis. Filaments approx. 2um in width. Due to the narrowness of the filament cell enumeration could not be performed. An estimated total of 16820 filaments per ml were calculated to be present in the samples. This total has not been included in the final total for cell per ml.

10996402 (2) - Specimen D

Snowella

10996402 (2) - Total Cells

A 10 x dilution was required to enumerate. The value reported has been adjusted accordingly and is an estimated value.

10996402 (2) - Uncharacterized Algae

Short filaments, approx. 2um in width in screw like coils possibly from the genus Romeria. Due to the narrowness of the filament cell enumeration could not be performed. An estimated total of 320 filaments per ml were calculated to be present in the samples. This total has not been included in the final total for cell per ml.

Report Date: 8/30/2023 11:25:42 AM

Report ID: 109964-4984812

Page 1 of 3

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 109964

Work ID:

C3O7682

Analytical Results

Lab ID: 10996401	Sample ID: 1	Criteria: N/A	Date Received: 8/18/2023
Matrix: Water	Location: S105		Date Collected: 8/16/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	26000	cells/mL		10	10		08/18/2023	08/29/2023	
Chroococcus	1400	cells/mL		10	10		08/18/2023	08/29/2023	
Merismopedia	1700	cells/mL		10	10		08/18/2023	08/29/2023	
Microcystis	14000	cells/mL		10	10		08/18/2023	08/29/2023	
Specimen A	1900	cells/mL		10	10		08/18/2023	08/29/2023	*
Specimen B	See comment	cells/mL		10	10		08/18/2023	08/29/2023	*
Specimen C	1600	cells/mL		10	10		08/18/2023	08/29/2023	*
Total Cells	47000	cells/mL		10	10		08/18/2023	08/29/2023	*
Uncharacterized Algae	See comment	cells/mL		10	10		08/18/2023	08/29/2023	*

Lab ID: 10996402	Sample ID: 2	Criteria: N/A	Date Received: 8/18/2023
Matrix: Water	Location: S205		Date Collected: 8/16/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	4000	cells/mL		10	10		08/18/2023	08/29/2023	
Chroococcus	1100	cells/mL		10	10		08/18/2023	08/29/2023	
Merismopedia	720	cells/mL		10	10		08/18/2023	08/29/2023	
Microcystis	18000	cells/mL		10	10		08/18/2023	08/29/2023	
Specimen A	180	cells/mL		10	10		08/18/2023	08/29/2023	*
Specimen B	See comment	cells/mL		10	10		08/18/2023	08/29/2023	*
Specimen D	530	cells/mL		10	10		08/18/2023	08/29/2023	*
Total Cells	61000	cells/mL		10	10		08/18/2023	08/29/2023	*
Uncharacterized Algae	See comment	cells/mL		10	10		08/18/2023	08/29/2023	*

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present

16-Aug-23 12:44

Grace (Hongmei) Zhao



C307682

E

Custody Tracking Form



T751425-H

when submitting the work instructions via eCOC (electronic Chain of Custody) or a Bureau Veritas eCOC confirmation number in the top right hand side. This

First Sample: S105
Last Sample: S115
Sample Count: 3

SPI ENV-1416 Number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

Relinquished By				Received By			
Print Zahra Parhizgari	Sign <i>Z. Parhizgari</i>	Date	2023/08/16	Print <i>[Signature]</i>	Sign <i>[Signature]</i>	Date	2023/08/16
		Time (24 HR)	12:00			Time (24 HR)	12:00
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print)

Zahra Parhizgari

of Coolers/Pkgs:

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
<i>Y</i>	<i>Y</i>	<i>Y</i>	<i>22</i>	<i>22</i>	<i>22</i>

Drinking Water Metals Preservation Check Done (Circle) YES NO

#696192



Custody Tracking Form



T751425-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By				Received By			
Print Zahra Parhizgari	Sign <i>Z. Parhizgari</i>	Date	2023/08/16	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	12:00 <small>HH:MM</small>			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

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Triage Information

Sampled By (Print)

of Coolers/Pkgs:

Zahra Parhizgari

1

Rush

Immediate Test

Food Residue

Micro

Food Chemistry

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 759426

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/09/07
 Report #: R7800379
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3Q7655

Received: 2023/08/31, 15:23

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/09/05	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/09/01	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/09/02	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/09/02	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/09/01	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/09/05	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/09/02	2023/09/02	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/09/05	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/09/01	2023/09/06	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/09/01	2023/09/02	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 759426

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/09/07
Report #: R7800379
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3Q7655

Received: 2023/08/31, 15:23

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas

07 Sep 2023 13:21:04

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C3Q7655
Report Date: 2023/09/07

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		WWD090			WWD091			WWD092		
Sampling Date		2023/08/30 11:00			2023/08/30 11:15			2023/08/30 11:30		
COC Number		759426			759426			759426		
	UNITS	S105	RDL	QC Batch	S115	RDL	QC Batch	S205	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	8892401	ND	0.050	8892401	ND	0.050	8892401
Colour	TCU	17	2	8892018				16	2	8892018
Conductivity	umho/cm	1200	1.0	8894574				1200	1.0	8894574
Total Kjeldahl Nitrogen (TKN)	mg/L	0.56	0.10	8892612	0.51	0.10	8892612	0.48	0.10	8892612
Dissolved Organic Carbon	mg/L	8.3	0.40	8891795				8.1	0.40	8891795
Orthophosphate (P)	mg/L	ND	0.004	8893161	0.005	0.004	8893161	0.013	0.004	8893161
pH	pH	8.85		8894569				8.31		8894569
Total Phosphorus	mg/L	0.013	0.004	8893487	0.011	0.004	8893487	0.017	0.004	8893487
Dissolved Chloride (Cl-)	mg/L	330	5.0	8893169				330	5.0	8893169
Nitrite (N)	mg/L	ND	0.010	8892306	ND	0.010	8892306	ND	0.010	8892306
Nitrate (N)	mg/L	ND	0.10	8892306	ND	0.10	8892306	ND	0.10	8892306
Nitrate + Nitrite (N)	mg/L	ND	0.10	8892306	ND	0.10	8892306	ND	0.10	8892306
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.										



BUREAU
VERITAS

Bureau Veritas Job #: C3Q7655
Report Date: 2023/09/07

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3Q7655

Report Date: 2023/09/07

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8891795	Dissolved Organic Carbon	2023/09/02	NC	80 - 120	97	80 - 120	ND, RDL=0.40	mg/L	3.7	20		
8892018	Colour	2023/09/01			100	80 - 120	ND, RDL=2	TCU	NC	25		
8892306	Nitrate (N)	2023/09/05	NC	80 - 120	97	80 - 120	ND, RDL=0.10	mg/L	2.9	20		
8892306	Nitrite (N)	2023/09/05	107	80 - 120	104	80 - 120	ND, RDL=0.010	mg/L	1.4	20		
8892401	Total Ammonia-N	2023/09/01	101	75 - 125	102	80 - 120	ND, RDL=0.050	mg/L	0.86	20		
8892612	Total Kjeldahl Nitrogen (TKN)	2023/09/07	110	80 - 120	103	80 - 120	ND, RDL=0.10	mg/L	5.2	20	101	80 - 120
8893161	Orthophosphate (P)	2023/09/05	83	80 - 120	96	80 - 120	ND, RDL=0.004	mg/L	14	20		
8893169	Dissolved Chloride (Cl-)	2023/09/05	NC	80 - 120	99	80 - 120	ND, RDL=1.0	mg/L	5.2	20		
8893487	Total Phosphorus	2023/09/02	98	80 - 120	98	80 - 120	ND, RDL=0.004	mg/L	15	20	100	80 - 120
8894569	pH	2023/09/02			101	98 - 103			1.7	N/A		
8894574	Conductivity	2023/09/02			101	85 - 115	ND, RDL=1.0	umho/cm	0.70	10		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3Q7655
Report Date: 2023/09/07

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.



BUREAU VERITAS

Custody Tracking Form

eCOC Number

T759426

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

Relinquished By				Received By			
Zahra Parhizgari	<i>Z Parhizgari</i>	Date	2023/08/30	ALAM	<i>ALAM</i>	Date	2023/08/31
		Time (24 HR)	13:30			Time (24 HR)	1523
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

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Triage Information					
Sampled By (Print)	# of Coolers/Pkgs	Rush	Immediate Test	Food Residue	
Zahra Parhizgari	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		Micro		Food Chemistry	
		<input type="checkbox"/>		<input type="checkbox"/>	

*** Laboratory Use Only ***								
Received At		Lab Comments: 31-Aug-23 15:23 Grace (Hongmei) Zhao C3Q7655	Custody Seal		Cooling Media	Temperature °C		
Labeled By			Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Verified By			N	N	Y	5	9	5
			Drinking Water Metals Preservation Check Done (Circle)				YES	NO

A1V ENV-800



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 774683

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/10/18
 Report #: R7867157
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3U0767

Received: 2023/09/28, 14:45

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/10/03	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/10/02	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/10/03	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/09/29	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/10/04	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2023/10/03	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	2	N/A	2023/09/30	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/09/29	2023/10/03	CAM SOP-00413	SM 4500H+ B m
pH	1	2023/09/30	2023/09/30	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	2	N/A	2023/10/02	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/10/03	2023/10/04	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/10/03	2023/10/03	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 774683

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/10/18
Report #: R7867157
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3U0767

Received: 2023/09/28, 14:45

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Heba Gamal
Project Manager
18 Oct 2023 19:01:07

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C3U0767
Report Date: 2023/10/18

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		XDD302	XDD303			XDD304		
Sampling Date		2023/09/27 10:15	2023/09/27 10:45			2023/09/27 10:30		
COC Number		774683	774683			774683		
	UNITS	S105	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics								
Total Ammonia-N	mg/L	ND	ND	0.050	8958076	ND	0.050	8958076
Colour	TCU	9	11	2	8951202			
Conductivity	umho/cm	1200	1200	1.0	8950554			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.60	0.67	0.10	8957011	0.70	0.10	8957011
Dissolved Organic Carbon	mg/L	8.8	9.1	0.40	8950543			
Orthophosphate (P)	mg/L	0.010	ND	0.004	8953168			
pH	pH	8.22	7.92		8950557	8.12		8952612
Total Phosphorus	mg/L	0.036	0.055	0.004	8957086	0.044	0.004	8957086
Dissolved Chloride (Cl-)	mg/L	310	300	3.0	8950575			
Nitrite (N)	mg/L	ND	ND	0.010	8950395	ND	0.010	8952180
Nitrate (N)	mg/L	ND	ND	0.10	8950395	ND	0.10	8952180
Nitrate + Nitrite (N)	mg/L	ND	ND	0.10	8950395	ND	0.10	8952180
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.								



BUREAU
VERITAS

Bureau Veritas Job #: C3U0767
Report Date: 2023/10/18

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	18.3°C
-----------	--------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3U0767

Report Date: 2023/10/18

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8950395	Nitrate (N)	2023/09/30	102	80 - 120	101	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8950395	Nitrite (N)	2023/09/30	110	80 - 120	109	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8950543	Dissolved Organic Carbon	2023/09/29	92	80 - 120	95	80 - 120	ND, RDL=0.40	mg/L	6.9	20		
8950554	Conductivity	2023/10/02			100	85 - 115	ND, RDL=1.0	umho/cm	0.40	10		
8950557	pH	2023/10/02			102	98 - 103			0.48	N/A		
8950575	Dissolved Chloride (Cl-)	2023/10/03	96	80 - 120	96	80 - 120	ND, RDL=1.0	mg/L	NC	20		
8951202	Colour	2023/10/02			100	80 - 120	ND, RDL=2	TCU	3.7	25		
8952180	Nitrate (N)	2023/10/03	92	80 - 120	93	80 - 120	ND, RDL=0.10	mg/L	1.9	20		
8952180	Nitrite (N)	2023/10/03	108	80 - 120	109	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8952612	pH	2023/09/30			102	98 - 103			0.081	N/A		
8953168	Orthophosphate (P)	2023/10/02	71 (1)	80 - 120	94	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8957011	Total Kjeldahl Nitrogen (TKN)	2023/10/04	91	80 - 120	101	80 - 120	ND, RDL=0.10	mg/L	NC (2)	20	99	N/A
8957086	Total Phosphorus	2023/10/03	100	80 - 120	101	80 - 120	ND, RDL=0.004	mg/L	12	20	109	80 - 120
8958076	Total Ammonia-N	2023/10/04	100	75 - 125	100	80 - 120	ND, RDL=0.050	mg/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Due to a high concentration of NOx, the sample required dilution. The detection limit was adjusted accordingly.



BUREAU
VERITAS

Bureau Veritas Job #: C3U0767

Report Date: 2023/10/18

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

A handwritten signature in cursive script that reads 'Cristina Carriere'.

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



York-Durham Regional Environmental Laboratory

901 McKay Road
Pickering, ON L1W 3A3
Phone (905)686-0041 Fax (905)686-0664



LABORATORY ANALYSIS REPORT

Work Order #: 112349

Work ID:

C3U0767

Analytical Results

Lab ID: 11234901	Sample ID: 1	Criteria: N/A	Date Received: 10/3/2023
Matrix: Water	Location: S105		Date Collected: 9/27/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	32000	cells/mL		10	10		10/03/2023	10/10/2023	
Chroococcus	1000	cells/mL		10	10		10/03/2023	10/10/2023	
Coelosphaerium	7200	cells/mL		10	10		10/03/2023	10/10/2023	
Merismopedia	1500	cells/mL		10	10		10/03/2023	10/10/2023	
Microcystis	9000	cells/mL		10	10		10/03/2023	10/10/2023	
Specimen A	See comment	cells/mL		10	10		10/03/2023	10/10/2023	*
Specimen B	1300	cells/mL		10	10		10/03/2023	10/10/2023	*
Specimen C	4700	cells/mL		10	10		10/03/2023	10/10/2023	*
Specimen D	9900	cells/mL		10	10		10/03/2023	10/10/2023	*
Total Cells	67000	cells/mL		10	10		10/03/2023	10/10/2023	*

Lab ID: 11234902	Sample ID: 2	Criteria: N/A	Date Received: 10/3/2023
Matrix: Water	Location: S205		Date Collected: 9/27/2023
Type: Surface Water	Description:		

Parameter	Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
PHYTOPLANKTON (Cells/mL) (RELM-14)									
Aphanocapsa	16000	cells/mL		10	10		10/03/2023	10/10/2023	
Chroococcus	340	cells/mL		10	10		10/03/2023	10/10/2023	
Coelosphaerium	430	cells/mL		10	10		10/03/2023	10/10/2023	
Merismopedia	1500	cells/mL		10	10		10/03/2023	10/10/2023	
Microcystis	5800	cells/mL		10	10		10/03/2023	10/10/2023	
Specimen A	See comment	cells/mL		10	10		10/03/2023	10/10/2023	*
Specimen B	120	cells/mL		10	10		10/03/2023	10/10/2023	*
Specimen C	650	cells/mL		10	10		10/03/2023	10/10/2023	*
Specimen D	2900	cells/mL		10	10		10/03/2023	10/10/2023	*
Total Cells	28000	cells/mL		10	10		10/03/2023	10/10/2023	*

Report Date: 10/18/2023 5:04:18 PM

Report ID: 112349-5103671

Page 2 of 3

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; * = Comment Present



Custody Tracking Form



T774683-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By				Received By			
<i>Zahra Parkizgari</i> <small>Print</small>	<i>Z Parkizgari</i> <small>Sign</small>	Date 2023/09/27	Time (24 HR) 13:30	<i>Pedro Kan Prewit</i> <small>Print</small>	<i>Pedro Kan</i> <small>Sign</small>	Date 2023/09/28	Time (24 HR) 14:45
<small>Print</small>	<small>Sign</small>	Date <small>YYYY/MM/DD</small>	Time (24 HR) <small>HH:MM</small>	<small>Print</small>	<small>Sign</small>	Date <small>YYYY/MM/DD</small>	Time (24 HR) <small>HH:MM</small>
<small>Print</small>	<small>Sign</small>	Date <small>YYYY/MM/DD</small>	Time (24 HR) <small>HH:MM</small>	<small>Print</small>	<small>Sign</small>	Date <small>YYYY/MM/DD</small>	Time (24 HR) <small>HH:MM</small>

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Triage Information

Sampled By (Print): *Zahra Parkizgari* # of Coolers/Pkgs: 1

Rush Immediate Test Food Residue
 Micro Food Chemistry

***** LABORATORY USE ONLY *****

Received At: Labeled By: Verified By:

Lab Comments:
 28-Sep-23 14:45
 Grace (Hongmei) Zhao

C3U0767
 AIV ENV-602

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
N	N	N	18	19	18

Drinking Water Metals Preservation Check Done (Circle) YES NO

Bu H 209703

COR FCD-00383/4



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 786142

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/10/26
 Report #: R7880703
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3W6306

Received: 2023/10/19, 15:58

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/10/26	CAM SOP-00463	SM 23 4500-CI E m
Colour	2	N/A	2023/10/23	CAM SOP-00412	SM 23 2120C m
Conductivity	2	N/A	2023/10/21	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/10/21	CAM SOP-00446	SM 23 5310 B m
Total Ammonia-N	3	N/A	2023/10/24	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2023/10/24	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	2	2023/10/20	2023/10/21	CAM SOP-00413	SM 4500H+ B m
Orthophosphate (low level)	3	N/A	2023/10/24	CAM SOP-00461	SM 23 4500 P G m
Total Kjeldahl Nitrogen in Water	3	2023/10/23	2023/10/24	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/10/23	2023/10/25	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.



Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 786142

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/10/26
Report #: R7880703
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3W6306

Received: 2023/10/19, 15:58

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas

26 Oct 2023 18:17:45

Please direct all questions regarding this Certificate of Analysis to:

Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====
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BUREAU
VERITAS

Bureau Veritas Job #: C3W6306
Report Date: 2023/10/26

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		XIP091			XIP092			XIP093		
Sampling Date		2023/10/18 10:30			2023/10/18 11:00			2023/10/18 10:45		
COC Number		786142			786142			786142		
	UNITS	S105	RDL	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch

Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9000441	ND	0.050	9000441	ND	0.050	9000441
Colour	TCU	9	2	8998012	10	2	8998012			
Conductivity	umho/cm	1300	1.0	8996972	1300	1.0	8996972			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.68	0.10	9000821	0.63	0.10	9000821	0.70	0.10	9000821
Dissolved Organic Carbon	mg/L	8.2	0.40	8995735	8.5	0.40	8995735			
Orthophosphate (P)	mg/L	ND	0.004	8997029	ND	0.004	8997029	ND	0.004	8997029
pH	pH	8.01		8996973	8.06		8996973			
Total Phosphorus	mg/L	0.019	0.004	9000806	0.022	0.004	9000803	0.022	0.004	9000806
Dissolved Chloride (Cl-)	mg/L	170	1.0	8997025	330	5.0	8997025			
Nitrite (N)	mg/L	ND	0.010	8996935	ND	0.010	8996935	ND	0.010	8996937
Nitrate (N)	mg/L	ND	0.10	8996935	ND	0.10	8996935	ND	0.10	8996937
Nitrate + Nitrite (N)	mg/L	ND	0.10	8996935	ND	0.10	8996935	ND	0.10	8996937

RDL = Reportable Detection Limit
 QC Batch = Quality Control Batch
 ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.



BUREAU
VERITAS

Bureau Veritas Job #: C3W6306
Report Date: 2023/10/26

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C
-----------	-------

Results relate only to the items tested.



**BUREAU
VERITAS**

Bureau Veritas Job #: C3W6306

Report Date: 2023/10/26

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8995735	Dissolved Organic Carbon	2023/10/21	94	80 - 120	96	80 - 120	ND, RDL=0.40	mg/L	2.4	20		
8996935	Nitrate (N)	2023/10/24	99	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8996935	Nitrite (N)	2023/10/24	106	80 - 120	106	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8996937	Nitrate (N)	2023/10/24	98	80 - 120	100	80 - 120	ND, RDL=0.10	mg/L	NC	20		
8996937	Nitrite (N)	2023/10/24	106	80 - 120	107	80 - 120	ND, RDL=0.010	mg/L	NC	20		
8996972	Conductivity	2023/10/21			101	85 - 115	ND, RDL=1.0	umho/cm	0.14	10		
8996973	pH	2023/10/21			101	98 - 103			0.79	N/A		
8997025	Dissolved Chloride (Cl-)	2023/10/26	NC	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	5.5	20		
8997029	Orthophosphate (P)	2023/10/24	88	80 - 120	95	80 - 120	ND, RDL=0.004	mg/L	NC	20		
8998012	Colour	2023/10/23			102	80 - 120	ND,RDL=2	TCU	NC	25		
9000441	Total Ammonia-N	2023/10/24	99	75 - 125	102	80 - 120	ND, RDL=0.050	mg/L	2.8	20		
9000803	Total Phosphorus	2023/10/25	99	80 - 120	99	80 - 120	ND, RDL=0.004	mg/L	NC	20	94	80 - 120
9000806	Total Phosphorus	2023/10/25	100	80 - 120	102	80 - 120	ND, RDL=0.004	mg/L	16	20	98	80 - 120
9000821	Total Kjeldahl Nitrogen (TKN)	2023/10/24	107	80 - 120	103	80 - 120	ND, RDL=0.10	mg/L	7.6	20	103	80 - 120

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3W6306
Report Date: 2023/10/26

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



Custody Tracking Form



T786142

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By			Received By				
Zahra Parhizgari	Z Rahmani	Date	2023/10/18	Razafimanantsoa	Razafimanantsoa	Date	2023/10/19
		Time (24 HR)	12:30			Time (24 HR)	15:58
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

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Triage Information

Sampled By (Print): Zahra Parhizgari # of Coolers/Pkgs: 1

Rush Immediate Test Food Residue
 Micro Food Chemistry

***** LABORATORY USE ONLY *****

Received At	Lab Comments:	Custody Seal		Cooling Media		Temperature °C		
Labeled By		Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3	
Verified By		N	N	Yes	8	2	6	
				ODG 2023/10/19				
Drinking Water Metals Preservation Check Done (Circle) YES NO								

19-Oct-23 15:58
Grace (Hongmei) Zhao
C3W6306

JDK ENV-1142

BV H 713000

COR FCD-00383/4



Your P.O. #: PB22006
 Site Location: SWAN LAKE
 Your C.O.C. #: 805813

Attention: Zahra Parhizgari

City of Markham
 Environmental Services Depart
 8100 Warden Ave
 Markham, ON
 Canada L6G1B4

Report Date: 2023/11/30
 Report #: R7935669
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3AJ293

Received: 2023/11/23, 18:15

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Chloride by Automated Colourimetry	2	N/A	2023/11/30	CAM SOP-00463	SM 24 4500-Cl E m
Colour	2	N/A	2023/11/29	CAM SOP-00412	SM 24 2120C m
Conductivity	2	N/A	2023/11/28	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2023/11/24	CAM SOP-00446	SM 24 5310 B m
Total Ammonia-N	3	N/A	2023/11/27	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	2	N/A	2023/11/27	CAM SOP-00440	SM 24 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2023/11/28	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH	2	2023/11/24	2023/11/24	CAM SOP-00413	SM 24th - 4500H+ B
Orthophosphate (low level)	3	N/A	2023/11/24	CAM SOP-00461	SM 24 4500 P-E
Total Kjeldahl Nitrogen in Water	3	2023/11/24	2023/11/27	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	3	2023/11/24	2023/11/25	CAM SOP-00407	SM 23 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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Your P.O. #: PB22006
Site Location: SWAN LAKE
Your C.O.C. #: 805813

Attention: Zahra Parhizgari

City of Markham
Environmental Services Depart
8100 Warden Ave
Markham, ON
Canada L6G1B4

Report Date: 2023/11/30
Report #: R7935669
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3AJ293

Received: 2023/11/23, 18:15

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

- (1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
- (2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



**AUTHORIZED REPORT
RAPPORT AUTORISÉ**

Bureau Veritas
30 Nov 2023 17:26:57

Please direct all questions regarding this Certificate of Analysis to:
Grace (Hongmei) Zhao, Project Manager
Email: hongmei.zhao@bureauveritas.com
Phone# (905)817-5734

=====
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For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C3AJ293
Report Date: 2023/11/30

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		XRS952			XRS953			XRS954		
Sampling Date		2023/11/22 10:00			2023/11/22 10:45			2023/11/22 10:15		
COC Number		805813			805813			805813		
	UNITS	S105	RDL	QC Batch	S205	RDL	QC Batch	S115	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.22	0.050	9070680	0.22	0.050	9070680	0.22	0.050	9070680
Colour	TCU	9	2	9071074	12	2	9071074			
Conductivity	umho/cm	1300	1.0	9072119	1300	1.0	9072119			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.84	0.10	9070673	0.82	0.10	9070673	0.84	0.10	9070673
Dissolved Organic Carbon	mg/L	8.7	0.40	9069638	8.9	0.40	9069638			
Orthophosphate (P)	mg/L	ND	0.004	9070384	ND	0.004	9070384	0.004	0.004	9070384
pH	pH	8.10		9070978	7.94		9070978			
Total Phosphorus	mg/L	0.012	0.004	9070293	0.015	0.004	9070293	0.012	0.004	9070293
Dissolved Chloride (Cl-)	mg/L	290	5.0	9071053	280	3.0	9071053			
Nitrite (N)	mg/L	ND	0.010	9071990	ND	0.010	9071923	ND	0.010	9071923
Nitrate (N)	mg/L	ND	0.10	9071990	ND	0.10	9071923	ND	0.10	9071923
Nitrate + Nitrite (N)	mg/L	ND	0.10	9071990	ND	0.10	9071923	ND	0.10	9071923
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.										



BUREAU
VERITAS

Bureau Veritas Job #: C3AJ293
Report Date: 2023/11/30

City of Markham
Site Location: SWAN LAKE
Your P.O. #: PB22006
Sampler Initials: ZP

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C
-----------	-------

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C3AJ293

Report Date: 2023/11/30

QUALITY ASSURANCE REPORT

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9069638	Dissolved Organic Carbon	2023/11/24	93	80 - 120	96	80 - 120	ND, RDL=0.40	mg/L	3.9	20		
9070293	Total Phosphorus	2023/11/25	98	80 - 120	102	80 - 120	ND, RDL=0.004	mg/L	17	20	101	80 - 120
9070384	Orthophosphate (P)	2023/11/24	93	80 - 120	94	80 - 120	ND, RDL=0.004	mg/L	NC	20		
9070673	Total Kjeldahl Nitrogen (TKN)	2023/11/27	106	80 - 120	97	80 - 120	ND, RDL=0.10	mg/L	NC	20	98	80 - 120
9070680	Total Ammonia-N	2023/11/27	100	75 - 125	101	80 - 120	ND, RDL=0.050	mg/L	NC	20		
9070978	pH	2023/11/24			102	98 - 103			0.28	N/A		
9071053	Dissolved Chloride (Cl-)	2023/11/30	80	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	0.69	20		
9071074	Colour	2023/11/29			101	80 - 120	ND, RDL=2	TCU	2.7	25		
9071923	Nitrate (N)	2023/11/27	96	80 - 120	98	80 - 120	ND, RDL=0.10	mg/L	NC	20		
9071923	Nitrite (N)	2023/11/27	106	80 - 120	107	80 - 120	ND, RDL=0.010	mg/L				
9071990	Nitrate (N)	2023/11/28	89	80 - 120	91	80 - 120	ND, RDL=0.10	mg/L	NC	20		
9071990	Nitrite (N)	2023/11/28	105	80 - 120	105	80 - 120	ND, RDL=0.010	mg/L	NC	20		
9072119	Conductivity	2023/11/28			101	85 - 115	ND, RDL=1.0	umho/cm	0.40	10		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



BUREAU
VERITAS

Bureau Veritas Job #: C3AJ293

Report Date: 2023/11/30

City of Markham

Site Location: SWAN LAKE

Your P.O. #: PB22006

Sampler Initials: ZP

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

A handwritten signature in cursive script that reads 'Cristina Carriere'.

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



Custody Tracking Form



T805813

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: S105
Last Sample: S115
Sample Count: 3

Relinquished By				Received By			
Zahra Parhizgari	<i>Z. Parhizgari</i>	Date	2023/11/22	Alum	<i>Ala</i>	Date	2023/11/23
		Time (24 HR)	13:30			Time (24 HR)	18:15
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information			
Sampled By (Print)	# of Coolers/Pkgs:	Rush <input type="checkbox"/>	Immediate Test <input type="checkbox"/>
Zahra parhizgari	1	Micro <input type="checkbox"/>	Food Residue <input type="checkbox"/>
			Food Chemistry <input type="checkbox"/>

*** LABORATORY USE ONLY ***

Received At:

Labeled By:

Verified By:

Lab Comments:

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	4	6	6
Drinking Water Metals Preservation Check Done (Circle)			YES	NO	

23-Nov-23 18:15
Grace (Hongmei) Zhao
C3AJ293

ENIV 1450

COR FCD-00383/4



**Swan Lake Monitoring Program
2023 Annual Report**



Swan Lake Water Quality Improvement & Parks Refresh Program and Parks Improvements Projects

Community Meeting on Program Update

Environmental Services & Operations Departments

March 25, 2024



Background



Lake Formation and Land Development

- Gravel pit in the 1960s and 1970s; construction waste dump in the early 1980s
- Lake formed when pumping for the gravel pit ceased operations
- Area draining to the Lake started as farmlands and rapidly changed to urban residential
- Drainage area fully developed.





Water Flow

- Water flows into the Lake from:
 - Direct Precipitation
 - Urban development ponds and oil and grit separators/ sewer system
 - Shoreline runoff
- Water leaves the Lake through:
 - Evaporation
 - Lake outfall to sewer and then to Mt. Joy Creek
- Groundwater exchange complex and uncertain





Natural Features

- Diverse community of terrestrial species
- Mute and trumpeter swans
- Small mammals and several bird species
- Snapping turtles
- Resident and migratory Geese
- Limited fish community
- Invasive species
- Designated as 'Other Greenway System Lands including naturalized stormwater management facilities'



Photo of birds and turtles courtesy of Donald and Cindy Fowler (through FOSLP)





Community Interest

- Original objective set out by the developers in 1993
- A community feature within the Swan Lake Park. The Park is widely used by residents and visitors.
- Many avid bird-watchers and photographers.
- Survey conducted by the Friends of Swan Lake in 2020

to transform the inactive gravel pit into a 'diverse natural habitat for aquatic and terrestrial wildlife... that incorporates passive use opportunities surrounding the Lake'.

residents "support a long-term plan that involves investment in sustainable solutions and restoration of the aquatic and land-based habitat".



Issues

- Phosphorus from sediment and geese resulting in algae growth
- Chloride from winter maintenance activities
- Limited flushing of contaminants in Lake



Opportunities

- Swan Lake and park are well used amenities with strong community support for sustainable solutions
- Existing stormwater management infrastructure to treat most of runoff

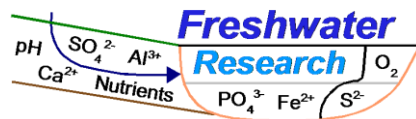


Water Quality Improvement Plan



Timeline 2011-2019

- 2011: Lake at Hyper-eutrophic level/ Monitoring started (external lake quality advisor hired)
- 2013: Phoslock application improved water quality
- 2014: Geese control initiated
- 2019: Water quality strategy study



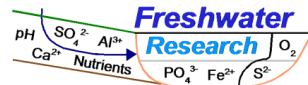


Developing a Long-Term Plan

- Goal Statement
- Targets derived considering local conditions
- Several potential mitigation measures reviewed by lake experts
- TRCA was consulted on respective measures
- Stakeholders' extensive input was considered

To improve the **overall health** of Swan Lake, which will provide **opportunities** for no-contact activities for the enjoyment of the **community**

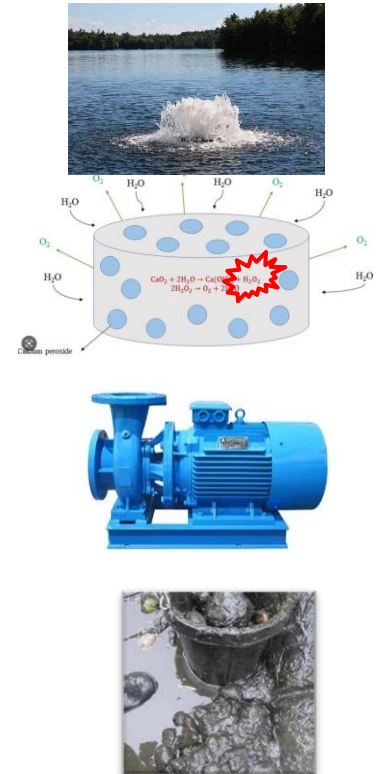
- Phosphorus: a low eutrophic condition in year 1 after treatment increasing in year 3
- Chloride: remain below acute guideline and close to 2013-2014 values
- Transparency: above 0.8 m





Screening of Ideas

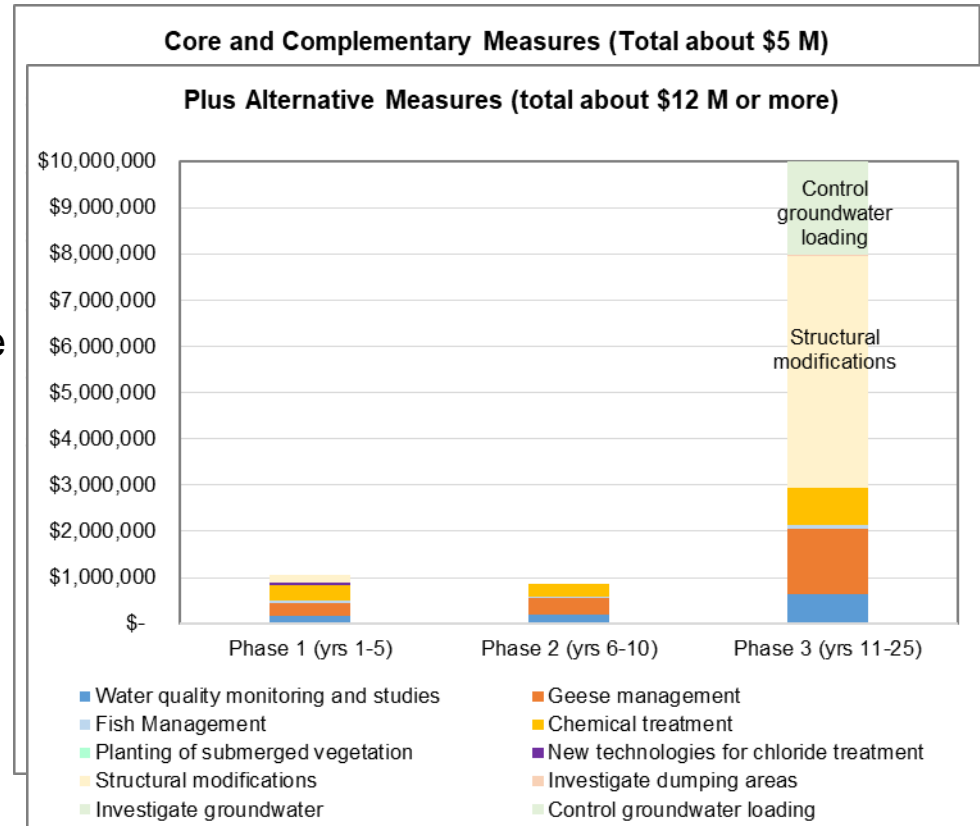
- ✓ Nutrient control focuses on governing contaminant (phosphorus)
- ✓ Chemical treatment most effective for nutrients from sediment
- ✓ Geese management most effective for nutrients from geese
- Mechanical aeration promotes release of nutrients from sediment
- Chemical oxygenation toxic for aquatic life
- Water circulation increases temperature and evaporation; costly and disruptive
- Sediment removal extremely costly and disruptive
- ✓ Stormwater re-direction and research into chloride removal technologies considered





Adaptive Plan

- A Long-Term Management Plan was approved by Council in 2021 for the next 25 years
- In three Phases to allow for reviewing and updating the Plan to adapt to Lake conditions
 - Core Measures: All years
 - Complementary Measures: years 6-10 (brought forward)
 - Alternative Measures: years 11-25 (partially brought forward)





BUILDING MARKHAM'S FUTURE TOGETHER
2020 – 2023 Strategic Plan



Plan Implementation



Monitoring, Inspections and Studies

- Important for understanding issues and planning mitigation measures and adapting the plan based on the results
- Includes chemistry and biology
- Water level logger and staff gauge
- Measurements and samples by City staff
- Analysis by accredited laboratories
- Regular site inspections and observations
- External experts hired for review and updates

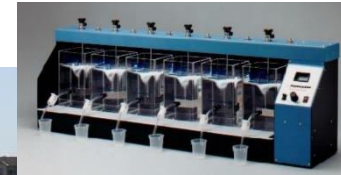




Water Treatment

- Most effective way to control release of nutrients from sediment
- Careful treatment planning and monitoring to avoid any adverse effect
- Repeated every three years or as needed based on review of monitoring results
- 2021 treatment very effective in reducing phosphorus and algae levels

$$ASP = P_{mob} \times SG \times SF \times TD \times \frac{g}{1000\ mg} \times \frac{10,000\ cm^2}{m^2}$$



August 3, 2021



August 5, 2021



August 19, 2021



Geese Management

- Hazing/chasing
- Geese relocation and egg/nest management
- Public education and geese count (see QR code)
- Fenced open spaces to prevent geese from accessing the water
- Low cost alternatives (e.g., strobe lights were tested)



Swan Lake Geese Count Survey QR Code





Fish Management / Aquatic Planting

- Removal of bottom-dwelling fish (to avoid disturbance of sediment)
- Fish management plan and fish stocking pending improved water quality
- Planting of submerged aquatic vegetation initiated as a pilot project in 2023 to improve transparency and promote aquatic habitat improvement





Maintenance

- In November 2021 the East pond inlet was cleared
- In August 2023, the outlet from Swan Club OGS was cleared
- Assumption by the City for the two private ponds underway
- Best practices for winter maintenance followed by the City and the Village





Stakeholder Engagement

- Annual reporting to Markham Subcommittee in May
- Consultation with TRCA and researchers
- Exchanges with FOSLP and other interested residents
- Swan Lake page on website
- Algae signs warn against contact with water
- Geese signs upgraded with info on geese impact
- An online application for public input into geese count
- Residents informed against releasing goldfish pets and poaching turtles

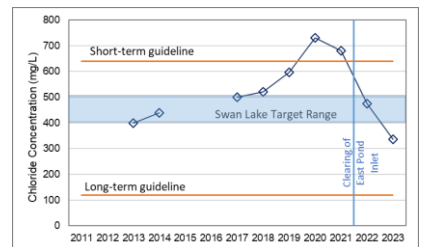
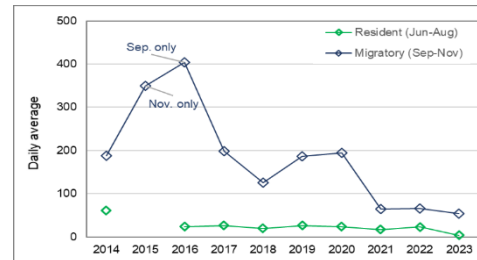
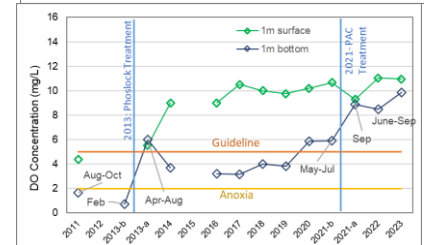
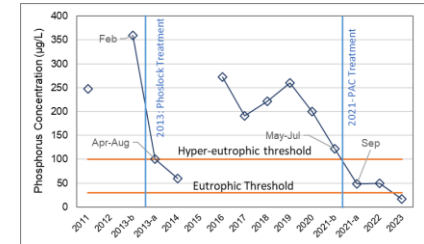
www.markham.ca/swanlake





Plan Accomplishments

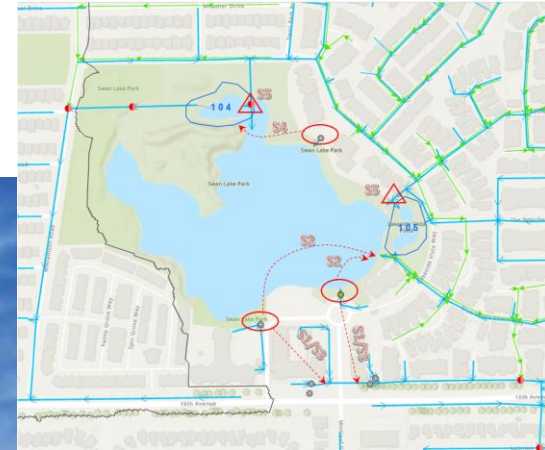
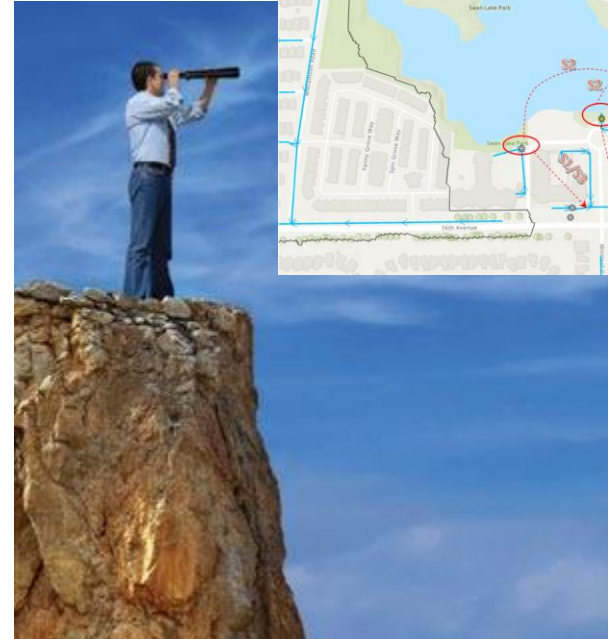
- Controlling internal and external sources of nutrients reduced phosphorus and nitrogen to below targets
- Enhanced oxygen levels
- Maintenance activities reduced chloride to below targets
- Geese management reduced the number of migratory geese by half
- Aquatic vegetation planting initiated to improve clarity and promote healthier habitat





Looking Ahead

- Continue monitoring of water quality
- Geese and fish management
- Water treatment followed by aquatic planting
- Opportunities to reduce loadings will be sought through Flow Diversion Study
- Chloride treatment research in 2024 as positive results could be a valuable tool
- Continue pond assumption process
- Research by Trent University on Rare Earth Elements





Summary of Parks Refresh Program and Parks Improvements Projects (2021 to 2023)





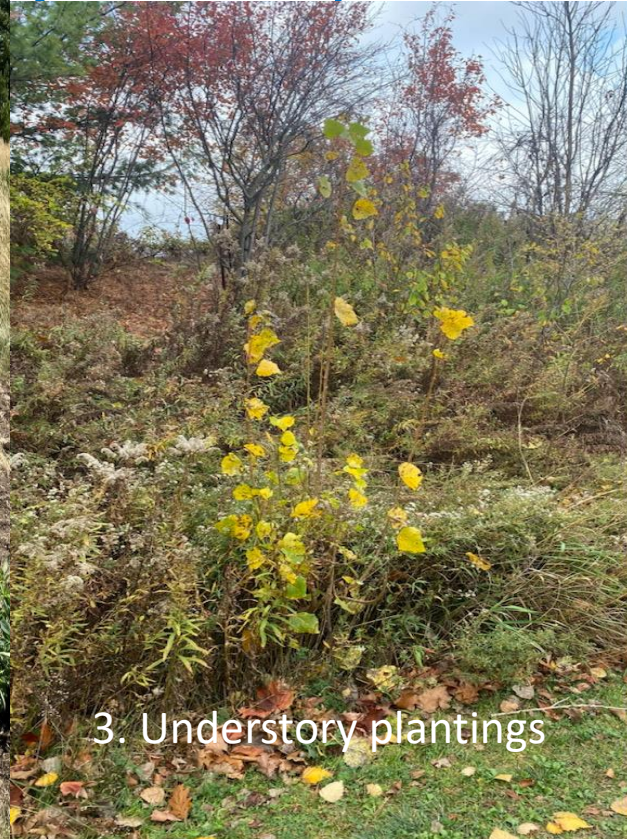
Parks Refresh Program 2 Year Project Complete



1. Pollinator planting in place of rain garden



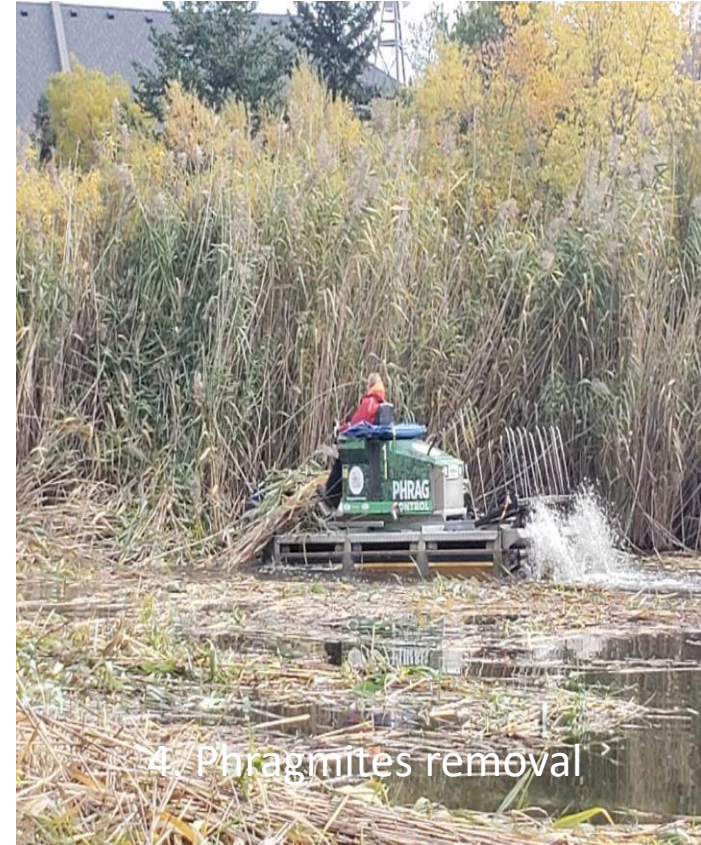
2. Pollinator Planting



3. Understory plantings



Parks Refresh Program 2 Year Project Complete



4. Phragmites removal



5. Shoreline improvements



GOOSE MANAGEMENT AREA



About Canada Geese

- I fly in large V-shaped flocks when migrating
- I can travel more than 1,000 km in one day
- I nest in the same area where I was born
- I mate for life, but I may partner else. I will take another mate
- I don't fly for six weeks in the early summer when I am growing new wing feathers (molt)

We are not hungry – please do not feed us!

- Bread hurts my stomach
- Grass & grains keep me healthy
- I won't migrate if you feed me



Help us control the Canada Geese population

Suburban is not urban areas! Geese need natural areas for nesting, foraging and other activities. The City of Markham has a Geese Management Program to help sustainably reduce the number of geese present.

As a resident and visitor, we encourage you to help the City of Markham by reporting your observations about geese on the blog and by downloading the City's Geese Counting App.

Learn more: markham.ca/SweetLake

Environmental & Water Quality Impacts

- High nutrient concentrations from goose poop can lead to blooms of cyanobacteria which forms a layer of scum on the lake surface and may produce toxins which is toxic to humans, pets and wildlife upon contact in Markham.
- Geese damage the turf through excessive sitting, and large numbers compact the soil to destroy the turf grass.
- Geese are now "NoCell" species meaning they no longer migrate so these problems can exist year round.





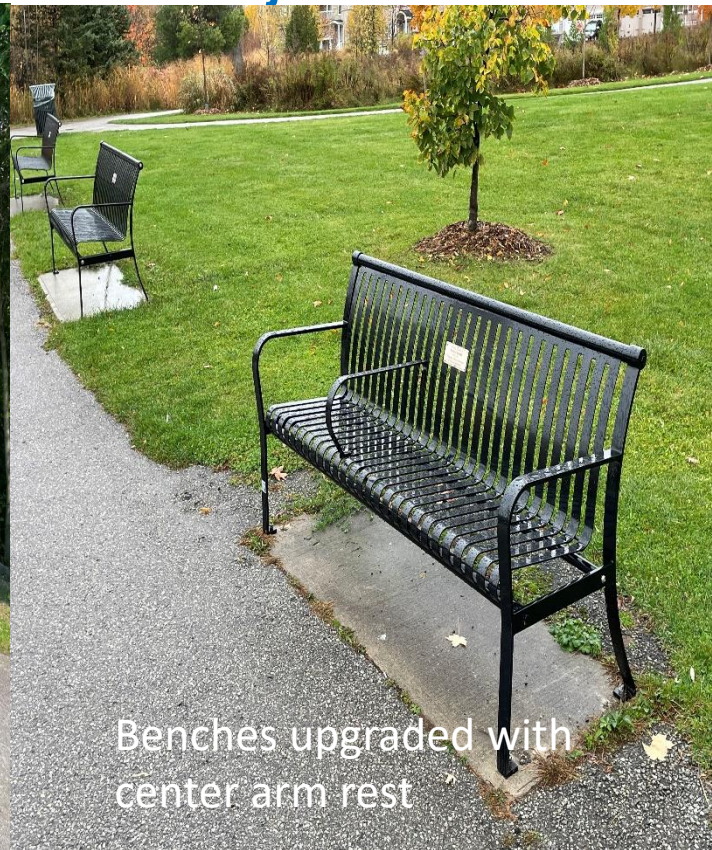
Swan Lake Park Improvement Projects



Bank erosion project



Post and rail replacement



Benches upgraded with
center arm rest



Swan Lake Park Improvement Projects



Surfacing

Pathway resurfacing



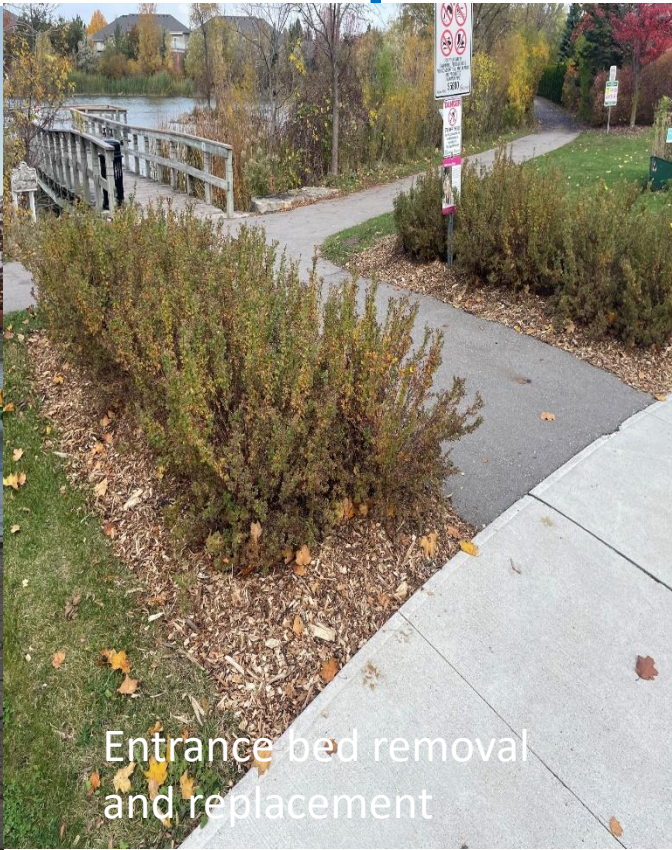
Mulch tree rings in



Swan Lake Park Improvement Projects



Playground and
Rubberized Surfacing
replacement



Entrance bed removal
and replacement



AMICA property trail
connection



Swan Lake Park Projects 2024

- Limestone pathway grading levelling
- Maintain plantings from previous years
- Maintain goose exclusion fencing until permanent fencing is erected
- Monitor Phragmites for reoccurrence and additional treatment
- Restoration of existing lake level viewing nodes on north shoreline, new viewing nodes are not being considered at this time

Operations has completed the Park Refresh and Shoreline Improvement consultation and will support Environmental Services on water quality improvement as the first priority. In 2024, staff will submit 2025 capital budget request to construct permanent goose exclusion fencing and plantings to further support water quality improvements



References

- www.markham.ca/swanlake
- Update on Swan Lake Water Quality (February, 2013)
- Swan Lake Water Quality Improvement Program (June, 2020)
- Geese Management at Swan Lake: Overview of Options and Path Forward (September, 2020)
- Swan Lake Long-Term Management Plan (November 2021)
- Swan Lake 2021 Water Quality Status and Updates (May 2022)
- Swan Lake 2022 Water Quality Status and Updates (May 2023)

Contact information:

Swan Lake Water quality:

Robert Muir
Manager, Stormwater, Environmental Services
✉: rmuir@markham.ca
☎: 905.477.7000 x 2357

Swan Lake Park:

City of Markham Contact Center:
✉: customerservice@markham.ca



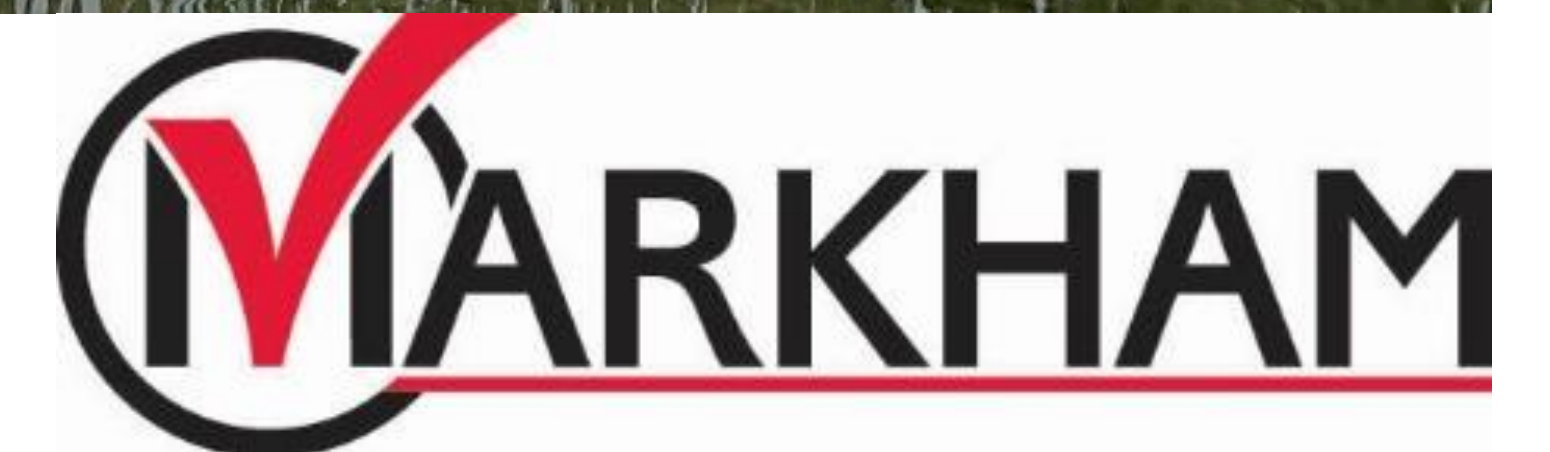
Questions?



WELCOME

Swan Lake Water Quality Improvement
Community Meeting on Program Update
March 25, 2024

March 25, 2024



Purpose of Swan Lake Water Quality Improvement

To improve the **overall health** of Swan Lake, which will provide **opportunities** for no-contact activities for the enjoyment of the **community**

Purpose of Public Information Meeting

- 💧 Provide details of the water quality improvement program
- 💧 Share achievements of the program since it started
- 💧 Inform the public about upcoming activities in 2024
- 💧 Discuss ways to get involved in improving water quality and habitat health
- 💧 Answer any questions the public may have

Swan Lake History



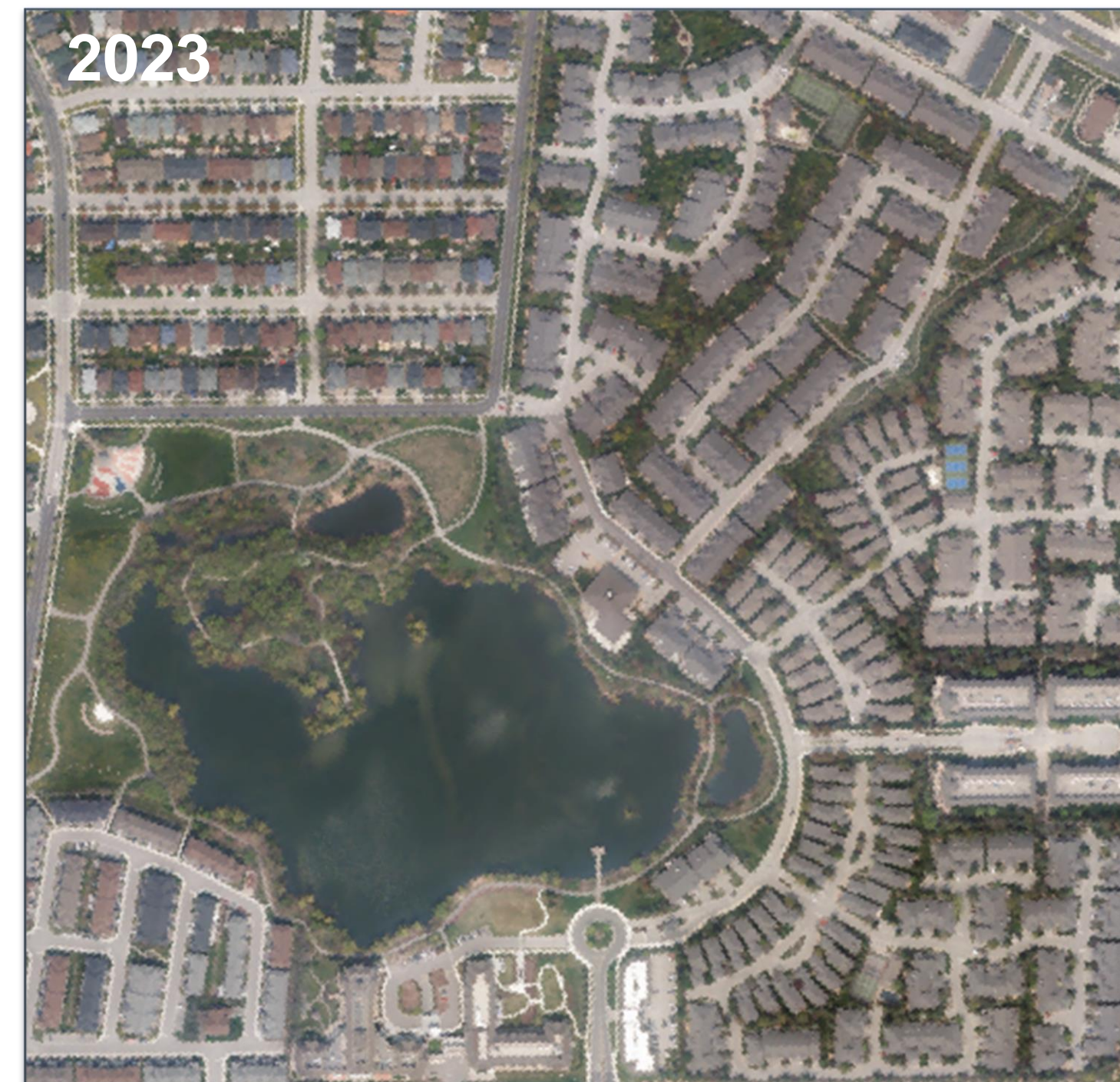
1967
Gravel pit in the 1960s and 1970s
Construction waste dump in the early 1980s



1995
Lake formed when pumping for the gravel pit ceased operations



2002
Area draining to the Lake started as farmlands and rapidly changed to urban residential



2023
Drainage area fully developed

Swan Lake Water Flow



Issues



Phosphorus from sediment and geese resulting in algae growth



Chloride from winter maintenance activities



Closed system with limited flushing of contaminants from Lake



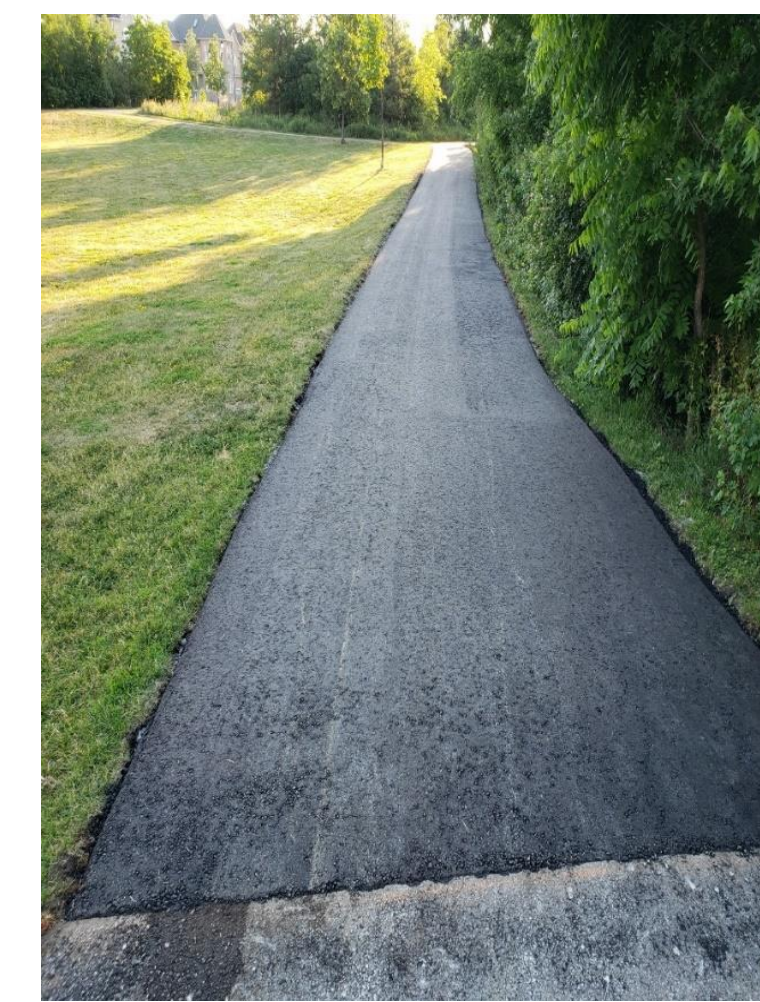
Limited aquatic community

- Brown Bullhead (Cattfish)
- Common Carp
- Fathead Minnow

Invasive species

- Dog-strangling vine
- Black Locust
- Phragmites (Common reed)

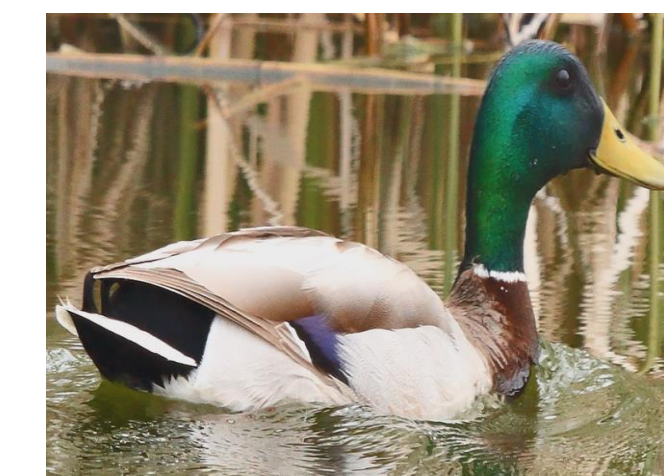
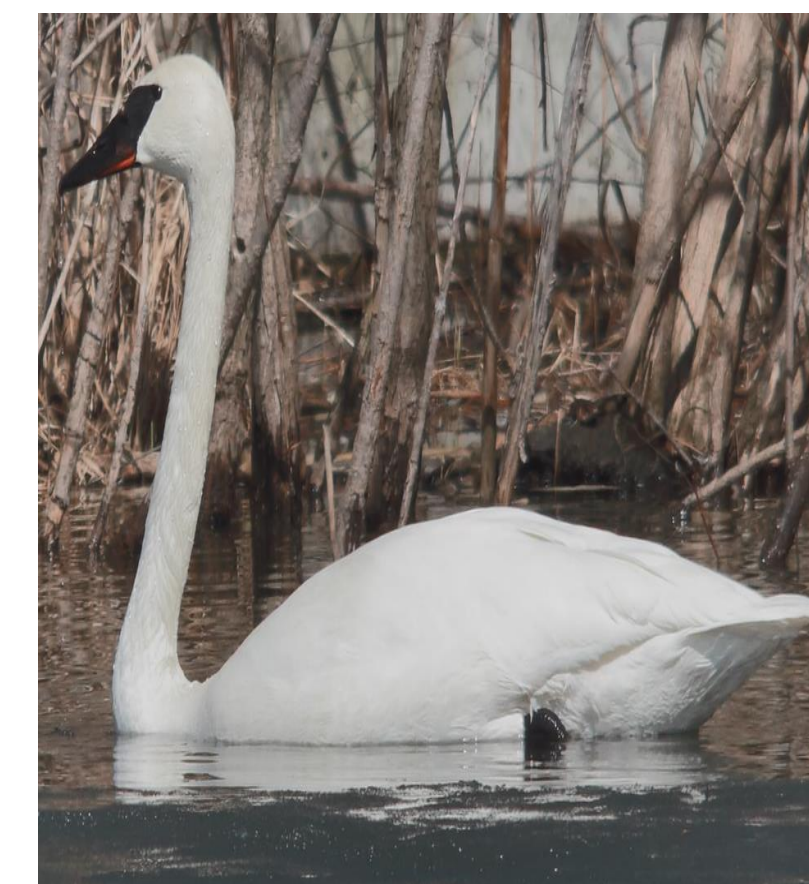
Opportunities



Swan Lake and park are well used amenities with strong community support for sustainable solutions



Existing stormwater management infrastructure to treat most of runoff



Diverse community of terrestrial species

Photo of birds and turtles courtesy of Donald and Cindy Fowler (through FOSLP)
 From top left: Trumpeter swan, Red-tailed hawk, Domestic duck, Great blue heron
 Cormorant, Black-crowned night heron, Ruby-crowned kinglet
 Mute swan, Yellow warbler, Painted turtles

Swan Lake Long-Term Management Plan

CORE MEASURES

- * Water quality monitoring
- * Geese management
- * Fish removal
- * Maintenance of stormwater facilities
- * Chemical treatment

COMPLEMENTARY MEASURES

- * Planting of submerged vegetation
- * Fish Management
- * New technologies for chloride treatment

ALTERNATIVE MEASURES

- * Investigate dumping areas
- * Investigate/control groundwater loading
- * Evaluate/implement structural modifications (runoff diversion)

Adaptive Plan

Stakeholder Engagement

Scientific Approach

Financial Stewardship

- **Core Measures**
- Phase 1: 2021-2025

Evaluate measures

- **Core and Complementary Measures**
- Phase 2: 2026-2030 *

Evaluate measures

- **Core and Alternative** Measures**
- Phase 3: 2031-2045

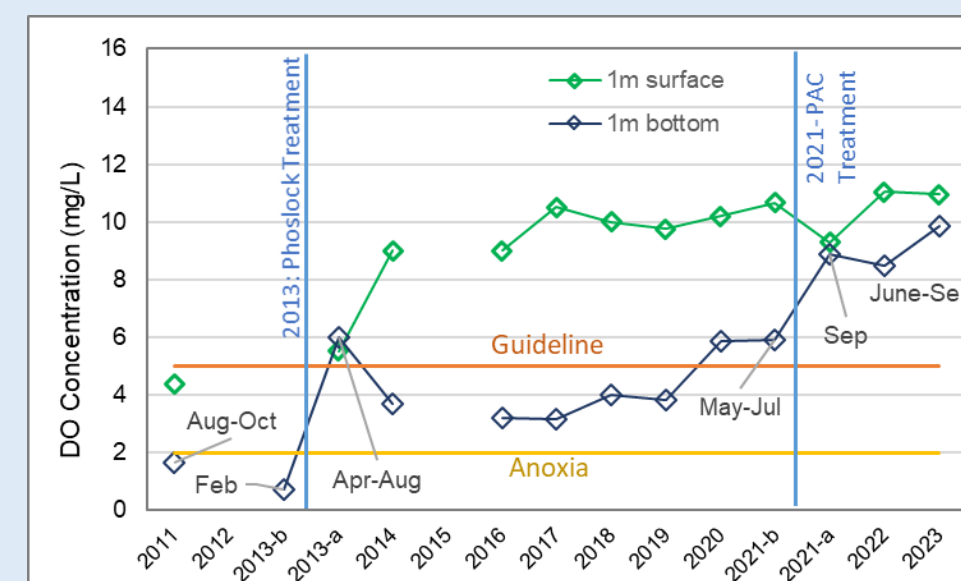
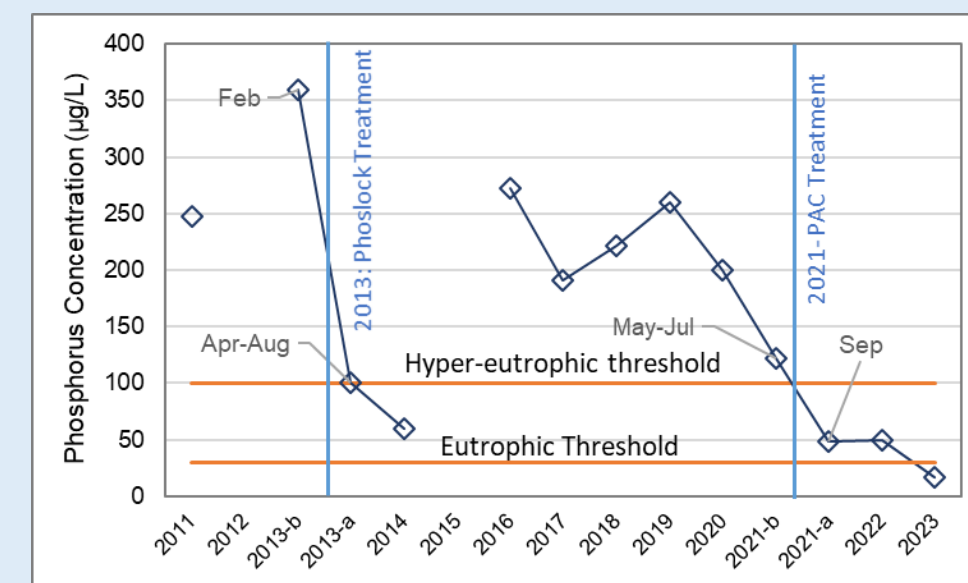
* Some complementary measures have been brought forward to Phase 1.

** Some alternative measures have been brought forward to Phase 1.

Water Quality Accomplishments

Water Treatment

- Most effective way to control release of nutrients from sediment
- Careful treatment planning and monitoring to avoid any adverse effect
- Repeated every three years or as needed based on review of monitoring results
- 2021 treatment very effective in reducing phosphorus and algae levels



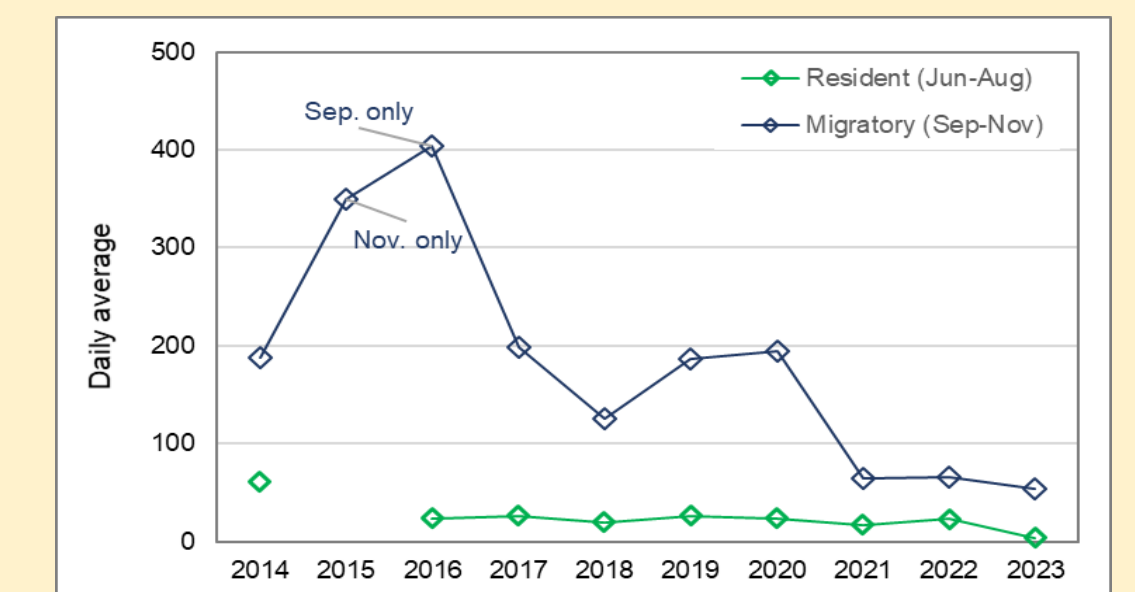
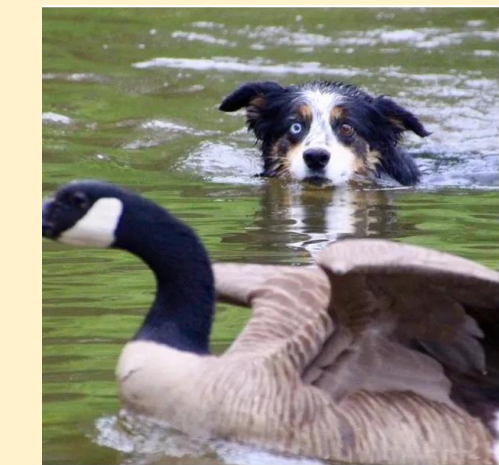
Fish Management and Aquatic Planting

- Removal of bottom-dwelling fish (to avoid disturbance of sediment)
- Planting of submerged aquatic vegetation initiated as a pilot project in 2023 to improve aquatic habitat



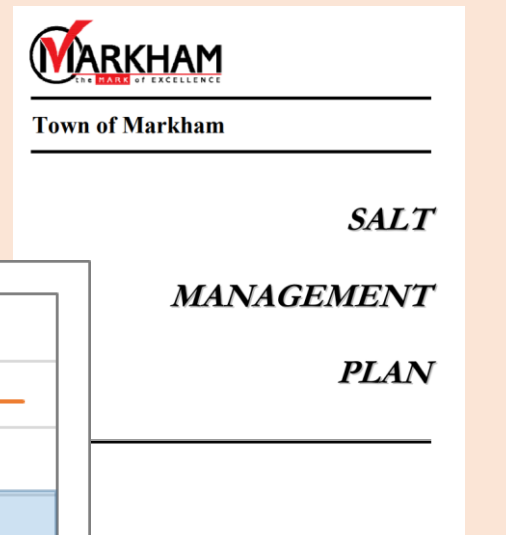
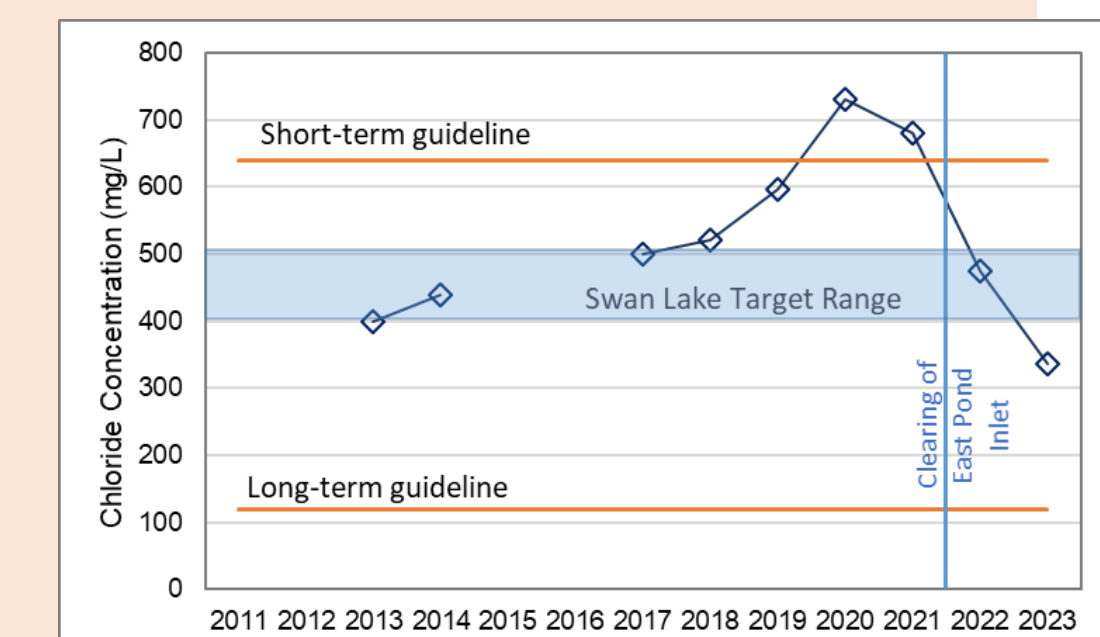
Geese Management

- Hazing /chasing
- Geese relocation and egg/nest management
- Geese count
- Public education sign
- Fenced open spaces to prevent geese from accessing the water
- Low cost alternatives (e.g., strobe lights were tested)



Source Control and Maintenance

- East pond inlet was cleared
- Outlet from Swan Club treatment device was cleared
- Assumption by the City for the two private ponds underway
- Best practices for winter maintenance followed by the City and the Village



Ongoing and Upcoming Work in 2024-2025

Water Quality Monitoring

- Important for understanding issues and planning mitigation measures
- Chemistry and biology
- Oxygen and temperature
- Water level



Geese Management

- Hazing /chasing
- Geese relocation and egg/nest management
- Public education
- Replacing temporary fencing with permanent features



Fish Management

- Removal of bottom-dwelling fish
- Consultation with OMNRF on fish stocking



Decorative image - OMNRF fish stocking using a helicopter

Water Treatment

- Planning and implementation of the second treatment



Planting of Aquatic Vegetation

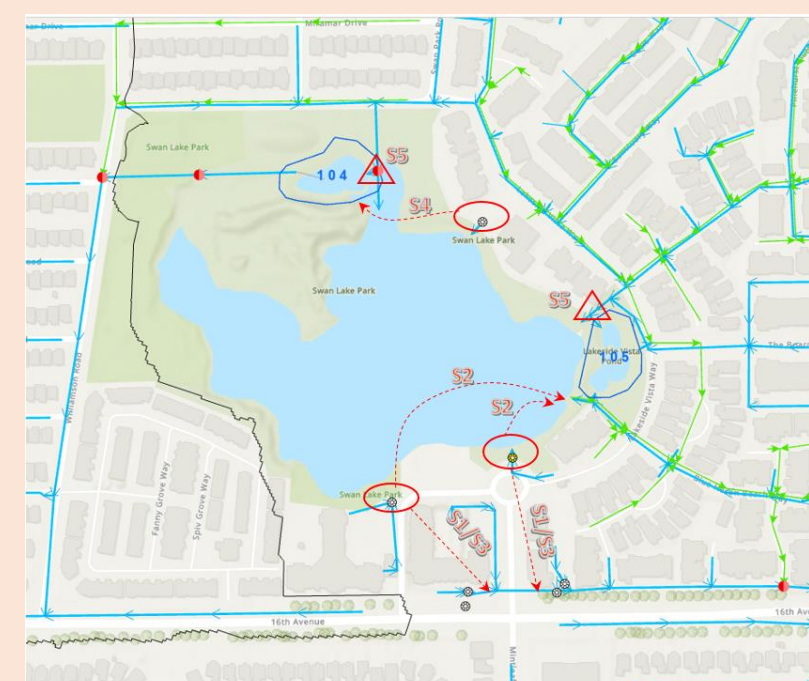
- Additional planting of submerged aquatic vegetation to improve aquatic habitat



Decorative image – submerged aquatic plants

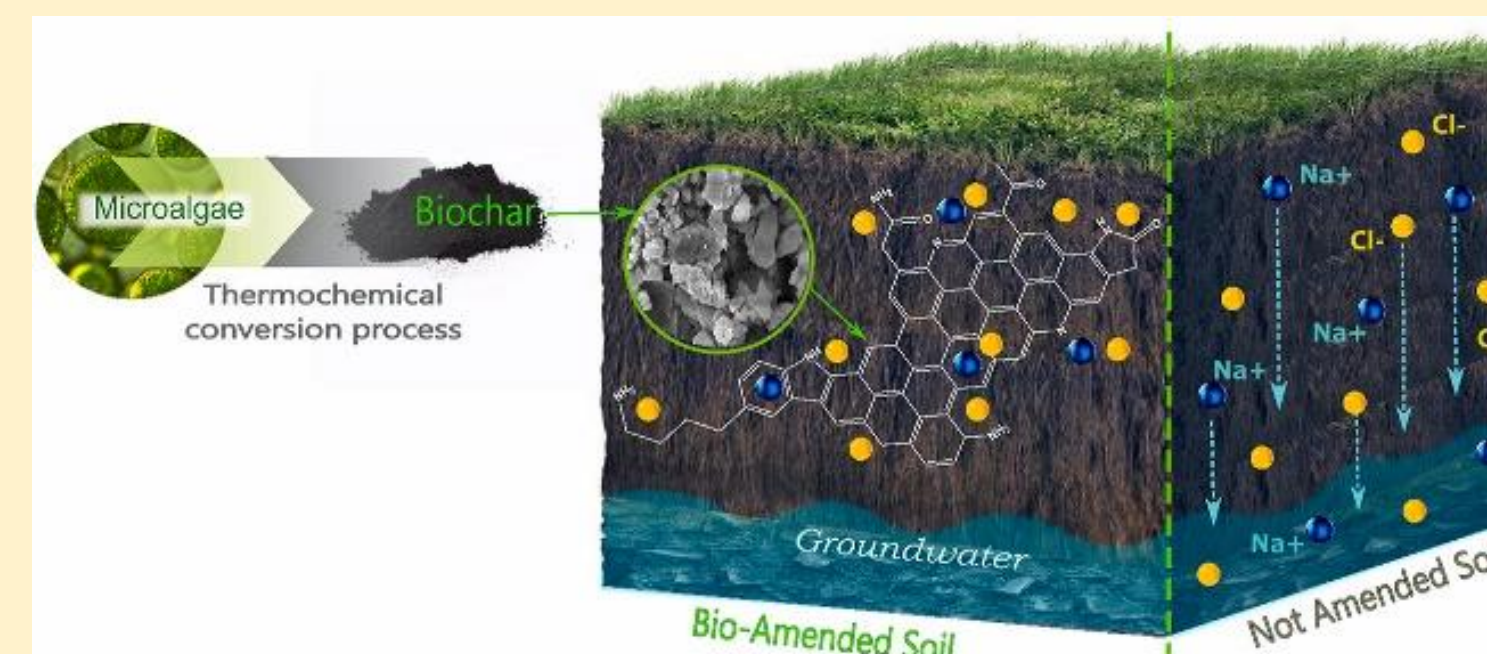
Flow Diversion Study

- Study feasibility of flow redirection and potential impacts on flooding and chloride level
- Flow monitoring



New Technologies for Chloride Treatment

- Research by York University on chloride removal using biochar



Pond Assumption Process

- Continue engaging with the developers on maintenance and assumption of stormwater ponds



Parks Refresh Program 2 Year Project Complete



1. Pollinator planting in place of rain garden



2. Pollinator Planting



3. Understory plantings



4. Phragmites removal



5. Shoreline improvements



GOOSE MANAGEMENT AREA

About Canada Geese

- I fly in large V-shaped flocks when migrating
- I can travel more than 1,000 km in one day
- I nest in the same area where I was born
- I mate for life, but if my partner dies, I will take another mate
- I don't fly for six weeks in the early summer when I am growing new wing feathers (molt)

We are not hungry – please do not feed us!

- Bread hurts my stomach
- Grass & grains keep me healthy
- I won't migrate if you feed me

My friends, the Swans, should not be fed either, except by trained handlers

Help us control the Canada Geese population

Suburban and urban areas provide ideal conditions for geese survival – plenty of food and space to roost, lack of natural predators and safe from hunters. Because of this, we have too many geese in our urban areas including Swan Lake. The population of Canada Geese at Swan Lake has contributed to poor water quality and other negative impacts to the environment. The City of Markham has a Geese Management Program to help sustainably reduce the number of geese present.

Area residents and visitors are encouraged to help the City's efforts by submitting their observations about geese on the lake and its shorelines to the City's Geese Counting App.

Learn more: markham.ca/SwanLake

Environmental & Water Quality Impacts

- Too many geese poop leads to contamination and over-fertilization (eutrophication) of water sources
- High nutrient concentrations from goose poop can lead to blooms of cyanobacteria which forms a layer of scum on the lake surface and may produce microcystins which is toxic to humans, pets and wildlife upon contact or ingestion
- Geese damage the turf through excessive eating, and large numbers compact the soil so nothing else will grow
- Geese are now "resident" species, meaning they no longer migrate so these problems can exist year round

Green MARKHAM
A Healthier Community

MARKHAM

6. Educational outreach

How You Can Help

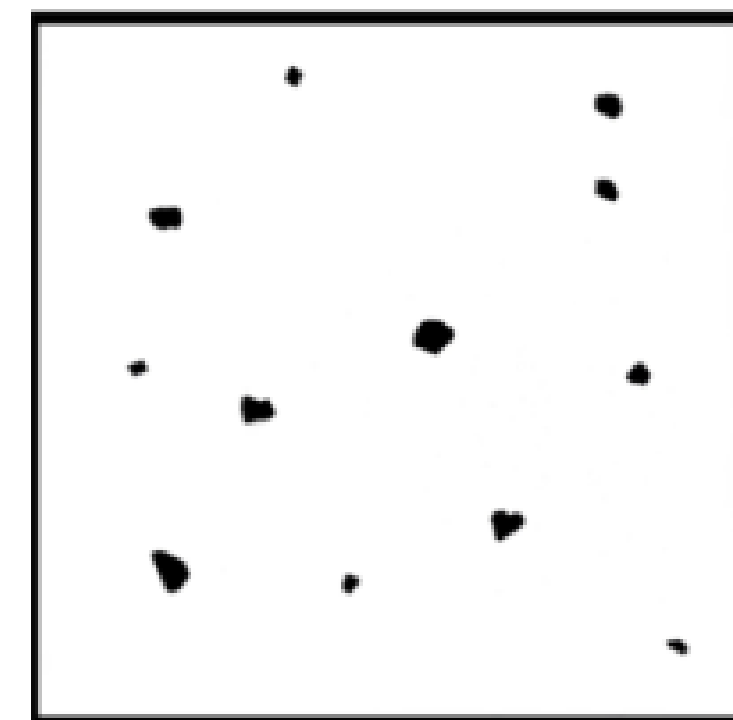
- Do not feed the geese
- Report geese count and other wildlife observations through an online application (scan QR code)



- Refrain from releasing goldfish pets and poaching turtles

- Follow best management practices for salt management, check the TRCA's Sustainable Salt Management Resources

<https://partnersinprojectgreen.com/resources/sustainable-salt-management-resource-hub/>



Black dots/salt showing how much salt should be applied - 50mg/m2.

Looking for More Information

- Annual meeting with Markham Subcommittee in May
- Swan Lake page contains past reports and presentations:
www.markham.ca/swanlake



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