# King's Bay Environmental Centre

Works # 110003665

# Annual Wastewater Performance Report

Prepared For: The City of Kawartha Lakes

Reporting Period of January 1st – December 31st, 2020

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Operating Authorities:

Kawartha Lakes

OCWA

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

## 2020 Performance Report for King's Bay Environmental Centre

The Environmental Compliance Approval Number 7037-A77JLP, for the King's Bay Environmental Centre, stipulates that the operating authority for the following conditions shall maintain annual records:

**Section 10 - Reporting (6)**

**(a)** a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the Works;

**(b)** a description of any operating problems encountered and corrective actions taken;

**(c)** a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming a part of the Works;

**(d)** a summary of any effluent quality assurance or control measures undertaken in the reporting period;

**(e)** a summary of the calibration and maintenance procedures conducted on all monitoring equipment; and

**(f)** a description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6.

**(g)** a tabulation of the volume of sludge generated in the reporting period and an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;

**(h)** a summary of any complaints received during the reporting period and any steps taken to address the complaints;

**(i)** a summary of all by-pass, spill or abnormal discharge events;

**(j)** a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification;

**(k)** a report summarizing all modifications completed as a result of Schedule B, Section 3; and

**(l)** any other information the Water Supervisor requires from time to time.

The following is a report from the records maintained by the Ontario Clean Water Agency for the King's Bay Environmental Centre for the year 2020.

**(a)** Attached, as **Appendix I**, is a copy of the 2020 **Performance Assessment Report (PAR)** for the King's Bay Environmental Centre showing effluent criteria. The PAR contains: a tabulation of all monthly average raw sewage and final effluent sample results obtained during the reporting period, a tabulation of average daily flows, and monthly volumes for the reporting period, and a tabulation of calculated total loading of BOD, suspended solids, total phosphorus, and ammonia + ammonium as nitrogen concentrations in the final effluent.

Attached as **Appendix II: Groundwater Monitoring**, are the results of the groundwater monitoring as required by the Environmental Compliance Approval – Table 3.

The following table summarizes the average concentration and annual average loading of the effluent parameters $CBOD_5$, Total Suspended Solids, Total Phosphorus, and pH in comparison to the effluent limits and objectives specified by the Environmental Compliance Approval. Attached in **Appendix III**, a summary of the final effluent pH and temperature recorded at the facility. The recording frequency required by the Environmental Compliance Approval is monthly.

Table 1 outlines the effluent criteria limits as set out in Section 7(1) of Environmental Compliance Approval Number 7037-A77JLP as follows:

**Table 1: Final Effluent Compliance Limits 2020**

| Effluent Parameters *(Column 1)* | Average Effluent Concentration limit (mg/L) *(Column 2)* | Actual Annual Average Effluent Concentration (mg/L) | Compliant (Y/N) | Average Total Effluent Loading Limit (kg/d) *(Column 3)* | Actual Annual Average Effluent Loading (kg/d) | Compliant (Y/N) |
|---|---|---|---|---|---|---|
| $CBOD_5$ | 15.0 | 10.571 | Y | N/A | N/A | N/A |
| Total Suspended Solids | 15.0 | 20.358 | N | N/A | N/A | N/A |
| Total Phosphorus | 1.0 | 0.369 | Y | 0.17 | 0.016 | Y |

| Effluent Parameters *(Column 1)* | Average Effluent Concentration limit (mg/L) *(Column 2)* | Actual Annual Average Effluent Concentration (mg/L) | Compliant (Y/N) | Average Total Effluent Loading Limit (kg/d) *(Column 3)* | Actual Annual Average Effluent Loading (kg/d) | Compliant (Y/N) |
|---|---|---|---|---|---|---|
| pH | 6.0 to 9.5, inclusive, at all times | 7.40 | Y | N/A | N/A | N/A |

*Note:*
*Condition 7(2) states that for the purposes of determining compliance with and enforcing subsection (1):*
*(a) The Annual Average Concentration of CBOD5 and Total Suspended Solids named in Column 1 of subsection (1) shall not exceed the corresponding maximum concentration set out in Column 2 of subsection (1).*
*(b) The Annual Average Loading of a parameter named in Column 1 of subsection (1) shall not exceed the corresponding maximum waste loading set out in Column 3 of subsection (1).*

The maximum raw flow into the facility was 79.97 $m^3$/d, which occurred in October 2020. This is well below the allowable peak flow rate of approximately 666.0 $m^3$/d and is also well below the rated capacity of 170.0 $m^3$/d listed in the Environmental Compliance Approval. The average daily flow for 2020 was 49.17 $m^3$/d.

ECA Condition 6(2)(b) states: *"The Owner shall use best efforts to operate the works within the Rated Capacity of the Works."* Rated Capacity is defined as Average Daily Flow for which the Works are approved to handle. Table 2 provides a summary of the average daily influent flows in comparison with the rated capacity of 170.0 $m^3$/day.

**Table 2: Effluent Objectives Influent Flow Data for 2020 (per ECA # 7037-A77JLP, Condition 6(2)(b))**

| Month | Avg. Daily Flow ($m^3$) | ECA Rated Capacity ($m^3$) | Compliant (Y/N) |
|---|---|---|---|
| **January** | 50.13 | 170.0 | Y |
| **February** | 44.57 | 170.0 | Y |
| **March** | 56.35 | 170.0 | Y |
| **April** | 63.87 | 170.0 | Y |
| **May** | 53.79 | 170.0 | Y |
| **June** | 47.88 | 170.0 | Y |
| **July** | 46.67 | 170.0 | Y |
| **August** | 44.25 | 170.0 | Y |

| Month | Avg. Daily Flow ($m^3$) | ECA Rated Capacity ($m^3$) | Compliant (Y/N) |
|---|---|---|---|
| **September** | 43.05 | 170.0 | Y |
| **October** | 43.26 | 170.0 | Y |
| **November** | 45.07 | 170.0 | Y |
| **December** | 51.21 | 170.0 | Y |

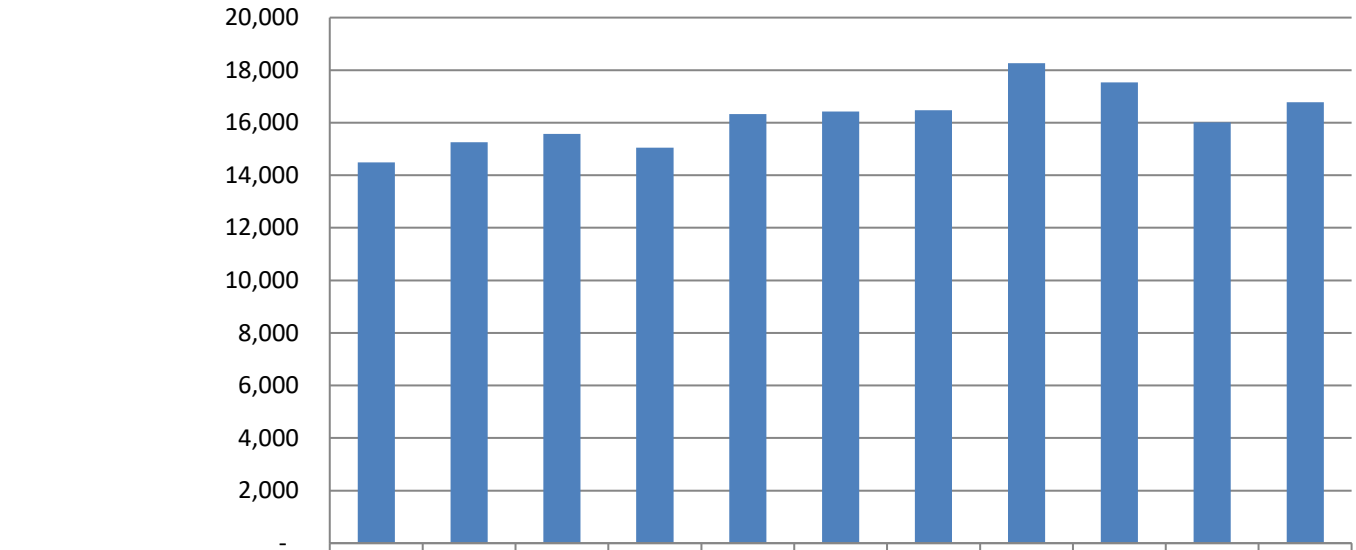
Table 3 provides a summary of the average daily effluent flows in comparison with the rated capacity of 170.0 m3/day.

**Table 3: Effluent Objectives Effluent Flow Data for 2020 (per ECA # 7037-A77JLP, Condition 6(2)(b))**

| Month | Avg. Daily Flow ($m^3$) | ECA Rated Capacity ($m^3$) | Compliant (Y/N) |
|---|---|---|---|
| **January** | 45.94 | 170.0 | Y |
| **February** | 41.39 | 170.0 | Y |
| **March** | 54.62 | 170.0 | Y |
| **April** | 59.65 | 170.0 | Y |
| **May** | 51.92 | 170.0 | Y |
| **June** | 46.33 | 170.0 | Y |
| **July** | 40.78 | 170.0 | Y |
| **August** | 42.74 | 170.0 | Y |
| **September** | 39.05 | 170.0 | Y |
| **October** | 39.76 | 170.0 | Y |
| **November** | 41.32 | 170.0 | Y |
| **December** | 48.12 | 170.0 | Y |

Chart 1 provides a summary of the annual total effluent flows from 2010 to the 2020 reporting period.

**Chart 1: Annual Total Effluent Flow Comparison**




| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Annual Effluent Flow (m3) | 14,496 | 15,257 | 15,574 | 15,048 | 16,331 | 16,429 | 16,477 | 18,267 | 17,540 | 16,011 | 16,776 |

The final effluent quality for total phosphorus was well below the limits set in the Environmental Compliance Approval. The annual average concentration for total phosphorus was 0.369 mg/L (limit of 1.0 mg/L) and the annual average loading for total phosphorus was 0.016 kg/d (limit of 0.17 kg/d based on design average day flow of 170.0 $m^3$/d).

The pH of the effluent ranged from 7.03 to 7.78, which are within the range of 6.0 – 9.5 required by the Environmental Compliance Approval.

The total suspended solids effluent objective and limit was not met in 2020. The annual effluent average of 20.358 mg/L exceeded the objective of 10.0 mg/L and exceeded the limit of 15.0 mg/L.

The carbonaceous biochemical oxygen demand effluent objective was not met but the limit was met in 2020. The annual effluent average of 10.571 mg/L exceeded the objective of 10.0 mg/L but met the limit of 15.0 mg/L.

During this reporting period, work continued to bring the system into compliance. Adjustments to the system include: relocating the alum injection point, the timers on the return sludge system to optimize the return rate, and removal of sludge from the system by a licensed waste hauler to lower the solids build-up. The operators are continuing to closely monitor the process and make necessary adjustments as required. Additionally, OCWA's Process Optimization and Technical Services group in conjunction with the operations staff conducted a process review. A Technical Memorandum was developed, which summarizes the key findings of the investigation and provides recommendations

to further optimize the facility. The Technical Memorandum was reviewed by the Owner and provided to the District MECP Office for review and comment in late 2020. Implementation of the recommendations outlined in the Technical Memorandum require further discussions between the Operating Authority, the Owner and MECP with approval from the MECP Approvals Branch and District Office.

**Groundwater Monitoring Wells**

The well levels were measured once in Quarter 1, 2, 3 and 4 of 2020. The well levels for the eight groundwater monitoring wells are found in **Appendix IV: Groundwater Monitor Wells - Levels.**

The groundwater quality monitoring in the eight monitoring wells (**Appendix II**) show consistent results with few anomalies for pH, conductivity, CBOD, total phosphorous, total suspended solids, nitrite, nitrate, and nitrate + nitrite.
The Provincial Water Quality Objective for pH is 6.5 – 8.5 and all samples collected from the eight monitoring wells fell within this range. The Provincial Water Quality Objectives does not outline objectives or interim objectives for any of the remaining parameters.

The Amended ECA issued February 16, 2016 has changed the groundwater monitoring to Quarterly water levels and semi-annually samples for: pH, Conductivity, Total Phosphorous, Nitrate Nitrogen, Total Suspended Solids and CBOD5. It also specifies that Total Phosphorous is to be a field filtered grab sample. The trigger value is a concentration of 0.3 mg/L in either GW1 or GW8.

The Total Phosphorous trigger value of 0.3 mg/L was exceeded in GW1 during the sampling conducted in September 2020. Notification was provided to the District MECP Office as per the facility ECA. The frequency of sampling GW1 and GW8 has been increased to quarterly as per the facility ECA and will continue until such time that the Total Phosphorous concentrations in two consecutive quarterly samples in each of the downgradient monitoring wells GW1 and GW8 are less than 0.3 mg/L. The first quarter immediately following the trigger exceedance, samples were collected in December 2020 from GW1 and GW8 was dry, meaning no samples were able to be collected. The Total Phosphorous result was below the trigger value. The second set of quarterly samples are due to be collected in March 2021.

The following table (Table 4) shows the performance related to groundwater.

**Table 4 − Groundwater Well Monitoring Performance for Total Phosphorous**

| **Well #** | March 2020 | September 2020 | December 2020 |
|---|---|---|---|
| **Upgradient** | mg/L | mg/L | mg/L |
| Well 5 | 0.011 | <0.003 | N/A |
| Well 4 | 0.003 | <0.003 | N/A |
| **Downgradient** | Mg/L | Mg/L | Mg/L |
| **East trench** | | | |
| Well 3 (5m) | 0.074 | 0.008 | N/A |
| Well 2 (10m) | 0.011 | <0.003 | N/A |
| Well 1 (15m) | 0.015 | 0.927 | 0.075 |
| **West trench** | | | |
| Well 6 (5m) | 0.009 | <0.003 | N/A |
| Well 7 (10m) | 0.005 | <0.003 | N/A |
| Well 8 (15m) | <0.003 | <0.003 | Dry Well |

*Shading indicates a result > 0.3mg/L*
*East and west trenches corrected (east was west and vice versa)*
*Wells were numbered differently in the field than when drilled and installed in 2000. Originally wells 1 and 2 were numbered as upgradient, but in the field 4 and 5 are the upgradient wells while 1 and 2 are downgradient.*

**(b)** The facility has experienced a number of challenges over the past few years, primarily with breakdowns of the rotating biological contactors (RBC). This has historically affected the effluent quality. During the reporting period, both RBC units continued to function as designed but higher TSS numbers continued. Adjustments to the system include: relocating the alum injection point, the timers on the return sludge system to optimize the return rate, and removal of sludge from the system by a licensed waste hauler to lower the solids build-up. The operators are continuing to closely monitor the process and make necessary adjustments as required. Additionally, OCWA's Process Optimization and Technical Services group in conjunction with the operations staff conducted a process review. A Technical Memorandum was developed, which summarizes the key findings of the investigation and provides recommendations to further optimize the facility. The Technical Memorandum was reviewed by the Owner and provided to the District MECP Office for review and comment in late 2020. Implementation of the recommendations outlined in the Technical Memorandum require further discussions between the Operating Authority, the Owner and MECP with approval from the MECP Approvals Branch and District Office.

**(c)** Ontario Clean Water Agency (OCWA) maintenance activities are based on a computerized Work Management System (WMS) using the Maximo application. In its developmental stages, each piece of equipment at the operating facility was tagged with a unique bar code number, and this information was entered into the electronic WMS

database. In addition, data regarding the description of the equipment, model number, serial number, the equipment type, location at the facility as related to process, serviceable status, manufacturer's suggested maintenance activities, all risk factor information and average monthly usage was also recorded.

Once the equipment inventory was established, preventive maintenance procedures and schedules were developed for each piece of equipment. Each work order generated by the Preventive Maintenance schedule includes materials and parts required, any special tool requirements, work protection, job safety planning, running checks, a preventive maintenance job procedure, and upon completion of the task, the work order is closed out.

Corrective or breakdown maintenance is required when equipment is determined to be non-serviceable, or the potential for non-serviceability exists. All preventive and corrective/breakdown maintenance in OCWA and more specifically the King's Bay Environmental Centre is executed and accounted for under a Maximo work order.

Attached is **Appendix V: Maintenance Summary**, a Work Order Summary report, showing all preventive and corrective maintenance activities performed at the King's Bay Environmental Centre during 2020.

**(d)** Effluent control measures include in-house sampling and testing for operational parameters such as suspended solids, pH, phosphorus, and temperature. In-house testing provides real time results, which are then evaluated to determine if process changes are necessary to enhance operational performance. All in-house sampling and analysis are performed by certified operations staff utilizing approved methods and protocols for sampling, analysis and recording as specified in the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", the Ministry's publication, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the publication, "Standard Methods for the Examination of Water and Wastewater".

All final effluent samples collected during the reporting period to meet ECA sampling requirements were submitted to SGS Lakefield Research Ltd. laboratory for analysis, with the exception of pH and temperature. SGS Lakefield Research has been deemed accredited by the Canadian Association for Laboratory Accreditation (CALA), meeting strict provincial guidelines including an extensive quality assurance/quality control program. By choosing this laboratory, the Ontario Clean Water Agency is ensuring appropriate control measures are undertaken during sample analysis. The pH

and temperature parameters were analyzed in the field at the time of sample collection by certified operators, to ensure accuracy and precision of the results obtained.

**(e)** Flow meter calibrations were conducted on June 11, 2020. As a result of failing calibration, effluent pump 1 has been taken out of service until such time that repairs are completed. The reports are attached as **Appendix VI: Calibration Reports.**

**(f)** OCWA uses a number of **Efforts to achieve the Effluent Objectives**. Effluent quality assurance and control measures include in-house sampling and testing for operational parameters such as pH, temperature, TSS and phosphorous. In-house testing provides real time results, which are then used to enhance process and operational performance. OCWA also collects raw sewage and effluent samples as per the ECA and reviews these results on a regular basis to ensure compliance with the ECA objectives and limits.

Table 5 provides a summary of the ECA effluent objectives, specified in Condition 6(1), in comparison to the actual effluent results obtained during the reporting period.

**Table 5: Effluent Objectives and Results – 2020**

| Effluent Parameters | ECA - Effluent Objective Concentration | Actual Annual Average Concentration in Effluent | Compliant (Y/N) |
|---|---|---|---|
| $CBOD_5$ | 10.0 mg/L | 10.571 mg/L | N |
| Total Suspended Solids | 10.0 mg/L | 20.358 mg/L | N |
| Total Phosphorus | 0.8 mg/L | 0.369 mg/L | Y |
| pH | 6.5 - 9.0 | 7.40 | Y |

The effluent **objectives** for $CBOD_5$, Total Suspended Solids, Total Phosphorus and pH in the effluent are recommended not to exceed: 10.0 mg/L, 10.0 mg/L, 0.8 mg/L and range of pH between 6.5 – 9.0, respectively. The annual average effluent objective concentrations for Total Phosphorus and pH were met during the 2020 reporting period. The annual average effluent objective concentrations for CBOD5 and Total Suspended Solids were not met during the 2020 reporting period. The Annual Average for TSS was 20.358 mg/L which exceeded the objective of 10.0 mg/L and the limit of 15.0 mg/L. The Annual Average for CBOD5 was 10.571 mg/L, which exceeded the objective 10.0 mg/L but met the limit of 15.0 mg/L. The objectives were met for all other parameters. OCWA has developed comprehensive manuals detailing operations, maintenance, instrumentation and emergency procedures. To ensure facilities are operated in

compliance with applicable legal requirements, facility staff have access to a network of operational compliance and support experts at the hub, region and corporate level.

**Appendix VII** contains a summary of the coagulant used in 2020.

**(g)** Attached as **Appendix VIII: Biosolids Summary** that contains the volume of sludge generated for the reporting period which was 306.30 $m^3$. The anticipated volume for the next reporting period is not expected to be appreciably different from this reporting period. Sludge is hauled to the Lindsay Water Pollution Control Plant. No change is expected from the current sludge handling methods.

**(h)** No **Community Complaints** were received regarding the King's Bay Environmental Centre during the reporting period.

**(i) Bypass, spill and abnormal discharge event summary**: None to report.

**(j) Notices of Modifications**: None to report.

**(k) Report Summarizing all Modifications**: A summary of all modifications completed as a result of Schedule B, Section 3 are included in **Appendix V: Maintenance Summary.**

**(l) Additional information the Water Supervisor requires**: None to report.