

# Identification of Potential Significant Dischargers to the Metro Vancouver Wastewater System

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# Executive Summary

The goal of this project is to investigate potential significant dischargers that are not currently permitted, but may warrant requiring a waste discharge permit. North American Industry Classification System (NAICS) codes were used to create a shortlist of industries thought to be potential significant dischargers of biological oxygen demand, total suspended solids, cadmium, lead, molybdenum, nickel, and/or zinc. Industries of interest were cross referenced with existing permit holders and the created shortlist was used to perform an industry directory search of all businesses in Metro Vancouver with the same NAICS codes. Results of this search were used to populate an Excel database which stores information on company location, work performed, industry description, company discharge risk potential, and company contact information. Based on knowledge about these companies, current waste discharge permit data, and industry research, the discharge risk potential for each company was assigned based on expected discharge concentrations for the parameters of interest. These risk ratings are subjective and ranked as low, medium, or high. If insufficient information was available at the time of assigning a risk ranking, the risk was labelled unassigned. Database entries can be updated at any time and new entries can be added as more research is done for potential significant dischargers. Summary tables are used to highlight all the important information within the database to show what sewerage areas potential dischargers reside in and where risk is common for different parameters. An accompanying Google Earth map facilitates the visual distribution of potential significant dischargers within the database. A user manual was developed to provide detailed information on how to best use the database functionality. The database will need to be updated regularly to capture the most up-to-date information, as well as to include new businesses that may emerge or change discharge habits. Further investigation into the risk ratings assigned to companies should also be reviewed as further research is conducted. This database will facilitate Environmental Regulation and Enforcement's investigation of unusual events which could impact sewerage area infrastructure, wastewater treatment plants, and/or the environment. It will help bring potential significant dischargers that do not currently meet the threshold for a waste discharge permit to Environmental Regulation and Enforcement Officers' attention, as these companies may be required to apply for a permit in the future. The database is an important tool for planning assignment of waste discharge permits and investigating contaminant spike events within different sewerage areas.

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## Introduction

Regional sewage and wastewater transport and treatment in Metro Vancouver is managed by the Greater Vancouver Sewerage and Drainage District (GVS&DD). Discharge by any entity (whether residential, commercial, institutional or industrial) within the GVS&DD is regulated by the [GVS&DD Sewer Use Bylaw No. 299, 2007 \(as amended\)](#), hereinafter referred to as “the Bylaw” [1]. The subject of this project is potential industrial dischargers.

There are four (4) Sewerage Areas in the GVS&DD region [2]:

- Fraser
- Lulu Island West
- North Shore
- Vancouver

There are five (5) Wastewater Treatment Plants (WWTPs) in the GVS&DD [3]:

- Annacis Island Wastewater Treatment Plant (Delta)
- Iona Island Wastewater Treatment Plant (Richmond)
- Lions Gate Wastewater Treatment Plant (West Vancouver)
- Lulu Island Wastewater Treatment Plant (Richmond)
- Northwest Langley Wastewater Treatment Plant (Langley)

The Bylaw aims to protect the sewers and WWTPs from damage, promote cost-effective operation of facilities, protect human health and safety, protect the environment, and impose payable fees to those who discharge into the sewage treatment system [1].

This report describes the process undertaken to search for potential significant dischargers to the wastewater system in Metro Vancouver region that are not currently captured in the permitting process. This report summarizes the findings and describes the creation of the Potential Significant Discharger Database, hereinafter referred to as “the Database”. This report should be reviewed in conjunction with the Database, which was created using the methodology described herein and within the Potential Significant Discharger Database User Manual, hereinafter referred to as “the User Manual”.

## Objectives

The following are a list of objectives that were created for this project:

- Review the current list of North American Industry Classification System (NAICS) codes from Statistics Canada and compare to codes determined by the Canadian Water and Wastewater Association (CWWA) to pertain to the wastewater industry.
- Cross reference these lists with existing Waste Discharge Permit (WDP) holders provided by Source Control Program staff and research which industries from the list may be

significant contributors of biological oxygen demand (BOD), total suspended solids (TSS), and metals (as listed in the Bylaw).

- Interview Environmental Regulation and Enforcement (ERE) Officers to inform the development of a condensed list of NAICS codes pertaining to industries likely to discharge BOD, TSS, and metals.
- Using the condensed list of industries, work with the corporate librarian to use the Metro Vancouver library to conduct a business directory search to investigate operations in the region that discharge BOD, TSS, and metals. Then, cross reference these businesses with currently permitted dischargers.
- Work with Source Control Program staff to create a database in Excel to show the list of non-permitted potential significant dischargers and develop level of risk estimates for potential of BOD, TSS, and metals that may be discharged. Include additional information that may be useful to Enforcement Officers, such as description of processes for that business or industry.
- Conduct a risk assessment of these industries and prioritize them based on information gathered on the amount of BOD, TSS, and metals potentially discharged. Types of operations, description of operational processes, and size of the operation will be considered.
- Map out each potential discharger in Google Earth and color coordinate potential dischargers according to the risk assigned.

The research findings and methodology for developing the Database have been documented in this report. It is currently unknown how many businesses in Metro Vancouver region may be discharging significant amounts of BOD, TSS, and metals that impact local WWTPs. When contaminant spike events occur at the inlet to WWTPs, in biosolids, or elsewhere, ERE must investigate the source of the spike event. This includes existing WDP holders, as well as other businesses that do not hold a permit, but may have discharged levels that contributed to creating the spike event. Historically this can be a complex and time-consuming process for ERE. The Database will allow ERE Officers to expedite the process of gathering information on non-permitted dischargers that may be potential significant dischargers, especially when considering metals. The Database will also allow ERE to identify and further investigate businesses that do not currently hold a WDP, but may meet the threshold for a WDP. It can also be used to track businesses that do not meet the threshold for a WDP at this time, but may require one in the future. The Database will enable Enforcement Officers to track these businesses and focus their initiatives based on a risk assessment of various industries compared to current WPD holders.

The results of this project will:

- Capture significant dischargers that are not currently permitted, but may warrant requiring a permit.
- Facilitate ERE's investigation of unusual events which could impact sewerage area infrastructure, WWTPs, and/or the environment.

- Bring potential significant dischargers to ERE’s attention that do not currently meet the threshold for a WDP, but may be required to apply for one in the future.

## Methodology

### NAICS Codes

The North American Industry Classification System (NAICS) is used to categorize businesses according to the work they perform. In Canada, Statistics Canada regulates the list of relevant NAICS codes. Other statistical agencies regulate similar lists for the United States of America and Mexico. The classification hierarchy begins with broad industry sectors and becomes more detailed, ending with a specific National Industry [4], [5]. This hierarchy is shown in Table 1 below, where each “X” in a NAICS code is a digit from 0 through 9.

Table 1: NAICS Code Hierarchy

The NAICS Code Hierarchical Structure	
XX	Industry Sector
XXX	Industry Subsector
XXXX	Industry Group
XXXXX	NAICS Industry
XXXXXX	National Industry - CAN, USA, MEX

The most current Canadian version of the NAICS can be found on the [Statistics Canada website](#). At the time of writing this report, NAICS 2017 version 3.0 was being used [4]. NAICS Association regulates their own [website](#), which is designed for the U.S. At the time of writing this report, NAICS 2017 was also being used [5].

### Short List Creation

A short list of NAICS codes was created looking at industries that had potential to be significant dischargers to the Metro Vancouver wastewater system. First, an overall review of the entire NAICS 2017 list was performed to gain an understanding of all the industries and ensure that a unique industry would not go unnoticed. A list of potential dischargers was then created, containing 114 NAICS codes.

Second, an existing list of NAICS codes identified by the Canadian Water and Wastewater Association (CWWA) was reviewed. This CWWA list looks at industries that transfer substances to wastewater treatment plants in accordance with information from the National Pollutant Release Inventory (NPRI) database [6]. This CWWA list contains 207 NAICS codes.

Third, the two lists mentioned above were compared to the NAICS codes of industries currently holding active WDPs in Metro Vancouver. Industries were evaluated for their potential to discharge BOD, TSS, and five metals of interest (cadmium, lead, molybdenum, nickel, and zinc, referred to as the “key metals”). These metals have been prioritized due to frequent high-concentration events in recent years, including in the influent to WWTPs or in post-treatment

biosolids. These key metals are not only regulated by the Bylaw, but also in the [Organic Matter Recycling Regulation](#) and [B.C. Reg. 63/88 Hazardous Waste Regulation](#) of the Environmental Management Act [1], [7], [8].

According to the Bylaw, an industry discharging more than the Restricted Waste Criteria (RWC) quantities listed in Table 2 would be subject to the requirement of a WDP [1].

Table 2: Restricted Waste Criteria in the Bylaw for Parameters of Interest

Parameter	Restricted Waste Criteria (mg/L)
BOD	500
TSS	600
Cadmium	0.20
Lead	1.0
Molybdenum	1.0
Nickel	2.0
Zinc	3.0

Using data on the discharge limits of active permits, businesses that have discharge limits above the standard requirements for permit consideration, as shown in Table 2, were flagged as potential significant dischargers. The NAICS code of that business was then considered an industry with significant discharge potential if it repeated five times or more within active permits and was added to the short list. Additionally, permitted businesses with the five highest recorded discharges in past years (for each parameter) were looked at. The NAICS codes of those high dischargers were also flagged as industries with potential for other significant dischargers and were added to the short list. Special note was taken for NAICS codes that are high-loading dischargers compared to existing WDP holders and appear with higher frequency among active permits (as mentioned above). At this time, water usage data for active WDP holders was not provided and loading on the basis of volume was not considered.

In the making of the short list, many industries were removed from the first two lists mentioned above based on the nature of their business. These businesses were expected to be low risk for the parameters being investigated, but were originally considered, as more research may find that these businesses should still be considered for permitting in the future. These businesses include, but are not limited to, warehouses, office buildings, and printing services. Additionally, any industries that are already regulated under a sector-specific discharge bylaw or code of practice in Metro Vancouver were removed from consideration, as Source Control Program Staff and ERE already have information about these businesses and are aware of their discharge potential. This includes businesses such as breweries, wineries, and dry-cleaning facilities. It should be noted that there were some discrepancies with active permits containing NAICS codes that did not appear in the search results. See Appendix A for more information. This led to the first iteration of a short list, which contained 35 NAICS codes.

With assistance of the Metro Vancouver corporate librarian, an industry search of the Metro Vancouver region was completed. Four iterations of refining the short list, running searches, and reviewing results were completed. With direction from Source Control Program staff, some industries were chosen to be ignored (such as bars, restaurants, and wholesalers), as their discharge potential is known to ERE and was not required to be investigated at this time. Other industries were given more focus (such as food and metal processing), as they were prioritized as important by Source Control Program and ERE staff. Processing facilities were confirmed as having high potential of significant discharge. The fourth short list iteration, simply referred to as “the short list” in the remainder of this report, was used to begin creation of the Database. It contained 23 NAICS codes and can be seen in Appendix B.

## Database Set-up

Information about the businesses added to the Database will be completed manually. Many of the company information related fields in the Database can be populated directly with data from the results of the industry search conducted, including company name, trade style, location information, business description, and NAICS code. This information was grouped into five major sections within the Database, as seen below.

### Company Info

This section contains information about the company legal name, trade style they do business under, and the NAICS code they are registered under. All the headings can be seen below in Figure 1.

Company Info			
Company Name	Doing Business As	NAICS 2017 Code	NAICS 2017 Description

Figure 1: Database Headings - Company Info Section

### Company Location

This section contains information about the company location, including address and sewerage area. All the headings can be seen below in Figure 2.

Company Location						
Address	City	Postal Code	Latitude	Longitude	Sewerage Area	WWTP

Figure 2: Database Headings - Company Location Section

### Company Discharge Risk Potential

This section contains information about the company discharge risk potential for the various parameters of interest. All the headings can be seen below in Figure 3.

Company Discharge Risk Potential												
Permitted?	Overall BOD/TSS Rating	BOD	TSS	Overall Metals Rating	Cadmium	Lead	Molybdenum	Nickel	Zinc	Other Metals Risk	Other Metals	Discharge Risk

Figure 3: Database Headings - Company Discharge Risk Potential Section

## Company Description

This section contains information about the company business description and the number of employees. All the headings can be seen below in Figure 4.

Company Description	
Business Description	# of Employees

Figure 4: Database Headings - Company Description Section

## Company Contact Info

This section contains information about the company contact info that can be found, such as name of employee, phone, email, and company website. All the headings can be seen below in Figure 5.

Company Contact Info					
Company Contact Name	Position	Company Contact Phone	Company Contact Email	URL	Additional Address Info

Figure 5: Database Headings - Company Contact Section

## Potential Significant Discharge Risk Assessment

### Assessing Risk of a Business

The risk assigned to each business was divided between BOD, TSS, and the five key metals, as advised in consultation with Source Control Program and ERE staff. Two overall ratings were then created. One rating for BOD/TSS combined and a second rating for overall metals. The risk is assigned manually when a business is entered into the Database, but can be changed at any time, as needed. Risk for businesses with NAICS codes that match current WDP holders was compared to discharge limits of those permits and the top five significant discharges from the past. More information on this process can be found in the User Manual.

New entries into the Database with NAICS codes matching existing WDPs were initially assigned the same risk as would be assigned to current permit holders. For situations where multiple current permit holders of the same NAICS code were assigned a different risk rating, due to their discharge limit or past discharge numbers, the highest risk of those permit holders was selected for the new database entry. For new entries that do not have an exact NAICS code match with any currently permitted businesses, NAICS codes were compared at a higher level and assigned risk based on similarity in industry. After an initial risk is assigned based on known information and risks assigned to other businesses with identical or similar NAICS codes, the individual businesses were investigated further to determine specific information about that business. This includes, but is not limited to, materials used, processes used, known waste products, and the size of the operation. Sources for information include company websites, general web search, and journal articles containing general information about certain processes or studies of wastewater from that industry, as noted in Appendix D. For businesses that have websites, these were consulted to confirm the work that the company performs and relate that work to known

information about the specific process(es) and/or industry. The information described above for supporting the decisions on risk ratings is noted within the Database under the Discharge Risk and Business Description columns.

Businesses are assigned risk for a parameter based on the following:

- **Low (L)**: information about discharge concentration for the industry is known and it is not expected to surpass the requirement criteria for a WDP.
- **Medium (M)**: information about discharge concentration for the industry is known and it is above the requirement criteria for a WDP, however only slightly or for certain sub-portions of what that company/industry performs as work.
- **High (H)**: information about discharge concentration for the industry is known and it is significantly above the requirement criteria for a WDP.

In some cases, the lack of information on an industry or the lack of NAICS codes within that industry was used to estimate that a new entry is not expected to be a significant discharger for that specific parameter. If so, this would be noted in the Discharge Risk section of the entry, along with any further explanation. However, for most entries where data was lacking, a risk entry of “?” is assigned for each parameter, to signify that the risk is currently unknown and warrants further investigation.

### Assigning or Modifying Risk to a Database Entry

Once the risk for a database entry is determined, the drop-down menus can be used to select the risk as high (H), medium (M), or low (L). The Overall Rating for BOD and TSS as a combination and for all overall metals is manually assigned based on the entries for each individual parameter, specific information about that business, and the database user’s judgement. This should consider how many individual high, medium, and low entries exist in that category (be that BOD/TSS or the key metals), whether the expected discharge concentrations are known, and whether something about that business or industry should be flagged as significantly important or not important to review. For entries that currently hold a permit or obtain one in the future, the database entry can flag this using the Permitted? column, which can be selected to read “Permitted” or “No”. The database user can elect to leave an entry within the Database once a permit is obtained or add information about permitted entries into the Database to use as examples of risk assignment.

In the case of metals, a column exists where other metals can be noted. Other metals should include those which are not considered in the five key metals of concern, but are metals on the Restricted Waste Criteria list in the Bylaw. If no metal is selected, this column can be marked as not applicable, to show that other metals were considered and no significant information was noted. When a metal is identified, the next column may be used to note the metal of concern. A note in the header cell for the column describes the metals that may be of interest to investigate.

Once all parameters are assigned a risk rating, the Discharge Risk column can be completed to note why these selections have been made. Suggested information to include as reasons for a risk designation includes, but is not limited to, the exact NAICS code being shared with current permit holders, a similar NAICS code being held by current permit holders, or information gained about the industry or that specific business. These fields can be seen below in Figure 6, which gives an example of possible entries.

Company Discharge Risk Potential												
Permitted?	Overall BOD/TSS Rating	BOD	TSS	Overall Metals Rating	Cadmium	Lead	Molybdenum	Nickel	Zinc	Other Metals Risk	Other Metals	Discharge Risk
No	High	H	M	Low	?	?	M	L	L	M	cobalt, iron	BOD & TSS directly compared with existing data for this NAICS code. Research indicates that BOD has potential to be quite high, whereas TSS may remain fairly low. As such, TSS has been ranked as medium, to average research with the known NAICS code information. See report for reference. All five key metals have lack of data for industry sector 31. Research indicates potential for some metals to be present, which has been indicated here. This includes additional metals cobalt and iron. See report for reference.

Figure 6: Assigning Risk Rating to Parameters of Concern for a Database Entry

## Findings

### Identification of Potential Significant Dischargers

At the time of writing this report the Database contains industry directory search results for 154 businesses. Of these businesses, 116 were based on results from the short list search. The remaining 38 businesses are results from the additional codes that were searched, but not considered for the short list, as described in the Short List Creation section above. A total of 15 businesses that have active WDPs were returned within the 154 total businesses. Of the 116 results returned from the short list, 46 were entered into the Database, split into eight example businesses that already have active WDPs and 38 businesses that do not have an active WDP and are considered potential significant dischargers. The remaining 70 businesses from the short list search results were either deemed low priority or not considered potential significant dischargers, and therefore were not researched and entered into the Database at this time. This information can all be found on the *Search Results* sheet within the Database.

At the time of writing this report, there are a total of 14 businesses with a risk rating of high for BOD and nine businesses with a risk rating of high for TSS. For Overall BOD/TSS there are ten businesses that have a risk rating of high. This can all be seen on the *BOD & TSS* sheet of the Database.

There are a total of five businesses with a risk rating of high for cadmium, lead, and molybdenum, and 19 businesses with a risk rating of high for nickel and zinc. For Overall Metals there are five businesses that have a risk rating of high. This can all be seen on the *Metals* sheet of the Database.

For further information on risk ratings for different businesses, refer to the Database. Summary tables include information on risk rating by individual parameter, overall parameter summaries, NAICS code, sewerage area, and more.

## Using the Database

The Database can easily be populated by typing or copying and pasting information about new entries into the required fields. Some fields contain automatic drop-down menus so that information is consistent throughout the Database for ease of searching and filtering. Conditional formatting also automatically colour-coordinates risk ratings for each entry, so that differences in risk can be easily distinguished.

The Database Excel Workbook also contains the following additional tools/groups of information:

- NAICS Master Look-up Tool
- Risk Check Look-up Tool
- Overall Database Summary, BOD/TSS Summary, and Metals Summary
- Short List and other recommended NAICS codes to consider
- Search Results

Refer to User Manual for information on making a new database entry, editing an existing entry, assigning risk, navigating the Database, and using the above tools.

## Map of Potential Significant Dischargers in Metro Vancouver

A Google Earth map was created to mark the locations of the businesses within the Database. Based on the address used, a coloured pin has been placed for each business so that the sewerage areas and distribution of risk ratings can easily be visualized for all the potential significant dischargers. Pins for high (red), medium (orange), low (yellow), and grey (unassigned) can be seen on the map. Each entry was marked with a colour based on the higher of the risk ratings for Overall BOD/TSS and Overall Metals. A note for each business shows the business address, both overall risk ratings, a quick industry description, and any additional address information that may be important.

## Recommendations

The following is a list of recommendations based on observations made during researching of potential significant dischargers and the creation of the Database.

- 1) As mentioned above, not all NAICS codes that were investigated were added to the short list and included in the Database. The *Search Results* sheet contains directory search result data for the additional suggested codes mentioned in Appendix C. These codes will be a good place to begin when adding more entries to the Database. However, as mentioned above in the Short List Creation section, there are other industries that may have potential to discharge substances of concern into the sewer system that could be considered in the future. Additionally, and noted above, there are also various industries that were intentionally not considered during the creation of the short list since they are already regulated under a sector-specific discharge bylaw or code of practice in Metro Vancouver. This includes businesses such as breweries, wineries, food service

establishments (bars and restaurants), and dry-cleaning facilities. These additional industries may have potential to be significant dischargers and should be considered in the future.

- 2) As mentioned above and in Appendix A, it was found that NAICS codes for some active WDPs are outdated and no longer exist in the NAICS 2017 list. Due to these discrepancies, some active WDPs did not appear in industry directory search results, which suggests that some other potential significant dischargers may also not have been returned during searches. It is recommended that ERE investigate updating the list of NAICS codes relevant to current WDPs.
- 3) Based on the NAICS codes searched, it is noted that the initial entries into the Database do not include businesses in all sewerage areas. This is a circumstantial outcome based on the industries that were chosen for the short list as potential significant dischargers and the results that were returned. No preference was given to different sewerage areas. It is recommended that further industries be investigated in the future (and that NAICS codes are updated, as mentioned above) to ensure that all potential significant dischargers around Metro Vancouver can be investigated.
- 4) Along with industries that were not focused on during the time of database creation, it should be noted that the industries investigated and the risk ratings assigned to database entries are limited to high concentrations of the parameters of interest. At the time of making the Database, high volume dischargers were not considered. Further consideration for high volume dischargers is recommended, as even low concentration discharge can be impactful to WWTPs in high volumes due to the loading considerations.
- 5) It is recommendation that Source Control Program and/or ERE staff further investigate the potential dischargers in the database to better confirm risk assessment as businesses are considered for a WDP. The current risk assessment for the initial entries is a starting point, however it is noted that risk ratings assigned were based on limited research of those businesses and industries. Metro Vancouver staff with more knowledge of significant discharges and the wastewater discharged by different industries may have beneficial insights to businesses or industries of concern. Further investigation (via direct communication with site staff, wastewater characterization, and/or inspections) by ERE Officers is needed to better inform risk assessments. It is suggested that all the entries in the Database be reviewed, with special attention to the risk ratings that have been assigned.
- 6) As more businesses are entered into the Database, it is recommended that the risk ratings be transferred into the Risk Assessment Recommendation Tool to help track the risk assigned to various businesses and build an overall picture of the risk assigned to each

parameter for specific NAICS codes. Since risk is assigned on a subjective basis, this methodology is limited to the research conducted on that industry, information available about that specific business, and knowledge of the user. As more businesses are assigned risk, a generalization about industries can be made over time to make risk rating assessment easier and promote knowledge sharing.

- 7) The Database is built with some structural limitations, such as pre-built drop-down menus or formulas that extend only 500 rows long. As the Database is updated and more entries are added, certain small adjustments may be required to ensure that the functionality remains useful to the user and working properly. For information on completing edits to the Database, refer to the User Manual.

The Database will need to be updated regularly to capture the most up-to-date information, as well as to include new businesses that may emerge or change discharge habits. The Database is a useful tool to find potential significant dischargers in the region and aid ERE Officers in monitoring WDPs.

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## Appendix A - NAICS Code Discrepancies

When creating the short list of NAICS codes for conducting an industry search several discrepancies were discovered.

1. There are some businesses with active Waste Discharge Permits that have a NAICS code that does not appear on the Statistics Canada or NAICS Association lists.
  - a. The assumed reason is that some permits were issued when an older version of NAICS codes was current and the business and/or permit has not been updated. Some investigation was completed, however, most businesses with codes that do not appear on current 2017 lists were not found on the 2007 or 2012 lists maintained by NAICS Association.
  - b. Issues were observed when comparing short list codes against search results. Many of the active permits are using a NAICS code that does not appear on the Statistics Canada list, the NAICS Association list, or both. Therefore, these businesses could not be confirmed to show up in the search results based on the NAICS code they are registered under for their permit.
  - c. It is believed that the permits should follow the Statistics Canada list of NAICS codes, however the industry directory search seems to return results according to the NAICS Association list. However, this was not confirmed. It is possible that permits that do not appear in search results is simply due to old NAICS codes. Some updating or estimating was completed by comparing the Statistics Canada and NAICS Association lists and looking for codes that have changed from old lists. Estimates were also made by comparing the descriptions of businesses with the description for current NAICS codes.
2. There are some discrepancies between the Statistics Canada list and the NAICS Association list. Though both lists are the most current (2017), it is believed this is due to variances between Canada and the United states. Though a few variations occur at higher levels of the list hierarchy (Industry Sector, Subsector, Group, and NAICS Industry), most differences are observed for the lowest level NAICS National Industry (6-digit code).
  - a. These discrepancies cause difficulty in comparing search results to the short list, as some results may not be returned depending on which list was used to assign a NAICS code to a business or if the NAICS code for a permit or business is current.

## Appendix B - Short List

Table 3: NAICS Codes on Short List Expected to be High BOD/TSS Dischargers

<b>BOD and/or TSS</b>	
311225	Fats and Oils Refining and Blending
311313	Beet Sugar Manufacturing
311314	Cane Sugar Manufacturing
311611	Animal (except Poultry) Slaughtering
311612	Meat Processed from Carcasses
311613	Rendering and Meat Byproduct Processing
311615	Poultry Processing
311710	Seafood Product Preparation and Packaging
311999	All Other Miscellaneous Food Manufacturing
312111	Soft Drink Manufacturing

Table 4: NAICS Codes on Short List Expected to be High Metals Dischargers

<b>Metals</b>	
321212	Softwood Veneer and Plywood Manufacturing
322211	Corrugated and Solid Fiber Box Manufacturing
331222	Steel Wire Drawing
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)
332322	Sheet Metal Work Manufacturing
332811	Metal Heat Treating
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing
334412	Bare Printed Circuit Board Manufacturing
485112	Commuter Rail Systems
485113	Bus and Other Motor Vehicle Transit Systems
488119	Other Airport Operations

## Appendix C - Other NAICS Codes to Consider

Table 5: Additional NAICS Codes That Were Given Consideration

<b>Additional NAICS Codes of Interest for BOD, TSS, and Metals</b>	
311119	Other Animal Food Manufacturing
311224	Soybean and Other Oilseed Processing
311411	Frozen Fruit, Juice, and Vegetable Manufacturing
311511	Fluid Milk Manufacturing
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing
311520	Ice Cream and Frozen Dessert Manufacturing
311812	Commercial Bakeries
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing
311821	Cookie and Cracker Manufacturing
311830	Tortilla Manufacturing
311911	Roasted Nuts and Peanut Butter Manufacturing
311930	Flavoring Syrup and Concentrate Manufacturing
311991	Perishable Prepared Food Manufacturing
331313	Alumina Refining and Primary Aluminum Production
331314	Secondary Smelting and Alloying of Aluminum
331315	Aluminum Sheet, Plate, and Foil Manufacturing
331318	Other Aluminum Rolling, Drawing, and Extruding
331410	Nonferrous Metal (except Aluminum) Smelting and Refining
331420	Copper Rolling, Drawing, Extruding, and Alloying
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding

## Appendix D – Wastewater Characteristics

The below sections show summaries of research conducted on the concentration of contaminants in wastewater for various industries. This is compared to the Restricted Waste Criteria (RWC) limits for the requirement of a Waste Discharge Permit in the Bylaw.

### D.1 – Slaughterhouses

Table 6 below shows some typical characteristics of wastewater from slaughter houses [9], [10].

Table 6: Wastewater Characteristics for Slaughter Houses

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	4635	average value
TSS	600	6394	as total solids
Cadmium	0.20	not detectable	
Lead	1.0	0.21	
Molybdenum	1.0	0.13	
Nickel	2.0	0.21	
Zinc	3.0	1.22	

### D.2 – Meat Processing

Table 7 below shows some typical characteristics of wastewater from meat processing facilities [10], [11].

Table 7: Wastewater Characteristics for Meat Processing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	40 - 5749	
TSS	600	48 - 6203	
Cadmium	0.20	not detectable	
Lead	1.0	< 0.18	
Molybdenum	1.0	0.01	
Zinc	3.0	0.0 – 3.6	average = 0.9

### D.3 – Seafood Processing

Table 8 below shows some typical characteristics of wastewater from seafood processing facilities [12].

Table 8: Wastewater Characteristics for Seafood Processing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	100 – 24,000,000	depends on product
TSS	600	27 – 20,000	depends on product

## D.4 – Soft Drink Manufacturing

Table 9 below shows some typical characteristics of wastewater from soft drink manufacturing facilities [13].

Table 9: Wastewater Characteristics for Soft Drink Manufacturing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	600 – 4500	
TSS	600	0 – 60	
Molybdenum	1.0	3 – 8	
Nickel	2.0	1.2 – 2.5	
Zinc	3.0	1 – 5	
Cobalt	5.0	3 – 8	
Iron	10.0	10 – 20	

## D.5 – Baby Food Manufacturing

Table 10 below shows some typical characteristics of wastewater from canned soup and baby food manufacturing facilities [14].

Table 10: Wastewater Characteristics for Baby Food Manufacturing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	520 – 590	
TSS	600	280 – 360	

## D.6 – Vitamin and Pharmaceutical Manufacturing

Table 11 below shows some typical characteristics of wastewater from pharmaceutical and vitamin manufacturing facilities [15], [16].

Table 11: Wastewater Characteristics for Pharmaceutical/Vitamin Manufacturing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	200 – 7000	depends on product
TSS	600	10 – 7130	depends on product

## D.7 – Cardboard Manufacturing

Table 12 below shows some typical characteristics of wastewater from cardboard manufacturing facilities [17], [18], [19].

Table 12: Wastewater Characteristics for Cardboard Manufacturing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	1760	COD of 2358 – 20,000
TSS	600	3,000 – 10,000	
Molybdenum	1.0	10 – 30	
Copper	2.0	80 - 150	

## D.8 – Plating, Electroplating, Coating, and Finishing

Table 13 below shows some typical characteristics of wastewater from electroplating facilities [20], [21], [22]

Table 13: Wastewater Characteristics for Electroplating Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500		COD of 59.4
Cadmium	0.20	0.79 – 8.52	
Lead	1.0	7.30	
Nickel	2.0	3 – 365	
Zinc	3.0	4 – 250	
Chromium	4.0	5.10 – 127.00	
Copper	2.0	4.12 – 25.20	
Iron	10.0	10,000	
Silver	1.0	2 – 3	

## D.9 – Metalworking: Sheet Metal, Pipe Manufacturing

Table 14 below shows some typical characteristics of wastewater from metalworking facilities [23], [24], [25], [26].

Table 14: Wastewater Characteristics for Metalworking Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	280 – 6,500	COD as <30 – 35,200
TSS	600	30 – 5,700	
Cadmium	0.20	<0.2 or not detectable	
Nickel	2.0	not detectable – 17.3	
Zinc	3.0	0.1 – 56.0	used in galvanization
Aluminum	50.0	not sampled	aluminum sheets
Copper	2.0	<0.5 or not detectable	
Chromium	4.0	<0.5 or not detectable	used in stainless steel
Iron	10.0	not detectable – 5.8	
Manganese	5.0	not sampled	from aluminum sheets

## D.10 – Glass Manufacturing

Table 15 below shows some typical characteristics of wastewater from glass manufacturing facilities [27], [28], [29].

Table 15: Wastewater Characteristics for Glass Manufacturing Facilities

Parameter	RWC Limit (mg/L)	Actual Conc. (mg/L)	Notes
BOD	500	115	
TSS	600	1810 – 9058	
Selenium	1.0	not sampled	high potential