MUNICIPALITY OF MCDOUGALL

MCDOUGALL LANDFILL SITE

2021 ANNUAL MONITORING REPORT

MARCH 22, 2022

MCDOUGALL LANDFILL SITE

2021 ANNUAL MONITORING REPORT

MUNICIPALITY OF MCDOUGALL

PROJECT NO.: 111-52820-00
DATE: MARCH 22, 2022

WSP
UNIT 2
126 DON HILLOCK DRIVE
AURORA, ON, CANADA L4G 0G9

T: +1 905 750-3080
F: +1 905 727-0463
WSP.COM

March 22, 2022

MUNICIPALITY OF MCDOUGALL
5 Barager Blvd.
Parry Sound, Ontario
P2A 2W9

Attention: Mr. Tim Hunt, CAO/Director of Operations

Dear Mr. Hunt,

Subject: McDougall Landfill Site
2021 Annual Monitoring Report

We are pleased to forward the 2021 Annual Monitoring Report for the above-noted program. The monitoring program was completed as outlined in the Certificate of Approval for the Site. Comments provided by the Municipality have been incorporated into the report.

This report documents the results of the groundwater, surface water, and leachate monitoring program completed during 2021. We have also included information on site operations in accordance with the Amended Provisional Certificate of Approval, issued on March 28, 2008, and Notice No. 1, issued on November 19, 2008. A summary of the findings is contained in the Executive Summary, while details and discussions of our interpretation and assessment of the data are provided in the text. Technical details are appended.

It is proposed that the monitoring program should be continued in future, but that based on the monitoring results the frequency of groundwater and surface water monitoring should be reduced from four times per year to two times per year (Spring and Fall sampling events). The municipality should request the MECP to undertake a technical review of this annual monitoring report and seek their concurrence with the proposed reduction in monitoring frequency. Assuming concurrence is obtained, the municipality would them apply for an Environmental Compliance Approval (ECA. formerly Provisional Certificate of Approval) amendment application to modify the monitoring program accordingly.

We thank you for the opportunity to work on this study. If there are any questions, please contact us.

Yours truly,

Greg R. Siiskonen, P.Eng.
Director, Waste - Ontario Earth & Environment

JEB/GS/PAS

WSP ref.: 111-52820-00
H:\Proj\11\52820-00\100 Monitoring\1624012\Wp\McDougall Landfill - 2020 Monitoring Report.docx

UNIT 2
126 DON HILLOCK DRIVE
AURORA, ON, CANADA L4G 0G9

T: +1 905 750-3080
F: +1 905 727-0463
wsp.com

EXECUTIVE SUMMARY

The McDougall Landfill Site has been owned and operated by the Municipality of McDougall since taking over from private ownership in 1989. The Municipality of McDougall, upon assuming the ownership and operation of the site, constructed an engineered containment cell on site as part of the remediation of local groundwater and surface water quality. The original waste was mined, screened, and re-landfilled within the new cell. Leachate is currently being collected from within the containment cell and is treated at the on-site Combined Leachate and Groundwater Treatment Facility.

The 2021 water levels within the overburden were similar to or slightly higher than the historical values and the seasonal ranges at the site. Variations through the year, and historically, are mainly attributed to climatic conditions.

Groundwater in the unconfined flow system is a subtle reflection of the local topography and is controlled by the underlying bedrock surface. Three different flow paths are identified, which correlate with adjacent catchment areas. These areas are identified as the Cramadog Lake, Oxley wetland, and Seguin Lake catchment areas. The interpreted groundwater flow paths during 2021 are generally consistent with the historical flow pattern.

The engineered containment cell is functioning as designed to contain leachate.

Landfill leachate influenced groundwater is continuing to migrate from the former refuse disposal area in the direction of the groundwater movement; however, the concentrations of diagnostic parameters within several downgradient monitors located within 200 m of the refuse area, including chloride, conductivity, iron, manganese, and chemical oxygen demand, are continuing to decrease over the long term. It is expected that the concentrations of the diagnostic parameters in the area of leachate influenced groundwater will continue to decrease over time as a result of the dilutive effects from infiltrating precipitation and the natural decomposition of some components within the leachate influenced groundwater. The installation of the liner and the operation of the LCS is resulting in a reduction in parameter concentrations in the remnant groundwater plume beneath the landfill site

The site is generally considered to be in compliance with Guideline B-7 criteria for Reasonable Use except for iron, manganese and dissolved organic carbon (DOC) to the west of the site. With the removal of the original waste area (and contaminant source), it is expected that these concentrations will decrease to natural levels over time within this portion of the site.

The water quality within the domestic wells sampled during 2021 complies with the ODWQS for the parameters tested with the exception of hardness, iron, manganese, and DOC at well W11, and alkalinity, hardness, iron, and DOC at well W14. These parameters affect the aesthetic quality of the water and are not health related. These elevated parameter concentrations are naturally occurring within the local setting and are not attributed to the landfill site.

Surface water quality at Stations SW6 and SW7, within the Cramadog Lake catchment area, is affected by the landfill although this influence appears to have decreased and stabilized since 2008. The chloride and conductivity parameter results fluctuated in 2021 with chloride being slightly higher compared to the period between 2002 and 2017. This fluctuation can be partially attributed to road salt influence as both McDougall Road and Haines Road are both within proximity to SW6 and SW7. A landfill influence is not measurable along the discharge stream from Little Cramadog Lake into Cramadog Lake. In general, surface water quality in the Cramadog catchment area is improving.

Surface water quality within the Oxley wetland is influenced by a contaminant source that is not attributed to the landfill site. Water quality at the sampled surface water stations within the wetland generally satisfied the Provincial Water Quality Objectives for the parameters analysed with the exception of iron at surface water locations SW4, SW27, SW28, and SW30, boron at SW4 and SW28, and phosphorus at SW27, SW28 and SW30. Copper, lead and zinc also exceeded the PWQO at SW28 in April 2021; however, this is considered to reflect entrained sediment in the sample. These parameters decreased and did not exceed the PWQO in October 2021.

Surface water quality within Seguin Lake is generally comparable to the background Station SW26 and, based on the monitoring results for 2021, there is no measurable landfill influence on the water quality within the lake at this location.

The landfill site satisfied the surface water quality requirements at the compliance surface water stations SW20, SW30, and SW33, as established in the Compliance Monitoring Plan, during the sampling events in 2021.

Approximately 11,629 tonnes of waste were received and landfilled at the site during 2021, which is approximately 13% more than the volume of waste received in 2020. The maximum landfilling capacity of the original engineered cell was reached in early October 2007, and landfilling has continued in the expanded cell area since September 2008. The remaining capacity of the expansion cell is approximately 463,847 m3 at the end of December 2021, which is equivalent to an approximate remaining site life capacity of 24 years.

The on-site Combined Leachate and Groundwater Treatment Facility (CLGTF) began operation in September 2008 and treated approximately 35,283 m3 of leachate in 2021. The leachate was collected from the original engineered containment cell, the expansion cell, and purge well PW1. The collected leachate volume in 2021 was very similar to the volume collected in 2020 (35,217 m3).

There is no requirement to change the monitoring program, remedial works or contingency plans at this time, based on the current monitoring results. The site is operating in accordance with the Provisional Certificate of Approval.

The 2021 monitoring program should be continued into 2022, but should only include Spring and Fall sampling events, as outlined in Section 5.5 of this report. The municipality should request the MECP to undertake a review of this annual monitoring report and seek their concurrence with the proposed reduction in monitoring frequency. Assuming concurrence is obtained, the municipality would them apply for an Environmental Compliance Approval (ECA. formerly Provisional Certificate of Approval) amendment application to modify the monitoring program accordingly.

SIGNATURES

PREPARED BY

Jamie Bonany, M.A.Sc.
Project Scientist

Paul Smolkin, P.Eng.
Senior Geo-environmental Engineer

WSP Canada Inc. ("WSP") prepared this report solely for the use of the intended recipient, MUNICIPALITY OF MCDOUGALL, in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

WSP disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, WSP reserves the right to amend or supplement this report based on additional information, documentation or evidence.

WSP makes no other representations whatsoever concerning the legal significance of its findings.

The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

WSP has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in respect of projects of a similar nature in similar circumstances. It is understood and agreed by WSP and the recipient of this report that WSP provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by WSP and the recipient of this report that WSP makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

Overall conditions can only be extrapolated to an undefined limited area around these testing and sampling locations. The conditions that WSP interprets to exist between testing and sampling points may differ from those that actually exist. The accuracy of any extrapolation and interpretation beyond the sampling locations will depend on natural conditions, the history of Site development and changes through construction and other activities. In addition, analysis has been carried out for the identified chemical and physical parameters only, and it should not be inferred that other chemical species or physical conditions are not present. WSP cannot warrant against undiscovered environmental liabilities or adverse impacts off-Site.

The original of this digital file will be kept by WSP for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP, its integrity cannot be assured. As such, WSP does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

This limitations statement is considered an integral part of this report.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND

The McDougall Landfill Site, which is currently owned and operated by the Municipality of McDougall, is located in Part Lots 11 and 12, Concession 4, Township of McDougall. See the Location Map and Site Area Map, Figures 1-1 and 1-2, respectively, for details. The site serves the Municipality of McDougall and area municipalities.

Landfilling commenced at the site in 1976. The site was originally owned and operated by a private company. It was confirmed in the early 1980s that the site, while privately owned and operated, had contaminated domestic water wells and surface watercourses in the area. In 1989 the Ontario Ministry of the Environment (MOE) ordered McDougall Township to take over ownership and operation of the site from the private owner. McDougall Township made an application to the Ministry to permit remediation of the site. Provisional Certificate of Approval No. A522101, dated November 29, 1991, was re-issued by the Ministry to the Township to permit remediation.

It was estimated that the site would reach the approved capacity at the end of June 2005, but the status and timelines provided in the Environmental Assessment Act and the Environmental Protection Act approvals, including construction of the proposed new cell, exceeded the remaining disposal capacity. As such, the Municipality made an Environmental Protection Act application to amend Provisional Certificate of Approval No. A522101 to permit a short-term increase in landfilling capacity. Amendment Notice No. 6 to the Provisional Certificate of Approval A522101, dated November 16, 2005, provided approval for landfilling at the site on an emergency basis up to a revised disposal volume of 329,600 m^3.

Since taking over the site, the Municipality of McDougall has completed extensive remediation measures, which commenced with a study of Site Remediation Options completed in 1991. In 1994, remedial works involving the relocation of the waste into an engineered containment cell commenced. Subsequently, measures implemented to achieve compliance have included:

- Purchase of adjacent properties for expansion of buffer zones;
- Easement agreement with one adjacent property owner, known as the Oxley property, to establish a contaminant attenuation zone;
- Additional assessment of hydrogeologic conditions;
- Optimization of water quality monitoring programs; and
- Installation and operation of a groundwater purge well system in 1999 to reduce on site residual groundwater impacts.

In 2004, Conestoga-Rovers & Associates (CRA) was commissioned by the Municipality of McDougall to develop a Compliance Plan for the McDougall Landfill Site with the aim of bringing the site into compliance with the applicable Ministry of the Environment regulations. This compliance plan was completed in May 2005, amended in May 2006, and approved. The amended Provisional Certificate of Approval was issued on September 26, 2006. The approach to complete the development and implementation of the Compliance Plan was as follows:

1) Identify and summarize compliance issues at the site.
2) Meet with the Ministry of the Environment to discuss the site and confirm the identified compliance issues.
3) Prepare work plans to address outstanding issues.
4) Complete an investigation and assessment of the groundwater and surface water regimes.
5) Identify and formalize the contaminant attenuation zone and compliance locations for the site.
6) Evaluate the need for, and conceptual design of, remedial measures required to achieve compliance.
7) Prepare a Compliance Plan Summary Report.

The compliance issues were summarized as follows:

1) Monitoring program recommendations;
2) Extraction (purge) well performance;
3) New source of impacted groundwater (SW28);
4) Stockpiled fines material; and
5) Surface water and groundwater compliance and compliance locations.

Work carried out during 2004 and 2005 in relation to the Compliance Plan development included the turning off of the groundwater purge well system in order to study aquifer response and recovery, as well as the addition of new monitoring locations in and around the site, including two surface water locations and four new wells. Results of monitoring and analysis of these new locations are included in this report and were included in the September 2006 amendment to the Provisional Certificate of Approval. Aspects of the program are discussed in relevant sections of this report.

On March 1, 2006, the Ontario Ministry of the Environment approved the Environmental Assessment for the proposed expansion of the McDougall Landfill Site by Order in Council 523/2006. Subsequently the expansion of the site was approved through the Environment Protection Act and the construction of the expansion cell was initiated in July 2007. Additional details of the expansion work carried out under the review of Conestoga-Rovers & Associates are outlined in *Appendix E* of this report.

1.2 RECENT SITE ACTIVITIES

1.2.1 LANDFILLING

The expansion cell began receiving waste in September 2008 and continued to receive waste in 2021.

1.2.2 LEACHATE COLLECTION AND HAULAGE

Leachate continued to be collected from the original engineered containment cell and from the expansion cell in 2021. The collected leachate was treated by the on-site Combined Leachate and Groundwater Treatment Facility (CLGTF). No leachate was hauled from the site in 2021.

1.2.3 MONITORING

Routine groundwater and surface water monitoring was carried out in accordance with Condition 10 on the Provisional Certificate of Approval.

A summary of the current and historical groundwater monitors and borehole locations is provided in Table A-1, *Appendix A,* which includes the various alternate identifications used in various historical documents. As shown in Table A-1, nested monitors at a specified borehole location are identified by a letter suffix that shows the relative screening depth at the borehole location. Generally, the suffix “A” represents the deepest monitor at the location, with “B” being the next deepest, etc.

1.3 OBJECTIVES AND SCOPE

The principal objectives of the 2021 annual monitoring program are summarized below.

- To assess the effects of the landfill site and associated activities on the groundwater and surface water setting.
- To assess site operations.
- To provide technical data for site redevelopment operations.
- To determine the 2022 monitoring program.
- To document the results in the Annual Report in accordance with Condition 8 of the Provisional Certificate of Approval.

This program involves a data collection component, collation of these data with the landfill historical database, and an analysis and interpretation component. This latter component includes the historical data collected since 1990; therefore, the results are a detailed assessment of the groundwater regime over both the long term, since 1990, and the short term, since 2010. These findings provide the basis for recommendations relating to future monitoring and site redevelopment and operations.

The assessment of site operations is based on information provided by the Municipality of McDougall and CRA, the design engineers for this site.

1.4 METHODOLOGY

The 2021 water monitoring program consisted of the following tasks.

- Groundwater level measurements
- Groundwater sampling and chemical analysis
- Surface water sampling and chemical analysis
- Leachate sampling and chemical analysis
- Interpretation and reporting

The field component of the routine monitoring program was carried out by experienced technical staff from WSP. A quality assurance and quality control (QA/QC) program was followed for each of the tasks. A summary of the 2021 monitoring program is provided in Table 1-1.

There were four monitoring events completed in 2021, as listed below.

- April 26 to 28, 2021
- July 20, 2021
- October 18 to 20, 2021
- December 17, 2021

As part of each monitoring event, the condition of the monitors was assessed, water levels were measured in the groundwater monitors, and the results recorded. Groundwater samples were collected from each of the groundwater monitors and residential wells listed in Table 1-1.

Groundwater samples were collected from the monitors after purging three well volumes of water, if available. Monitor development and sample collection were completed in accordance with standard protocols. The groundwater samples were submitted to Eurofins in Ottawa for analysis of the inorganics, metal, and organic parameters listed in Table C-5, Appendix C.

There are nine surface water monitoring stations and the infiltration pond at the locations shown on Figure 1-2. Surface water Stations SW6, SW7, SW26, and SW33 are located to the southeast of the landfill site, within the

Cramadog Lake catchment area; Stations SW4, SW27, SW28 and SW30 are located within the Oxley wetland catchment area; the constructed infiltration pond (Infiltration Pond No. 2) and surface water Station SW20 are located within the Seguin Lake catchment area; and Station SW34 is located along the west side of McDougall Road, south of the landfill site. The surface water samples were obtained on April 27 and 28, July 20, October 19 and 20, and December 17, 2021, and were submitted to Eurofins in Ottawa for analysis of the inorganics and metals listed in Table C-5, Appendix C.

Upon completion of the field monitoring and laboratory analysis program, as described above, the data was collated with the historical data, analysed and interpreted. The water chemistry results were also assessed at specific compliance locations as outlined in the Compliance Monitoring Plan, dated May 2006. These compliance locations include:

- Sequin Lake Flow Path: Surface water Station SW20, Groundwater Monitor BHE-2
- Little Cramadog Lake Flow Path: Surface water Station SW33
- Oxley Wetland Flow Path: Surface water Station SW30

Results are documented in this report.

2 PHYSICAL SETTING

2.1 LOCAL GEOLOGY

The geologic and hydrogeologic setting of the McDougall Landfill Site was previously described in detail by M.K. Ince and Associates Ltd and by CRA. The site is located on Precambrian bedrock terrain overlain by silty to sandy soils with occasional gravelly or cobbly lenses and boulders. A discontinuous clayey layer is found at depths of approximately four metres in the area of Monitors BHL and BHK, to the northwest of the landfilling area. The sandy soils overlying the mafic metamorphic bedrock extend to 20 metres in depth within the northwest portion of the site. Bedrock outcrops are present east of the site entrance. The bedrock is reported as massive and not heavily fractured.

The sandy soils are associated with the unconfined groundwater flow system in which the water table is present. The underlying bedrock has a low bulk hydraulic conductivity and, therefore, the bedrock surface partially serves to influence the direction of groundwater flow within the sandy soils, particularly within the southeast portion of the site.

The property is generally well drained due to the presence of the surficial sands and the amount of topographic relief. There are no water courses on the property, but surface water runoff is controlled by on-site grading and swales that direct the water towards nearby surface water courses.

2.2 GROUNDWATER REGIME

Groundwater level data collected from 1990 to the end of 2021 are documented on Table A-2, Appendix A. Groundwater hydrographs, Figures A-1 to A-8, are also contained in Appendix A.

Based on the groundwater level data and hydrographs, the groundwater levels within the monitors are generally consistent over the long term with seasonal and climatic variations. The groundwater elevations in 2021 are similar to the historical range and seasonal patterns. Water levels are typically higher in April and subsequently decrease through the remainder of the year.

The configuration of the shallow groundwater regime, based on the October 2021 water level data, is depicted on Figure 2-1. As shown in the figure, groundwater movement is in three different directions from the landfilling area. The relative grouping of the flow directions is based on the corresponding catchment areas. These catchment areas

are designated according to the receiving surface water body and are identified as the Oxley wetland, Cramadog Lake, and Seguin Lake catchment areas.

As shown in Figure 2-1, a portion of the groundwater flow on site is towards the southeast. Bedrock outcrops and valleys control the directional flow of the groundwater in this direction. Once the groundwater has traveled between the bedrock outcrops in the vicinity of McDougall Road, one component of groundwater continues southeasterly, towards Little Cramadog Lake (and the Cramadog Lake catchment area), while the remaining component flows easterly to north-easterly, towards the Oxley wetland area.

Within the western portion of the site, historical water level data and interpretations have indicated varying flow directions, ranging between north-easterly and westerly. As shown in Figure 2-1, based on the water level elevations during the October 2021 monitoring event, groundwater flow is southwesterly onto the adjacent Parry Sound Sand and Gravel property. These variances are partially attributed to infiltration of surface water from the infiltration pond inlet ditch and to seasonal fluctuations. Regardless of the localized flow variances, it is interpreted that the groundwater within this portion of the site eventually flows northward, towards Seguin Lake.

2.3 SURFACE WATER FLOW SYSTEM

The landfill site lies within the Parry Sound Watershed. Surface water in the areas surrounding the site eventually discharge to the Seguin River, which flows west to Mill Lake, eventually discharging to Big Sound that is part of Georgian Bay.

Locations for surface water monitoring, which are part of the landfill monitoring program, are shown on Figure 1-2. Surface water movement is grouped into three different areas around the landfill site. The relative grouping of the surface water stations is based on the corresponding catchment areas. These catchment areas are designated according to the receiving surface water body and are identified as the Oxley wetland, Cramadog Lake, and Seguin Lake catchment areas.

Surface water Stations SW6, SW7, SW26, and SW33 are located to the southeast of the landfill site, within the Cramadog Lake catchment area. Stations SW6 and SW7 are situated downgradient of the refuse area, and downstream of groundwater springs, between the landfill site and Little Cramadog Lake. Station SW33 is located at the discharge stream from Little Cramadog Lake, close to Haines Road, approximately 1,000 m southeast of the refuse area. Station SW26, which is further removed from the refuse disposal area, within a large wetland, is considered to be representative of background (reference) surface water quality in the general area of the landfill site.

Infiltration Pond No. 2 and surface water Station SW20 are located within the Seguin Lake catchment area. The infiltration pond is located northwest of the approved waste limit, as shown in Figure 1-2**.** Surface water Station SW20 is located within Seguin Lake.

Surface water Stations SW4, SW27, and SW30 are located within the Oxley wetland catchment area. Station SW27 is established within a ditch on the east side of McDougall Road, east of the refuse area. Station SW30 is established downstream of a culvert that discharges approximately midway along the Oxley wetland, and Station SW4 is established at the Oxley wetland outlet adjacent to McDougall Road.

Surface water Station SW34 is located at a culvert within a low-lying area on the west side of McDougall Road, south of the landfill site.

3 MONITORING RESULTS

3.1 QUALITY ASSURANCE/QUALITY CONTROL

Water sampling events carried out for the 2021 monitoring program followed field sampling protocols established for the site. Included in the protocols is a Quality Assurance/Quality Control (QA/QC) program which utilizes duplicate and replicate samples, along with travel blanks.

Results of statistical comparisons between the original and field duplicate samples are provided in Table C-6, Appendix C. Relative Percent Differences (RPD) were calculated to compare the parameter results from both samples. A RPD value of less than 20% is considered as an acceptable level for differences in concentrations. It is noted that the 20% guideline is only applicable to parameter concentrations that are at least 5 times the Limit of Quantitation (LOQ). As shown in these tables, the RPD were generally within the acceptable level of 20%; therefore, the laboratory results can be interpreted with confidence.

3.2 LEACHATE RESULTS

The general chemical results for the leachate samples obtained for the old cell (PS1) and the expansion cell (PS2) are contained in Tables B-1 and B-2, Appendix B. Time-concentration graphs for the diagnostic parameters, chloride, alkalinity, conductivity, iron, manganese, dissolved organic carbon (DOC), chemical oxygen demand (COD), and total Kjeldahl nitrogen (TKN) are presented in Figures B-1 and B-2, Appendix B**.** Anomalous data were screened from the analysis, and a value of half the method detection limit was used where an individual result was less than the method detection limit.

As shown in the time-concentration graphs, diagnostic parameter concentrations at station PS1 generally fluctuate although distinguishable trends and patterns are noted below.

- Chloride, alkalinity, conductivity, and TKN concentrations generally decreased between 1998 and early 2004 but increased noticeably in late 2004. This increase is attributed to the discontinuation of pumping from BHA-2 in 2004, which reduced the dilution effect of the extracted groundwater. A slight decreasing trend in chloride and conductivity has been observed since 2004, whereas alkalinity and total Kjeldahl nitrogen have generally remained at stable elevated levels since that time
- Concentrations for DOC and COD decreased between 1996 and 2003 and have fluctuated within the lower range since that time.
- Iron concentrations generally increased between 1995 and 2002 but have generally decreased since that time. There was a noticeable increase in concentration during the September 2015 event, but the fluctuating iron concentrations returned to the lower range during the sampling events between 2016 and 2021. Continued monitoring will permit an assessment of the long-term trend for iron within the leachate.
- Manganese concentrations have decreased over the long term, reaching historical lows during 2009, although concentrations increased in 2010 and have remained relatively stable since 2011.

Although there have only been four samples obtained at station PS2, the parameter concentrations at this location are generally similar to or slightly below the historical range for station PS1. Continued monitoring will confirm the long-term trend at this location.

Concentrations of 1,4-dichlorobenze, benzene, chlorobenzene, ethylbenzene, m/p-xylenes, and o-xylene were detected in the samples collected at PS-1, at similar concentrations to those reported in recent years. No volatile organic compounds (VOC) were detected at PS-2 in 2021, consistent with 2020.

3.3 TREATMENT SYSTEM EFFLUENT

The general chemical results for the leachate and groundwater treatment system effluent are contained in Tables B-3 and B-4, Appendix B. Time-concentration graphs for the diagnostic parameters, chloride, alkalinity, conductivity, iron, manganese, DOC, COD, and TKN are presented in Figures B-3 and B-4, Appendix B.

As shown in time-concentration graphs, parameter concentrations fluctuate over the intermediate term, since 2009, with concentrations for chloride, alkalinity, conductivity, COD, and TKN generally increasing until 2013, followed by a decrease in 2014 and remaining stable since that time. Concentrations for several parameters within the effluent are generally lower compared to LHT concentrations including chloride, alkalinity, conductivity, manganese, DOC, COD, and TKN. It is noted that the treatment system effluent includes water from PW1, which may serve as a dilutive influence for overall parameter concentrations. In general, parameter concentrations were stable in 2021, consistent with concentrations observed since 2014. No VOC were detected in the leachate and groundwater treatment system effluent in 2021, consistent with recent years.

3.4 GROUNDWATER RESULTS

The general chemical results for the unconfined aquifer are contained in Table C-2, Appendix C**.** Time-concentration graphs for the diagnostic parameters chloride, alkalinity, conductivity, iron, manganese, DOC, and COD are presented in Figures C-1 to C-14, Appendix C. Anomalous data were screened from the analysis, and a value of half the method detection limit was used where an individual result was less than the method detection limit.

3.4.1 GENERAL CHEMISTRY TRENDS

In general, the diagnostic parameter concentrations fluctuated or declined. Following is a summary of the observed patterns:

- Within Monitors BHA-2 and BHE-2, the levels of chloride, alkalinity, conductivity, iron, manganese, DOC, and COD were elevated and/or increased between 1990 and 1996 but have subsequently decreased since that time. Both of these monitors were previously located immediately downgradient of the former refuse footprint prior to the rehabilitation of the site in 1994. Monitor BHA-2 was a former refuse monitor. The 2021 chemistry results were similar to those reported in recent years and generally confirm the continued decreasing trends for these parameters at Monitor BHE-2.
- Within the northwest Monitors BHL and BHM, chloride, alkalinity, conductivity, iron, manganese, DOC, and COD concentrations generally decreased or remained stable between 1998 and 2016. In 2021, Monitor's BHL and BHM continued to decrease or remained stable. A similar decreasing and level trend is exhibited for these parameters within the adjacent Monitor BHK.
- Parameter concentrations are generally higher at Monitor BHH compared to the other monitors located southeast of the refuse disposal area with the exception of manganese that is lower at Monitor BHH compared to Monitors BHB and BHD-2. Over the long term, concentrations at Monitor BHH have generally decreased, with a more significant decrease occurring for chloride since 2011. The 2021 chemistry results at BHH were similar to those reported in recent years. Borehole BHH is located approximately 150 m downgradient of the former and current refuse area.
- Within the southeast boundary Monitors BHB and BHD-2, chloride, alkalinity, conductivity, iron, and manganese concentrations decreased between 1990 and 1995, establishing a relative low in 1995 followed by an increase to a relative peak in 1998 and 1999. The concentrations of these parameters have subsequently decreased between 1999 and 2018 at BHB; and remained relatively stable since 2019. Other parameter concentrations at borehole BHB either fluctuate or remain constant. Monitor BHD-2 was last sampled in September 2007 due to well decommissioning.
- Parameter concentrations at Monitor BHP, located on the east side of McDougall Road, are lower compared to the other southeast monitors and have remained relatively constant between 2004 and 2021.

- At downgradient Monitor BHC, chloride, alkalinity, conductivity, and iron concentrations decreased between 1990 and 1995, establishing a relative low in 1995 followed by a relative peak in 1998. The concentrations of these parameters have subsequently decreased since 1999 with the exception of chloride, conductivity, and iron exhibiting an increasing trend through 2009, followed by a fluctuating trend since 2011. This can be attributed to the influence of road salt, and with the close proximity of Monitor BHC to McDougall Road. Manganese concentrations generally fluctuate over the long term. The 2021 parameter concentrations at BHC were less than or similar to those reported in recent years.
- The short-term chloride, alkalinity, conductivity, and iron concentrations within Monitor BHQ are generally lower than the concentrations within Monitor BHC between 2005 and 2020. Concentrations for manganese were generally lower than concentrations within Monitor BHC until 2010, when the concentrations at Monitor BHQ increased to levels higher than those at Monitor BHC. The manganese concentrations at Monitor BHQ decreased in 2012 and continued to decrease until 2020 to a level below monitor BHC levels. An increase in chloride and manganese was observed at BHQ in 2021 and the concentrations reported were greater than those at Monitor BHC. Similarly, concentrations of DOC and COD at Monitor BHQ also increased and were greater than concentrations at BHC in 2021. BHQ is considered cross-gradient to the disposal area and removed from potential effects from landfill leachate by the channeling effect of the bedrock surface. As such, the increases observed are not considered to reflect impact from leachate; continual monitoring will verify the increase observed in 2021 and permit an assessment of the long-term trend at BHQ. .
- Parameter concentrations within the monitors at Borehole Locations 1, 3, 4, 5, 8, 9, 10, and 11 (labelled as OW on Figure 1-2) are generally similar, or fluctuate, between sampling events completed between 2008 and 2021. The time period for these sampling events precludes the interpretation of long-term trends at these locations, but the following short-term trends are noted:
  - Concentrations for chloride, alkalinity, DOC, and COD at monitor OW 4A have fluctuated between 2008 and 2021, whereas conductivity and manganese have steadily increased during this time, however, they have stabilized between 2016 and 2017. Manganese and iron concentrations decreased and stabilized at monitor OW4C between 2015 and 2019. Continual monitoring will permit an assessment of the long-term trend at this location.
  - Iron and DOC concentrations at monitor OW 1B fluctuate over the intermediate term. However, iron concentration increased in September 2016, remained consistent in 2017, and then decreased in 2020. Iron concentrations increased slightly in 2021 but remain below those reported in 2017.
  - Concentrations of chloride, alkalinity, and conductivity fluctuate but have steadily decreased at monitor OW 3A between 2008 and 2014. Between 2016 and 2021, concentrations have stabilized or slightly decreased.
  - Concentrations for chloride, alkalinity, conductivity, iron, and DOC have generally fluctuated or decreased at downgradient monitor OW10 since 2009, whereas manganese concentrations have increased. The significant changes for alkalinity, iron, and manganese around 2013 may be attributed to the replacement of the original monitor with monitor OW10R, in September 2013, but continued monitoring will permit continued assessment of the longer-term trend at this location. In 2021, concentrations of chloride, conductivity, iron, and manganese were slightly elevated. It is noted that OW10 is located adjacent to the scale house within a high vehicular and heavy equipment traffic area. Therefore, the location is influenced by road salt.

3.4.2 ORGANIC CHEMISTRY

The historical organic chemical results for the groundwater monitors are contained in Table C-3, Appendix C. In general, the organic parameter concentrations for the October 2021 sampling event were below the laboratory detection limit with the exception of monitor OW4A, where detected concentrations of benzene, chloroethane, ethylbenzene, m/p-xylenes, toluene and vinyl chloride occurred. The detected parameters are similar to the historical results. It is noted that monitor OW4 is located approximately 75 m south of the original waste limit.

3.4.3 WATER QUALITY COMPLIANCE

Chemical results that exceeded the Ontario Drinking Water Quality Standards (ODWQS) are presented in Table 3-1. In general, alkalinity, hardness, iron, manganese, DOC and total dissolved solids exceeded the Standards at several monitors during 2021. Monitor BHH generally had the highest exceedances for iron whereas Monitor OW4A had the highest exceedances for alkalinity, hardness, chloride, sodium, DOC, and total dissolved solids. Monitor OW10 had the highest exceedances for manganese. It is noted the parameters listed in the table affect the aesthetic quality of the water, or are operational guidelines, and are not health related.

Based on the Ministry of the Environment Guideline B-7, criteria were calculated for the parameters analysed as part of the 2021 water monitoring program that have Ontario Drinking Water Quality Standards. These criteria were used to assess compliance based on the 2021 geochemical results at the groundwater monitors. The following formulae were used to calculate the criteria.

$$Cm = Cb + X\,(Cr - Cb)$$

Where:
- Cm = Maximum acceptable concentration of a particular parameter.
- Cb = Natural background concentration of a particular parameter.
- Cr = Drinking Water Quality Standard for a particular parameter.
- X = Reduction Factor. For drinking water X equals 0.5 for non-health related parameters, and 0.25 for health-related parameters.

$$Cm = Cw + Co + Cp$$

Where:
- Cw = Maximum acceptable concentration of a particular parameter originating at the landfill site
- Co = Concentration of a particular parameter from another source at the time of the assessment
- Cp = Potential parameter concentration increase from another source

Since there are no other parameter sources that have or will potentially affect background groundwater quality at this site, Cp and Co = 0 and Cw = Cm.

Colour and turbidity, which have Ontario Drinking Water Quality Standards, were excluded from the calculations. Colour and turbidity levels are affected by the sampling procedure. Background inorganic parameter concentrations were based on results from the designated upgradient monitors. Background organic parameter concentrations were assumed to be 0.0 µg/L.

Table 3-2 summarizes the results of the Guideline B-7 calculations for the compliance monitors within the unconfined aquifer. The compliance monitors listed in the table are based on the recommended locations provided in the Compliance Plan Summary Report. In summary, most parameters had concentrations in compliance with the criteria with the exception of iron, manganese, and DOC at several monitors. Monitor BHE-2 is established as a compliance location for the Seguin Lake Flow Path in the Compliance Monitoring Plan, while monitors W11 and OW5 are established as a compliance location for the Cramadog Lake Flow Path. The types of parameters in exceedance of the criteria at the groundwater monitors in 2021 are similar to historical results. The parameters that exceeded Reasonable Use criteria during 2021 are aesthetic objectives and are not health related.

3.5 RESIDENTIAL WELLS

The historical general chemical results for the residential wells are contained in Table C-4, Appendix C. Time-concentration graphs for the diagnostic parameters, including chloride, alkalinity, conductivity, iron, manganese, DOC and COD, are presented in Figures C-15 to C-21, Appendix C. Wells W11 and W14 were sampled as part of the routine monitoring program in 2021. The resident for well W7 requested the well no longer be sampled starting in 2018 as he was concerned the casing may crumble due to its age.

3.5.1 GENERAL CHEMISTRY TRENDS

In general, the parameter concentrations fluctuated, remained constant or decreased over the long term, although the following exceptions are noted.

- The concentrations of alkalinity and conductivity increased at well W7 over the long term until 2009; however, the parameter concentrations decreased between 2009 and the last sample collection in 2012. Iron concentrations exhibited a noticeable decrease in concentration between 1999 and 2000, fluctuated between 2002 and 2005, and generally remained at the lower levels thereafter.
- Alkalinity and conductivity concentrations within well W14 decreased between 1998 and 2002 and remained relatively constant or decreased since that time. Although there was an increase in concentration in 2016, the concentration levels were within the lower portion of the historical range between 2017 and 2021. Manganese, iron, DOC, and COD concentrations at well W14 generally fluctuate over the long term. An increase in DOC was noted in April 2021 and the concentration represents a new historical maximum at W14 but is similar to concentrations reported at the old Oxley well (W7). It is noted that chloride concentrations at W14 are generally low. There was a slight increase in chloride concentration noted in 2019 and 2020; however, concentrations decreased in 2021 and returned to historical norms. Continued monitoring is required to confirm the long-term trend at this location.
- Parameter concentrations within well W11 are generally higher compared to the other domestic wells. Concentrations of chloride, alkalinity, and conductivity at this well have fluctuated, but decreased, over the long-term. An increase in DOC was noted in April 2021, similar to that observed at W14; DOC at W11 remained below the historical maximum reported in 2010. The concentrations of iron and manganese have fluctuated at W11 in recent years but remain well below those reported prior to 2011. Concentrations for COD exhibited a significant increase in May 2020 followed by a noticeable decrease in 2021. Continued monitoring is required to confirm the long-term trend at this location.

3.5.2 WATER QUALITY COMPLIANCE

Concentrations that exceeded the Ontario Drinking Water Quality Standards are presented in Table 3-1. In general, the parameter concentrations satisfied the Standards with the exception of alkalinity, hardness, iron, manganese, and DOC at one or more domestic wells in 2021. With the exception of DOC at W14, the 2021 exceedances are similar to historical results at these locations.

A comparison of the results at well W11 to the Guideline B-7 criteria is presented in Table 3-2. Domestic well W11 is a recommended compliance location as outlined in the Compliance Plan Summary Report. In summary, the analysed parameters at domestic well W11 had concentrations in compliance with the criteria with the exception of iron, manganese and DOC.

3.6 SURFACE WATER

The surface water sampling events were carried out at the surface water stations in April, July, October, and December of 2010. The general chemical results for the surface water stations are contained in Table D-2, Appendix D**.** Time-concentration graphs for the diagnostic parameters chloride, alkalinity, conductivity, iron, manganese, and DOC are presented in Figures D-1 to D-6, Appendix D. Generally, the chemistry parameters show fluctuating trends. Following is a summary of the observed trends.

- Within the Oxley wetland catchment area, historical chloride, conductivity, and manganese concentrations were generally lower at Station SW27 when compared to the outlet Station SW4; although the chloride and conductivity values were higher at Station SW27 compared to Station SW4 during some sampling events between 2009 and 2011. In 2021, chloride, conductivity, manganese, and iron concentrations were similar at SW27 when compared to the outlet station SW4. Parameter concentrations generally fluctuate within a large range over the long term at Station SW4. Alkalinity has fluctuated since 2007 whereas DOC has exhibited a slight decreasing trend at Station SW4 over the long term. Concentrations of alkalinity, conductivity, and manganese at Station SW30 within the western portion of the wetland are generally similar to, or lower than the

concentration at Station SW4. Concentrations of DOC were slightly higher at SW30 when compared to the concentration at SW4 in 2021, consistent with 2020.

- Within the Cramadog Lake catchment area, chloride, conductivity, and alkalinity values at Stations SW6 and SW7 generally decreased between 1990 and 2004 and have fluctuated within a defined range since that time. Parameter concentrations at Station SW33, along the discharge stream from Little Cramadog Lake, fluctuate and are lower compared to the concentrations at Stations SW6 and SW7, while concentrations of DOC are higher at Station SW33 compared to Stations SW6 and SW7. The concentrations at Station SW33 are generally similar to the background station SW26. It is noted there was a beaver dam at the SW33 location for several years and the dam has since been removed through human activity.
- Parameter concentrations within the water at the background Station SW26 are generally low compared to the other surface water stations and are relatively constant over the long term. Concentrations of chloride, alkalinity and conductivity are generally higher at Station SW34 compared to Station SW26 whereas concentrations of iron, manganese, and DOC are generally similar between the two stations. It is noted that concentrations of chloride, iron, and manganese at Station SW34 fluctuated over a wide range since 2016; concentrations in 2021 were similar to those reported in recent years. Concentrations of chloride, conductivity, manganese and iron were higher at SW34 compared to SW26, and concentrations of DOC and alkalinity were similar or lower at SW34 compared to SW26.
- The water quality at Station SW20, within Seguin Lake, is generally comparable to the background water characteristics with relatively low concentrations for several parameters.
- Parameter concentrations within the infiltration pond, identified as SP, generally peaked in 2002 and have decreased to low, pre-2000, levels since that time. Chloride, alkalinity, conductivity, and dissolved organic carbon concentrations between 2001 and 2003 were generally higher than the other surface water stations, but these concentrations have subsequently decreased to similar levels. It is noted that samples have not been collected at the infiltration pond since 2012 due to frozen or dry conditions. A water sample was obtained at the SP location during the April 2016 and 2017 sampling events. The parameter concentrations were similar to or slightly elevated when compared to the parameter concentrations obtained in 2012. No samples were obtained in 2021 due to frozen or dry conditions.

Surface water quality at the surface water stations generally complied with the Provincial Water Quality Objectives (PWQO) with the exceptions shown in Table 3-3. In general, iron, phosphorus, and phenols were the parameters with the predominant exceedances at several of the surface water stations within each catchment area, with infrequent exceedances occurring for boron at stations SW4 and SW28. The concentrations of copper, lead and zinc also exceeded the PWQO at SW28 in April 2021, however this is considered to reflect entrained sediment in the sample. These parameters decreased and no longer exceeded the PWQO in October 2021. Surface water quality at the compliance Stations SW20 and SW33, as established in the Compliance Monitoring Plan, had sporadic PWQO exceedances for pH, iron, phosphorus, and phenols that were generally similar to, or lower than the range of exceedances at the background Station SW26. With the exception of pH and phenols, which were similar to the background Station SW26, the exceedances at station SW30, within the Oxley wetland, were generally similar to, or lower than, exceedances at stations SW4 and SW28. The pattern along these flow paths indicates that the landfill site does not have a measurable influence on the water quality at these locations, and the site satisfies the surface water quality requirements at the compliance locations, as outlined in the Compliance Monitoring Plan.

4 SITE OPERATIONS

4.1 WASTE DISPOSAL

4.1.1 SITE CONTROLS

The Municipality of McDougall reviews and updates the tipping fees on an annual basis. Non-hazardous household and commercial waste tipping fees are $128 per tonne. The tipping fee for asbestos is a minimum of $175 plus $175 per tonne, and the fee for shingles is $175/tonne. Wood "Sorted" is $128 per tonne, while "loads of mixed construction waste with divertible waste, or commercial waste mixed with divertible waste" is $200 per tonne. Tipping fees for contaminated soil are $275 per tonne. The tipping fee for tires is $128 per ton. Tires larger than 22.5 inches in diameter are not accepted, nor are tires on rims.

The landfill is open between 8 a.m. and 4 p.m., Monday to Friday. In addition, the site was open on Saturdays from 9 a.m. to 1 p.m. between May 1 and Thanksgiving weekend, and on the first Saturday of each month during the remainder of the year. Incoming wastes to be landfilled are weighed at the site scales. The site attendant issues weigh scale tickets and maintains records of the waste type, source of waste, waste hauled and tonnage. A new weigh scale was installed at the site in 2000. In 2006, the municipality implemented a new scale software system that has allowed it to track the quantities and types of waste that are received at the site and the movement of waste sent for recycling, including tires, scrap metal, white goods, etc.

4.1.2 DAILY COVER

Daily cover is applied over waste deposited each day. The daily cover material is comprised of the fines material recovered from the waste screening operation carried out at the landfill. The fines material is stockpiled on-site adjacent to the containment cell area. Daily cover requirements are described in more detail in the Operations & Inspection Manual for the site.

4.1.3 WASTE DIVERSION[1]

The McDougall Landfill Site has restricted public access and the bulk of McDougall residents take their household garbage to a transfer station where recycling occurs. The municipalities that use the site have recycling programs and their waste is segregated before arrival at the site. The site added two residential recycling compactor bins in 2011 for fibers and blue box items. An e-waste recycling bin was included at the site in 2012. Scrap steel and metal products are received at the site and segregated in a holding area. When sufficient volume is accumulated this material is sold as scrap metal. The site has a separate receiving area with off-site diversion for drywall and shingles. In 2021, the following materials were hauled off-site by a third-party contractor:

- Drywall: 68.32 tonnes
- Shingles: 182.08 tonnes
- Tires: 0.00 tonnes
- Scrap Metal: 209.98 tonnes

Segregated wood waste and brush are stockpiled east of the weigh scale area. This material is chipped when quantities dictate. No burning of wood waste takes place at the site.

[1] This information is provided by M.K. Ince and Associates Ltd., Groundwater Monitoring Program 2006 Annual Report, February 2009.

Approximately 21,700 tonnes of recycled asphalt were received at the site in 2020 and stockpiled on site with the intention of the material being used for future roadwork within the Municipality. In 2021, approximately 5,163 tonnes of recycled asphalt were subsequently removed from the site for roadworks. No re-cycled asphalt was landfilled at the site in 2021.

In the past, tires were buried in the northeast corner of the site near grid co-ordinates 390N and 450E. The practice of burying tires ceased in approximately 1999 and in August of that year an application was made to the Ministry of the Environment in which an approval was obtained to allow for a tire storage pile. By 2004 this pile was estimated to contain approximately 9,000 tires and a tire recycler was hired to remove the pile. By 2005, the pile was under 5,000 tires and the Municipality reports the number of buried tires remaining in this portion on the site was approximately 3,000. Tires that are currently dropped off at the site and are temporarily stored in a designated area. The stored tires are removed from the site on a periodic basis, as required.

4.1.4 CONTAMINATED SOILS

Soils contaminated with gasoline, fuel oil or other materials are accepted at the site. Depending on the nature of the material, the contaminated soil may be used as daily cover. In 2021, there was no soil classed as contaminated accepted on site. Operating procedures for recording and disposing of contaminated soils on-site were developed in accordance with Regulation 347 and applicable municipal guidelines and are included in the Operations & Inspection Manual for the site.

4.1.5 WASTE QUANTITIES

The total waste tonnage received during 2021 is presented in Table 4-1 with the exclusion of the gravel and recycled asphalt. Based on the weigh scale records, approximately 11,629 tonnes of waste were received at the site in 2021. This tonnage is approximately 13% higher than the waste received during 2020. A comparison of the landfilled waste tonnages received between 2004 and 2021 is also included in Table 4-1.

4.1.6 LANDFILL CAPACITY

Approximately 22,362 m^3 of waste and daily cover material was landfilled at the McDougall Landfill in 2021 based on the 11,629 tonnes received (and landfilled) at the site during these months; resulting in an estimated remaining volume of 463,857 m^3 at the end of December 2021. Approximately 4,472 m^3 of material would have been used as daily cover through 2021. The Municipality incorporates the existing fines that are stockpiled on site, along with the wood and clean brush that is brought onto site, which is subsequently chipped, for the cover material. Based on the approximately 453 tonnes of wood waste and 100 tonnes of clean brush that were brought onto the site in 2021, it is expected that the fines stockpile was reduced by 3,366 m^3 in 2021. Based on an adjustment of wood waste being incorporated into the daily cover for the latter portion of 2018 and through 2019, it is estimated that the fines stockpile has been reduced to 15,227 m3 at the end of 2021. The remaining landfilling capacity equates to an approximate remaining site life capacity of 24 years, based on an estimated average of 10,000 tonnes/year being landfilled at the site in future years. As shown in Table 4-1, the annual amounts of waste received at the site between 2012 and 2019, inclusive, are noticeably lower compared to pre-2011 levels, however an increase in the amount received was noted in 2020 and 2021. The reduction in waste amounts during the recent time period is attributed to waste diversion programs initiated by the Municipality, but the annual amounts are expected to increase in future years due to population growth in the area.

4.1.7 LEACHATE TREATMENT

There was a total of 31,866 m^3 of leachate collected from the original and engineered containment cells in 2021. Also, 4,386 m^3 of leachate influenced groundwater was pumped from purge well PW1 and treated by the on-site Combined Leachate and Groundwater Treatment Facility (CLGTF) in 2021. Leachate from the original engineered landfill area and the expanded cell area is now collected and pumped via a forcemain to the CLGTF. There was no leachate transported off site during 2021.

The collected leachate volumes are summarized in Table 4-2. The total volume of 35,283 m^3, collected and treated in 2021, is very similar to the volume collected in 2020 (35,283 m^3). Continued landfilling, covering, and grading activities of the cell to promote surface runoff will reduce the amount of infiltration of precipitation into the refuse in the future. It is expected that the leachate volume collection rate will decrease as the expanded cell is completed.

4.1.8 LANDFILLING VARIANCES

Based on the existing site contours, as shown in Figure 2-1, and following discussions with Municipality of McDougall staff and Conestoga-Rovers & Associates, there are no known deviations from the Site Remediation Options study, completed in 1991, with the exception of the approved emergency extension provided by the Ministry of the Environment in their Certificate of Approval Amendment Notice No. 6, dated November 16, 2005.

4.2 OPERATIONAL COMPLIANCE

Based on the information provided during 2021, the Municipality has been operating the site in a manner consistent with the Conditions of the Provisional Certificate of Approval.

5 DISCUSSION

5.1 BACKGROUND

The McDougall Landfill Site began receiving waste in 1976 under private ownership and operation, with waste being placed upon, and within, the overburden. During the early 1980s, leachate influenced groundwater migrated from the site and contaminated domestic water wells and surface watercourses in the area. McDougall Township was ordered by the Ontario Ministry of the Environment (MOE) to take over the ownership and operation of the site in 1989. As part of the remediation of local groundwater and surface water quality, an engineered containment cell was constructed on site and the originally placed waste was mined, screened, and re-landfilled within the new cell. During 2017, the existing landfill site was comprised of a closed engineered lined refuse cell, which occupies 3.3 ha, and an expansion area, 3.7 ha, that was completed, and began receiving waste in September 2008. Leachate is currently being collected from within the original and expanded containment areas and is treated by the on-site Combined Groundwater and Leachate Treatment Facility.

5.2 GROUNDWATER ASSESSMENT

Leachate is produced principally from the infiltration and percolation of precipitation through the refuse. As the water percolates through the refuse, it reacts with the refuse resulting in an increase in parameter concentrations. The resulting liquid is termed leachate. Prior to the relocation of waste into the engineered containment cell in 1994, the sandy soils beneath the refuse provided an avenue for leachate egress from the refuse and into the shallow groundwater system.

The lateral groundwater flow direction, which is a subtle reflection of the local topography, is in three different directions from the site, towards three different catchment areas. One component of groundwater flow is towards the southeast, beneath McDougall Road, which is then diverted by the bedrock topography in two directions – one towards Little Cramadog Lake and the other towards the Oxley wetland. Although groundwater flow within the northwestern portion of the site is locally variable, it is interpreted that the groundwater gradient in this area is northward, towards Seguin Lake.

Leachate influenced groundwater is continuing to migrate from the former refuse disposal area in the direction of the groundwater movement. This influence is detected at Monitors BHB, BHH, and OW4A, to the south and southeast of the former refuse area, and at Monitors BHE-2, BHL, and BHM, to the west of the former refuse area. Although concentrations of diagnostic parameters are, or have historically been, elevated at these locations, several parameters, including chloride, conductivity, iron, manganese, and COD have decreased over the long term. This decreasing trend generally continued through 2021 or typically stable concentrations are observed. With the removal of the original waste to an engineered cell, the contaminant source no longer exists such that the concentrations of the diagnostic parameters will continue to decrease over time as a result of the dilutive effects from infiltrating precipitation and the natural decomposition of some components within the leachate influenced groundwater. Continued monitoring is required to assess this trend over the long term.

Based on the 2021 monitoring results, the site is generally in compliance with Guideline B-7 criteria for reasonable use. Monitor BHE-2, located to the northwest of the existing cell, and established as a compliance location in the Compliance Monitoring Plan, exceeded the criteria for reasonable use for iron, manganese, and dissolved organic carbon during 2021. The concentration of iron and manganese exceeded the criteria for reasonable use in the offsite Monitor BHM, and manganese in monitors BHL and OW5. The exceedances at these monitors are comparable to historical results. The existing CAZ that was established southeast of the landfill site, which includes the Oxley property, is considered to be sufficient for attenuating elevated parameter concentrations which may be attributed to the landfill site.

5.3 RESIDENTIAL WELLS

Domestic water well sampling was completed at two locations in 2021. The water quality from these wells complies with the Ontario Drinking Water Quality Standards for the parameters tested with the exception of hardness, iron, manganese, and DOC at well W11, and alkalinity, hardness, iron, and DOC at well W14. These parameters affect the aesthetic quality of the water and are not health related.

Concentrations for iron within the new Oxley well during recent sampling events is different compared to the historical results at this location. The increase in concentrations is attributed to a change in the sampling location during the recent sampling events. The water sample is now collected from an outside faucet at the house, instead of directly from the dug well.

Based on the 2021 monitoring results, water quality at well W11 satisfied the Guideline B-7 criteria for reasonable use at this location with the exception of iron, manganese, and DOC. This location is located within municipally owned lands.

5.4 SURFACE WATER

The surface water sampling was completed at the surface water stations in 2010, in conjunction with the groundwater sampling events where there was sufficient water for sampling. The surface water stations are located within the Oxley wetland, Cramadog Lake, and Seguin Lake catchment areas.

Historically, for parameters with detectable concentrations, these concentrations tend to fluctuate within a range, although there is a general stable trend for chloride and alkalinity at Stations SW6 and SW7 within the Cramadog catchment area. The historical iron and manganese concentrations at Station SW7 were significantly higher compared to other sampling locations which likely reflected a landfill influence; however, the elevated concentrations may also be partially attributed to the low flows present at this location. The decrease of iron and manganese concentrations at Station SW7 since 2008, to levels similar to Station SW6, may indicate a reduced landfill influence on water quality at Station SW7. In 2021, the concentrations of chloride and conductivity were similar to those reported in 2020, but slightly elevated when compared to results from 2016 and 2017. Continued monitoring will allow an assessment of this trend over the long term. Parameter concentrations (including chloride) at Station SW33, along the discharge stream from Little Cramadog Lake, are generally low compared to the concentrations at Stations SW6 and SW7. Water quality at this station is not affected by the landfill site. It is noted that a long-standing beaver dam was recently removed from this location.

Surface water quality at the surface water stations generally complied with the Provincial Water Quality Objectives with the exceptions shown in Table 3-3. In general, iron was the parameter with the predominant exceedances at several of the surface water stations within each catchment area, with infrequent exceedances occurring for boron and phosphorus at some.

In 2021, surface water quality at the compliance Stations SW20 and SW33, as established in the Compliance Monitoring Plan, had multiple PWQO exceedances for iron at SW20 and SW33. The iron concentrations were generally similar to the range of exceedances at background Station SW26. Sporadic PWQO exceedances for pH, phosphorus, and phenols were also reported that were generally similar to, or lower than the range of exceedances at the background Station SW26. This pattern indicates that the landfill site does not have a measurable influence on the water quality at these locations, and the site satisfies the surface water quality requirements at the compliance locations, as outlined in the Compliance Monitoring Plan. Within the Oxley wetland, alkalinity concentrations generally increase between Station SW27 and Station SW30. Concentrations of several parameters at SW30, including chloride, alkalinity, conductivity, and manganese, are generally similar or lower than the concentrations at Station SW4 whereas DOC was generally higher at Station SW30. Since Station SW30 is located between the landfill site and the downstream location SW4, the degraded surface water quality at Station SW4 is from an alternate source and is not landfill related. In 2021, chloride, conductivity, manganese, and iron concentrations were lower or similar at SW27 when compared to the outlet station SW4. Based on historical reports, there is a contaminating source near Station SW28, located between SW30 and SW4; however, the source of this contamination is not from the landfill site. It is noted that road improvements occurred on McDougall Road during 2015, which included replacement of the old culverts. It is likely the road work disruptions contributed to fluctuating parameter concentrations between 2015 and 2021.

Water quality at Station SW20, within Seguin Lake, was generally comparable to the background surface water quality during 2021. In general, iron, phosphorus and phenols were the predominant exceedances of PWQO at several of the surface water stations within each catchment area, including pH, iron, and phenols at the background station, SW26. Phosphorus also exceeded the PWQO at the background station SW26 in previous years.

The site is operating in accordance with the Provisional Certificate of Approval and there are no required or recommended changes to the operation of the landfill site at this time. It is noted that it may be necessary to establish a contaminant attenuation zone west of the site in the future.

5.5 2022 MONITORING PROGRAM

Since a majority of the groundwater monitors and surface water stations at this site have been sampled over several years, and since the water chemistry is generally consistent between sampling events, it is recommended the existing frequency of sampling be reduced from four (4) events per year to two (2) events per year. It is recommended the two (2) events that are to be continued would consist of the existing spring and fall sampling events. The reduction in sampling frequency would not reduce the ability of assessing the landfill influence on surrounding groundwater and surface water settings, or the assessment of site compliance. The municipality should request the MECP to undertake a review of this annual monitoring report and seek their concurrence with the proposed reduction in monitoring frequency. Assuming concurrence is obtained, the municipality would them apply for an Environmental Compliance Approval (ECA. formerly Provisional Certificate of Approval) amendment application to modify the monitoring program accordingly.

6 CONCLUSIONS AND RECOMMENDATIONS

Based on the study findings, the following conclusions are made.

- The water levels in 2021 were similar to, or slightly higher than, the historical values and the seasonal ranges at the site. Variations through the year, and historically, are mainly attributed to climatic conditions.
- Groundwater in the unconfined flow system is a subtle reflection of the local topography and is controlled by the underlying bedrock surface. Three different flow paths are identified, which correlate with adjacent catchment areas. These areas are identified as the Cramadog Lake, Oxley wetland, and Seguin Lake catchment areas. The interpreted groundwater flow paths during 2021 are consistent with the historical flow pattern.
- The engineered containment cell is functioning as designed to contain leachate and assist in reducing parameter concentrations within the remnant groundwater plume beneath the landfill site.
- Landfill leachate influenced groundwater is continuing to migrate from the former refuse disposal area in the direction of the groundwater movement; however, the concentrations of several diagnostic parameters, including chloride, conductivity, iron, manganese, and COD, continue to decrease or remain stable over the long term. It is expected the concentrations of the diagnostic parameters will continue to decrease over time as a result of the dilutive effects from infiltrating precipitation and the natural decomposition of some components within the leachate influenced groundwater. The collection and treatment of iron influenced groundwater from Purge Well PW1 will also assist to decrease the iron concentrations over the long term.
- The site is generally considered to be in compliance with Guideline B-7 criteria for Reasonable Use except for DOC, iron, and manganese to the west of the site. With the removal of the original waste area (and contaminant source), it is expected that the concentrations of these parameters will decrease to natural levels over time within this portion of the site.
- The water quality within the domestic wells sampled in 2021 complies with the Ontario Drinking Water Quality Standards for the parameters tested with the exception of hardness, iron, manganese, and DOC at well W11, and alkalinity, hardness, iron, and DOC at well W14. These parameters are aesthetic parameters and are not health related.
- Surface water quality at Stations SW6 and SW7, within the Cramadog Lake catchment area has historically been affected by the landfill although this influence appears to have decreased since 2008. A landfill influence is not measurable along the discharge stream from Little Cramadog Lake into Cramadog Lake. In general, surface water quality in the Cramadog catchment area is improving.
- Surface water quality within Oxley wetland is influenced by a contaminant source that is not attributed to the landfill site. Water quality at the sampled surface water stations within this wetland generally satisfied the Provincial Water Quality Objectives for the parameters analysed.
- Surface water quality within Seguin Lake is generally comparable to the background Station SW26 results and, based on the monitoring results for 2021, there is no measurable landfill influence on the water quality within the lake at this location.
- The landfill site satisfied the surface water quality requirements at the compliance surface water stations SW20, SW30, and SW33, as established in the Compliance Monitoring Plan, during the sampling events in 2021.
- Approximately 11,629 tonnes of waste were received and landfilled at the site in 2021, which is approximately 13% more than the volume of waste received during 202. The remaining capacity of the expansion cell at the end of December 2021 is approximately 463,847 m^3, which is equivalent to an approximate remaining site life capacity of 24 years, based on an estimated average of 10,000 tonnes/year being landfilled at the site in future years.
- A total leachate volume of 35,283 m^3 was collected from the original and expansion engineered containment cells, and the purge well, PW1, in 2021. The leachate was treated by the on-site Combined Leachate and Groundwater Treatment Facility (CLGTF). The collected leachate volume in 2021 was very similar to the volume collected in 2020 (35,217 m^3). No leachate was hauled from the landfill site in 2021. Continued

landfilling, covering, and grading activities in the expansion cell to promote surface runoff will reduce the amount of infiltration of precipitation into the refuse in the future.

- There is no requirement to change the monitoring program remedial works or contingency plans at this time, based on the current monitoring results.
- The site is operating in accordance with the Provisional Certificate of Approval.

We respectfully submit the following recommendations for your consideration.

- The 2021 monitoring program should be continued in 2022 but should only include the Spring and Fall sampling events as described in Section 5.5. The municipality should request the MECP to undertake a review of this annual monitoring report and seek their concurrence with the proposed reduction in monitoring frequency. Assuming concurrence is obtained, the municipality would them apply for an Environmental Compliance Approval (ECA. formerly Provisional Certificate of Approval) amendment application to modify the monitoring program accordingly.
- The new water supply well located along the southwest landfill boundary near the gate entrance should continue to be sampled for groundwater quality in 2022.
- There are no requirements for additional remedial measures at this time.

TABLES

TABLE 1-1
MONITORING PROGRAM SUMMARY
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

		Spring	***Summer***	***Autumn***	***Winter***
	LOCATION	*Mar/Apr*	*June/July*	*Sept/Oct*	*Nov/Dec*
Residential					
	W11	B		B	
	W14 - Oxley New House Well	B		A + VOC	
Groundwater	BHB	B	B	A + VOC	B
	BHC	B	B	A + VOC	B
	BHE-2	B	B	A + VOC	B
	BHH	B		B	
	BHK	B		B	
	BHL	B		B	
	BHM	B		B	
	BHO	B		B	
	BHP	B		B	
	BHQ	B		B	
	OW1A	B		A + VOC	
	OW1B	B		A + VOC	
	OW2	B		A + VOC	
	OW3A	B		A + VOC	
	OW3B	B		A + VOC	
	OW4A	B		A + VOC	
	OW4B	B		A + VOC	
	OW5	B		A + VOC	
	OW8	B		A + VOC	
	OW9	B		A + VOC	
	OW10	B		A + VOC	
	OW11	B		B	
	OW12	B		B	
Leachate Sampling	PW1	B	B	A + VOC	B
	LHT (PW2)	A		A, VOC, PCBs	
	Treatment System Effluent	B	B	A + VOC	B
Surface Water	SW4	C	D	C	D
	SW6	C		C	
	SW7	C		C	
	SW20	C	D	C	D
	SW26	C	D	C	D
	SW27	C		C	
	SW28	C		C	
	SW30	C	D	C	D
	SW33	C	D	C	D
	SW34 - MC Culvert	C		C	
	SP	C		C	

NOTE: A, B, C, and D indicate laboratory analysis package as listed in Table C-5, Appendix C.

TABLE 3-1
ONTARIO DRINKING WATER QUALITY STANDARD EXCEEDANCES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

MONITOR		DATE	PARAMETER & ONTARIO DRINKING WATER QUALITY STANDARD								
			pH	Alkalinity	Hardness	Chloride	Sodium	Iron	Manganese	Dissolved Organic Carbon	Total Dissolved Solids
			6.5-8.5 pH units	30-500 mg/L	80-100 mg/L	250 mg/L	200 mg/L	0.3 mg/L	0.05 mg/L	5 mg/L	500 mg/L
NORTHWEST MONITORS	BHE-2	Apr-21			232			16.0	2.41	8.3	
		Jul-21			199			14.0	2.21	8.2	
		Oct-21			185			12.5	1.97	-	
		Dec-21			214			16.4	2.02	9.2	
	BHK	Apr-21	6.4	13	21						
		Oct-21		24	21						
	BHL	Apr-21	6.4	16	23				0.08		
		Oct-21		22	18						
	BHM	Apr-21			40			9.23	1.34		
		Oct-21			35			9.38	1.38		
SOUTHEAST MONITORS	BHB	Apr-21			207			24.7	1.94		
		Jul-21			196			0.82	1.86		
		Oct-21			188			20.8	1.87	-	
		Dec-21			193			25.3	1.77		
	BHH	Apr-21			348	321	267	31.5	0.30	13.2	1140
		Oct-21			346	287	250	37.2	0.29	14.6	1180
	BHP	Apr-21	6.5	8	10						
		Oct-21	6.3	8	32						
	OW3A	Apr-21			222				0.50		
		Oct-21			188					-	
	OW3B	Apr-21		18	62						
		Oct-21		16	117					-	
	OW9	Apr-21	6.3	5	12						
		Oct-21	6.1	6	16					-	
	OW11	Apr-21			212				0.72		
		Oct-21			203			0.37	1.69	-	

TABLE 3-1
ONTARIO DRINKING WATER QUALITY STANDARD EXCEEDANCES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

MONITOR		DATE	PARAMETER & ONTARIO DRINKING WATER QUALITY STANDARD								
			pH	Alkalinity	Hardness	Chloride	Sodium	Iron	Manganese	Dissolved Organic Carbon	Total Dissolved Solids
			6.5-8.5 pH units	30-500 mg/L	80-100 mg/L	250 mg/L	200 mg/L	0.3 mg/L	0.05 mg/L	5 mg/L	500 mg/L
DOWNGRADIENT MONITORS	BHC	Apr-21			74			16.1	2.88		
		Jul-21			66			24.3	2.64	7.0	
		Oct-21			47			18.2	2.01	-	
		Dec-21			50			19.1	1.74	8.2	
	OW4A	Apr-21		625	512	784	757	0.44	0.30	302	2510
		Oct-21		658	452	780	713	0.42	0.30	-	-
	OW4B	Apr-21			273			31.7	3.57		573
		Oct-21			266			33.4	3.69	-	601
	OW5	Apr-21			64				0.57		
		Oct-21							1.09	-	
	OW10	Apr-21			270			12.7	5.61	8.4	
		Oct-21			268			20.9	6.98	-	
	OW8	Apr-21			231				0.82		535
		Oct-21			242				0.95	-	647
CROSSGRADIENT MONITORS	BHQ	Apr-21	6.1		211	294			13.9	8.3	871
		Oct-21	6.0				221		4.97	17.0	786
	OW1A	Apr-21			70						
		Oct-21			59					-	
	OW1B	Apr-21			101						
		Oct-21			165					-	
DOMESTIC WELLS	W11	Apr-21			184						
		Oct-21			164			0.32	0.37	11.5	
	W14	Apr-21		11	12			0.36		5.9	
		Oct-21		21	12					-	
New Supply Well		Apr-21	6.4	8	63						
		Oct-21	6.3	8	61				0.16		

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standard (2006)
2) Blank indicates parameter concentration was within the ODWQS.
'-' - Indicates parameter not analysed.

TABLE 3-2
MINISTRY GUIDELINE B-7 CRITERIA
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	UNITS	REFERENCE AVERAGE	GUIDELINE B-7 CRITERIA	Northwest Monitors				Southeast Monitors	
					BHE-2	BHK	BHL	BHM	W11	OW5
Health Related	**MAC**									
Barium	1	mg/L	-	0.25	0.1	<0.01	<0.01	<0.01	0.04	0.02
Boron	5	mg/L	-	1.25	0.52	0.03	0.03	0.04	0.16	0.10
Cadmium	0.005	mg/L	-	0.001	<0.0001	-	-	-	-	<0.0001
Chromium	0.05	mg/L	-	0.01	0.001	-	-	-	-	<0.001
Lead	0.01	mg/L	-	0.003	<0.001	-	-	-	-	<0.001
Mercury	0.001	mg/L	-	0.0003	<0.0001	-	-	-	-	<0.0001
Nitrate	10	mg/L	0.14	2.61	0.51	0.41	0.35	<0.10	0.11	0.12
Nitrite	1	mg/L	0.009	0.26	<0.10	-	-	-	-	<0.10
Benzene	5	µg/L	0.0	1.3	<0.5	-	-	-	-	<0.5
Methylene Chloride	50	µg/L	0.0	12.5	<4.0	-	-	-	-	<4.0
Vinyl Chloride	2	µg/L	0.0	0.5	<0.2	-	-	-	-	<0.2
Aesthetic	**MDC**									
Chloride	250	mg/L	0.7	125	23	2.0	3.0	3.5	33	19
Copper	1	mg/L	-	0.50	<0.001	-	-	-	-	0.004
Dissolved Organic Carbon	5	mg/L	1.4	3.2	**8.6**	1.0	0.9	1.1	1.3	1.3
Iron	0.3	mg/L	0.24	0.27	**14.7**	<0.03	0.07	**9.3**	0.18	0.05
Manganese	0.05	mg/L	0.01	0.03	**2.2**	<0.01	0.03	**1.40**	**0.21**	**0.83**
Sulphate	500	mg/L	-	250	50	8	9	13	24	13
Zinc	5	mg/L	-	2.50	0.08	-	-	-	-	<0.01
1,2-Dichlorobenzene	3	µg/L	0.0	1.5	<0.4	-	-	-	-	<0.4
1,4-Dichlorobenzene	1	µg/L	0.0	0.5	<0.4	-	-	-	-	<0.4
Chlorobenzene	30	µg/L	0.0	15.0	<0.5	-	-	-	-	<0.5
Ethylbenzene	2	µg/L	0.0	1.2	<0.5	-	-	-	-	<0.5
m/p-Xylenes	300	µg/L	0.0	150	<0.4	-	-	-	-	<0.4
o-Xylene	300	µg/L	0.0	150	<0.4	-	-	-	-	<0.4
Toluene	24	µg/L	0.0	12.0	<0.5	-	-	-	-	<0.5

NOTES:
1) ODWQS - Ontario Drinking Water Quality Standards (2006)
MAC - Maximum Acceptable Concentration
MDC - Maximum Desirable Concentration
2) Reference averages presented are based on the average of historical concentrations for reference well W5 - Philips Well.
Reference concentrations for VOCs are considered to be 0.0 µg/L.
3) Blank indicates parameter not analysed.
"-" - Indicates parameter not historically analysed.
4) Highlighted values exceed Guideline B-7 Criteria
5) All concentrations presented for comparison are 2018 average values.

TABLE 3-3
SURFACE WATER PWQO EXCEEDANCES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

STATION		DATE	pH	Iron	Boron	Copper	Lead	Phosphorus	Zinc	Phenols
			6.5-8.5	0.300	0.200	0.005	0.005	0.030	0.020	1
			units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L
BACKGROUND	SW26	Apr-21								8
		Jul-21	6.2	3.01						6
		Oct-21	6.4							
		Dec-21	5.9			-	-		-	
LITTLE CRAMADOG LAKE	SW6	Apr-21								
		Oct-21								
	SW7	Apr-21		2.48						
		Oct-21		0.34						
	SW33	Apr-21								3
		Jul-21		1.09				0.033		3
		Oct-21								
		Dec-21	6.3			-	-		-	
OXLEY WETLAND	SW4	Apr-21		4.09						2
		Jul-21		8.03	0.36					
		Oct-21		2.76						
		Dec-21		1.30		-	-		-	
	SW27	Apr-21		0.62				0.068		
		Oct-21		0.69				0.056		
	SW28	Apr-21		836	0.36	0.022	0.011	1.120	0.12	
		Oct-21		1.61				0.060		
	SW30	Apr-21		3.10						
		Jul-21		9.29				0.119		5
		Oct-21		0.95				0.035		
		Dec-21	6.43	0.43						

TABLE 3-3
SURFACE WATER PWQO EXCEEDANCES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

STATION		DATE	pH	Iron	Boron	Copper	Lead	Phosphorus	Zinc	Phenols
			6.5-8.5	0.300	0.200	0.005	0.005	0.030	0.020	1
			units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L
SEGUIN LAKE	SP	Apr-21	-	-	-	-	-	-	-	-
		Oct-21	-	-	-	-	-	-	-	-
	SW20	Apr-21								
		Jul-21		0.80				0.082		
		Oct-21		0.50						
		Dec-21				-	-		-	
SOUTHWEST STATION	SW34	Apr-21		1.02						
		Oct-21		5.11						

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) "-" - Indicates parameter not analysed.
3) Blank indicates parameter satisfied the PWQO.

TABLE 4-1

WASTE VOLUME RECEIVED - Metric Tonnes

McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

MUNICIPALITY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
McDougall	48.68	41.01	59.50	57.03	58.34	74.23	70.36	74.47	76.73	60.17	52.65	59.63	732.80
Archipelago	6.84	2.24	10.41	12.79	32.65	45.23	57.11	70.80	37.87	24.91	16.49	-	317.34
Carling	23.07	27.18	27.92	30.09	34.64	72.77	71.83	76.90	57.64	36.89	32.27	11.31	502.51
Seguin	198.79	153.93	253.52	306.70	321.13	331.25	461.73	469.89	355.96	312.51	258.98	256.49	3,680.88
McKellar	43.05	30.51	32.74	53.33	54.93	52.50	82.67	85.78	59.55	63.06	37.55	34.91	630.58
McKellar Rate Payers	2.00	0.47	2.66	8.93	14.06	16.72	16.20	12.93	11.45	16.59	9.49	2.59	114.09
Parry Sound	21.92	12.37	59.04	45.76	44.57	57.02	40.63	44.73	47.22	43.22	55.48	22.36	494.32
Whitestone	3.98	2.82	11.00	11.25	15.74	8.35	14.60	12.31	9.11	9.07	7.42	3.35	109.00
Progressive	138.87	108.32	148.28	171.69	157.77	225.92	313.72	292.57	240.10	187.61	146.00	151.85	2,282.70
Commercial Users	170.49	111.43	141.67	183.93	178.84	224.93	190.31	203.13	181.09	225.96	204.01	137.65	2,153.44
Mcdougall Rate Payers	17.48	9.11	22.87	54.05	77.06	63.97	73.84	78.31	59.66	72.66	52.74	29.12	610.87
Monthly Totals	**675.17**	**499.39**	**769.61**	**935.55**	**989.73**	**1,172.89**	**1,393.00**	**1,421.82**	**1,136.38**	**1,052.65**	**873.08**	**709.26**	**11,628.53**

Waste Exported	**0.00**
Waste Landfilled	**11,628.53**

HISTORICAL LANDFILLED TONNAGE COMPARISON

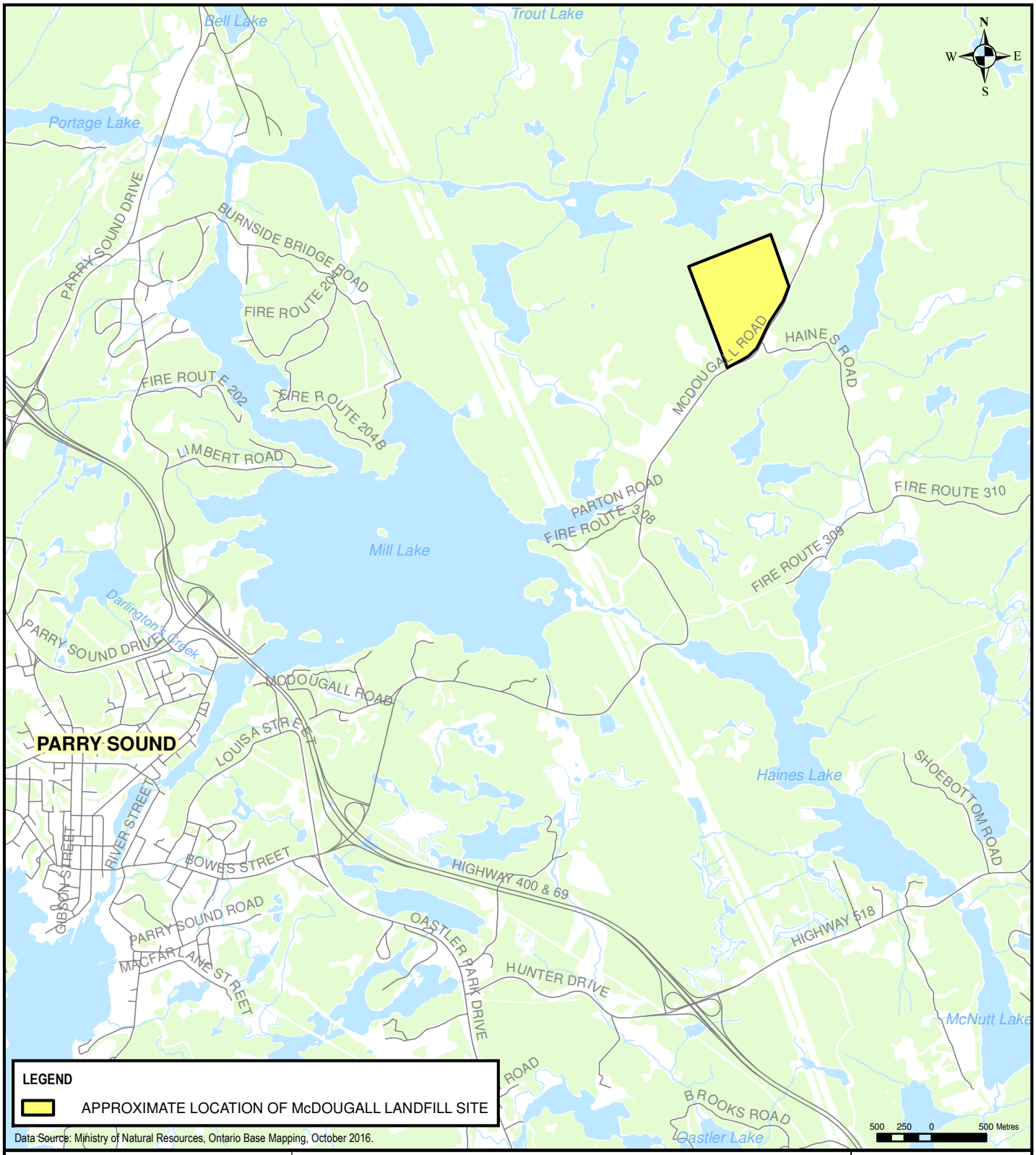
Year	Tonnes	Year	Tonnes
2004	7,531	2013	7,224
2005	8,182	2014	7,841
2006	10,305	2015	7,188
2007	10,438	2016	9,215
2008	11,287	2017	8,840
2009	13,185	2018	8,649
2010	12,880	2019	8,905
2011	10,851	2020	10,313
2012	8,702	2021	11,629

TABLE 4-2
LEACHATE COLLECTION AND TREATMENT
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

MONTH	Volume of Leachate Treated On-Site (m^3)					Volume of Leachate Hauled (m^3)	Number of Loads	Average Volume per Load (m^3)
	PS1 - Original Engineered Cell	PS2 - Expansion Cell	PW1	Total	Final Effluent			
January	403	1,421	353	2,177	2,208	0	0	-
February	354	530	318	1,202	1,090	0	0	-
March	376	2,576	269	3,221	3,229	0	0	-
April	387	3,790	180	4,357	4,265	0	0	-
May	524	2,856	285	3,665	3,553	0	0	-
June	195	587	466	1,248	1,088	0	0	-
July	262	1,249	471	1,982	1,795	0	0	-
August	278	1,920	464	2,662	2,539	0	0	-
September	216	1,493	426	2,135	2,055	0	0	-
October	217	4,424	406	5,047	4,978	0	0	-
November	210	3,906	433	4,549	4,509	0	0	-
December	296	3,396	315	4,007	3,974	0	0	-
TOTAL (m^3)	**3,718**	**28,148**	**4,386**	**36,252**	**35,283**	**0**	**0**	**-**

HISTORICAL COMPARISON		
YEAR	**HAULED (m^3)**	**TREATED (m^3)**
2004	5,884	0
2005	4,381	0
2006	5,385	0
2007	3,093	0
2008	2,755	1,831
2009	1,893	30,844
2010	0	30,056
2011	0	30,123
2012	0	33,382
2013	0	40,600
2014	0	46,196
2015	0	35,737
2016	0	40,198
2017	0	48,204
2018	0	39,680
2019	0	50,124
2020	0	35,217
2021	0	35,217

FIGURES



LEGEND

APPROXIMATE LOCATION OF McDOUGALL LANDFILL SITE

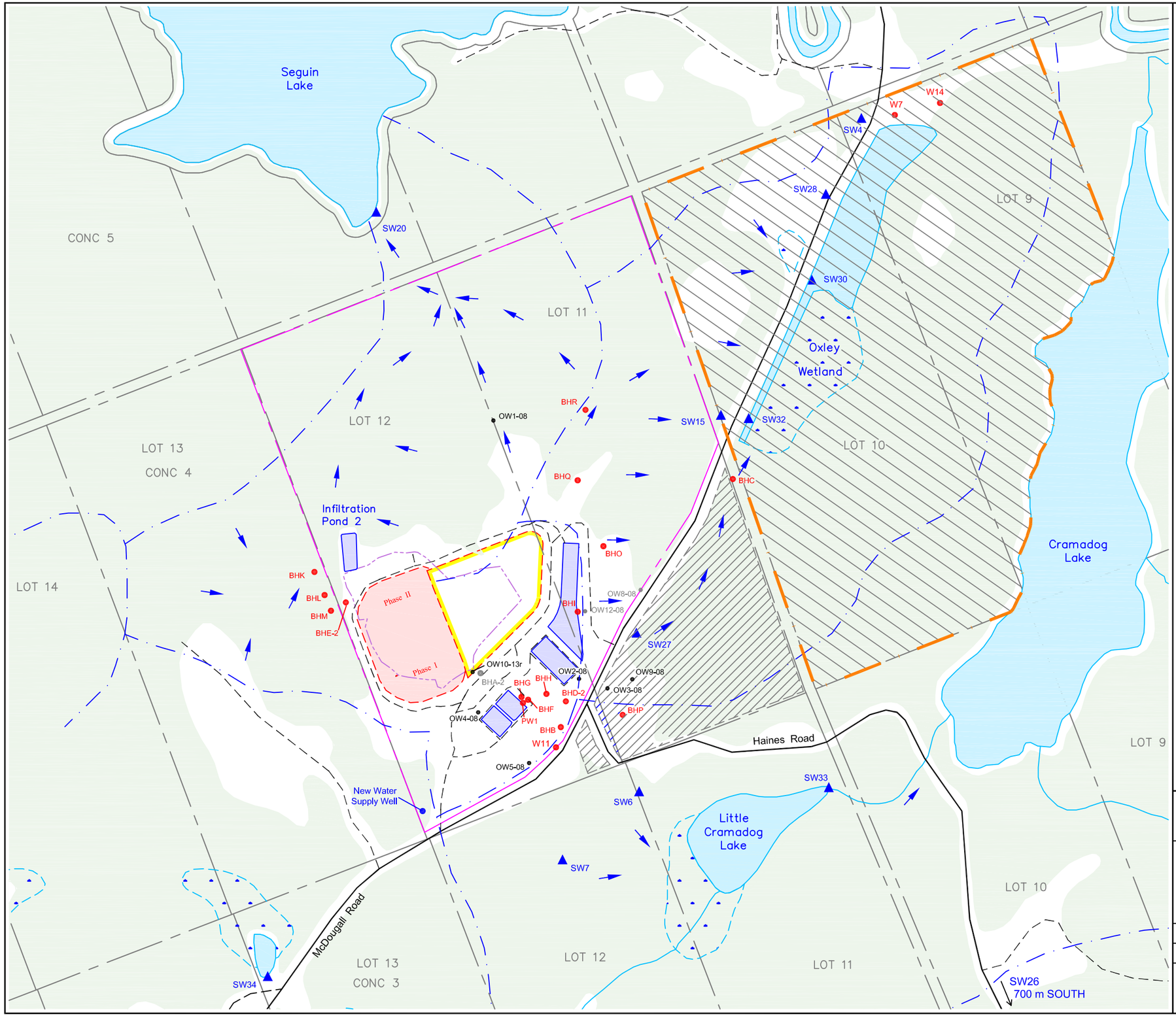
Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

wsp

126 DON HILLOCK DRIVE, UNIT 2
AURORA, ONTARIO CANADA L4G 0G9
TEL.: 905-750-3080 | FAX: 905-727-0463 | WWW.WSP.COM

PROJECT: 2021 ANNUAL MONITORING REPORT McDOUGALL LANDFILL SITE	SCALE: 1:50,000
	DRAWN BY: TP / CHECKED BY: -
TITLE: LOCATION MAP	PROJECT NO: 111-52820-01
	DATE: MARCH 2022
CLIENT: MUNICIPALITY OF McDOUGALL	FIGURE NO: 1-1 / REV.: -

Document Path: D:\aProjects\111-52820-01\MXD\111-52820-00 Figure 1 Location Map.mxd



LEGEND

- PROPERTY LINE
- ORIGINAL WASTE LIMIT
- APPROVED WASTE LIMIT
- W11 — OVERBURDEN DOMESTIC WELL LOCATION AND DESIGNATION
- BHB — GROUNDWATER MONITOR LOCATION AND DESIGNATION
- OW9-08 — NEW MONITOR LOCATION AND DESIGNATION (INSTALLED 2007 / 2008)
- BHA-2 — FORMER GROUNDWATER MONITOR LOCATION AND DESIGNATION
- SW6 — SURFACE WATER MONITORING LOCATION AND DESIGNATION
- BUFFER ZONE
- OXLEY PROPERTY
- SURFACE WATER CATCHMENT AREAS
- SURFACE WATER FLOW
- EXPANSION CELL WASTE LIMIT

0 100 200 m

DATA SOURCES:
1. OBM 1:10000 SHEET 10 17 5800 50250, NAD 83 DATUM.
2. LANDFILL PLAN, COMPLIANCE PLAN FIGURE 2 AND 9, CRA, MAY 5, 2006.
3. MARCH 2007 SURVEY PROVIDED BY CONESTOGA-ROVERS & ASSOCIATES.

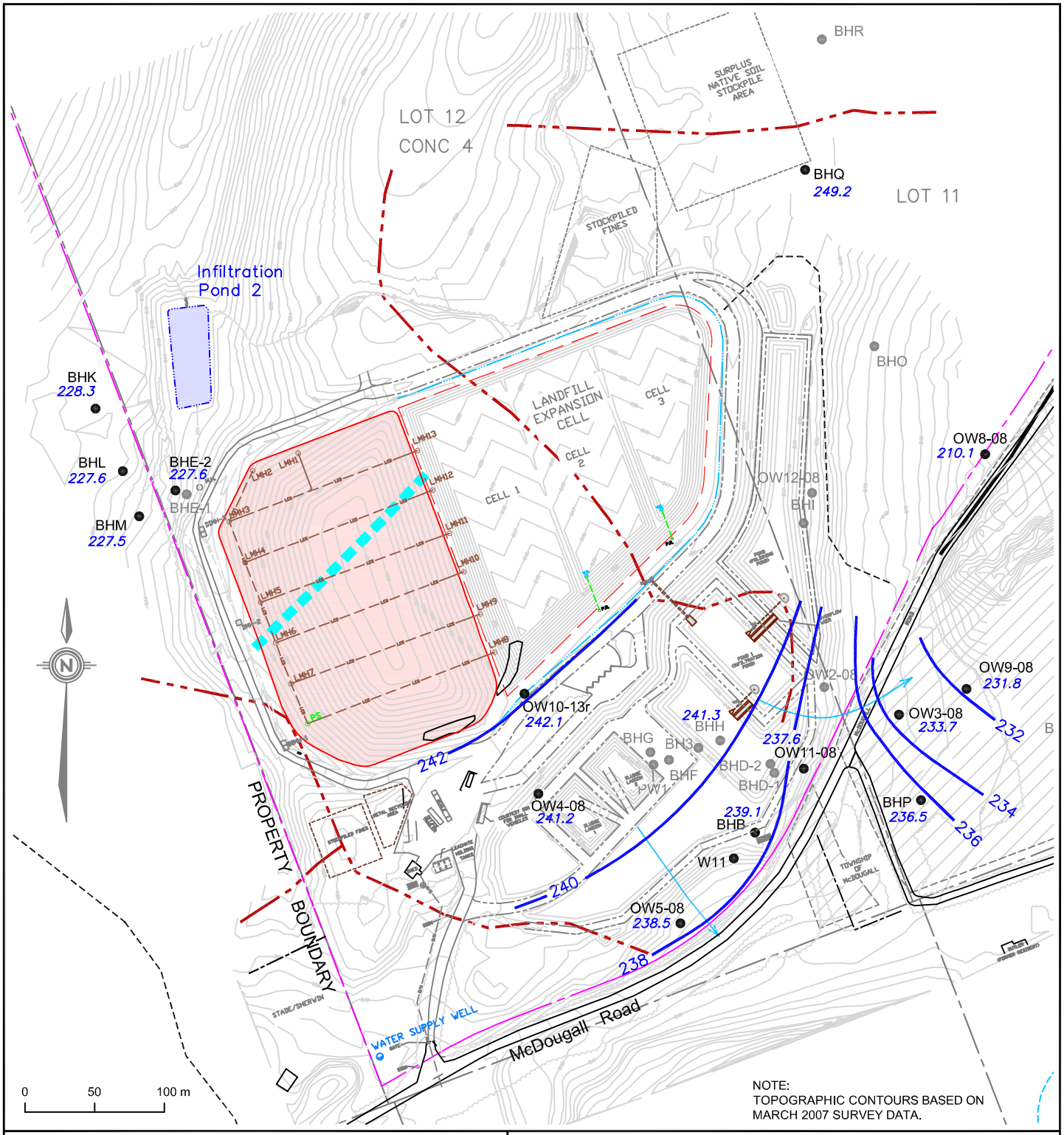
SITE PLAN

2021 ANNUAL MONITORING REPORT
McDOUGALL LANDFILL SITE
For Municipality of McDougall

DATE: MARCH 2022	SCALE: 1:7500
PROJECT: 111-52820-01	REF. NO.: 111-52820-01 Figure 1-2

wsp

FIGURE 1-2



LEGEND

- APPROVED WASTE LIMIT
- BHK 228.3 — GROUNDWATER MONITOR LOCATION, DESIGNATION AND GROUNDWATER ELEVATION IN mASL (OCTOBER 2021)
- APPROXIMATE SHALLOW GROUNDWATER FLOW DIVIDE
- 242 — INTERPRETED GROUNDWATER CONTOUR (m)
- INFERRED DIRECTION OF GROUNDWATER FLOW
- BEDROCK FLOW BOUNDARY

GROUNDWATER FLOW REGIME - OCTOBER 2021

2021 ANNUAL MONITORING REPORT
McDOUGALL LANDFILL SITE
For Municipality of McDougall

DATE: MARCH 2022	SCALE: 1:4000
PROJECT: 111-52820-01	REF. NO.: 111-52820-01 Figure 2-1

wsp

FIGURE 2-1

APPENDIX

A GROUNDWATER REGIME

TABLE A-1
GROUNDWATER MONITOR IDENTIFICATION SYSTEM
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

BOREHOLE LOCATION		MONITOR IDENTIFICATIONS		COMMENTS
Original	Alternate Names	Original	Alternate Names	
BHA	BH-A	BHA1	BHA-1, BH-A1	Removed
		BHA2	BHA-2, BH-A2	Removed in 2007
BHB	BH-B	BHB	BH-B	
BHC	BH-C	BHC	BH-C	
BHD	BH-D	BHD1	BHD-1	Removed
		BHD2	BHD-2	
BHE	BH-E	BHE-1	BHE1, BH-E1	Removed
		BHE-2	BHE2, BH-E2	
BHF	BH-F	BHF	BH-F	Removed
BHG	BH-G	BHG	BH-G	Removed
BHH	BH-H	BHH	BH-H	
BHI	BH-I	BHI	BH-I	Removed/destroyed
BHJ	BH-J	BHJ	BH-J	Removed in 2007
BHK	BH-K	BHK	BH-K	
BHL	BH-L	BHL	BH-L	
BHM	BH-M	BHM	BH-M	
BHN	BH-N	BHN	BH-N	Removed in 2007
BHO	BH-O	BHO	BH-O	Removed/destroyed
BHP	BH-P	BHP	BH-P	
BHQ	BH-Q	BHQ	BH-Q	
BHR	BH-R	BHR	BH-R	
OW1	OW1	OW1	OW1L, OW1-L	Leachate monitor, Removed/destroyed
PW1	PW1	PW1	PW1	
OW1-08	OW1	OW1A	OW1A-08	Groundwater monitoring nest
		OW1B	OW1B-08	
OW2-08	OW2	OW2	OW2-08	
OW3-08	OW3	OW3A	OW3A-08	Groundwater monitoring nest
		OW3B	OW3B-08	
OW4-08	OW4	OW4A	OW4A-08	Groundwater monitoring nest
		OW4B	OW4B-08	
		OW4C	OW4C-08	
OW5-08	OW5	OW5	OW5-08	
OW8-08	OW8	OW8	OW8-08	
OW9-08	OW9	OW9	OW9-08	
OW10-08	OW10	OW10	OW10-08	Monitor OW10-08 decommissioned in 2013 and replaced with OW10-13r.
OW10-13		OW10	OW10-13r	
OW11-08	OW11	OW11	OW11-08	
OW12-08	OW12	OW12	OW12-08	

NOTES:
1) A Borehole Location represents one or more groundwater monitors at the specified location.
2) At borehole locations with more than one monitor, each monitor is identified with a suffix which indicates the relative screen depth at the borehole location.
3) Borehole Locations OW1-08 to OW12-08 were originally identified in the site CofA with the "-07" suffix, as the installations were originally planned for 2007. The borehole identifications were subsequently identified with the "-08" suffix in later amendments to the CofA to reflect the actual year of installation (2008).

TABLE A-2
GROUND WATER MONITOR DETAILS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

WELL ID	DESCRIPTION	GROUND ELEVATION (mASL)	T.O.P. ELEVATION (mASL)	B.O.H. ELEVATION (mASL)
W1	Coomber House	240.92	241.23	
W2	Butler Garden	237.20	237.66	233.76
W3	Butler House	240.00	240.45	237.35
W5	Phillips House	238.28	238.73	236.13
W6	Sherwin House	205.00	205.61	
W7	Oxley House	205.00	205.51	202.44
W10	McCauley House		245.00	239.75
W11	Trailer	245.12	243.77	237.78
W12	Butler House, New	240.00	240.00	154.66
W13	Sherwin House, New	206.00	206.46	65.79
BHA1	Borehole Leachate	254.50	254.57	243.06
BHA2	Borehole Leachate	255.78	257.21	239.48
BH-B	Borehole Monitor	250.17	250.90	238.11
BH-C	Borehole Monitor	208.00	208.71	200.41
BHD-1	Borehole Monitor	251.00	251.62	238.90
BHD-2	Borehole Monitor	250.51	251.31	234.28
BHE-1	Borehole Monitor	243.67	244.71	236.35
BHE-2	Borehole Monitor	243.73	244.71	226.18
BHF	Borehole Monitor	243.92	244.92	
BHG	Borehole Monitor	244.11	245.11	
BHH	Borehole Monitor	244.57	245.57	
BHI	Borehole Monitor			
BHJ	Borehole Monitor	256.11	257.11	
BHK	Borehole Monitor	238.50	239.50	
BHL	Borehole Monitor	239.12	240.12	
BHM	Borehole Monitor	242.09	243.09	
BHN	Borehole Monitor	255.59	256.59	
BHO	Borehole Monitor	242.91	243.57	232.85
BHP	Borehole Monitor	240.65	241.11	235.16
BHQ	Borehole Monitor	250.64	251.57	245.31
BHR	Borehole Monitor	249.21	249.91	244.49

TABLE A-2
GROUND WATER MONITOR DETAILS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

WELL ID	DESCRIPTION	GROUND ELEVATION (mASL)	T.O.P. ELEVATION (mASL)	B.O.H. ELEVATION (mASL)
OW1	Borehole Leachate	256.04	257.04	238.52
PW1	Pump Well		244.92	
TH1	Test Hole	243.92	244.78	237.08
TH2	Test Hole	246.46	247.32	242.99
TH3	Test Hole	248.39	249.36	246.22
TH5	Test Hole	251.91	252.82	244.44
OW1A	Borehole Monitor	257.04	258.28	
OW1B	Borehole Monitor	257.09	258.06	
OW2	Borehole Monitor	248.07	249.26	
OW3A	Borehole Monitor	242.09	243.02	
OW3B	Borehole Monitor	242.23	243.14	
OW4A	Borehole Monitor	249.52	250.44	
OW4B	Borehole Monitor	249.53	250.48	
OW4C	Borehole Monitor	249.53	250.42	
OW5	Borehole Monitor	243.84	244.68	
OW8	Borehole Monitor	234.65	235.64	
OW9	Borehole Monitor	240.21	240.96	
OW10	Borehole Monitor	255.82	256.67	
OW11	Borehole Monitor	249.01	249.69	
OW12	Borehole Monitor	250.75	251.36	

NOTES: 1) T.O.P. - Top Of Pipe
2) B.O.H - Bottom Of Hole
3) mASL - Metres Above Sea Level

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	W2	W3	W7	W10	W11	W12	BHA2	BHB	BHC	BHD-1	BHD-2	BHE-2	BHF	BHG
T.O.P. Elev.	237.66	240.45	205.51	245.00	243.77	240.00	257.21	250.90	208.71	251.62	251.31	244.71	244.92	245.11
Jan-90	234.80				239.57			239.59	203.42	Dry		Dry		
Apr-90	235.55		204.43		239.81			239.81	203.86	Dry		Dry		
Jul-90	234.89	238.52			240.17		243.63							
Aug-90							243.52	239.85	204.56					
Aug-90					239.89		243.43	239.79	204.38					
Oct-90	234.81	238.93	203.93		240.05			239.92	204.15			226.54		
Nov-90							243.75		204.33			226.67		
Jan-91		238.84	204.19		240.00		243.85	239.67	204.84			227.63		
Feb-91							243.81					227.45		
Mar-91							244.13							
Apr-91	235.81	239.62	204.59		240.94		244.49	240.33	205.99			228.46		
May-91							244.31							
Jun-91														
Jul-91	234.87	238.57	203.93		240.25		243.75	240.00	205.55			228.08		
Aug-91							243.71					227.94		
Oct-91	235.22	238.82	203.88		240.18		244.34	240.04	203.93			227.71		
Jan-92	235.09	238.83	204.17		239.88		243.69	239.81	204.46			227.76		
Feb-92							243.57			Dry		227.21		
Mar-92							243.61	239.76			236.09	227.77		
Apr-92	235.86	239.50	204.55		240.33		244.06	240.05	204.75		236.31	228.27		
Jul-92							243.42	239.86	204.99		236.24	227.68		
Aug-92	234.77	238.44	203.72		239.57		243.19	239.70	204.38		236.06	227.74		
Nov-92	235.47	239.21	204.39		240.09		243.25	239.94	203.67		236.24	227.38		
Jan-93							243.32					227.57		
Mar-93	234.97	238.32	204.33		238.59		243.40	239.26	204.01		235.71	227.48		
Apr-93												227.94		
Jul-93	235.16	238.80	204.14	242.55	239.16	223.70	243.47	239.53	204.70	Dry	236.03	227.75		
Aug-93							243.24					227.65		
Oct-93	235.01	238.94	204.04		238.91		243.32	239.36	204.02	Dry	235.81	227.47		
Feb-94							242.91					227.33		
Apr-94	235.52	239.55	204.50		239.00		243.69	239.41	203.80		235.85	227.39		
May-94							240.90					227.67		
Jul-94	234.99	238.61	204.04		238.77	227.75	243.20	239.23	204.25		235.98	227.56		
Sep-94							242.90					227.54		
Oct-94	234.79	238.81			238.73		242.78	239.13	203.90		235.77	227.33	241.54	241.61
Nov-94	235.11				238.78		243.04	239.26			235.82		241.86	241.93
Nov-94							242.73					227.28	241.86	
Dec-94	235.17	238.84					242.88	239.13	203.75		235.69	227.13	241.64	241.71
Feb-95		238.65	204.09					239.21	203.88		235.79	227.42	241.74	
Mar-95							243.61					227.99		
Apr-95	235.42	239.17	204.37		238.87		243.36	239.37	204.50		235.91	227.76	242.17	242.25
May-95							243.29					227.88		
Jul-95	235.28	239.09	204.21		238.98		243.37	239.44	205.09		235.97	228.21	242.34	242.30
Sep-95							243.09					228.21		
Oct-95	235.01	238.71	204.17		238.81	230.84	242.97	239.26	205.04		235.94	228.12	241.73	241.80
Nov-95							243.27					228.38		
Apr-96	235.69	239.29	204.49		239.31		243.62	239.73	206.13		236.41	228.53	242.58	242.67
May-96							243.30					228.56		
Jun-96	235.17	238.68	204.16		238.85		243.09	239.36	206.37		236.11	228.70	242.17	242.25
Jul-96	235.01	238.66	204.06		238.77		242.92	239.27	205.96		236.02	229.20	241.69	241.78
Aug-96							242.81					228.27		
Sep-96							242.80					227.89		
Oct-96	234.66	238.63	203.91		238.77		242.69	239.23	204.62		235.96	227.85	241.59	241.67
Nov-96							242.80							
Apr-97	235.85	239.48	204.52		239.59		243.68	239.94	205.11		236.54	228.43		
Jul-97			204.06					239.55	206.26			228.21		
Oct-97			203.16	241.90	238.62		242.01	239.00	204.61		235.76	227.66	241.12	241.16
Dec-97	234.60	238.62	203.91		238.49		242.01	238.97	204.00		235.70	227.16	241.01	241.07

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	W2	W3	W7	W10	W11	W12	BHA2	BHB	BHC	BHD-1	BHD-2	BHE-2	BHF	BHG
T.O.P. Elev.	237.66	240.45	205.51	245.00	243.77	240.00	257.21	250.90	208.71	251.62	251.31	244.71	244.92	245.11
Apr-98	235.50	239.08	204.33		239.03		243.08	239.55	203.99			227.18	242.00	242.11
Jul-98			204.00					239.16	204.26			227.05		
Oct-98	234.21	238.23	203.81		238.39		241.75	238.92	203.61		235.54	226.50	240.79	240.87
Nov-98			203.84					238.90	203.55			226.48		
Apr-99	235.45	239.19	204.50		238.82		242.55	239.25	203.43		236.14	226.48		
Jul-99			204.19					239.29	203.76			226.48		
Oct-99	234.75	238.92	204.03		238.12		242.12	239.08	203.90		235.79	226.49	241.29	241.31
Nov-99			204.53					239.41	204.04			226.57		
Apr-00	235.38	239.12	204.50		238.82		240.58	239.32	205.52		236.04	227.56		
Jun-00			204.31					239.32	205.44					
Sep-00	234.73	238.56	203.90		238.58		240.58	239.06	204.68		235.98	227.36	241.08	241.08
Nov-00			203.94					238.91	204.02			227.12		
Apr-01	235.83	239.51	204.61		239.04		241.57	239.38	203.81		235.90	226.74		
Jul-01			204.19				240.37	239.13	204.46			227.08		
Oct-01	234.62	238.85	204.15		238.58		240.45	239.09	204.02		235.97	226.91	241.21	241.28
Nov-01			204.43				241.21	239.45	204.14			227.42		
Apr-02	235.63	239.18	204.55		239.43		242.00	239.83	206.20		236.49	228.27		
Jun-02								239.54	206.59			228.46		
Jul-02							241.33							
Sep-02							240.41	239.10	205.36		235.77	227.89	241.02	241.09
Nov-02								239.00	204.47			227.37		
Apr-03	235.42	239.17	204.46		238.92		240.77	239.49	205.01		236.31	227.61	241.90	241.98
Jul-03			204.23					239.27	204.64			227.15		
Oct-03	235.21	239.00	204.44		238.93		240.69	239.45	204.84		236.19	227.33	241.79	241.87
Nov-03								239.58	205.29			228.12		
Apr-04	235.35	239.14	204.42		239.03		243.17	239.58	205.82		236.23	228.05	241.90	241.98
Jun-04							243.59	239.40	205.66		236.06	228.13	241.67	241.51
Jun-04							243.41	239.32	205.56		236.03	227.88	241.43	241.51
Sep-04	234.43	238.33	203.77		238.43		242.67	239.02	204.55		235.73	227.13	240.85	240.91
Nov-04			203.86					238.95	203.83			227.01		
Apr-05		239.25	204.49		239.12	Dry	244.21	239.58	204.21		236.41	227.36		
Jun-05			203.96					239.34	204.71			227.55		
Sep-05	234.19	238.09	203.68		238.32		242.60	239.57	204.05		235.73	227.24		
Nov-05								238.90	203.73			226.77		
Apr-06		239.35			239.54		244.86	239.98	204.17		236.64	228.02		
Jun-06			204.22					240.41	205.26			227.86		
Oct-06							242.87	239.08	204.35		235.81	227.66		241.08
Nov-06								239.22				227.33		
Apr-07												227.97	242.30	242.38
Jun-07					238.83			239.30	205.07		235.95		241.47	241.54
Sep-07													240.84	240.91
Dec-07														
Apr-08				242.84	239.39			239.69	205.07			228.25		
Jun-08					239.90			240.10	206.43			228.64		
Sep-08		238.79	204.28	243.07	239.04	231.85		239.50	206.15			228.16		
Dec-08								239.15	204.86	Dry	Dry	228.16		
Apr-09			204.62	243.98	239.24	232.41		239.69	205.97			228.72		
Jun-09								239.27	206.02			228.30		
Oct-09			204.27	243.90	238.39	231.64		238.92	205.20			227.81		
Dec-09					238.61			239.11	205.21			227.53		
Apr-10			204.62	242.44	238.79	232.21		239.30	205.02			227.72		
Jul-10								239.05	204.70			227.42		
Oct-10			204.35	241.72	238.55	231.88		239.08	204.44			227.32		
Dec-10								239.02	204.50			227.26		
Apr-11			204.52	242.01		232.13		239.12	204.05				235.60	235.83
Jul-11					238.65	231.89		239.19	205.80			227.87	235.61	235.83
Sep-11			203.78	241.84	238.24			238.85	204.35			227.46	234.73	235.08
Dec-11								238.97	204.19			227.29	235.43	236.58

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	W2	W3	W7	W10	W11	W12	BHA2	BHB	BHC	BHD-1	BHD-2	BHE-2	BHF	BHG
T.O.P. Elev.	237.66	240.45	205.51	245.00	243.77	240.00	257.21	250.90	208.71	251.62	251.31	244.71	244.92	245.11
Apr-12			204.36		238.90	231.94		239.44	204.83			227.83	236.14	236.31
Jul-12								239.20	205.09			227.69		
Sep-12			203.83		238.24	231.02		238.89	204.09			227.17	234.89	235.17
Dec-12								239.18	204.39			227.34	235.74	235.90
Apr-13						231.88		239.35	204.46			227.67		
Jun-13					238.91			239.44	206.63			228.26		
Sep-13								239.19	205.29			227.80		
Dec-13					239.07			239.55	205.76			228.21		
Apr-14					238.52			239.07	204.40			227.71		
Jul-14					238.90			239.45	206.67			228.36		
Sep-14					238.54			239.16	205.28			227.82		
Dec-14								239.74	206.11			228.60		
Apr-15					238.54			239.24	204.73			227.85		
Jul-15					238.60			239.15	205.40			227.75		
Sep-15					238.25			238.85	204.21			227.45		
Dec-15					237.98			238.60	203.65			226.98		
Apr-16					239.26			239.66	204.64			228.58		
Jul-16					238.64			239.19	204.51			227.61		
Sep-16					238.44			239.02	204.41			227.45		
Dec-16					238.21			238.83	203.80			226.73		
Apr-17					239.12			239.57	203.97			228.03		
Jul-17					239.66			239.47	206.15			228.39		
Sep-17					238.78			239.30	205.68			227.97		
Dec-17					Frozen			239.11	204.62			227.61		
Apr-18					238.91			239.43	204.38			227.93		
Jul-18					238.66			239.22	205.34					
Sep-18					238.32			239.01	204.44			227.53		
Dec-18					Frozen			239.16	204.31			227.51		
Apr-19								239.38	204.23			228.31		
Jul-19								239.55	206.73			228.57		
Sep-19								239.17	205.17			227.77		
Dec-19								239.32	204.85			227.76		
May-20								239.48	204.90			227.93		
Jul-20					238.59			239.13	204.77			227.55		
Oct-20								239.06	204.20			227.29		
Dec-20					238.72			239.23	204.49			227.39		
Apr-21								239.43	204.20			227.82		
Jul-21					238.57			239.13	204.54			226.94		
Oct-21								239.14	204.36			227.61		
Dec-21					238.31			239.28	204.97			227.73		

NOTES: 1) All units are metres Above Sea Level (mASL) unless otherwise indicated.
2) T.O.P. - Top of Pipe
3) (19.48) - Indicates depth to water (in metres).
Blank indicates water level not measured.
4) W2 - Butler Garden
W3 - Butler House
W7 - Oxley House
W10 - McCauley House
W11 - Trailer
W12 - Butler House, New

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	BHH	BHI	BHJ	BHK	BHL	BHM	BHN	BHO	BHP	BHQ	BHR	OW1	PW1	OW1A
T.O.P. Elev.	245.57		257.11	239.50	240.12	243.09	256.59	243.57	241.11	251.57	249.91	257.04	244.92	258.28
Jan-90														
Apr-90														
Jul-90														
Aug-90														
Aug-90														
Oct-90														
Nov-90														
Jan-91														
Feb-91														
Mar-91														
Apr-91														
May-91														
Jun-91														
Jul-91														
Aug-91														
Oct-91														
Jan-92														
Feb-92														
Mar-92												244.03		
Apr-92												244.51		
Jul-92												244.06		
Aug-92												243.90		
Nov-92												243.66		
Jan-93												243.75		
Mar-93												243.91		
Apr-93												244.19		
Jul-93												Dest.		
Aug-93														
Oct-93														
Feb-94														
Apr-94														
May-94														
Jul-94														
Sep-94														
Oct-94	241.50		243.07	227.60	227.28	227.21	242.36						241.57	
Nov-94	241.82		243.25				242.70						241.87	
Nov-94													241.45	
Dec-94	241.60		243.19	227.74	226.38	227.34	242.49						241.70	
Feb-95				228.06	227.61	227.55	242.72							
Mar-95						228.00	243.47							
Apr-95	242.10		243.50	228.28	227.86	227.81	243.15						242.25	
May-95						227.89	243.06							
Jul-95	242.47		243.49		228.25	228.22	243.19						242.28	
Sep-95						228.24	242.91							
Oct-95	241.65			228.56	228.18	228.14	242.64						241.77	
Nov-95						228.39	243.06							
Apr-96	242.54	-19.47	243.62	229.19	228.84	228.81	243.48							
May-96														
Jun-96	242.10		243.50	228.28	227.86	227.81	243.15						242.25	
Jul-96	242.28	-19.48	243.22	228.97	228.55	228.50	242.52							
Aug-96														
Sep-96														
Oct-96	241.56	-19.47	243.10	228.26	227.84	227.81	242.35							
Nov-96														
Apr-97	242.70			228.85		228.48							242.35	
Jul-97														
Oct-97	241.07		242.86	227.75	227.32	227.34	241.69						241.12	
Dec-97	241.01		242.76	227.37	226.97	226.92	241.54						241.06	

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	BHH	BHI	BHJ	BHK	BHL	BHM	BHN	BHO	BHP	BHQ	BHR	OW1	PW1	OW1A
T.O.P. Elev.	245.57		257.11	239.50	240.12	243.09	256.59	243.57	241.11	251.57	249.91	257.04	244.92	258.28
Apr-98	242.03		243.22	227.47	227.12	227.07	242.78							
Jul-98														
Oct-98	240.81		242.36	226.92	226.36	226.32	241.30							
Nov-98						226.19								
Apr-99	241.70			226.87	226.48	226.44								
Jul-99														
Oct-99	241.28		242.65	227.28	226.66	226.62	241.76							
Nov-99														
Apr-00	241.47			228.27	227.64	227.57								
Jun-00														
Sep-00	241.01		242.70	227.85	227.24	227.19	241.56							
Nov-00														
Apr-01	242.39		242.88	227.25	227.03	227.01	242.90							
Jul-01			242.82				241.75							
Oct-01	241.20		242.75	227.50	227.03	226.99	241.72							
Nov-01			242.99				242.50							
Apr-02	242.37		243.61	228.87	228.34	228.31	243.35							
Jun-02														
Jul-02			243.19				242.56							
Sep-02	241.02		242.82	228.23	227.62	227.57	240.60							
Nov-02														
Apr-03	241.87		243.13	227.57	227.27	227.25	242.22							
Jul-03														
Oct-03	241.75		243.25	228.26	227.82	227.78	242.58							
Nov-03														
Apr-04	241.86		243.34	227.00	228.12	228.08	242.77							
Jun-04	241.62	-19.49										232.82	235.61	
Jun-04	241.39	-19.50										Dry		
Sep-04			242.74	226.00	227.07	227.24	241.42					233.22		
Nov-04														
Apr-05	242.19	-19.50		225.50	227.62	227.59								
Jun-05														
Sep-05	240.93	-19.50		227.35	226.88	226.87								
Nov-05														
Apr-06	242.64	-19.49		228.20	228.03	228.01	243.83							
Jun-06														
Oct-06	240.55	-19.50		227.67	227.12	227.13	241.61							
Nov-06														
Apr-07		-19.55	243.54				243.29						242.35	
Jun-07	241.42	Dry	Dry	228.35	227.74	227.69	242.19						241.52	
Sep-07														
Dec-07				227.27	226.87	226.83								
Apr-08	242.27			228.28	228.22	228.23		Dry	236.89	249.50	248.73			
Jun-08	242.81			229.28	228.71	228.67		Dry	237.47	249.01	248.11			
Sep-08	241.65			228.84	228.23	228.19		Dry	236.89	248.68	247.71			253.28
Dec-08	241.05			228.27	227.72	227.68		Dry	236.69	248.77	248.14			253.32
Apr-09	241.94			229.29	228.78	228.74		Dry	237.88	249.28	248.40			253.56
Jun-09	241.22			228.93	228.38	228.33		Dry	237.10	248.43	247.59			253.23
Oct-09	240.78			227.91	227.50	227.46		Dry	236.53	248.67	247.53			253.40
Dec-09	240.93			228.05	227.63	227.59		Dry	236.70	249.10	248.34			253.55
Apr-10	241.47			228.24		227.66		Dry	237.00	248.96	248.32			253.39
Jul-10	240.90			227.95	227.38	227.34		Dry	236.70	248.21	247.34			253.14
Oct-10	241.02			227.82	227.37	227.33		Dry	236.61	248.78	248.00			253.37
Dec-10	240.91			227.72	227.34	227.31		Dry	236.65	249.32	248.62			253.64
Apr-11	241.16			226.98		227.72			236.68	247.83	248.48			253.59
Jul-11	241.16			228.44	227.84	227.79			236.96	248.12	247.22			253.08
Sep-11	240.44			227.72	227.14	227.13			236.51	247.45	246.18			252.69
Dec-11	240.92			Frozen	227.40	227.38			236.38	249.43	248.61			253.66

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	BHH	BHI	BHJ	BHK	BHL	BHM	BHN	BHO	BHP	BHQ	BHR	OW1	PW1	OW1A
T.O.P. Elev.	245.57		257.11	239.50	240.12	243.09	256.59	243.57	241.11	251.57	249.91	257.04	244.92	258.28
Apr-12	241.61			228.24	227.72	227.68			237.15	248.67	247.63			253.30
Jul-12	241.10			228.12	227.51	227.46			236.84	247.95	247.05			253.00
Sep-12	240.52			227.54	227.04	227.01			236.46	247.84	246.64			253.24
Dec-12	241.23								236.56	248.94				253.49
Apr-13	241.48			228.28	227.83	227.80			236.85	249.41				253.52
Jun-13	241.58			228.88	228.33	228.28			237.21	248.56				253.23
Sep-13	241.21			228.29	227.76	227.72			236.66	248.36				253.21
Dec-13	241.78			228.75	228.27	228.23			237.24	248.86				253.46
Apr-14	240.92			228.14	227.59	227.58			236.64	248.73				253.31
Jul-14	241.60			228.97	228.44	228.40			237.06	248.36	247.81			253.19
Sep-14	241.16			228.27	227.81	227.77			236.66	248.36				253.21
Dec-14	242.18			229.05	228.65	228.61			237.45	249.05	248.48			253.48
Apr-15	241.06			228.29	227.88	227.84			236.73	249.01	248.53			253.40
Jul-15	240.98			228.28	227.71	227.61			236.80	247.87	247.20			252.95
Sep-15	240.34			227.73	227.21	227.15			236.53	247.52	246.63			252.69
Dec-15	240.14			227.46	227.22	227.19				248.57	248.37			253.31
Apr-16	242.31			228.60	228.56	228.56			237.56	249.30	248.56			253.50
Jul-16	241.03								236.80	247.72	246.84			253.01
Sep-16	240.84			227.90	227.41	227.37			236.54	247.90	247.20			253.10
Dec-16	240.38			227.26	226.75	226.71			236.29	247.77	247.79			253.22
Apr-17	242.06			228.20	228.01	228.01			236.89	249.55	248.79			253.57
Jul-17	241.61			229.01	228.46	228.42			237.18	248.44	248.04			253.22
Sep-17	241.22			228.60	228.04	228.00			236.86	249.40	247.93			253.19
Dec-17	241.02			228.04	227.59	227.55			236.66	248.87	248.39			253.41
Apr-18	241.51			228.58	227.98	227.94			236.92	248.99	248.58			253.56
Jul-18				228.28	227.66	227.60			236.84	248.67	246.87			
Sep-18	240.73			227.99	227.57	227.54			236.60	248.17	247.86			253.32
Dec-18	240.64			227.88	227.47	227.43			236.63	248.85				
Apr-19	241.76			228.39	228.26	228.26			236.77	249.67				253.60
Jul-19	241.67			229.21	228.66	228.60			237.20	248.15				253.10
Sep-19	241.00			228.30	227.76	227.71			236.68	247.62				252.91
Dec-19	241.46			228.11	227.80	227.76			236.67	249.20				253.54
May-20	241.54			228.55	228.00	227.96			237.31	248.73				253.41
Jul-20	240.97			227.97	227.44	227.38			236.75	248.12				252.10
Oct-20	240.89			227.66	227.24	227.21			236.53	248.96				253.40
Dec-20	241.14			227.83	227.42	227.37			236.68	249.00				252.51
Apr-21	241.47			228.29	227.76	227.71			237.06	248.71				253.37
Jul-21	240.93			228.00	227.42	227.36			236.73	248.97				252.14
Oct-21	241.08			227.85	227.56	227.53			236.66	249.21				253.50
Dec-21	240.43			228.27	227.80	227.79			236.33	249.33				253.62

NOTES: 1) All units are metres Above Sea Level (mASL) unless otherwise indicated.
2) T.O.P. - Top of Pipe
3) (19.48) - Indicates depth to water (in metres).
Blank indicates water level not measured.
4) W2 - Butler Garden
W3 - Butler House
W7 - Oxley House
W10 - McCauley House
W11 - Trailer
W12 - Butler House, New

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	OW1B	OW3A	OW3B	OW4A	OW4B	OW4C	OW5	OW8	OW9	OW10-08	OW10-13r	OW11	OW12
T.O.P. Elev.	258.06	243.02	243.14	250.44	250.48	250.42	244.68	235.64	240.96		256.67	249.69	251.36
Jan-90													
Apr-90													
Jul-90													
Aug-90													
Aug-90													
Oct-90													
Nov-90													
Jan-91													
Feb-91													
Mar-91													
Apr-91													
May-91													
Jun-91													
Jul-91													
Aug-91													
Oct-91													
Jan-92													
Feb-92													
Mar-92													
Apr-92													
Jul-92													
Aug-92													
Nov-92													
Jan-93													
Mar-93													
Apr-93													
Jul-93													
Aug-93													
Oct-93													
Feb-94													
Apr-94													
May-94													
Jul-94													
Sep-94													
Oct-94													
Nov-94													
Nov-94													
Dec-94													
Feb-95													
Mar-95													
Apr-95													
May-95													
Jul-95													
Sep-95													
Oct-95													
Nov-95													
Apr-96													
May-96													
Jun-96													
Jul-96													
Aug-96													
Sep-96													
Oct-96													
Nov-96													
Apr-97													
Jul-97													
Oct-97													
Dec-97													

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	OW1B	OW3A	OW3B	OW4A	OW4B	OW4C	OW5	OW8	OW9	OW10-08	OW10-13r	OW11	OW12
T.O.P. Elev.	258.06	243.02	243.14	250.44	250.48	250.42	244.68	235.64	240.96		256.67	249.69	251.36
Apr-98													
Jul-98													
Oct-98													
Nov-98													
Apr-99													
Jul-99													
Oct-99													
Nov-99													
Apr-00													
Jun-00													
Sep-00													
Nov-00													
Apr-01													
Jul-01													
Oct-01													
Nov-01													
Apr-02													
Jun-02													
Jul-02													
Sep-02													
Nov-02													
Apr-03													
Jul-03													
Oct-03													
Nov-03													
Apr-04													
Jun-04													
Jun-04													
Sep-04													
Nov-04													
Apr-05													
Jun-05													
Sep-05													
Nov-05													
Apr-06													
Jun-06													
Oct-06													
Nov-06													
Apr-07													
Jun-07													
Sep-07													
Dec-07													
Apr-08													
Jun-08													
Sep-08	253.78	233.48	233.83	242.07	242.07	241.97	238.97	212.83	232.15	243.01			
Dec-08	253.80	233.38	233.72	241.44	241.46	241.35	238.67	210.73	230.84	242.36			
Apr-09	254.36	233.82	234.04	242.51	242.58	242.48	239.09	212.66	232.54	244.10			
Jun-09	253.67	233.61	233.87	241.66	241.69	241.58		212.71	232.38	243.54			
Oct-09	254.32	233.25	233.68	241.11	241.08	240.99	239.17	211.32	231.91	243.02			
Dec-09	254.34	233.31	233.70	241.31	241.32	241.26	238.74	211.27	231.75	243.19			
Apr-10	253.96	233.44	233.77	241.82	241.85	241.79	238.69	210.93	230.31	243.34			
Jul-10	253.62	233.35	233.77	241.18	241.23	241.16	238.38	210.44	232.00	242.94			
Oct-10	253.96	233.27	233.72	241.30	241.31	241.24	238.54	210.06	231.83	242.98			
Dec-10	254.38	233.34	233.72	241.13	241.15	241.07	238.50	209.87	230.20				
Apr-11	254.37	233.36	233.70	241.40	241.48	241.40	238.61	209.26	230.27	243.12		237.80	
Jul-11	253.54	233.49	233.85	241.45	241.52	241.45	238.50	212.49	232.26	243.15		237.69	
Sep-11	253.04	233.15	233.68	240.75	240.74	240.70	238.19	210.02	231.93	242.62		237.54	
Dec-11	254.37	233.14	233.59	241.12	241.14	241.06	238.43	209.44	230.45	242.87		237.52	Dry

TABLE A-3
GROUNDWATER ELEVATIONS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

DATE	OW1B	OW3A	OW3B	OW4A	OW4B	OW4C	OW5	OW8	OW9	OW10-08	OW10-13r	OW11	OW12
T.O.P. Elev.	258.06	243.02	243.14	250.44	250.48	250.42	244.68	235.64	240.96		256.67	249.69	251.36
Apr-12	253.90	233.48	233.82	241.91	242.02		238.81	211.40	231.94	243.57		237.75	
Jul-12	253.45	233.41	233.82	241.45	241.48		238.52	211.17	232.12	243.12		237.69	
Sep-12	253.82	233.13	233.67	240.80	240.81	240.73	238.20	209.36	231.85	242.68		237.54	
Dec-12	254.09	233.24	233.64	241.55	241.52	241.46	238.63	210.01	231.61	243.07		237.61	
Apr-13	254.18	233.45	233.80	241.80	241.85		238.73	209.95	230.68			237.80	
Jun-13	253.77	233.66	233.91	241.95	242.01	241.95	238.72	213.60	232.40			237.75	
Sep-13	253.81	233.37	233.75	241.51	241.54		238.50	211.42	232.04			237.63	
Dec-13	254.09	233.55	233.87	242.20	242.21	242.16	238.92	212.34	231.95			237.84	
Apr-14	253.89	233.39	233.71	241.19	241.19		238.40	209.70	231.92			237.60	
Jul-14	253.71	233.72	233.89	241.98	242.04	241.96	238.68	213.80	232.37			237.76	
Sep-14	253.87	233.48	233.75	241.41	241.47		238.45	211.42	232.03			237.63	
Dec-14	254.09	233.81	233.94	242.64	242.70	242.65	239.08	213.06	232.12			237.94	
Apr-15	254.17	233.59	233.76	241.35	241.65	241.33	238.45	209.70	232.03		242.27	237.63	
Jul-15	253.43	233.60	233.79	241.28	241.33	241.29	239.47	211.66	232.11			237.65	
Sep-15	253.13	233.37	233.70	240.62	240.61	240.59	238.21	209.73	231.92		241.65	237.53	
Dec-15	254.02	233.23	233.56	240.35	240.32	240.28	237.99	208.62	231.63		241.41	237.40	
Apr-16	254.28	233.72	233.80	242.54	242.69	242.68	239.55	210.04	231.83		243.47	237.94	
Jul-16	253.28	233.63	233.78	241.34	241.38	241.32	238.51	212.08	232.15		242.50	237.86	
Sep-16	253.79	233.41	233.69	241.11	241.14	241.09	238.44	210.22	231.95		241.97	237.66	
Dec-16	253.78	233.23	233.58	240.64	240.62	240.59	238.19	208.93	231.64		241.51	237.48	
Apr-17	254.36	233.44	233.67	242.29	242.40	242.37	239.18	209.37	231.50		243.28	237.88	
Jul-17	253.74	233.67	233.86	241.97	242.05	241.98	238.80	213.29	232.34		243.19	237.74	
Sep-17	253.70	233.52	233.80	241.58	241.62	241.56	238.60	212.38	232.18		242.83	237.69	
Dec-17	254.02	233.31	233.67	241.28	241.24	241.24	238.58	210.41	231.85		242.09	237.56	
Apr-18	254.29	233.46	233.81	241.93	241.90	241.84	238.74	210.10	231.99		243.00	237.73	
Jul-18	253.25		233.80			241.33	238.52	211.70	232.21		242.17	237.49	
Sep-18	254.08	233.24	233.73	240.99	241.01	240.96	238.32	210.34	232.01		241.87	237.58	
Dec-18		233.21	233.69					210.21	231.66		242.14		
Apr-19	254.35	233.33	233.73	241.90	242.01	241.96	238.88	209.60	231.84		243.05	237.68	
Jul-19	253.59	233.63	233.90	242.08	242.14	242.07		213.50	232.46		243.34	237.77	
Sep-19	253.42	233.29	233.77	241.32	241.35	241.28	238.46	211.40	231.88		242.24	237.66	
Dec-19	254.23	233.20	233.68	241.78	241.80	241.74	238.83	210.98	231.76		242.67	237.60	
May-20	254.06	233.53	233.92	241.88	241.94	241.87	238.81	211.49	232.27		243.02	237.77	
Jul-20	253.64	233.32	233.78	241.25	241.27	241.21	238.47	210.63	232.07		242.03	237.63	
Oct-20	254.07	233.19	233.70	241.17	241.18	241.13	238.42	209.61	231.83		241.93	237.56	
Dec-20	254.12	233.22	233.72	241.41	241.43	241.41	238.65	210.31	231.99		242.22	237.58	
Apr-21	254.04	233.37	233.80	241.73	241.76	241.79	238.80	210.00	231.91		242.51	237.72	
Jul-21	253.75	233.35	233.82	241.16	241.15	241.12	238.50	210.64	232.08		241.95	237.65	
Oct-21	254.26	232.95	233.71	241.42	241.37	241.32	238.54	210.11	231.78		242.12	237.59	
Dec-21	254.34	233.05	233.30	241.56	241.59	241.54	238.03	210.24	231.73		242.43	237.57	

NOTES: 1) All units are metres Above Sea Level (mASL) unless otherwise indicated.
2) T.O.P. - Top of Pipe
3) (19.48) - Indicates depth to water (in metres).
Blank indicates water level not measured.
4) W2 - Butler Garden
W3 - Butler House
W7 - Oxley House
W10 - McCauley House
W11 - Trailer
W12 - Butler House, New

FIGURE A-1
GROUNDWATER HYDROGRAPH
West Monitors: BHE-2, BHK, BHL, BHM

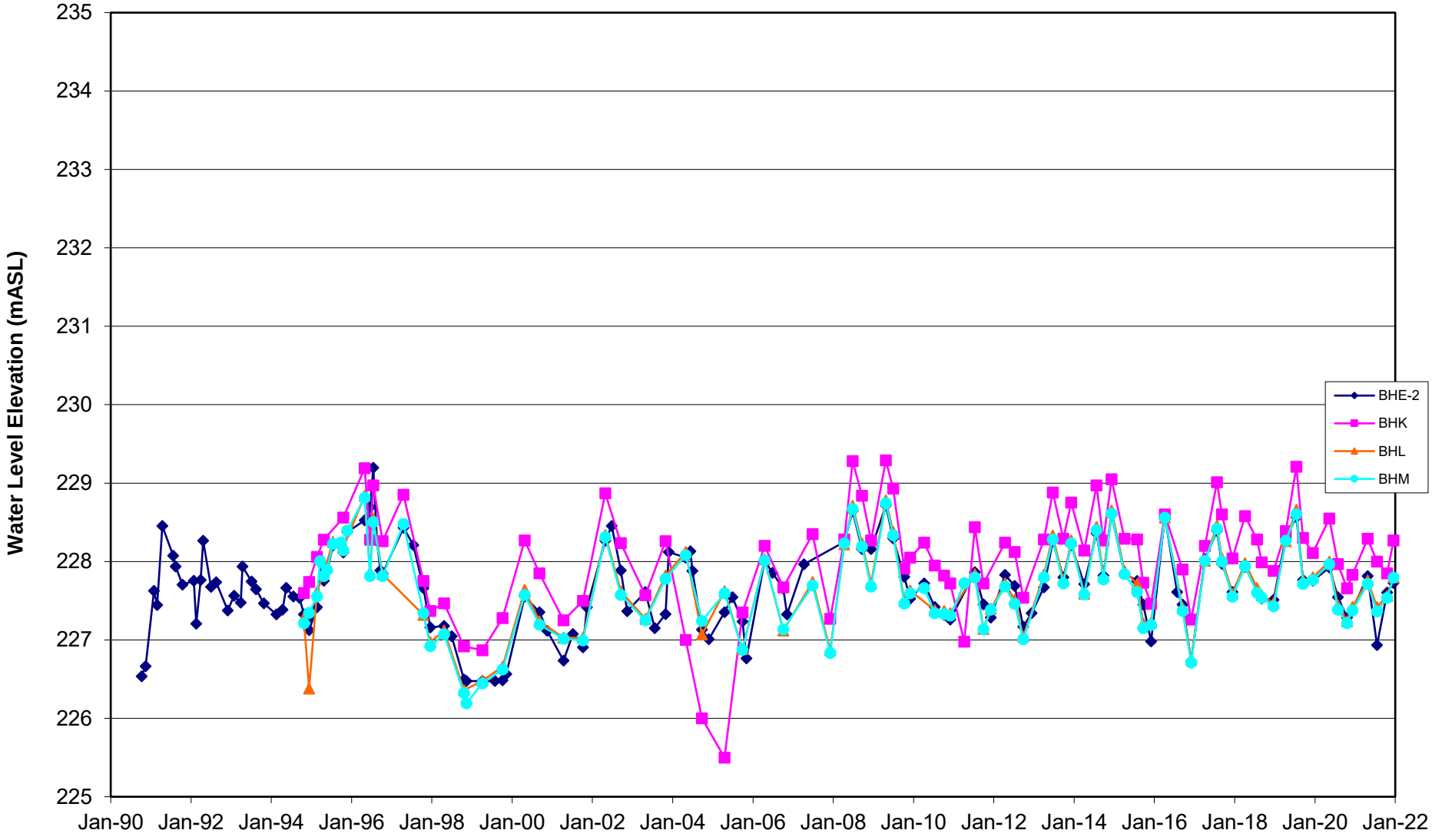


FIGURE A-2
GROUNDWATER HYDROGRAPH
East Monitors: BHB, BHD-2, BHH

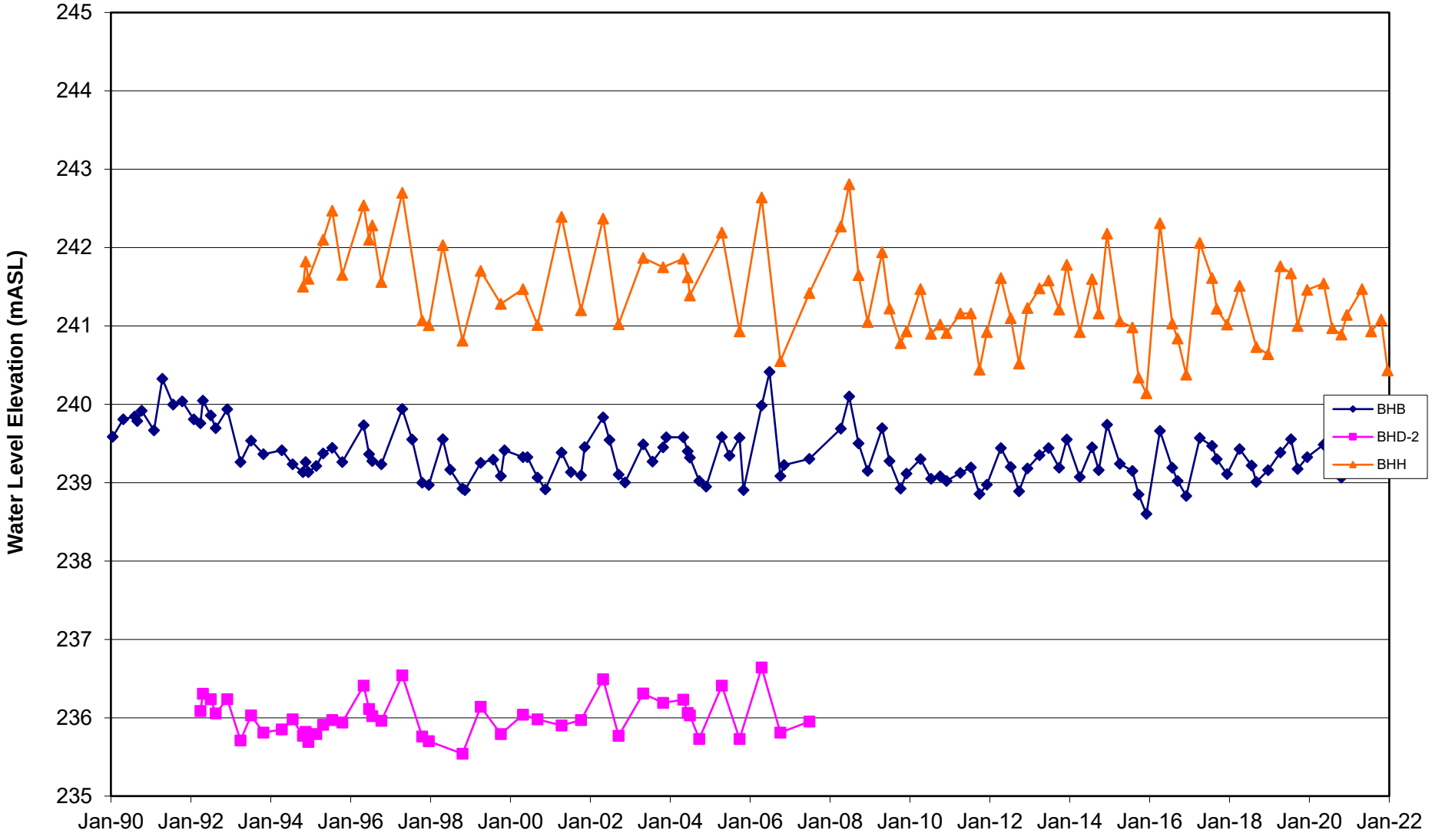


FIGURE A-3
GROUNDWATER HYDROGRAPH
Downgradient Monitor: BHC

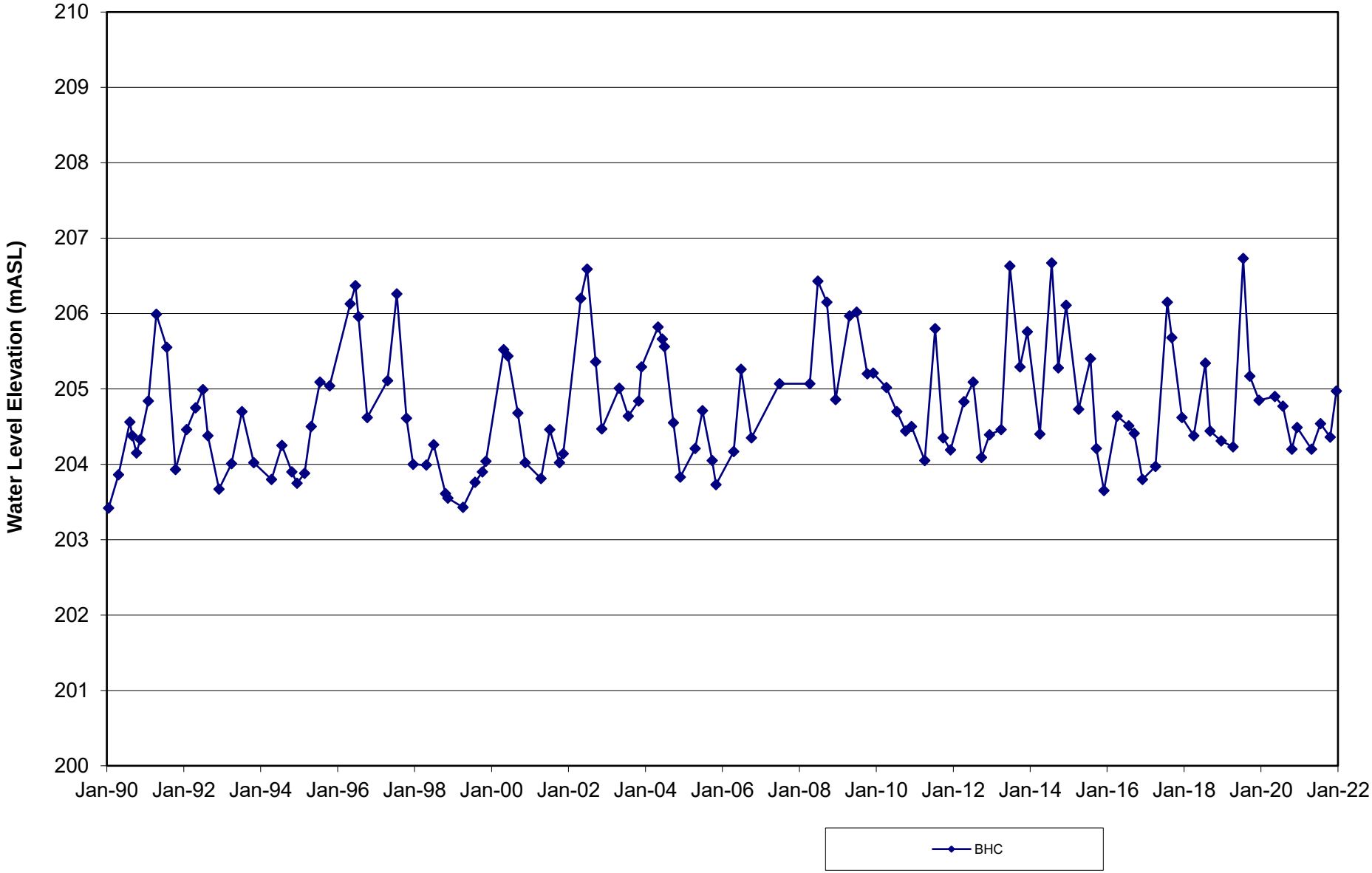


FIGURE A-4
GROUNDWATER HYDROGRAPH
West Monitors: OW1

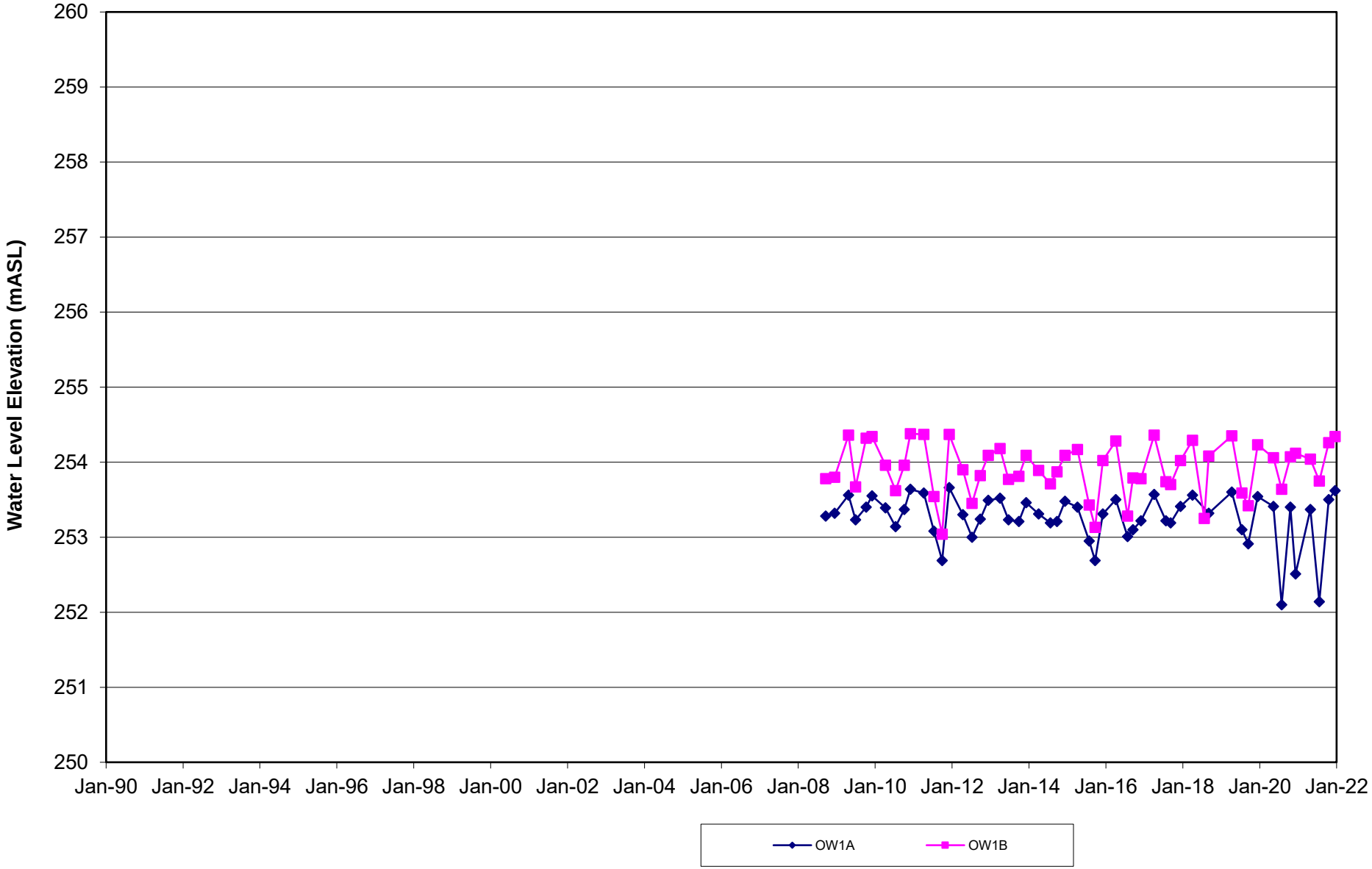


FIGURE A-5
GROUNDWATER HYDROGRAPH
East Monitors: OW3, OW9

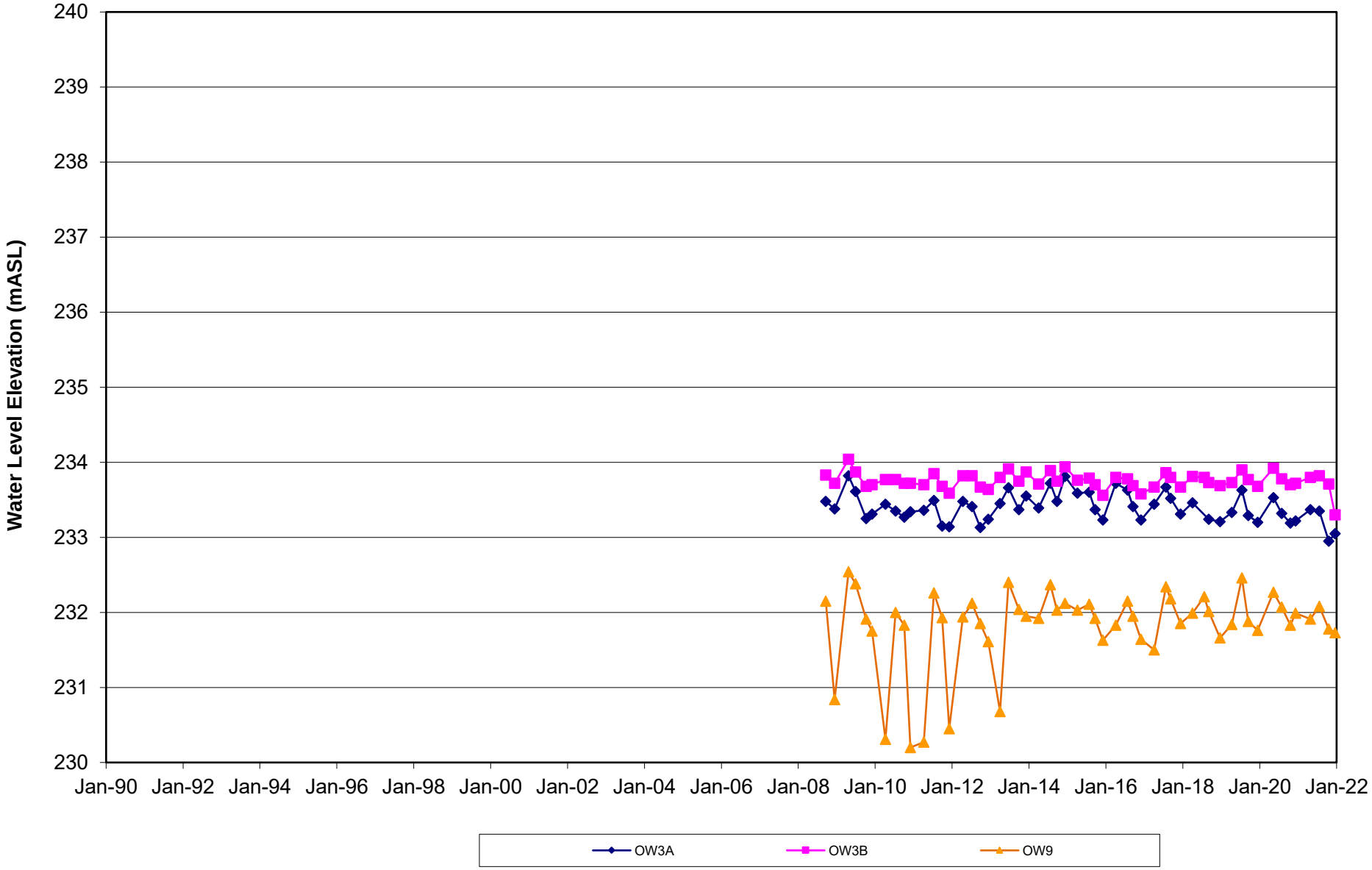


FIGURE A-6
GROUNDWATER HYDROGRAPH
West Monitors: OW4

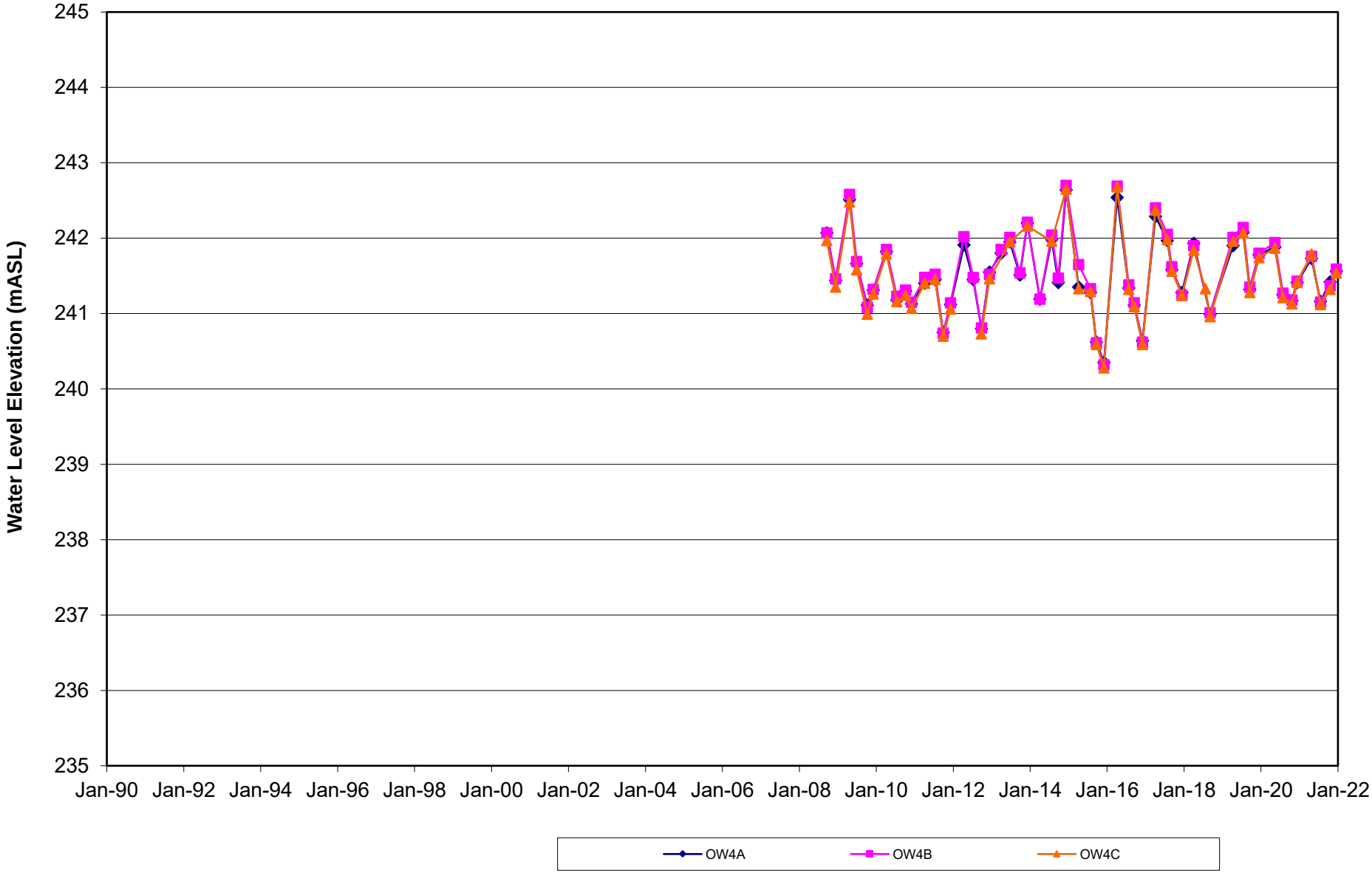


FIGURE A-7
GROUNDWATER HYDROGRAPH
West Monitors: OW5, OW10

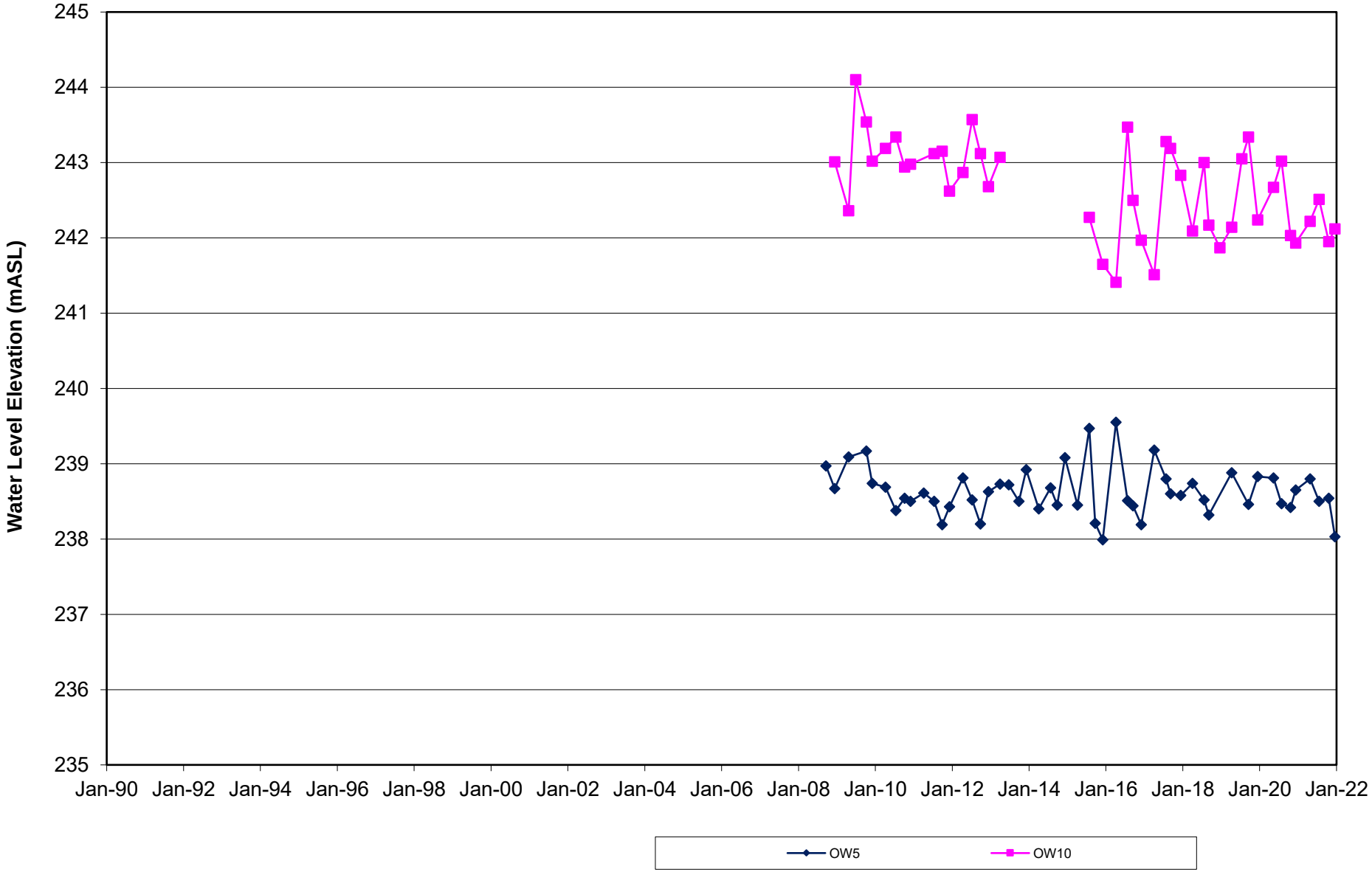
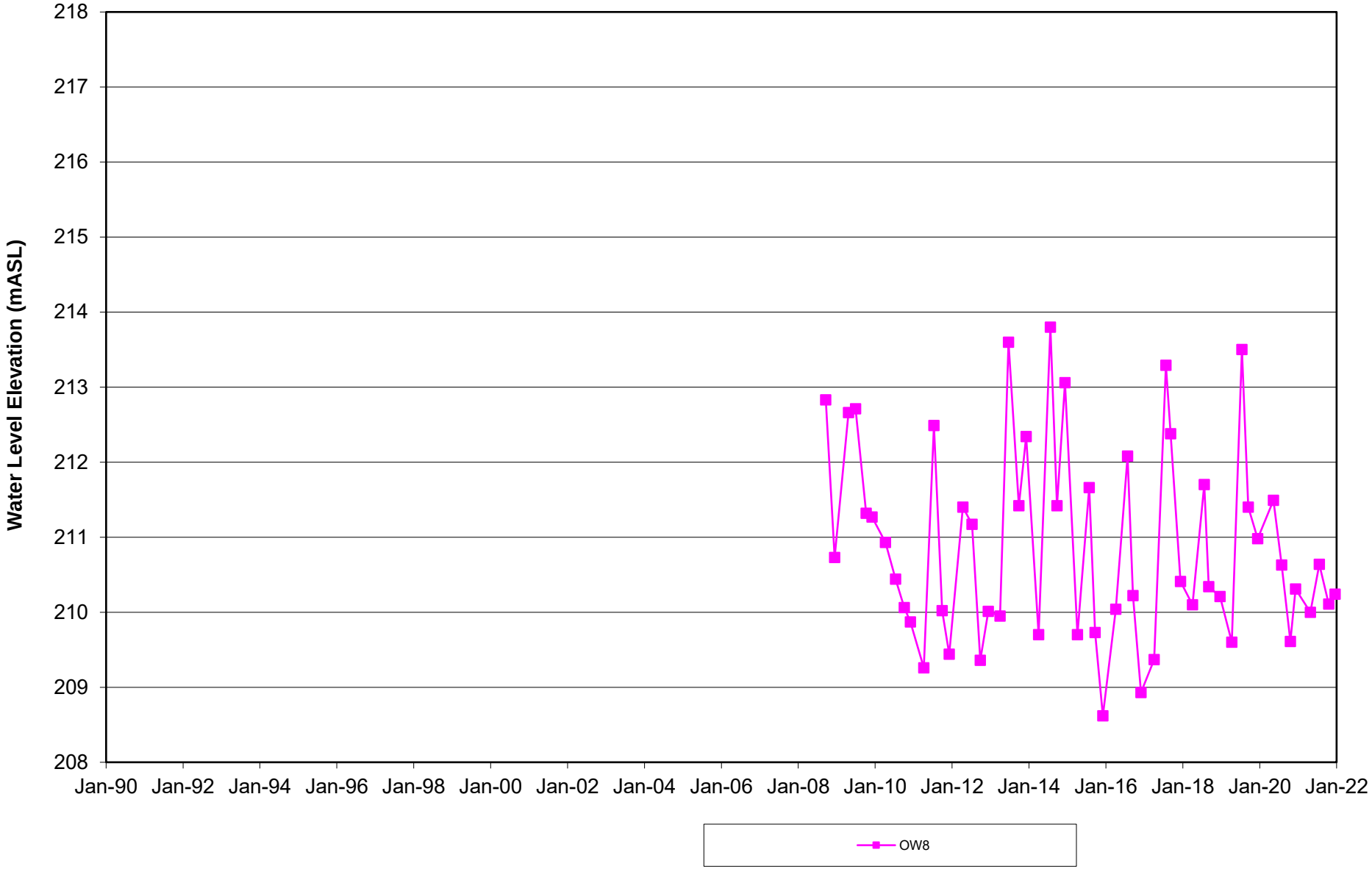


FIGURE A-8
GROUNDWATER HYDROGRAPH
North-East Monitor: OW8



APPENDIX

B LEACHATE CHEMISTRY

TABLE B-1
LEACHATE GENERAL CHEMISTRY RESULTS - PS1 and PS2
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Dec-94	Apr-95	Oct-95	Oct-96	Nov-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00
pH	units	7.26	6.37	7.27	7.6	7.5	7.26	8	7.83	7.3	8.2	7.6	6.94	7.4
Conductivity	µmho/cm	6960	3720	8150	4200	6400	4040	7020	5800	7100	5800	4600	3100	3900
Chloride	mg/L	1650	769	2000	830	1300	544	1230	1100	1500	1000	580	440	580
Phosphate - ortho	mg/L	0.02	0.02	0.02	<0.1	<0.1			<0.1	<0.5	<0.5	<0.5	<0.1	<0.1
Sulphate	mg/L													
Alkalinity	mg/L	1440	758	1450	710	1600	1194	1602	1500	1700	1700	1100	820	770
Hardness	mg/L	1440	552	754	690	1300	818	95	940	870	850	800	490	540
Total Kjeldahl Nitrogen	mg/L	115	51.8	152	69	120	90.7	168	160	190	340	160	57	74
Ammonia	mg/L	105	42.9	129	65	110	81.2	158	130	170	170	130	56	59
Nitrate	mg/L	0.15	0.1	0.15	<0.05	<0.05	<0.1	<0.1	<0.05	<0.25	<0.25	<0.25	0.2	0.15
Nitrite	mg/L	0.045	0.02	0.01	<0.05	<0.05	<0.1	<0.1	<0.05	<0.25	<0.25	0.067	0.042	0.037
Biochemical Oxygen Demand	mg/L				280	1600	750		24	14	540	13	9.2	7.4
Chemical Oxygen Demand	mg/L	2100	420	624	550	1700	1227	680	550	500	890	290	160	170
Dissolved Organic Carbon	mg/L	540	93	133	240	630	450	231	140	200	360	96	50	56
Total Suspended Solids	mg/L											120		
Phenols	µg/L	550	35	18.8	170	420	28.6	9	12	24	72	7.3	6.2	<1
Arsenic	mg/L													
Barium	mg/L													
Boron	mg/L													
Cadmium	mg/L													
Calcium	mg/L													
Chromium	mg/L													
Copper	mg/L													
Iron	mg/L	17.4	5.77	1.17	17	18	29.6	15	8.3	8.9	14	18	34	37
Lead	mg/L													
Magnesium	mg/L													
Manganese	mg/L								8.6	5	3.5	3.7	4.8	5.8
Mercury	mg/L													
Phosphorus	mg/L	0.5	0.05	0.2	0.37	0.34	0.09	0.27	0.41	0.5	0.31	0.27	0.26	0.38
Potassium	mg/L													
Sodium	mg/L													
Zinc	mg/L													
Total Dissolved Solids	mg/L													
PCB's	µg/L									<0.14	<0.14			<0.033

NOTE: Blank indicates parameter not analysed.

TABLE B-1
LEACHATE GENERAL CHEMISTRY RESULTS - PS1 and PS2
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07
pH	units	8.18	7.37	7.27	6.6	6.7	6.5	6.9	7.8	7.95	8.18	7.8	8	8.09	8.06
Conductivity	µmho/cm	2700	2700	2300	3400	2100	2100	2100	8000	4480	6380	5010	7020	5710	7400
Chloride	mg/L	380	440	340	460	340	270	350	1600	647	1320	663	1180	849	1380
Phosphate - ortho	mg/L	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	<1				<1.00
Sulphate	mg/L													25	
Alkalinity	mg/L	790	670	600	780	590	610	550	2300	1310	2030	1590	1900	1740	2210
Hardness	mg/L	550	460	490	420	400	380	340	610	648	582	870	710	635	448
Total Kjeldahl Nitrogen	mg/L	89	51	50	67	44	44	49	300	156	258	140	240	186	289
Ammonia	mg/L	68	43	38	53	36	39	43	260	150	225	133	277	224	250
Nitrate	mg/L	0.17	0.058	<0.05	<0.05	<0.05	<0.05	<0.05	0.57	<0.5	0.9	<0.1	1.6		2.05
Nitrite	mg/L	0.012	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.1		<0.01	0.28		<0.50
Biochemical Oxygen Demand	mg/L		7.1	390	6.7	<5	28	11	22	23	180		220		28
Chemical Oxygen Demand	mg/L	250	150	520	150	110	110	140	550	260	430	690	470	338	511
Dissolved Organic Carbon	mg/L	77	46	220	47	31	43	38	140	87.3	179	275	195	137	210
Total Suspended Solids	mg/L														
Phenols	µg/L	60	17	120	8.2	21	38	21	8.8	14.4	9	150	16	60	74
Arsenic	mg/L							<0.01	<0.01	<0.2	<0.2	0.004	<0.2	0.006	0.011
Barium	mg/L							0.18	0.39	0.35	0.41	0.67	0.55	0.568	0.647
Boron	mg/L								3.7	2.26	3.01	2.8	3.9	3.39	
Cadmium	mg/L							<0.002	<0.002	<0.005	<0.005	<0.0001	<0.005	<0.0001	<0.002
Calcium	mg/L														
Chromium	mg/L							0.005	0.018	<0.01	0.01	0.017	0.01	0.024	0.043
Copper	mg/L							0.003	<0.002	<0.02	<0.02	0.003	<0.02	0.007	0.006
Iron	mg/L	25	58	72	45	53	44	41	6.5	10.7	10.9	31	8.5	18.9	13.8
Lead	mg/L							<0.01	<0.01	<0.05	<0.05	0.0008	<0.05	<0.001	0.002
Magnesium	mg/L														
Manganese	mg/L	2.6	5.8	5.9	5.3	5.3	4.9	4.3	0.94	2.23	1.25	3.5	2	2.52	1.69
Mercury	mg/L								<0.05	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.21	0.24	0.48	0.26	0.17	0.21	0.17	0.41	<0.1		0.38	0.4	0.19	0.29
Potassium	mg/L														
Sodium	mg/L														
Zinc	mg/L							0.099	0.022	0.04	0.03	0.032	0.01	0.036	0.044
Total Dissolved Solids	mg/L														
PCB's	µg/L						<0.063		<0.068						<0.2

NOTE: Blank indicates parameter not analysed.

TABLE B-1
LEACHATE GENERAL CHEMISTRY RESULTS - PS1 and PS2
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14
pH	units	8.07	8.09	7.79	7.73	7.79	7.93	7.85	8.14	7.65	7.76	7.47	7.69	7.69	7.45
Conductivity	µmho/cm	5300	6950	5320	5540	5200	4860	4820	5920	5070	6910	5950	4860	5310	4280
Chloride	mg/L	822	1150	617	611	754	985	763	1170	615	897	852	512	560	495
Phosphate - ortho	mg/L			<0.10	<1.00	<0.20	<0.40	<0.10		0.03	0.04	0.1			
Sulphate	mg/L			208	42.3	23.6	17.4	23.5	27.1	65	29	35	51	23	82
Alkalinity	mg/L	1830	1930	1720	2130	1890	1600	1600	2080	1720	2260	1950	1950	2040	1470
Hardness	mg/L	829	689	955	1270	728	647	661	723	586	726	801	664	762	920
Total Kjeldahl Nitrogen	mg/L	199	243	142	156	227	209	198	333	194	264	223	196	210	89.7
Ammonia	mg/L	193	205	123	128	181	175	162	275	188	261	209	181	197	81.8
Nitrate	mg/L	0.91	10	<0.05	<0.50	<0.10	<0.20	<0.05	<0.50	<0.10	0.11	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.05	0.9	<0.05	<0.5	<0.10	<0.20	<0.05	<0.50	<0.10	<0.10	<0.10			
Biochemical Oxygen Demand	mg/L	230		123	51	28	22	21	28	16	57	26	24	24	17
Chemical Oxygen Demand	mg/L	404	455	779	727	482	327	222	455	385	645	475	404	385	276
Dissolved Organic Carbon	mg/L	131	197	241	245	131	129	115	171	105	162	133	107	118	89
Total Suspended Solids	mg/L			270	26	84	36	44	26	72	332	13	87	63	17
Phenols	µg/L	9	34	331	199	6	8	7	<1	2	3	<5	<5	3	13
Arsenic	mg/L	0.006	0.01	0.045	0.047	0.006	0.005	<0.003		<0.05	<0.01	<0.01			
Barium	mg/L	0.462	0.423	0.35	0.727	0.487	0.589	0.339		0.34	0.8	0.5	0.3	0.3	0.3
Boron	mg/L			8.04	6.86	2.99	3.62	2.86	3.48	3.4	4.2	3.6	3.4	5.3	6.3
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.01	<0.001	<0.001			
Calcium	mg/L									139	162	184	152	170	266
Chromium	mg/L	0.024	0.05	0.062	0.069	0.032	0.028	0.011		<0.05	0.01	<0.05			
Copper	mg/L	<0.002	0.002	0.007	0.007	0.003	<0.002	<0.002		<0.01	0.03	<0.01			
Iron	mg/L	16.5	4.89	1.06	0.97	19.5	12.4	13.4	6.08	13.3	9.6	9.8	10.6	4.2	6
Lead	mg/L	<0.002	<0.002	0.003	0.003	<0.002	<0.002	<0.002		<0.01	<0.01	<0.01			
Magnesium	mg/L									58	78	83	69	82	62
Manganese	mg/L	2.48	1.93	0.745	0.88	2.05	2.32	2.07	1.92	1.61	1.9	1.8	1.48	1.6	1.7
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001			
Phosphorus	mg/L	0.12	0.13	0.85	1.07	0.19	0.15	0.08	0.06	0.06	0.4	0.09	0.13	0.06	0.57
Potassium	mg/L									165	236	210			
Sodium	mg/L									480	746	717	459	540	467
Zinc	mg/L	0.012	0.019	0.149	0.067	0.019	0.041	0.007		<0.05	<0.1	<0.1			
Total Dissolved Solids	mg/L									3300	4490	3870	3160	3450	2780
PCB's	µg/L	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.2	<0.1		<0.1				

NOTE: Blank indicates parameter not analysed.

TABLE B-1
LEACHATE GENERAL CHEMISTRY RESULTS - PS1 and PS2
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.43	7.64	7.63	7.72	7.3	7.62	7.79	7.2	7.79	7.38	7.66	7.23	7.58
Conductivity	µmho/cm	5330	5580	5000	6400	4700	6400	4900	4010	5730	4470	4870	4500	3710
Chloride	mg/L	665	858	520	800	450	770	650	396	937	533	576	488	336
Phosphate - ortho	mg/L	<0.03	0.06	<0.05	<0.1	<0.20	<0.10	<0.10	<0.009	<0.6	<0.010	<0.010	<0.010	<0.010
Sulphate	mg/L	12	19	21	11	25	<5.0	13	16	25	14	8	2	24
Alkalinity	mg/L	1780	1790	1900	1900	1700	2200	1700	1780	1600	1490	1900	1780	1390
Hardness	mg/L	699	643	690	830	630	720	670	574	730	613	618	688	631
Total Kjeldahl Nitrogen	mg/L	210	224	200	300	190	250	180	163	190	249	222		184
Ammonia	mg/L	192	246	200	290	210	280	190	168	205	198	202	180	123
Nitrate	mg/L	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.50	<0.10	0.11	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.10	<0.10	0.012	0.034	0.023	0.037	<0.050	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L	20	23	7	30	21	21	17	13	24				
Chemical Oxygen Demand	mg/L	385	534	400	480	280	600	280	251	417	286	314	141	237
Dissolved Organic Carbon	mg/L	111	146	97	130	98	130	94						
Total Suspended Solids	mg/L	25	170	64	30	47	40	32	43	43	61	33	57	89
Phenols	µg/L	3	4	<10	7	4.1	7.2	7.6	5	13	7	10	<0.010	0.005
Arsenic	mg/L	<0.01	0.008	0.0023	0.0036	<0.0050	0.0024	0.0019	0.002	<0.005	0.002	0.002	0.001	0.002
Barium	mg/L	0.3	0.9	0.23	0.47	0.39	0.44	0.29	0.29	0.77	0.34	0.28	0.39	0.34
Boron	mg/L	4.4	3.9	5	4.8	4.5	5.3	4	4.1	3.85	3.77	4.77	4.3	4
Cadmium	mg/L	<0.001	<0.0001	<0.0001	<0.0001	<0.00050	<0.00010	<0.00010	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L	161	147	160	180	150	160	160	141	177	148	150	165	162
Chromium	mg/L	<0.01	0.014	0.0078	<0.01	<0.025	0.011	0.0062	0.007	0.007	0.007	0.007	0.006	0.006
Copper	mg/L	<0.01	0.06	0.0016	<0.001	<0.0050	<0.0010	0.0013	0.001	<0.005	0.002	<0.001	0.004	0.001
Iron	mg/L	4.8	71.9	0.33	9.5	25	10	3.9	5.11	20.9	20.6	1.55	22.6	28.3
Lead	mg/L	<0.01	0.003	<0.0005	<0.0005	<0.0025	<0.00050	<0.00050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L	72	67	74	90	64	76	66	54	70	59	59	47	55
Manganese	mg/L	1.5	1.8	1.3	1.8	1.1	1.6	1.5	1.28	2.17	1.46	1.19	0.94	1.7
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.05	0.68	0.092	0.43	0.11	0.14	0.11	0.091	0.091	0.132	0.11	0.115	0.191
Potassium	mg/L	183	203	170	210	140	200	150	128	169	136	150	114	125
Sodium	mg/L	551	633	480	680	400	580	470	338	601	421	408	284	356
Zinc	mg/L	<0.1	0.05	0.0069	<0.005	<0.025	<0.0050	<0.0050	<0.01	<0.05	<0.01	<0.01	0.01	<0.01
Total Dissolved Solids	mg/L	3460	3630	2160	3610	2060	2990	2100	2610	3720	2910	3170	1940	2410
PCB's	µg/L													

NOTE: Blank indicates parameter not analysed.

TABLE B-1
LEACHATE GENERAL CHEMISTRY RESULTS - PS1 and PS2
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

		PS2			
PARAMETER	**UNITS**	**May-20**	**Oct-20**	**Apr-21**	**Oct-21**
pH	units	7.57	7.5	7.31	7.52
Conductivity	µmho/cm	2930	3020	2990	2920
Chloride	mg/L	265	317	138	263
Phosphate - ortho	mg/L		0.181	<0.010	0.013
Sulphate	mg/L	73	103	85	93
Alkalinity	mg/L	1120	1060	1090	1130
Hardness	mg/L	696	745	730	802
Total Kjeldahl Nitrogen	mg/L	93	59.3	92.3	65.1
Ammonia	mg/L	68.3	53.9	49.5	54.7
Nitrate	mg/L	2.82	8.99	1.47	<0.10
Nitrite	mg/L		<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L	13			
Chemical Oxygen Demand	mg/L	143	130	141	210
Dissolved Organic Carbon	mg/L	48.9			
Total Suspended Solids	mg/L	44	16	12	92
Phenols	µg/L	15	3	0.011	0.003
Arsenic	mg/L		0.003	0.004	0.006
Barium	mg/L	0.22	0.19	0.23	0.24
Boron	mg/L	3.55	3.6	3.9	3.6
Cadmium	mg/L		<0.0001	<0.0001	<0.0001
Calcium	mg/L	211	234	2.15	247
Chromium	mg/L		0.009	0.009	0.012
Copper	mg/L		0.006	0.016	0.02
Iron	mg/L	14.4	3.66	4.62	19.6
Lead	mg/L		<0.001	<0.001	0.004
Magnesium	mg/L	41	39	47	45
Manganese	mg/L	0.93	0.83	0.94	1.4
Mercury	mg/L		<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.31	0.204	0.115	0.293
Potassium	mg/L		108	114	110
Sodium	mg/L	238	234	284	262
Zinc	mg/L		0.01	0.01	0.03
Total Dissolved Solids	mg/L	1900	1960	1940	1900
PCB's	µg/L		<0.1		<0.1

NOTE:

TABLE B-2
LEACHATE ORGANIC CHEMISTRY RESULTS - PS1 and PS2
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

	PS1																		
PARAMETER	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Oct-03	Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Dec-08	Apr-09	Oct-09
1,2-Dichlorobenzene	<0.4	<2	<4	<0.4	<0.4	<0.4	<0.4	<2	<2	<0.1	<0.1	<1	<2	<0.1	<0.10	<0.40	<0.40	<0.40	<0.10
1,4-Dichlorobenzene	1.7	3	<2.0	1.2	1.9	1.6	1.3	<1	<1	1.1	0.5	<1	<2	<0.1	0.98	0.8	<0.40	1.2	2.7
Benzene	<0.3	<1.5	<3	<0.3	1	<0.3	0.5	<1.5	<1.5	0.2	0.4	0.8	<1	<0.2	0.52	<0.80	<0.80	<0.80	1.1
Chlorobenzene	<0.3	<1.5	<3	<0.3	0.6	<0.3	0.5	<1.5	<1.5	<0.1	<0.1	0.6	<1	<0.1	<0.10	0.56	<0.40	<0.40	0.41
Chloroethane	<0.3	<1.5	<3	0.4	0.4	<0.3	<0.3	<1.5	<1.5	0.6	<0.2	1	<2	<0.2	0.36	<0.80	<0.80	<0.80	1.1
Ethyl benzene	<0.4	<2	<4	<0.4	<0.4	<0.4	<0.4	<2	<2	<0.1	<0.1	2.8	<1	<0.1	0.24	<0.40	<0.40	1.3	4.5
m/p-Xylenes														<0.2	0.88	0.96	<0.80	3.4	12
Methylene Chloride	<0.3	<1.5	<3	<0.3	13	<0.3	<0.3	<1.5	<1.5	<0.5	<0.5	<3	<5	<0.3	<0.30	<1.20	<1.20	<1.20	<0.30
o-Xylene														<0.1	0.58	0.57	0.57	1.4	3.8
Toluene	<0.4	<2	<4	<0.4	2.1	<0.4	0.5	<2	<2	<0.2	<0.2	7	<2	<0.2	<0.20	<0.80	2.9	4.4	21
Vinyl Chloride														<0.17	<0.17	<0.68	<0.68	<0.68	2
Xylenes - total	<0.9	<4.5	<9	<0.9	1.6	<0.9	<0.9	<4.5	<4.5	1.6	0.3	4.9	<1	<0.2	1.4	1.5	<0.80	4.8	16

	PS1																	PS2		
PARAMETER	Apr-10	Apr-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Apr-16	Dec-16	Sep-17	Apr-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21	Oct-20	Apr-21	Oct-21
1,2-Dichlorobenzene	<0.40	<1.00	<0.40	<0.4	<0.4	<0.4	<0.4	<2.0	<2.0	<2.0	<10	<0.4	<0.4	0.4	<0.4	<0.4	<0.8	<0.4	<0.4	<0.8
1,4-Dichlorobenzene	2.6	<1.00	<0.40	3.3	3.5	3.5	2.6	2.5	3	3.1	<10	<0.4	3.0	3.2	2.4	2.6	<0.8	<0.4	<0.4	<0.8
Benzene	1.7	<2.00	<0.80	0.7	2.3	2.4	<0.5	2.8	2.1	2.7	<5.0	1.3	1.6	3.5	0.7	3.3	<1	<0.5	<0.5	<1
Chlorobenzene	2.5	<1.00	<0.40	1.7		1.7	0.6	3.4	2.3	2.6	<5.0		1.6	3.4	0.8	2.8	<1	<0.5	<0.5	<1
Chloroethane	<0.80	<2.00	<0.80	<0.2	<0.2	<0.2	<0.2					<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.4
Ethyl benzene	1.8	1.8	<0.40	<0.5	2.2	<0.5	<0.5	5.8	<1.0	1.4	<5.0	<0.5	<0.5	4.3	<0.5	0.5	<1	<0.5	<0.5	<1
m/p-Xylenes	2	2.5	<0.80	3.1	4.4	3.9	0.9	6.4	2.6	5.6	<5.0	4.2	1.6	7.2	2.4	6.1	1.2	<0.4	<0.4	<0.8
Methylene Chloride	<1.20	<3.00	<1.20	<4.0		<4.0		<5.0	<5.0	<5.0	<25	<4.0	<4.0	<4.0	<4.0	<4.0	<8.0	<4.0	<4.0	<8.0
o-Xylene	0.94	<1.00	<0.40	1.1	2	1	<0.4	2.2	<1.0	1.3	<5.0	1.3	0.7	1.9	0.6	1.2	<0.8	<0.4	<0.4	<0.8
Toluene	<0.80	<2.00	<0.80	<0.5	<0.5	1.5	<0.5	<2.0	<2.0	<2.0	<10	<0.5	<0.5	0.6	<0.5	<0.5	<1	<0.5	<0.5	<1
Vinyl Chloride	<0.68	<1.70	<0.68	<0.2	<0.2	<0.2	<0.2	<2.0	<2.0	<2.0	<10	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.4
Xylenes - total	3	2.5	<0.80					8.7	2.6	6.9	<5.0	5.5	2.3	9.1	3	7.3	1.2	<0.5	<0.5	<0.5

NOTES: 1) All units are µg/L. **
2) Blank indicates parameter not analysed. **

TABLE B-3
TREATMENT SYSTEM EFFLUENT - General Chemistry Results
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Apr-11	Jul-11	Sep-11	Dec-11
pH	units	8.1	8.22	8.05	8.28	8.28	7.64	7.41	7.49	7.76	7.67	8.05
Conductivity	µmho/cm	3220	2510	2740	2320	2660	4120	2700	2920	3340	2960	3600
Chloride	mg/L	386	326	288	236	301	382	253	253	312	338	425
Phosphate - ortho	mg/L			<0.10				<0.10			<0.10	
Sulphate	mg/L	200	251	330	262	330	90.4	64	331	94.3	585	632
Alkalinity	mg/L	795	474	650	690	767	1830	1410	995	1480	939	963
Hardness	mg/L	759	631	812	845	981	1170	892	883	893	968	1080
Total Kjeldahl Nitrogen	mg/L	17.2	6.44	7.2	6.34	6.9	133	105	93	104	88.5	149
Ammonia	mg/L	10.8	<0.02	0.18	<0.02	0.02	131	86.4	58.7	108	63.9	87.7
Nitrate	mg/L	39.1	32.6	25.7	26.4	37.9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L			10.5				<0.05			<0.05	
Biochemical Oxygen Demand	mg/L	34	<5	<5	<5	<5	63	40	27	19	<5	139
Chemical Oxygen Demand	mg/L	240	156	194	155	141	382	284	137	187	183	599
Dissolved Organic Carbon	mg/L	80.3	51.9	70.4	59.5	59.3	135	102	85.1	52.9	77.4	194
Total Suspended Solids	mg/L	23	13	13	24	45	<10	10	60	17	74	174
Phenols	µg/L	4	2	8	22	<1	80	28	23	32	11	49
Arsenic	mg/L			0.008				0.012			0.007	
Barium	mg/L	0.06	0.036	0.035	0.074	0.059	0.289	0.236	0.18	0.21	0.266	0.161
Boron	mg/L	4.21	2.82	4.88	3.78	3.48	7.09	5.91	4.56	4.21	5.11	6.64
Cadmium	mg/L			<0.001				<0.001			<0.001	
Calcium	mg/L											
Chromium	mg/L			0.021				0.026			0.03	
Copper	mg/L			0.003				0.003			0.004	
Iron	mg/L	1.07	0.928	0.854	0.958	0.645	0.201	0.131	5.79	0.997	25.2	1.02
Lead	mg/L			<0.002				<0.002			<0.002	
Magnesium	mg/L											
Manganese	mg/L	2.01	2.44	1.35	2.08	0.856	1.23	1.2	1.15	0.994	2.23	1.07
Mercury	mg/L			<0.0001				<0.0001			<0.0001	
Phosphorus	mg/L	0.37	0.66	1.03	0.44	0.55	1.3	0.99	0.54	0.58	0.42	0.32
Potassium	mg/L											
Sodium	mg/L											
Zinc	mg/L			0.01				0.041			0.011	
Total Dissolved Solids	mg/L	2150	1750	1930	1700	2160	2460	1790	1740	1900	2140	2630

NOTE Blank indicates parameter not analysed.

TABLE B-3
TREATMENT SYSTEM EFFLUENT - General Chemistry Results
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14
pH	units	7.39	7.22	7.33	7.46	7.24	7.75	7.47	7.69	8	8.04	8.08	7.84
Conductivity	µmho/cm	4000	4460	3230	3230	4950	5280	5950	4860	3150	3030	2890	2800
Chloride	mg/L	337	490	294	423	532	635	852	512	454	349	320	221
Phosphate - ortho	mg/L			<0.03				0.1				0.43	
Sulphate	mg/L	339	659	312	404	24	41	35	51	147	84	130	135
Alkalinity	mg/L	1455	1080	961	362	1943	1732	1950	1950	610	847	845	836
Hardness	mg/L	867	987	761	648	882	670	801	664	660	787	840	868
Total Kjeldahl Nitrogen	mg/L	120	71.8	60.7	3.47	186	205	223	196	3.78	4.23	3.31	2.69
Ammonia	mg/L	109	67.7	57.6	0.04	186	198	209	181	0.08	0.1	0.05	0.09
Nitrate	mg/L	<0.10	0.59	<0.10	66	<0.10	<0.10	<0.10	<0.10	33.5	45.2	26	45.8
Nitrite	mg/L			<0.10				<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	25	7	12	5	34	25	26	24	2	6	5	8
Chemical Oxygen Demand	mg/L	363	281	264	177	412	419	475	404	115	148	131	142
Dissolved Organic Carbon	mg/L	103	76.2	74.2	54.8	106	120	133	107	44.8	58.1	53.7	55.8
Total Suspended Solids	mg/L	46	119	182	20	90	26	13	87	9	10	8	8
Phenols	µg/L	10	<1	1	<1	1	3	<5	<5	<1	<2	<1	<1
Arsenic	mg/L			<0.01				<0.01			0.003	0.003	
Barium	mg/L	0.19	0.24	0.2	0.09	0.3	0.4	0.5	0.3	0.05	0.1	0.07	0.11
Boron	mg/L	5.8	6.7	4.2	5.5	4.6	3.3	3.6	3.4	4.1	4.3	4.8	4.9
Cadmium	mg/L			<0.001				<0.001			<0.0001	<0.0001	
Calcium	mg/L	258	280	224	177	203	158	184	152	177	226	244	265
Chromium	mg/L			<0.01				<0.05			0.009	0.01	
Copper	mg/L			<0.01				<0.01			<0.001	<0.001	
Iron	mg/L	9.4	22.3	26.4	1.74	0.5	17.3	9.8	10.6	0.61	0.16	0.35	0.36
Lead	mg/L			<0.01				<0.01			<0.001	<0.001	
Magnesium	mg/L	54	70	49	50	91	67	83	69	53	54	56	50
Manganese	mg/L	1.19	1.03	1	0.24	1.5	1.4	1.8	1.48	0.97	0.7	1.46	1.05
Mercury	mg/L			<0.0001				<0.0001				<0.0001	
Phosphorus	mg/L	0.63	0.78	0.27	0.38	0.12	0.1	0.09	0.13	0.38	0.48	0.3	0.76
Potassium	mg/L			103				210				126	
Sodium	mg/L	308	404	207	372	537	589	717	459	396	269	248	221
Zinc	mg/L			<0.1				<0.1			0.01	<0.01	
Total Dissolved Solids	mg/L	2800	3340	2260	2260	3220	3430	3870	3160	2050	1970	1880	1820

NOTE Blank indicates parameter not analysed.

TABLE B-3
TREATMENT SYSTEM EFFLUENT - General Chemistry Results
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16	Apr-17	Jul-17	Sep-17	Dec-17
pH	units	7.31	8.01	8.09	8.01	8.06	7.95	8.07	8.03	7.9	8.02	8.05	7.97
Conductivity	µmho/cm	2600	2270	2470	2410	2600	1900	2700	2000	2200	2400	1900	2600
Chloride	mg/L	241	322	313	274	240	270	280	250	200	290	220	300
Phosphate - ortho	mg/L			0.39				0.068				0.041	
Sulphate	mg/L	826	266	330	225	66	150	370	190	52	94	120	180
Alkalinity	mg/L	136	376	431	533	770	290	470	370	660	620	460	620
Hardness	mg/L	995	538	630	675	730	440	740	430	580	630	440	640
Total Kjeldahl Nitrogen	mg/L	2.48	3.4	3.27	5.32	6	1.4	2.5	1.4	5.9	5.4	0.89	<2.0
Ammonia	mg/L	<0.02	<0.05	<0.025	2.91	0.18	<0.050	0.076	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate	mg/L	17.6	12.3	14.2	23.3	38.8	11.9	20.9	1.7	37.7	35.9	11.5	24.1
Nitrite	mg/L			<0.10		0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Biochemical Oxygen Demand	mg/L	3	1	<1	3	3	3	3	<2.0	2	4	<2.0	<2.0
Chemical Oxygen Demand	mg/L	65	82	83	116	160	66	100	72	100	100	60	99
Dissolved Organic Carbon	mg/L	23.9	30.2	29.4	44.7	45	24	32	24	36	37	22	37
Total Suspended Solids	mg/L	13	8	9	6	19	<10	<10	<10	18	17	<10	13
Phenols	µg/L	<1	<2	<1	<1	2	<1	<1	<1	<2	<2	7.5	2.7
Arsenic	mg/L			<0.001				0.0021	0.001		0.0012	<0.0010	
Barium	mg/L	0.07	0.03	0.03	0.04	0.12	0.046	0.065	0.023	0.099	0.084	0.046	0.06
Boron	mg/L	2.7	2.4	3	3.1	3.3	1.7	3.2	2.2	2.9	3.1	2.1	3.4
Cadmium	mg/L			<0.0001				<0.00010	<0.00010		<0.00010	<0.00010	
Calcium	mg/L	288	148	170	193	220	120	210	120	170	180	130	190
Chromium	mg/L			0.003				<0.0050	<0.0050		<0.0050	<0.0050	
Copper	mg/L			0.003				0.0044	0.0033		0.0057	0.0042	
Iron	mg/L	0.29	0.57	0.39	0.48	0.17	<0.10	<0.10	0.95	1.7	<0.10	<0.10	<0.10
Lead	mg/L			<0.001				<0.00050	<0.00050		<0.00050	<0.00050	
Magnesium	mg/L	67	41	50	47	42	35	50	35	36	42	31	43
Manganese	mg/L	3.09	0.79	1.71	1.95	1.1	0.92	1.4	0.85	0.87	0.66	0.42	0.48
Mercury	mg/L			<0.0001				<0.1				<0.1	
Phosphorus	mg/L	0.11	0.34	0.35	0.24	0.24	0.28	0.17	0.38		0.11	0.11	0.18
Potassium	mg/L			93				92	63		89	57	
Sodium	mg/L	227	310	227	248	220	210	250	200	180	240	160	240
Zinc	mg/L			<0.01				0.0081	0.0055		0.0059	<0.0050	
Total Dissolved Solids	mg/L	2080	1480	1730	1570	1630	1230	1690	1120	1340	1620	1140	1600

NOTE Blank indicates parameter not analysed.

TABLE B-3
TREATMENT SYSTEM EFFLUENT - General Chemistry Results
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20
pH	units	8.13	8.1	8.07	8.09	7.78	7.88	8.15	8.03	8.03	7.84	8.16	8.24
Conductivity	µmho/cm	2500	2300	2500	2700	2340	2420	2180	2550	2620	2600	2370	2250
Chloride	mg/L	340	350	300	270	59	314	278	305	328	389	300	282
Phosphate - ortho	mg/L			0.053				<0.6				<0.010	
Sulphate	mg/L	74	160	320	130	58	49	275	144	90	197	141	137
Alkalinity	mg/L	680	430	530	620	737	714	376	634	705	468	648	624
Hardness	mg/L	600	520	670	650	622	716	604	641	658	571	614	578
Total Kjeldahl Nitrogen	mg/L	<2.0	2	1.9	<2.0	4.1	4.52	2.1	3.15	4.81	2.68	3.34	3.79
Ammonia	mg/L	0.069	0.077	0.088	0.12	0.11	<0.010	0.08	<0.010	0.04	<0.010	0.164	<0.010
Nitrate	mg/L	37.7	19.5	19	46.2	23.5	72.5	11.8	48.1	39.7	26.8	17.5	18.3
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010			<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	<2	3	<2	13	8	6	3	4	3	<1		3
Chemical Oxygen Demand	mg/L	100	75	92	120	96	105	55	90	99	72	82	86
Dissolved Organic Carbon	mg/L	37	26	33	42	38.9	48		38.2	38.3	34.1		28.3
Total Suspended Solids	mg/L	12	<10	<10	12	20	11	73	9	6	8	7	12
Phenols	µg/L	2.2	<1	1.1	<1	10	<1	4	3	13	8	<1	11
Arsenic	mg/L			0.0013				<0.001				0.001	
Barium	mg/L	0.075	0.053	0.069	0.046	0.09	0.1	0.07	0.07	0.06	0.06	0.04	0.05
Boron	mg/L	3	2.2	2.7	3.4	2.6	3.7	2.3	3.05	3.35	2.9	2.9	2.8
Cadmium	mg/L			<0.00010				<0.0001				<0.0001	
Calcium	mg/L	170	140	200	190	193	214	176	189	191	161	185	172
Chromium	mg/L			<0.0050				0.003				0.004	
Copper	mg/L			0.0042				0.002				0.006	
Iron	mg/L	0.66	<0.10	<0.10	<0.50	1.77	0.16	0.06	0.1	0.1	0.09	0.07	0.08
Lead	mg/L			<0.00050				<0.001				<0.001	
Magnesium	mg/L	40	41	42	44	34	44	40	41	44	41	37	36
Manganese	mg/L	0.54	0.56	0.83	0.65	0.94	0.98	0.87	0.23	0.62	0.25	0.24	0.2
Mercury	mg/L			<0.1				<0.0001				<0.0001	
Phosphorus	mg/L	0.29	0.16	0.18	0.23	0.981	0.199	0.188	0.231	0.231	0.238	0.274	0.191
Potassium	mg/L			89				82				93	
Sodium	mg/L	230	250	230	270	215	247	196	242	278	305	214	224
Zinc	mg/L			<0.0050				<0.01				<0.01	
Total Dissolved Solids	mg/L	1510	1300	1610	1690	1520	1570	1420	1660	1700	1690	1540	1460

NOTE Blank indicates parameter not analysed.

TABLE B-3
TREATMENT SYSTEM EFFLUENT - General Chemistry Results
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	8.03	7.8	8.13	7.93
Conductivity	µmho/cm	2360	2400	2410	2270
Chloride	mg/L	270	340	253	299
Phosphate - ortho	mg/L			0.025	
Sulphate	mg/L	120	190	97	162
Alkalinity	mg/L	660	474	725	527
Hardness	mg/L	688	565	682	569
Total Kjeldahl Nitrogen	mg/L	3.49	2.4	4.97	4.43
Ammonia	mg/L	0.04	<0.010	<0.010	<0.010
Nitrate	mg/L	27.2	17.9	19	30.6
Nitrite	mg/L			<0.10	
Biochemical Oxygen Demand	mg/L	5	2		2
Chemical Oxygen Demand	mg/L	80	52	98	115
Dissolved Organic Carbon	mg/L	35	25		39.4
Total Suspended Solids	mg/L	3	4	14	8
Phenols	µg/L	<0.010	0.005	0.001	0.002
Arsenic	mg/L			0.002	
Barium	mg/L	0.07	0.06	0.09	0.06
Boron	mg/L	3	3.4	3.2	3.4
Cadmium	mg/L			0.0001	
Calcium	mg/L	203	157	207	170
Chromium	mg/L			0.006	
Copper	mg/L			0.026	
Iron	mg/L	0.11	0.05	0.12	0.08
Lead	mg/L			<0.001	
Magnesium	mg/L	44	42	40	35
Manganese	mg/L	0.54	0.36	0.73	0.41
Mercury	mg/L			<0.0001	
Phosphorus	mg/L	0.229	0.285	0.299	0.516
Potassium	mg/L			98	
Sodium	mg/L	243	287	244	277
Zinc	mg/L			0.02	
Total Dissolved Solids	mg/L	1530	1560	1570	1480

NOTE

TABLE B-4

TREATMENT SYSTEM EFFLUENT - Organic Chemistry Results

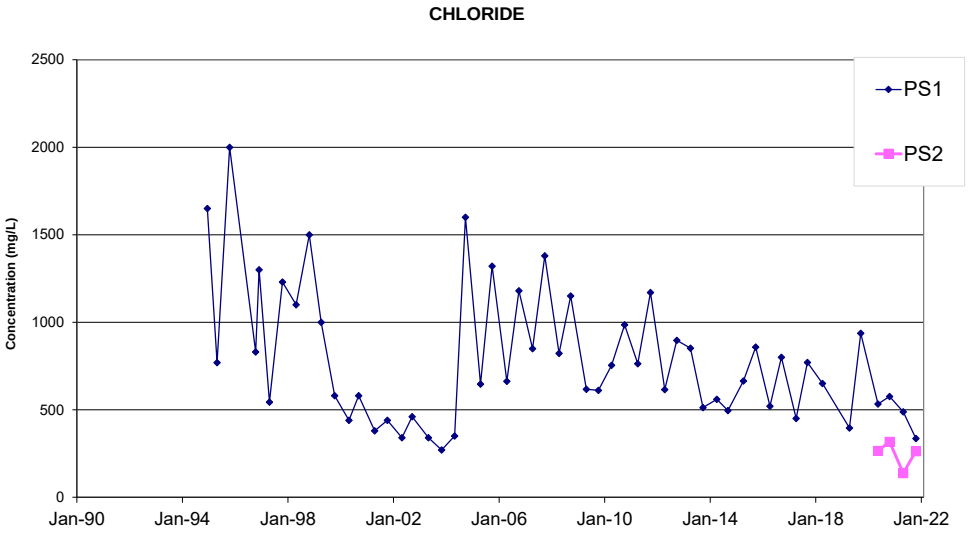
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

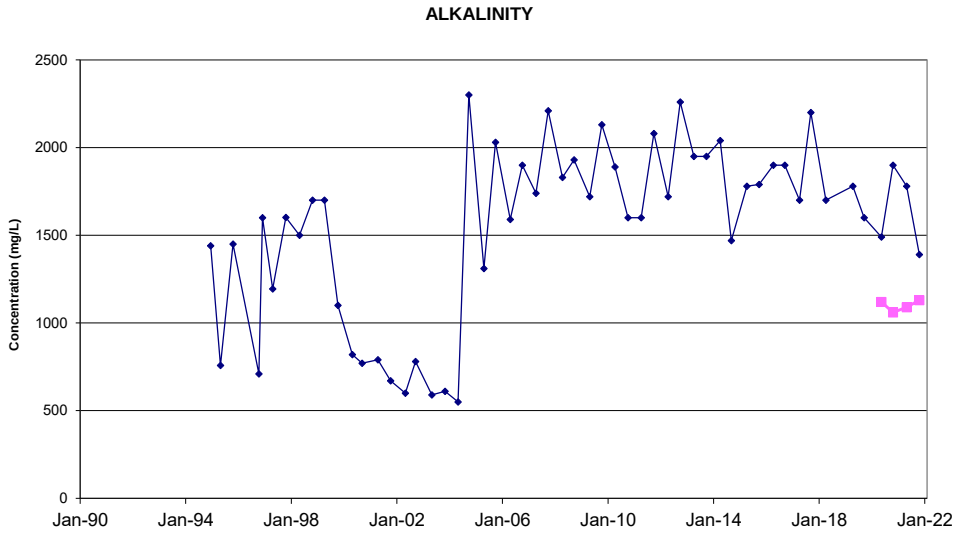
PARAMETER	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	<0.10	<1.00	<0.40	<0.4	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<1.0	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	<0.10	<1.00	<0.40	0.7	3.5	3.5	<0.4	<0.4	<0.20	<0.20	<1.0	<0.4	<0.4	<0.4
Benzene	<0.20	<2.00	<0.80	3.4	2.3	2.3	<0.5	<0.5	<0.10	<0.10	<0.50	<0.5	<0.5	<0.5
Chlorobenzene	<0.10	<1.00	<0.40	0.9			<0.2	<0.2	<0.10	<0.10	<0.50	<0.5	<0.5	<0.5
Chloroethane	<0.20	<2.00	<0.80	<0.2	<0.2	<0.2	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	<0.10	<1.00	<0.40	<0.5	2.2	2.2	<0.5	<0.5	<0.10	<0.10	<0.50	<0.5	<0.5	<0.5
m/p-Xylenes	<0.20	<2.00	<0.80	<0.5	4.4	4.4	<0.5	<0.4	<0.10	<0.10	<0.50	<0.4	<0.4	<0.4
Methylene Chloride	<0.30	<3.00	<1.20	<4.0			<4.0		<0.50	<0.50	<2.5	<4.0	<4.0	<4.0
o-Xylene	<0.10	<1.00	<0.40	<0.5	2	2	<0.5	<0.4	<0.10	<0.10	<0.50	<0.4	<0.4	<0.4
Toluene	<0.20	<2.00	<0.80	<0.5	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<1.0	<0.5	<0.5	<0.5
Vinyl Chloride	<0.17	<1.70	<0.68	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<1.0	<0.2	<0.2	<0.2
Xylenes (total)	<0.20	<2.00	<0.80						<0.10	<0.10	<0.50	<0.5	<0.5	<0.5

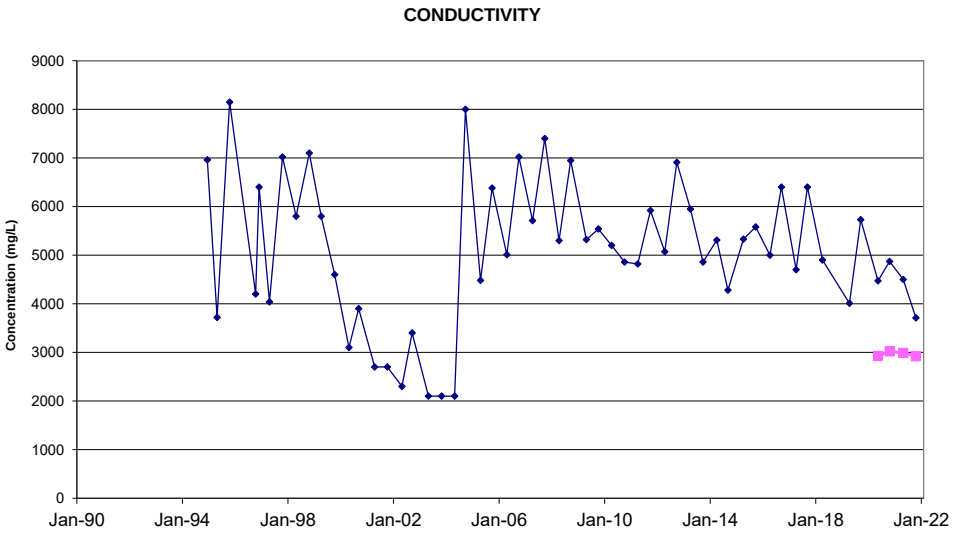
NOTES: 1) All units are µg/L.

2) Blank indicates parameter not analysed.

FIGURE B-1
LEACHATE TIME CONCENTRATION GRAPHS







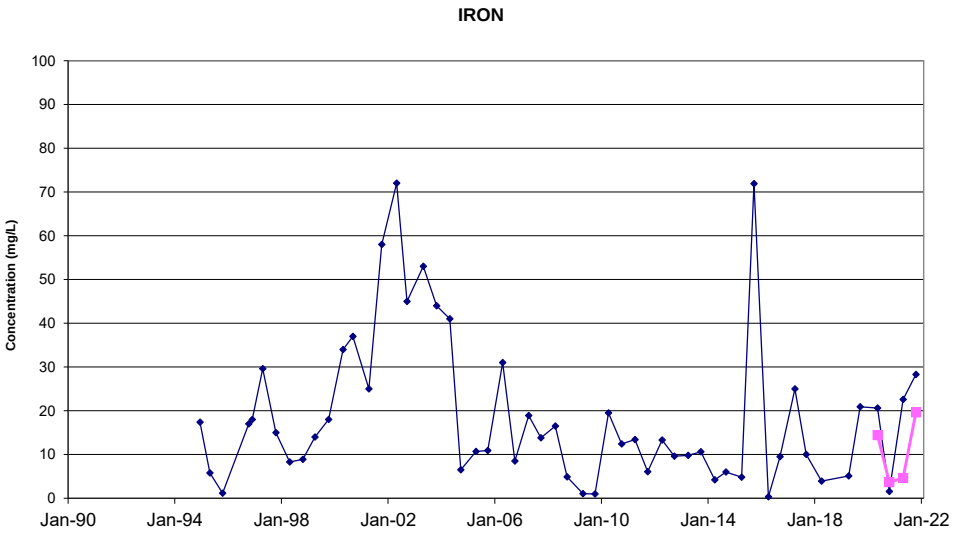
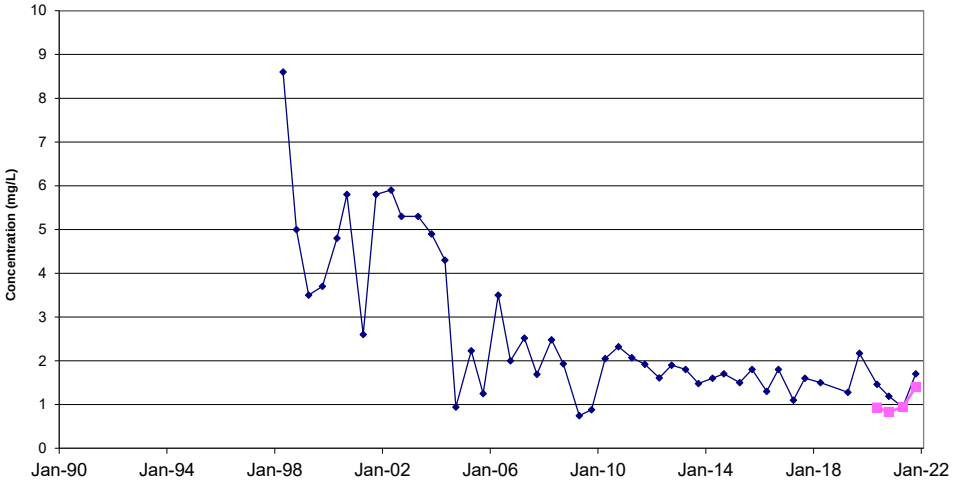
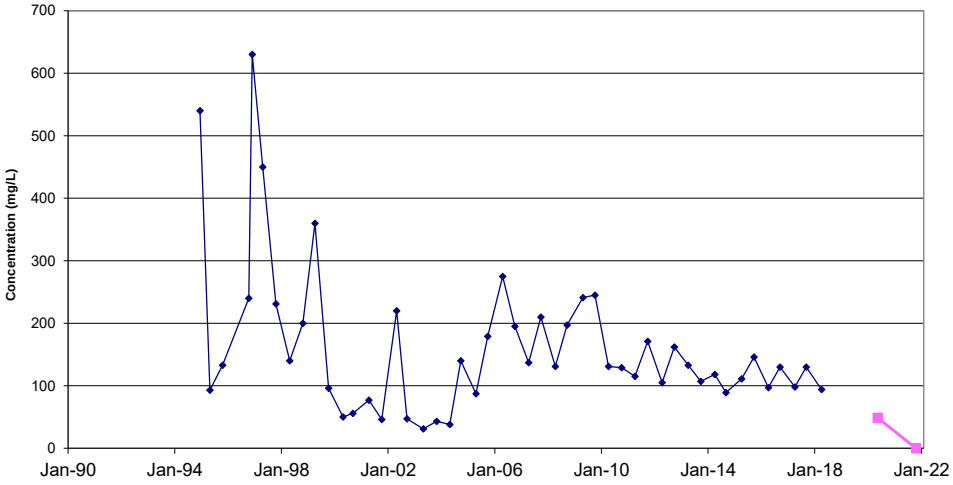


FIGURE B-2
LEACHATE TIME CONCENTRATION GRAPHS

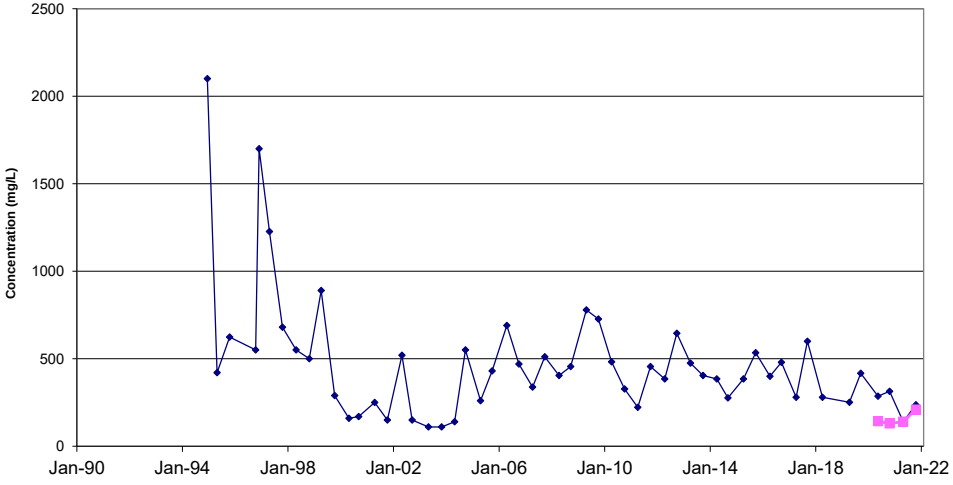
MANGANESE



DISSOLVED ORGANIC CARBON



CHEMICAL OXYGEN DEMAND



TOTAL KJELDAHL NITROGEN

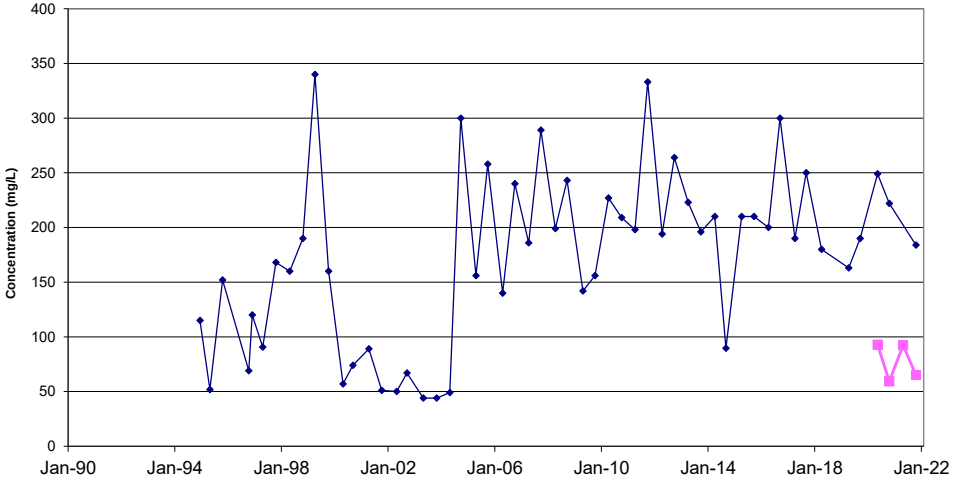
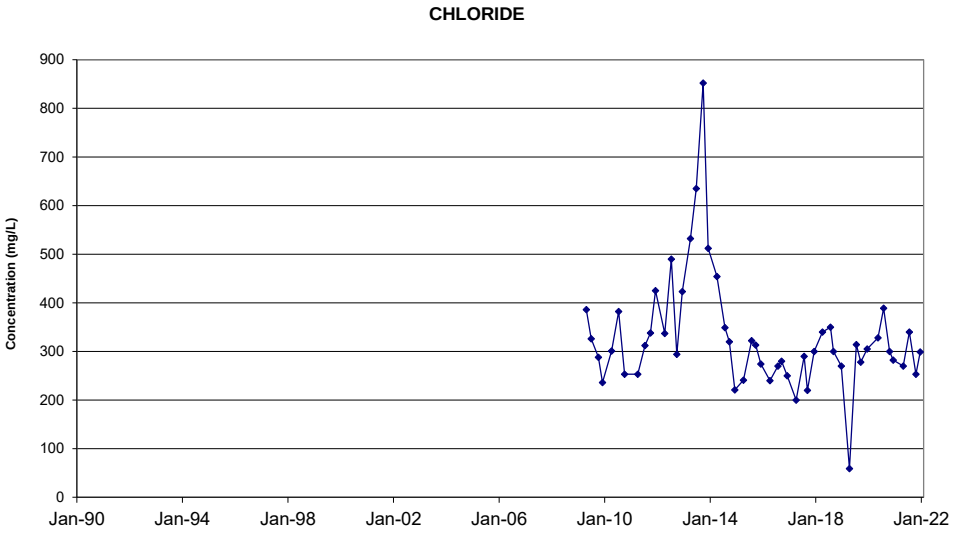
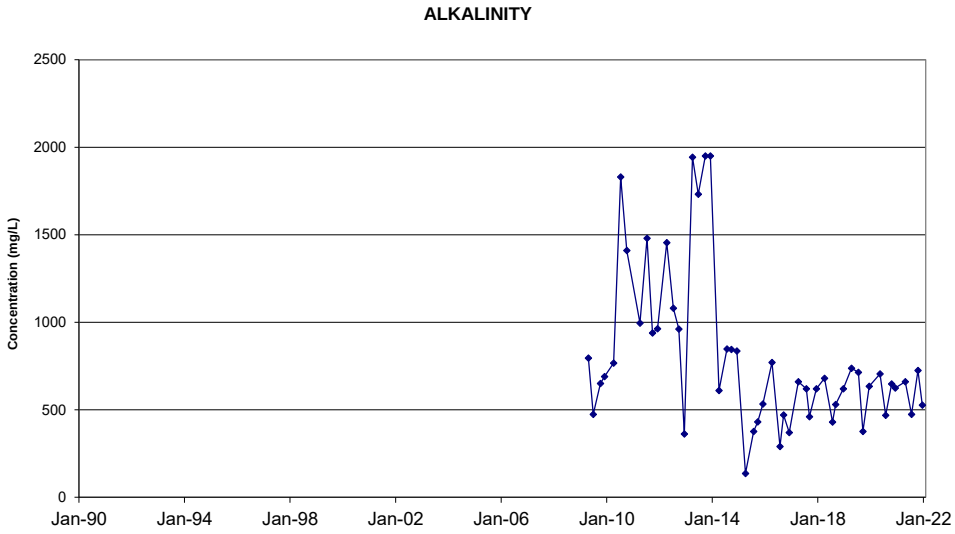
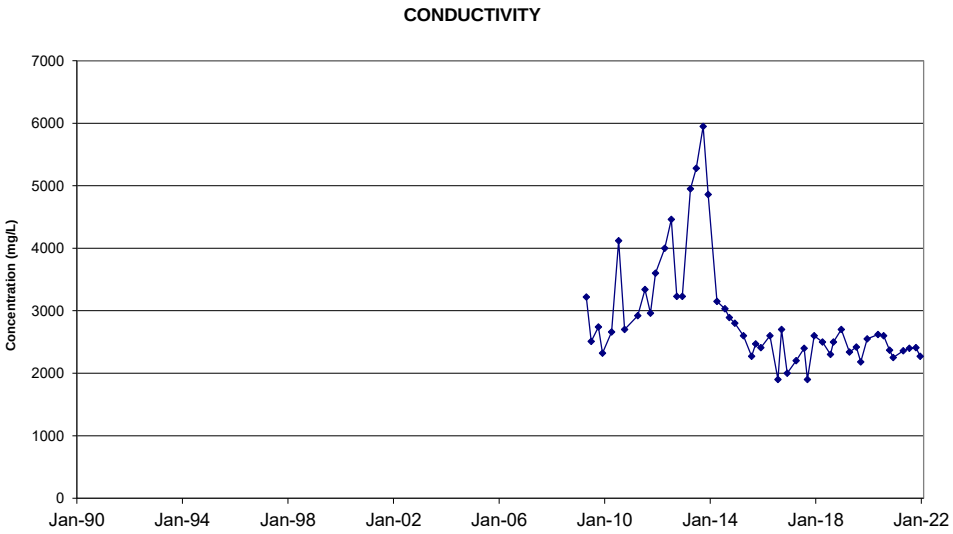


FIGURE B-3

TREATMENT SYSTEM EFFLUENT - TIME CONCENTRATION GRAPHS







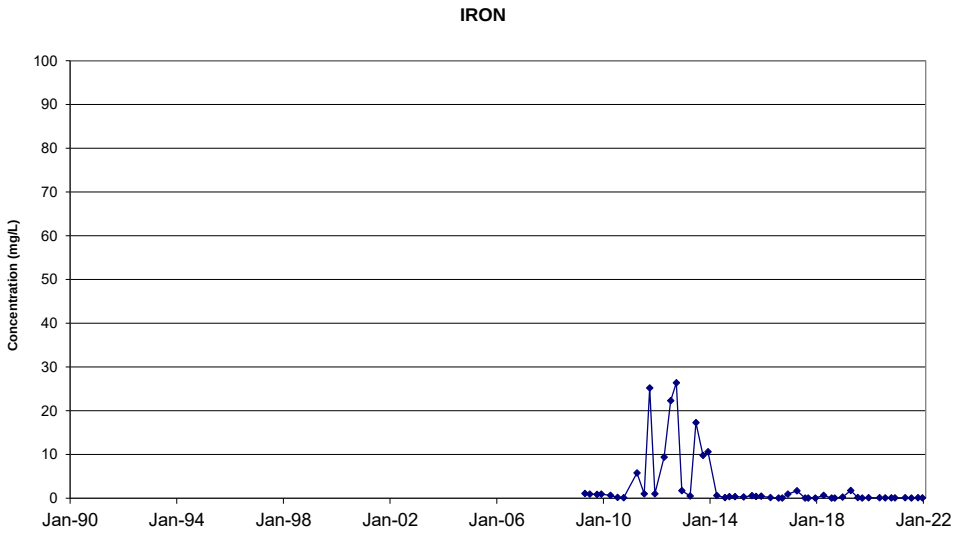
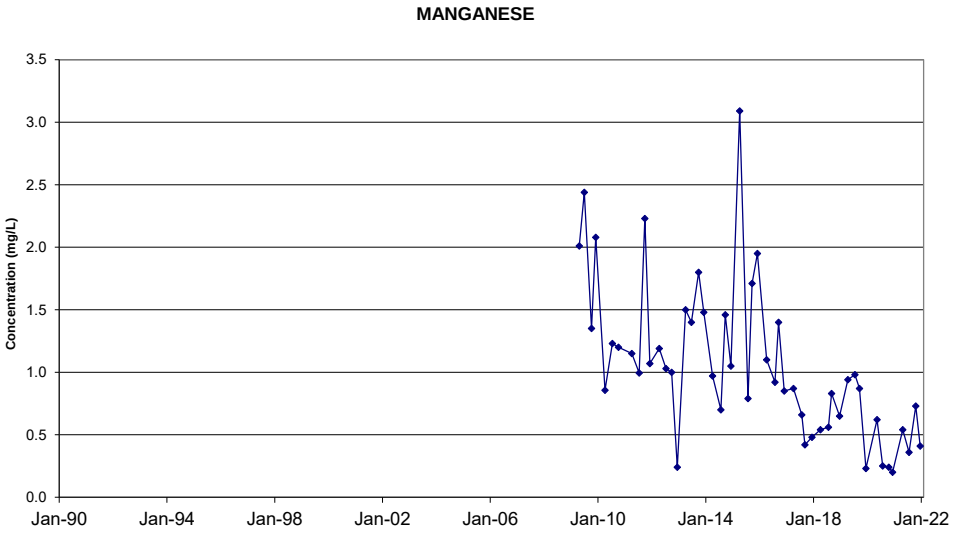
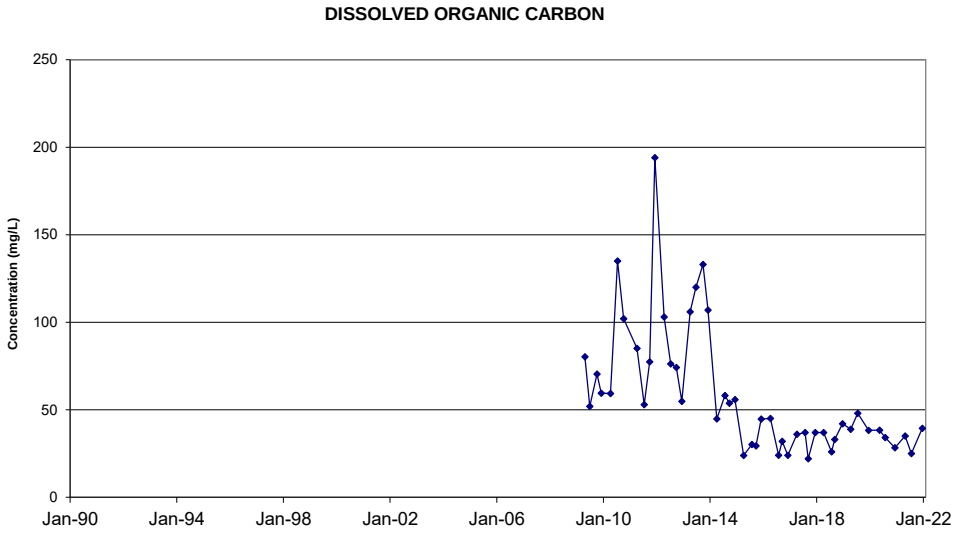
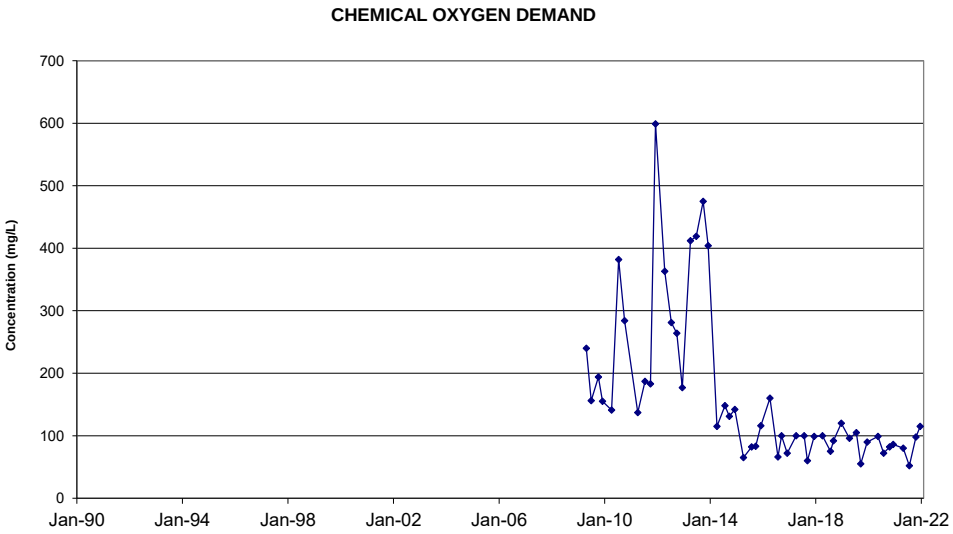


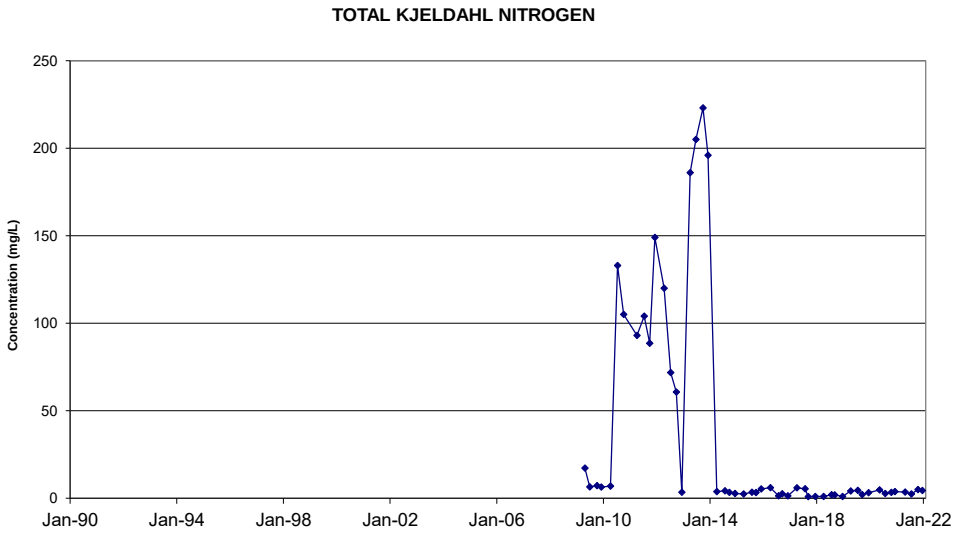
FIGURE B-4

TREATMENT SYSTEM EFFLUENT - TIME CONCENTRATION GRAPHS









APPENDIX

C GROUNDWATER CHEMISTRY

TABLE C-1
GROUNDWATER FIELD CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

LOCATION	SAMPLING EVENT	TEMPERATURE (°C)	pH (as units)	CONDUCTIVITY (µS/cm)	TURBIDITY (NTU)
BHB	April	10.7	7.0	693	89
	July	12.9	6.4	666	68
	October	10.2	6.6	661	251
	December	5.5	7.0	629	47
BHC	April	10.0	7.1	271	6
	July	10.6	6.8	207	13
	October	8.2	6.4	273	9
	December	5.6	7.7	569	7
BHE-2	April	9.3	7.1	606	16
	July	11.7	6.4	580	9
	October	10.3	6.6	555	10
	December	4.6	7.2	588	9
BHH	April	9.4	6.9	1723	44
	October	12.1	6.9	1783	29
BHK	April	10.9	7.8	72	5
	October	11.5	7.0	72	107
BHL	April	7.5	7.9	82	46
	October	9.9	6.8	91	7
BHM	April	7.9	7.4	136	10
	October	9.3	6.9	141	16
BHP	April	6.4	8.1	33	132
	October	11.1	7.0	244	138
BHQ	April	8.3	5.5	1528	100
	October	13.4	6.4	1147	410
W11	April	9.1	7.3	436	5
	October	10.0	6.7	460	317
W14	April	7.5	6.7	38	14
	October	13.9	6.4	58	17

TABLE C-1
GROUNDWATER FIELD CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

LOCATION	SAMPLING EVENT	TEMPERATURE (°C)	pH (as units)	CONDUCTIVITY (µS/cm)	TURBIDITY (NTU)
OW1A	April	10.1	8.2	142	8
	October	11.9	7.8	140	15
OW1B	April	8.1	7.4	182	136
	October	14.4	6.5	290	400
OW3A	April	7.7	7.3	597	261
	October	10.0	6.9	589	49
OW3B	April	7.6	7.1	391	78
	October	10.9	6.6	556	316
OW4A	April	11.9	8.2	3641	55
	October	11.7	7.7	3515	16
OW4B	April	12.4	8.0	893	100
	October	11.8	6.5	910	71
OW5	April	8.5	7.0	178	259
	October	9.5	6.5	300	436
OW8	April	11.2	7.2	792	14
	October	11.0	7.2	945	50
OW9	April	8.0	7.9	26	262
	October	10.0	7.0	24	327
OW10	April	11.8	6.7	649	2
	October	13.6	6.5	778	136
OW11	April	9.5	7.0	638	100
	October	10.9	7.6	595	126
PW1	April	10.8	6.8	942	0.5
	July	14.1	6.3	870	52.0
	October	13.5	6.5	842	0.3
	December	11.9	7.2	778	0.8
PS1	April	11.0	7.0	>3999	11
	October	14.8	7.1	3482	30
PS2	April	14.9	7.1	2882	4
	October	16.0	6.9	2814	10
EFFLUENT TREATMENT SYSTEM (ETS)	April	14.4	7.7	2833	77.9
	July	20.1	7.6	2407	23.6
	October	16.3	7.8	2281	6.7
	December	14.0	8.2	2161	8.7

NOTES:
1) NT - Indicates parameter not tested.
2) "-" - Monitor not sampled due to insufficient water or blockage
3) NS - Indicates not sampled as per compliance plan monitoring schedule
4) NSI - Indicates not sampled due insufficient volume
5) NFC - Field chemistry not obtained due to chemistry concentrations beyond testing equipment limits
6) Monitor BHD-2 was replaced by OW11-08
7) Monitor BHI was replaced by OW12-08

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB																			
		Jan-90	Apr-90	Oct-90	Jan-91	Apr-91	Jul-91	Oct-91	Jan-92	Apr-92	Nov-92	Mar-93	Jul-93	Oct-93	Apr-94	Jul-94	Oct-94	Dec-94	Feb-95	Apr-95	Jul-95
pH	units	7.24	6.92	6.89	7.03	6.81	6.6	7.3	8.35	6.88	6.8	6.94	7.64	7.12	6.69	6.95	8.3	8.36	6.93	7.61	7.23
Conductivity	µmho/cm	2580	2460	1810	1570	1890	1470	1470	1148	1800	1770	1420	833	1420	1470	1089	987	976	1000	840	830
Chloride	mg/L	433	372	316	243	253	241	272	189	271	292	229	149	212	220	154	144	149	71	106	108
Phosphate - ortho	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sulphate	mg/L																				
Alkalinity	mg/L	803	796	484	487	655	415	386	302	550	516	395	197	429	458	361	346	340	318	258	250
Hardness	mg/L	825	690	432	420	411	402	373	286	533	479	370		371	403	290	292	283	265	211	224
Total Kjeldahl Nitrogen	mg/L	4.3	3.35	5.45	5.25	5.6	5.15	7.25	5.75	8.15	9.15	7.85	5.2	8.7	8.5	7.25	8.3	7.75	8.35	7.75	6.85
Ammonia	mg/L	2.95	2.55	4.2	4.5	5.55	4.8	6.4	5.35	7.25	8.55	6.4	4.8	7.5	8.2	6.9	6.8	7.45	7.95	5.05	6.75
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	<0.05	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Biochemical Oxygen Demand	mg/L									780											
Chemical Oxygen Demand	mg/L	216	184	76	82	72	56	56	40	76	64	232	52	52	48	46	147	36.9	44.8	43.5	
Dissolved Organic Carbon	mg/L	61	42.5	16	8.2	10	8	10.6	7.7	21.5	41	7.4	6.8	8.2	7.8	7.7	10.4	12.5	6.5	5.3	5.7
Phenols	µg/L	102	58	22	3.8	10.8	3	3.2	2.6	10	2.6	235	2.4	0.8	1.8	1.8	84	1.4	2.6	1	1.2
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	115.3	82	95	42	53	44	0.56	27	43	27	26	21	47	34	44	48.4	40	39.1	33.9	35.2
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L																				
Mercury	mg/L																				
Phosphorus	mg/L	0.02	0.02	0.04	0.02	0.02	0.02	0.02	0.02	0.05	0.04	0.02	0.02	0.02	<0.02	<0.02	0.02	0.02	0.02	0.02	0.04
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB																			
		Oct-95	Apr-96	Jun-96	Jul-96	Oct-96	Apr-97	Jul-97	Oct-97	Dec-97	Apr-98	Jul-98	Oct-98	Nov-98	Apr-99	Jul-99	Oct-99	Nov-99	Apr-00	Jun-00	Sep-00
pH	units	7.34	6.8	6.8	7	7.2	6.36	6.66	6.22	6.19	6.7	6.8	6.52	6.77	7	6.98	6.6	6.4	6.71	6.87	7.62
Conductivity	µmho/cm	780	1468	1600	1200	1400	1590	1159	1776	1962	1600	1200	1800	2000	1800	1300	1400	1700	1200	1200	1300
Chloride	mg/L	105	205	210	170	200	228	159	288	314	280	160	320	340	310	220	160	200	140	120	130
Phosphate - ortho	mg/L	<0.02	<0.01	<0.1	<0.1	<0.1							<0.05				<0.05				
Sulphate	mg/L																				
Alkalinity	mg/L	215	273	460	270	390	266	228	350	380	440	270		420	520	310	310	370	240	220	270
Hardness	mg/L	205	404	540	320	400	416	309	579	547	440	280	550	390	380	370	360	410	300	270	340
Total Kjeldahl Nitrogen	mg/L	6.55	0.1	3.8	7.8	6.2	9	7	8	9	7.2	7.5	9	8.3	9.1	8.9	9.1	10	6.9	5.2	9.7
Ammonia	mg/L	6.15	<0.05	1.4	7.2	7.3	5	5	7	7	6.4	5	6.8	6.9	7.3	6.7	7.1	7.7	5.2	6.1	5.1
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05							0.92				<0.25				<0.05
Nitrite	mg/L	<0.01		<0.05	<0.05	<0.05							<0.25				<0.01				<0.01
Biochemical Oxygen Demand	mg/L																5.2				11
Chemical Oxygen Demand	mg/L	22	2	70	71	86	51	85	77	137	65	57	78	90	71	93	81	140	56	48	250
Dissolved Organic Carbon	mg/L	2.5	0.5	24	11	14	25	16	8	29	11	15	11	11	11	13	13	13	14	15	23
Phenols	µg/L	1.6	<2	17	1	1.1	<1	<1	<1	<1	1.3	<1	5.7	1.5	<1	<1	1.1	1.6	41	<2	5.5
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	29.3	0.13	68	62	80	86	61	110	85	90	60			80	81	79	95	72	64	74
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L										9.7	6.6		* 0.012	9.2	8.8	8.3	10	7.3	6.3	7.8
Mercury	mg/L																				
Phosphorus	mg/L	0.02		0.14	0.11	0.15									0.17		0.16				0.07
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB																			
		Nov-00	Apr-01	Jul-01	Oct-01	Nov-01	Apr-02	Jun-02	Sep-02	Nov-02	Apr-03	Jul-03	Oct-03	Nov-03	Apr-04	Jun-04	Jun-04	Sep-04	Nov-04	Apr-05	Jun-05
pH	units	6.73	6.93	7.28	6.97	7.11	7.53	7.23	6.6	6.8	6.78	6.7	6.81	6.5	6.7	6.5	6.8	6.6	6.99	7.29	7.22
Conductivity	µmho/cm	1200	1400	1200	1200	1300	1100	970	1100	1200	1100	1100	1000	950	880	810	830	900	1100	1050	938
Chloride	mg/L	130	190	110	140	150	110	84	100	110	140	92	92	89	77	70	75	110	120	120	85
Phosphate - ortho	mg/L				<0.5				<0.5				<0.5			<0.5	<0.5	<0.5	<0.5		
Sulphate	mg/L														130	94	110		130	117	155
Alkalinity	mg/L	330	360	220	270	350	210	210	240	210	260	260	260	210	210	180	190	250	230	197	185
Hardness	mg/L	330	360	230	330	360	320	270	290	340	310	300	300	260	270	210	220	320	320	314	249
Total Kjeldahl Nitrogen	mg/L	7.3	9.5	9	8.4	11	8.4	7.3	7.8	7.3	8.2	7.1	8.1	8.5	6.3	5.9	5.9	7.3	7.8	8.4	6
Ammonia	mg/L	6.8	7.8	5.8	6.6	8.7	5.9	5.2	5.9	6.6	6.7	6.5	7.1	7	6	5.3	5.7	6.1	6.7	6.6	5.4
Nitrate	mg/L				<0.05				<0.05				0.16				<0.05	<0.05	<0.05		
Nitrite	mg/L				<0.01				<0.01				<0.01			<0.01	<0.01	0.01	<0.01		
Biochemical Oxygen Demand	mg/L				<5				<5				5.5				<5	<5	<5		
Chemical Oxygen Demand	mg/L	78	67	49	63	89	84	140	<10	67	48	<10	42	69	66	29	41	81	46	39	12
Dissolved Organic Carbon	mg/L	12	12	11	13	13	12	12	11	12	12	11	12	13	8.6	6.6	7.5	8.1	8.8	9.9	8
Phenols	µg/L	2.5	4.8	3.6	3	3.1	4.7	<1	3.7	5.9	<10	<1	5	2	5	1.8	2.9	<1	2.1	<1	<1
Arsenic	mg/L														<0.01	<0.01	<0.01		<0.01	<0.2	<0.2
Barium	mg/L														0.095	0.071	0.07	0.098	0.11	0.11	0.08
Boron	mg/L														0.51	0.39	0.37	0.46	0.47	0.41	0.36
Cadmium	mg/L														0.002	<0.002	<0.002	<0.005	<0.005	<0.005	<0.005
Calcium	mg/L																				
Chromium	mg/L														<0.002	<0.002	<0.002	<0.004	<0.004	<0.01	<0.01
Copper	mg/L														0.003	<0.002	<0.002	<0.006	<0.006	<0.02	<0.02
Iron	mg/L	75	87	56	80	87	75	49	62	71	88	63	63	48	48	39	41	63	65	63.7	47.3
Lead	mg/L														<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.05
Magnesium	mg/L																				
Manganese	mg/L	8	8.7	5.3	7.7	8.1	7.1	5.7	6.2	7.4	7	6.3	6.4	5.2	4.9	3.8	4	5.7	5.8	5.53	4.38
Mercury	mg/L															<0.05	<0.05		<0.05		
Phosphorus	mg/L				0.12				0.08				0.08		0.03	<0.03	0.06	0.11	0.08	0.74	0.26
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L														0.042	0.011	0.01	0.007	<0.005	<0.01	<0.01
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB																			
		Sep-05	Nov-05	Apr-06	Jun-06	Oct-06	Nov-06	Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08	Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10
pH	units	7.44	7.42	7.3	7.4	7.1	7.2	7.25	6.63	6.89	6.81	6.95	6.84	7.32	7.44	7.08	7.13	7.22	7.52	7.24	7.37
Conductivity	µmho/cm	1040	989	1140	1020	1110	1240	1090	959	1030	1050	1040	926	735	735	768	840	782	836	833	852
Chloride	mg/L	107	112	158	94	130	148	124	87	110	112	140	112	66	69	72	96	94	107	102	95
Phosphate - ortho	mg/L	<1								<0.10								<0.10			
Sulphate	mg/L		181	152	182		163	199	180		170	237	138		149	103	118	111	110	91.4	103
Alkalinity	mg/L	207	215	204	188	211	219	167	177	180	192	107	140	95	109	171	169	157	176	217	210
Hardness	mg/L	304	315	350	310	380	390	340	289	316	317	336	268	198	197	203	237	240	255	256	247
Total Kjeldahl Nitrogen	mg/L	5	7	6	6	6	7.3	6.26	6.01	6.19	1.81	5.78	5.19	4.23	4.38	4.4	5.31	4.79	5.38	5.28	4.3
Ammonia	mg/L	6.33	6.4	4.8	5.9	6.9	8.1	5.13	4.99	5.58	0.6	5.64	5.27	4.32	4.28	4.62	1.97	1.66	1.32	3.96	1.92
Nitrate	mg/L	<0.2		<0.1	<0.1	<0.1				<0.05					0.08	<0.05	0.82	0.09	<0.05	<0.05	<0.05
Nitrite	mg/L			<0.01	<0.01	<0.01				<0.05								<0.05			
Biochemical Oxygen Demand	mg/L	6								<5				<5	11	<5	5	<5	<5	<5	<5
Chemical Oxygen Demand	mg/L	34	28	42	31	41	40	26	31	31	39	27	19	18	<5	23	24	23	26	42	29
Dissolved Organic Carbon	mg/L	9.3	10.3	8.5	9.7	10.5	10.3	8.4	8.7	8.5	10.1	8	7.9	5.9	6.5	6.5	9.2	9.4	9.8	9.7	9.5
Phenols	µg/L	1	<1	<1	<1	<1	<1	3	1	2	2	<1	<1	<1	3	<1	<1	<1	2	<1	<1
Arsenic	mg/L	<0.2	0.002	0.001	0.002	<0.2	<0.2	<0.003										<0.003			
Barium	mg/L	0.1	0.11	0.11	0.1	0.12	0.12	0.111	0.067	0.108	0.089	0.28	0.09	0.064	0.063	0.067	0.075	0.073	0.089	0.08	0.098
Boron	mg/L	0.46	0.47	0.38	0.4	0.55	0.54	0.406	0.284		0.464	0.28	0.289	0.3	0.313	0.369	0.317	0.534	0.524	0.397	0.671
Cadmium	mg/L	<0.005	<0.0001	0.0004	0.0001	<0.005	<0.005	<0.0001	<0.002	<0.0001	<0.0001	<0.001	<0.001	<0.001				<0.001			
Calcium	mg/L																				
Chromium	mg/L	<0.01	<0.005	<0.005	<0.005	<0.01	<0.01	0.003	<0.003	0.005	<0.003	0.186	<0.003	<0.003				<0.003			
Copper	mg/L	<0.02	<0.001	<0.001	0.001	<0.02	<0.02	<0.002	<0.002	<0.002	0.004	0.002	0.002	<0.002				<0.002			
Iron	mg/L	55.6	60	57	56	66.9	67.5	61.6	39.7	59.3	0.016	56.2	36.7	27.7	26.9	30.8	37	33.3	39.9	40.3	35.5
Lead	mg/L	<0.05	<0.0005	<0.0005	<0.0005	<0.05	<0.05	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001				<0.002			
Magnesium	mg/L																				
Manganese	mg/L	4.85	5.6	5	4.9	5.94	6.24	5.14	3.43	5.2	4.21	5.23	2.95	2.73	2.3	2.76	3.27	3.22	3.24	3.51	3.66
Mercury	mg/L							<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.0001			
Phosphorus	mg/L		0.92	0.08	0.06	<0.1	<0.1	0.32	0.28	0.76	0.20	0.17	0.41	0.40	0.24	0.17	0.32	0.24	0.40	0.03	0.20
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L	<0.01	<0.005	0.01	0.014	<0.01	0.02	0.02	0.01	0.007	0.027	0.008	0.01	<0.004				0.006			
Total Dissolved Solids	mg/L				654											480	502	504	468	542	552

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB																	
		Oct-10	Dec-10	Apr-11	Jul-11	Oct-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14
pH	units	7.37	7.54	7.37	7.58	7.8	7.23	7.21	6.93	6.83	6.57	6.77	7.31	6.61	7.13	6.82	7.05	6.73	7.06
Conductivity	µmho/cm	797	862	907	776	666	837	866	860	870	918	851	667	742	708	761	649	708	671
Chloride	mg/L	91	113	113	75	81	76	80	70	77	78	78	49	78	67	78	56	67	59
Phosphate - ortho	mg/L					<0.10				<0.03				<0.09				<0.03	
Sulphate	mg/L	93.9	86.4	87.4	78	129	87	88	101	101	99	91	66	72	55	70	57	52	43
Alkalinity	mg/L	215	208	238	219	173	220	229	231	222	263	234	197	190	189	193	176	189	202
Hardness	mg/L	231	248	257	203	199	214	219	198	229	222	215	186	200	205	219	172	198	186
Total Kjeldahl Nitrogen	mg/L	5.38	4.93	5.24	4.24	4.36	3.96	3.78	3.61	3.53	2.65	2.9	2.87	2.11	2.12	2.31	3.62	2.23	2.22
Ammonia	mg/L	1.59	3.26	1.33	3.09	2.89	2.03	2.89	2.86	2.84	2.64	2.6	2.18	1.93	2.06	2.18	1.82	1.75	1.66
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L					<0.05				<0.10				<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	<5	<5	<5	<5	<5	<5	3	1	4	2	3	2	4	2	2	9	2	2
Chemical Oxygen Demand	mg/L	30	29	25	33	28	35	43	41	60	41	38	24	67	24	31	32	34	34
Dissolved Organic Carbon	mg/L	9.4	10.7	11	11.7	9.3	9.5	9	8.7	7.8	8.4	6.8	6.1	8.4	7	4.9	6.6	6.7	7.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1
Arsenic	mg/L					<0.003				<0.01				<0.01			0.002	0.002	
Barium	mg/L	0.097	0.091	0.083	0.079	0.07	0.068	0.08	0.08	0.07	0.08	0.08	0.05	0.06	0.07	0.06	0.06	0.06	0.05
Boron	mg/L	0.696	0.7	0.933	0.641	0.691	0.654	0.79	0.79	0.78	0.7	0.8	0.54	0.69	0.79	0.84	0.75	0.7	0.64
Cadmium	mg/L					<0.001				<0.0001				<0.0001			<0.0001	<0.0001	
Calcium	mg/L							68	61	72	69	68	58	62	64	68	54	61	58
Chromium	mg/L					0.004				0.004				0.007			<0.001	<0.001	
Copper	mg/L					<0.002				0.001				<0.001			<0.001	<0.001	
Iron	mg/L	37.3	36.6	35.9	31.6	27.6	33.8	35.1	31.8	31.6	40.4	31.2	25.1	30.2	29.9	29.4	24.4	26.4	22.8
Lead	mg/L					<0.002				<0.001				<0.001			<0.001	<0.001	
Magnesium	mg/L							12	11	12	12	11	10	11	11	12	9	11	10
Manganese	mg/L	3.23	3.23	3.55	2.79	2.55	2.57	3.04	2.91	2.76	2.84	2.72	1.97	2.25	2.42	2.5	2.04	2.26	2.02
Mercury	mg/L					<0.0001				<0.0001				<0.0001				<0.0001	
Phosphorus	mg/L	<0.05	<0.05	0.17	0.20	0.34	0.23	0.21	0.18	0.22	0.10	0.19	0.15	0.13	0.09	0.12	0.36	0.13	0.14
Potassium	mg/L									12				11				12	
Sodium	mg/L							72	72	71	76	73	68	62	65	70	57	65	60
Zinc	mg/L					0.008				0.02				<0.01			<0.01	<0.01	
Total Dissolved Solids	mg/L	518	572	546	512	460	484	563	559	566	597	553	434	482	460	495	422	460	436

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB											
		Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16	Apr-17	Jul-17	Sep-17	Dec-17
pH	units	6.95	7.14	6.96	7.6	6.99	7.14	7.15	7.17	7.1	7.2	7.38	7.01
Conductivity	µmho/cm	747	645	646	635	700	620	600	600	670	540	570	620
Chloride	mg/L	80	61	57	76	68	56	53	52	70	46	56	66
Phosphate - ortho	mg/L			<0.03				<0.01				<0.010	
Sulphate	mg/L	51	48	52	60	60	55	49	43	47	46	45	44
Alkalinity	mg/L	204	195	183	177	180	160	160	170	170	150	150	150
Hardness	mg/L	214	198	190	197	190	180	170	170	180	170	150	160
Total Kjeldahl Nitrogen	mg/L	2.26	4.24	2.07	1.79	2	1.8	1.8	1.7	1.8	1.6	1.5	1.6
Ammonia	mg/L	1.71	1.88	1.26	1.6	1.7	1.4	1.4	1.3	1.4	1.3	1.3	1.3
Nitrate	mg/L	<0.10	<0.10	0.21	<0.10	0.12	0.18	<0.1	<0.1	<0.10	<0.10	0.48	<0.10
Nitrite	mg/L			<0.10		0.012	0.011	<0.01	<0.01	<0.010	<0.010	0.086	<0.010
Biochemical Oxygen Demand	mg/L	2	14	2	<1	<2.0	3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L	31	63	42	42	34	37	52	25	25	26	16	22
Dissolved Organic Carbon	mg/L	7.2	7	5.5	5.2	5.7	4.3	4	4.2	3.8	3.4	3.2	3.2
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			0.001				<0.001	0.0012			<0.0010	
Barium	mg/L	0.06	0.05	0.05	0.05	0.056	0.029	0.044	0.052	0.057	0.025	0.04	0.048
Boron	mg/L	0.68	0.53	0.53	0.58	0.48	0.46	0.48	0.49	0.47	0.44	0.4	0.39
Cadmium	mg/L			<0.0001				<0.0001	<0.0001			<0.00010	
Calcium	mg/L	66	61	58	59	56	55	50	51	53	51	44	47
Chromium	mg/L			<0.001				<0.005	<0.005			<0.0050	
Copper	mg/L			<0.001				0.0013	<0.001			<0.0010	
Iron	mg/L	29.7	22.5	20.9	20.3	30	<0.10	12	24	24	<0.10	13	21
Lead	mg/L			<0.001				<0.0005	<0.0005			<0.00050	
Magnesium	mg/L	12	11	11	12	11	11	10	11	12	11	9.4	9.9
Manganese	mg/L	2.45	1.96	2.25	2.23	2	0.014	1.7	1.9	2	0.012	1.1	1.8
Mercury	mg/L			<0.0001				<0.1				<0.1	
Phosphorus	mg/L	0.14	1.88	0.32	0.25					<0.10	<0.10	<0.10	<0.10
Potassium	mg/L			11				11	11			10	
Sodium	mg/L	62	58	52	59	54	51	43	44	47	46	36	39
Zinc	mg/L			<0.01				<0.005	<0.005			<0.0050	
Total Dissolved Solids	mg/L	486	419	420	413	406	370	314	292	370	344	362	410

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHB															
		Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	7.31	7.02	7.35	7.01	6.67	6.98	7.12	6.95	6.99	6.96	6.99	7.31	7	6.74	7.08	6.85
Conductivity	µmho/cm	630	600	590	590	603	418	529	576	578	574	561	599	606	616	6	615
Chloride	mg/L	72	67	67	61	75	41	63	61	64	66	80	73	81	82	70	70
Phosphate - ortho	mg/L			<0.010				<0.6				0.02				0.01	
Sulphate	mg/L	40	41	41	49	43	30	34	33	45	48	47	40	44	44	39	39
Alkalinity	mg/L	160	140	140	140	161	138	134	163	161	134	135	152	129	148	149	163
Hardness	mg/L	150	170	170	170	175	144	175	170	182	178	171	187	207	196	188	193
Total Kjeldahl Nitrogen	mg/L	1.5	1.4	1.3	<0.10	1.3	1.17	1.3	1.06	1.4	0.713	1.18	1.32	1.26	0.962	0.676	1.5
Ammonia	mg/L	1.3	1.4	1.2	<0.050	1.06	0.17	0.95	0.67	1.11	1.12	0.928	0.916	0.932	0.581	0.7	0.776
Nitrate	mg/L	0.16	0.17	<0.10	0.21	<0.10	<0.10	0.17	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.22	<0.10	<0.1
Nitrite	mg/L	<0.010	0.023	<0.010	<0.010			<0.10				<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	<2	5	<2	9	6	5	2	2	5	7		4	4	6		<1
Chemical Oxygen Demand	mg/L	16	14	27	19	15	<5	<5	<5	17	17	25	27	11	7	10	30
Dissolved Organic Carbon	mg/L	3.4	3.2	3	3.2	4.7	13		4.8	3.4	4.9		2.8	3.3	3		4.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1	<1	<1	<1
Arsenic	mg/L			0.0012				<0.001				0.001				0.001	
Barium	mg/L	0.022	0.054	0.052	0.025	0.05	0.04	0.04	0.05	0.06	0.05	0.05	0.06	0.06	0.05	0.06	0.05
Boron	mg/L	0.39	0.33	0.33	0.34	0.35	0.38	0.36	0.37	0.3	0.35	0.29	0.28	0.33	0.32	0.3	0.34
Cadmium	mg/L			<0.00010				<0.0001				<0.0001				<0.0001	
Calcium	mg/L	45	49	50	49	52	43	52	50	53	53	52	55	60	57	24	56
Chromium	mg/L			<0.0050				<0.001				<0.001				<0.001	
Copper	mg/L			0.0014				<0.001				<0.001				<0.001	
Iron	mg/L	<0.10	25	23	<0.10	16.9	9.13	8.02	11.3	24.3	0.04	17.1	24.9	24.7	0.82	20.8	25.3
Lead	mg/L			<0.00050				<0.001				<0.001				<0.001	
Magnesium	mg/L	9.4	11	11	11	11	9	11	11	12	11	10	12	14	13	13	13
Manganese	mg/L	0.012	1.9	1.8	0.092	1.86	0.73	0.92	1.75	1.88	1.81	1.8	1.76	1.94	1.86	1.87	1.77
Mercury	mg/L			<0.1				<0.0001				<0.0001				<0.0001	
Phosphorus	mg/L	0.28	0.14	0.18	0.16	0.231	0.021	0.005	0.013	0.20	0.06	0.31	0.27	0.37	0.28	0.68	0.25
Potassium	mg/L			12				12				11				13	
Sodium	mg/L	37	39	38	38	38	29	32	38	37	35	31	35	39	38	34	40
Zinc	mg/L			<0.0050				<0.01				<0.01				<0.01	
Total Dissolved Solids	mg/L	255	295	325	270	392	272	344	374	376	373	365	389	394	400	398	400

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC																			
		Jan-90	Apr-90	Aug-90	Aug-90	Oct-90	Nov-90	Jan-91	Apr-91	Jul-91	Oct-91	Jan-92	Apr-92	Aug-92	Dec-92	Mar-93	Jul-93	Oct-93	Apr-94	Jul-94	Oct-94
pH	units	7.52	7.49	7.54	7.05	7.38	7.52	7.63	7.19	7.3	7.7	8.35	7.95	7.32	7.84	7.28	7.65	7.66	7.19	7.44	
Conductivity	µmho/cm	1970	1970	1630	1380	989	617	692	739	1020	1209	991	654	680	799	782	495	430	372	350	
Chloride	mg/L	285	273	188	278	76	45	63	92	135	153	106	136	63	91	150	62	63	44	22	72
Phosphate - ortho	mg/L	0.02	0.02	0.02		0.02	0.09	0.09	0.04	0.02	0.02	0.02	0.02	0.04	0.02	0.04	0.10	0.11		0.14	0.11
Sulphate	mg/L																				
Alkalinity	mg/L	713	690	600	514	425	272	295	252	377	374	292	109	265	281	178	152	103	125	122	
Hardness	mg/L	890	717	582		292	208	210	199	339	379	334	110	170	250	109		59	80	80	42
Total Kjeldahl Nitrogen	mg/L	0.7	0.55	0.7	0.6	0.55		0.8	0.55	0.4	0.5	0.6	0.4	0.7	0.8	0.75	0.75	0.85	0.4	0.7	0.55
Ammonia	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.15	0.15	0.05	0.1	0.4	0.1	0.05	0.15	0.15	0.1	0.15
Nitrate	mg/L	0.05	0.05	0.05	0.05	0.05	0.10	0.05	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.05	0.10	<0.05	0.05
Nitrite	mg/L	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.01	0.03	0.01	0.02	0.02	0.02	0.02	0.03	0.01
Biochemical Oxygen Demand	mg/L												3.7								
Chemical Oxygen Demand	mg/L	238	134	150		78	54	66	52	72	42	34	26	94	52	74	48	62	36	60	15.8
Dissolved Organic Carbon	mg/L	43.5	40	25	18.1	14.3	17.5	18.6	13.6	11.4	8.8	10.9	4.3	15	20	13	18	17.8	14.4	15.4	12.3
Phenols	µg/L	122.6	90	57	43.6	25	4	3.4	2.8	2.4	1.6	1	0.6	0.2	0.6	0.8	1.6	0.2	0.6	8	0.6
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	70.62	72	252	67	55	44	21	16	44	59	37	7.5	22	24	9.8		9.6	8.6	9.2	6.61
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L																				
Mercury	mg/L																				
Phosphorus	mg/L	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.08	0.02	0.02	0.02	0.16	0.08	0.06	0.10	0.10	0.12	0.15	0.18	0.16
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC																			
		Dec-94	Feb-95	Apr-95	Jul-95	Oct-95	Apr-96	Jun-96	Jul-96	Oct-96	Apr-97	Jul-97	Oct-97	Dec-97	Apr-98	Jul-98	Oct-98	Nov-98	Apr-99	Jul-99	Oct-99
pH	units	7.64	7.55	7.6	7.41	7.35	7	7.1	7.5	7.2	6.7	6.71	6.79	6.53	6.1	6.9	6.3	6.3	6.4	7.28	7.2
Conductivity	µmho/cm	251	263	278	260	270	460	340	350	610	680	356	818	1102	760	620	320	270	250	180	230
Chloride	mg/L	24	29	26	19	30	62	43	47	99	94	66	124	161	110	76	29	16	12	13	6
Phosphate - ortho	mg/L	0.15	0.16	0.17	0.16	0.24	<0.01	<0.1	<0.1	<0.1	<0.1						<0.5				<0.5
Sulphate	mg/L																				
Alkalinity	mg/L	90	93	102	107	96	103	81	78	56	167	64	196	247	210	180	110	120	120	110	82
Hardness	mg/L	46	50	58	62	68	118	72	78	130	211	84	252	358	240	170	76	72	57	60	48
Total Kjeldahl Nitrogen	mg/L	1.15	0.85	1	0.55	0.55	0.1	0.74	0.87	0.81	1	0.9	0.8	1.4	0.82	1.1	0.58	0.66	0.94	1	0.92
Ammonia	mg/L	0.05	0.55	0.1	0.05	0.15	<0.05	0.25	0.23	0.27	0.34	0.28	0.54	0.76	0.51	0.51	0.37	0.35	0.44	0.35	0.29
Nitrate	mg/L	0.05	0.05	0.05	0.15	0.05	<0.05	<0.05	<0.05	<0.05			<0.1				0.30				<0.25
Nitrite	mg/L	0.02	0.02	0.02	0.02	0.02		<0.05	<0.05	<0.05			<0.1				<0.25				0.02
Biochemical Oxygen Demand	mg/L																<5				<5
Chemical Oxygen Demand	mg/L	65.2	67.1	55.1		44	4	37	42	33	34	12	32	31	27	31	38	50	35	38	57
Dissolved Organic Carbon	mg/L	20	17.3	15.6	15.3	12.6	0.6	6.5	7.6	8.2	8	5	3	10	6.1	9.1	15	15	13	12	14
Phenols	µg/L	0.4	0.6	0.6	0.6	0.4	<2	<1	2.8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.1
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	6.85	6.39	8.65		12.2	13.21	9	9.3	22	27	7.3	31.9	29.3	26	19	9	13	8.3	9.6	9.1
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L														8.1	5.8	2.7	3.8	2.2	0.45	1.8
Mercury	mg/L																				
Phosphorus	mg/L	0.24	0.20	0.15	0.26	0.24		0.23	0.15	0.10	0.10		0.04				0.14		0.27		0.42
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC																			
		Nov-99	Apr-00	Jun-00	Sep-00	Nov-00	Apr-01	Jul-01	Oct-01	Nov-01	Apr-02	Jun-02	Sep-02	Nov-02	Apr-03	Jul-03	Oct-03	Nov-03	Apr-04	Jun-04	Jun-04
pH	units	6.8	7.25	7.47	7.7	7.24	6.97	7.53	7.18	7.54	6.83	7.71	6.8	7.2	6.69	7.2	6.9	7.4	7	7.2	7.1
Conductivity	µmho/cm	220	210	230	210	200	170	380	220	200	180	280	340	230	340	350	270	220	230	240	230
Chloride	mg/L	5	5	8	6	16	24	29	17	12	9	24	64	18	39	33	17	15	19	19	29
Phosphate - ortho	mg/L				<0.1				<0.5				<0.5				<0.5			<0.5	<0.5
Sulphate	mg/L																		11	8.8	8.3
Alkalinity	mg/L	88	85	85	78	72	43	110	91	57	74	84	62	62	100	100	91	82	70	72	71
Hardness	mg/L	46	40	70	38	52	42	89	74	56	51	74	82	59	110	130	93	73	66	63	63
Total Kjeldahl Nitrogen	mg/L	0.85	0.9	0.52	1.3	0.61	0.59	0.86	1	0.3	0.18	0.72	0.87	0.63	0.66	0.78	0.74	0.89	0.67	0.59	0.68
Ammonia	mg/L	0.24	0.27	0.29	0.34	0.34	0.21	0.46	0.56	0.45	0.16	0.39	0.47	0.4	0.45	0.57	0.53	0.53	0.46	0.45	0.52
Nitrate	mg/L				<0.05				<0.05				<0.05				<0.05				<0.05
Nitrite	mg/L				<0.01				0.01				0.01				<0.01			<0.01	<0.01
Biochemical Oxygen Demand	mg/L				<5				<5				<5				<5				<5
Chemical Oxygen Demand	mg/L	43	43	49	53	39	17	28	37	49	18	35	20	37	17	25	<10	<10	29	21	22
Dissolved Organic Carbon	mg/L	14	15	15	14	10	3.2	6.8	8.4	8.6	5.9	4.7	5.5	7.1	3.4	4.8	6.4	7	5.8	6.6	7
Phenols	µg/L	<1	4.3	2	<1	4.5	<1	1.3	<1	7.6	1.1	<1	1.9	1.4	2.3	<1	1.1	1.3	1.8	<1	<1
Arsenic	mg/L																		<0.01	<0.01	<0.01
Barium	mg/L																		0.025	0.021	0.021
Boron	mg/L																		0.043	0.042	0.043
Cadmium	mg/L																		<0.002	<0.002	<0.002
Calcium	mg/L																				
Chromium	mg/L																		0.002	0.003	0.003
Copper	mg/L																		<0.002	<0.002	<0.002
Iron	mg/L	9.5	8.5	8.9	9.3	10	2.6	8.8	10	8.1	3.7	6	9.5	6.8	11	18	14	12	7.7	7.9	8.3
Lead	mg/L																		<0.01	<0.01	<0.01
Magnesium	mg/L																				
Manganese	mg/L	1.8	1.6	1.6	1.5	2	1.3	2.9	2.9	2.1	1.7	2.7	3.3	2.4	4.3	5.4	3.9	3	2.6	2.6	2.6
Mercury	mg/L																			<0.05	<0.05
Phosphorus	mg/L				0.49				0.26				0.08				0.13		0.07	0.10	0.17
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																		0.005	0.005	<0.005
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC																	
		Sep-04	Nov-04	Apr-05	Jun-05	Sep-05	Nov-05	Apr-06	Jun-06	Oct-06	Nov-06	Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08
pH	units	6.9	6.99	7.6	7.55	7.76	7.74	7.3	7.8	7.6	7.8	6.9	6.72	6.6	7.02	7.19	7.38	7.68	7.76
Conductivity	µmho/cm	270	320	214	300	206	146	119	177	161	146	152	169	173	151	141	218	271	199
Chloride	mg/L	29	38	15	22	11	7	15	9	7	6	13	10	8	10	22	19	43	15
Phosphate - ortho	mg/L	<0.5	<0.5			<1								<0.10					
Sulphate	mg/L		19	7.6	12		3	3	3		5	5.33	3.64		10.1	4.14	9.31		4.75
Alkalinity	mg/L	72	99	81	101	89	72	36	77	73	62	48	91	64	50	27	64	54	73
Hardness	mg/L	83	130	89	106	72	53	35	60	57	48	46	55	47	51	37	72	70	63
Total Kjeldahl Nitrogen	mg/L	0.35	1	2	1	0.9	0.8	0.4	0.9	0.8	0.9	0.35	0.81	0.83	0.8	0.21	0.63	0.89	0.95
Ammonia	mg/L	0.6	0.71	0.35	0.76	0.62	0.5	0.16	0.61	0.65	0.42	0.05	0.31	0.55	0.32	<0.02	0.69	0.59	0.43
Nitrate	mg/L	<0.05	<0.05			<0.2		<0.1	<0.1	<0.1				0.54					<0.05
Nitrite	mg/L	0.02	<0.01					<0.01	<0.01	<0.01				0.24					
Biochemical Oxygen Demand	mg/L	<5	<5							2				<5				5	9
Chemical Oxygen Demand	mg/L	45	25	18	13	26	24	12	21	28	24	8.1	13	18	32	10	8	<5	5
Dissolved Organic Carbon	mg/L	5.8	5	4.4	8	7.8	9.4	3.8	7.6	9.1	9.9	4.8	8.3	8.3	8.9	2.9	7	4.2	7.4
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1		1	<1	<1	1	1
Arsenic	mg/L		<0.01	<0.2	<0.2	<0.2	0.002	<0.001	0.002	<0.2	<0.2	<0.003							
Barium	mg/L	0.024	0.036	0.03	0.04	0.02	0.016	0.016	0.022	<0.02	<0.02	0.019	0.014	0.018	0.018	0.017	0.035	0.031	0.021
Boron	mg/L	0.038	0.018	<0.02	0.02	0.06	0.016	0.013	0.038	0.04	0.04	0.02	0.03		0.027	<0.010	0.029	0.02	0.024
Cadmium	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.0001	<0.0001	0.0002	<0.005	<0.005	<0.0001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Calcium	mg/L																		
Chromium	mg/L	<0.004	<0.004	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	<0.01	0.124	<0.003	<0.003	0.021	<0.003	<0.003	<0.003	
Copper	mg/L	<0.006	<0.006	<0.02	<0.02	<0.02	0.002	0.003	0.004	<0.02	<0.02	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Iron	mg/L	12	22	4.98	13.4	10	8.3	1.7	5.9	6.5	7.41	1.37	3.95	6.54	8.98	1.5	4.49	7.23	6.86
Lead	mg/L	<0.02	<0.02	<0.05	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.05	<0.05	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	
Magnesium	mg/L																		
Manganese	mg/L	3.4	5.1	2.42	4.07	2.73	2	0.74	2	2.16	1.92	0.975	1.63	2.31	2.19	0.619	2.18	3.4	2.28
Mercury	mg/L		<0.05									<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.13	0.18	<0.1	3.47		0.61	0.07	0.13	0.20	0.20	0.28	0.20	0.34	1.42	0.48	0.11	0.25	0.20
Potassium	mg/L																		
Sodium	mg/L																		
Zinc	mg/L	<0.005	0.011	0.02	0.01	<0.01	0.005	0.005	0.013	0.03	<0.01	<0.004	<0.005	0.016	<0.004	0.011	<0.004	<0.004	
Total Dissolved Solids	mg/L								133										

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC															
		Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10	Apr-11	Jul-11	Sep-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12
pH	units	7.53	7.37	7.36	7.62	7.32	7.36	7.47	7.53	7.57	7.5	7.46	7.35	6.97	7.07	6.9	6.55
Conductivity	µmho/cm	218	237	303	328	330	264	224	232	193	218	172	144	144	178	144	137
Chloride	mg/L	25	36	40	46	37	28	22	22	12	23	9	6	7	12	6	7
Phosphate - ortho	mg/L			<0.10								<0.10				0.95	
Sulphate	mg/L	9.72	14.1	21.6	28.4	40.9	26.5	19.2	19.5	8.91	13.3	7.2	7.91	1	7	3	3
Alkalinity	mg/L	58	48	71	70	77	68	69	67	71	62	71	61	60	64	64	60
Hardness	mg/L	60	66	101	111	119	93	86	82	68	70	59	51	38	41	47	38
Total Kjeldahl Nitrogen	mg/L	0.53	1.11	0.67	1.04	1.27	0.97	1.09	1.17	1.11	1.02	0.81	0.92	0.57	0.73	0.78	0.49
Ammonia	mg/L	0.18	0.35	0.31	0.27	0.12	0.41	0.38	0.6	0.35	1.21	0.68	0.52	0.49	0.58	0.56	0.53
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L			<0.05								<0.05				<0.10	
Biochemical Oxygen Demand	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1	<1	3	2
Chemical Oxygen Demand	mg/L	6	7	12	14	17	10	8	15	11	13	21	26	19	28	19	20
Dissolved Organic Carbon	mg/L	4.7	4.5	4.4	4.3	5.5	5.8	9.5	6.3	7.3	7.3	7.5	15.8	8	5.7	8	8.2
Phenols	µg/L	<1	2	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			<0.003								0.005				<0.01	
Barium	mg/L	0.031	0.027	0.037	0.043	0.046	0.04	0.032	0.036	0.029	0.036	0.033	0.025	0.02	0.02	0.02	0.02
Boron	mg/L	0.027	0.019	0.029	0.017	0.017	0.042	0.024	0.034	0.033	0.031	0.032	0.026	0.03	0.04	0.02	0.03
Cadmium	mg/L			<0.001								<0.001				<0.0001	
Calcium	mg/L													12	13	14	12
Chromium	mg/L			<0.003								<0.003				0.003	
Copper	mg/L			<0.002								<0.002				0.001	
Iron	mg/L	4.35	5.76	14.2	16.8	22.7	17.3	16.8	18.5	15.7	17.5	17	13.5	9.53	10.1	10.2	9.86
Lead	mg/L			<0.002								<0.002				<0.001	
Magnesium	mg/L													2	2	3	2
Manganese	mg/L	2.27	2.77	4.96	4.94	5.33	4.58	3.55	3.36	2.81	2.8	2.58	1.95	1.82	2.04	2.07	1.82
Mercury	mg/L			<0.0001								<0.0001				<0.0001	
Phosphorus	mg/L	0.08	0.09	0.16	0.54	0.12	0.16	0.39	0.39	0.47	0.41	0.83	0.50	0.36	0.35	0.40	0.46
Potassium	mg/L															2	
Sodium	mg/L													9	12	8	9
Zinc	mg/L			<0.005								0.011				<0.01	
Total Dissolved Solids	mg/L	156	172	208	150	256	214	180	182	148	206	168	136	94	116	94	89

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC															
		Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14	Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16
pH	units	6.78	7.37	6.71	7.1	6.55	7.29	6.54	6.9	6.85	7.19	6.94	7.18	6.73	7.09	7.32	7.37
Conductivity	µmho/cm	175	215	226	196	204	249	489	451	476	376	410	369	230	310	300	180
Chloride	mg/L	14	20	29	23	19	37	112	91	67	61	48	48	42	49	27	11
Phosphate - ortho	mg/L			0.29				<0.03				<0.03				<0.1	
Sulphate	mg/L	10	10	7	4	11	11	13	19	42	20	36	32	8.6	16	18	9.9
Alkalinity	mg/L	57	64	59	53	59	48	35	50	73	60	87	79	31	55	85	63
Hardness	mg/L	52	66	55	59	61	57	119	114	142	102	142	133	39	66	76	50
Total Kjeldahl Nitrogen	mg/L	0.8	0.71	0.78	0.61	0.96	0.78	0.73	0.84	1.1	0.91	1.16	0.99	0.26	0.99	1.2	0.88
Ammonia	mg/L	0.65	0.71	0.67	0.65	0.74	0.63	0.72	0.68	0.79	0.73	1.02	0.962	0.095	0.85	0.97	0.68
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.2	<0.1
Nitrite	mg/L			<0.10				<0.10				<0.10		<0.010	0.011	<0.02	0.014
Biochemical Oxygen Demand	mg/L	2	<1	<1	2	1	<1	1	<1	<1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L	16	7	14	16	16	<5	<5	8	14	16	18	22	24	4.4	26	23
Dissolved Organic Carbon	mg/L	6	3.2	5.5	8.7	8.1	2.7	1.6	2	3.1	2.8	3.1	2.5	3.2	2.3	4.8	6.6
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			<0.01			0.002	0.002				0.001				0.0011	0.0011
Barium	mg/L	0.03	0.04	0.03	0.3	0.03	0.04	0.08	0.06	0.06	0.07	0.07	0.06	0.035	0.041	0.043	0.027
Boron	mg/L	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.05	0.05	0.11	0.12	0.055	0.075	0.26	0.12
Cadmium	mg/L			<0.0001			<0.0001	<0.0001				<0.0001				<0.0001	<0.0001
Calcium	mg/L	16	20	17	17	18	18	36	34	42	31	42	40	13	20	23	15
Chromium	mg/L			0.001			<0.001	<0.001				<0.001				<0.005	<0.005
Copper	mg/L			<0.001			<0.001	<0.001				<0.001				<0.0010	<0.0010
Iron	mg/L	12	6.79	8.89	11.7	10.8	5.3	17.3	15.6	24.5	8.86	15.1	19.6	2.4	8.6	12	9.4
Lead	mg/L			<0.001			<0.001	<0.001				<0.001				<0.0005	<0.0005
Magnesium	mg/L	3	4	3	4	4	3	7	7	9	6	9	8	1.8	4.1	4.6	3.1
Manganese	mg/L	2.31	2.26	2.27	2.73	2.87	2.62	5.89	5.3	6.65	4.79	6.46	5.48	0.91	2.9	3.4	2.3
Mercury	mg/L			<0.0001				<0.0001				<0.0001				<0.1	
Phosphorus	mg/L	0.44	0.08	0.11	0.26	0.23	0.03	0.03	0.09	0.04	0.05	<0.05	0.06				
Potassium	mg/L			2				3				3				2.6	1.9
Sodium	mg/L	12	17	18	17	14	21	35	32	29	33	16	17	23	27	25	13
Zinc	mg/L			<0.01			<0.01	<0.01				<0.01				<0.005	<0.005
Total Dissolved Solids	mg/L	114	140	147	127	133	162	318	293	309	244	266	240	182	242	186	164

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHC																			
		Apr-17	Jul-17	Sep-17	Dec-17	Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	7.1	7.32	7.14	7.28	7.4	7.21	7.32	7.23	6.68	6.92	6.99	7.14	7.06	7.04	6.95	7.28	7.18	6.77	7.14	6.97
Conductivity	µmho/cm	130	270	400	230	240	300	330	270	303	303	527	218	372	340	254	250	218	213	148	152
Chloride	mg/L	21	33	86	18	17	49	40	23	41	67	128	22	55	47	35	27	20	18	9	13
Phosphate - ortho	mg/L			<0.010				<0.10				<0.6				0.031				0.224	
Sulphate	mg/L	3.2	13	8.7	8.7	16	12	18	12	21	9	10	7	21	23	15	12	6	7	1	2
Alkalinity	mg/L	21	62	42	76	78	51	75	80	80	47	34	76	74	70	70	75	64	75	70	69
Hardness	mg/L	27	45	62	41	50	50	70	64	86	60	100	47	107	96	74	78	74	66	47	50
Total Kjeldahl Nitrogen	mg/L	0.15	0.76	0.68	0.83	0.87	0.68	0.94	0.89	0.9	0.66	0.9	0.609	1.58	1.31	0.956	1.1	0.767	0.916	0.981	1.37
Ammonia	mg/L	<0.050	0.69	0.7	0.69	0.83	0.67	0.93	0.87	0.81	0.02	0.82	0.123	0.979	0.96	0.861	0.872	0.659	0.589	<0.01	0.595
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.050	0.022	<0.010	<0.050			<0.10				<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	<2.0	3	<2.0	<2.0	<2	3	<2	10	<1	<1	3	<1	2	3		4	3	5		,1
Chemical Oxygen Demand	mg/L	14	<4.0	5.3	11	16	5.2	12	15	14	<5	<5	<5	10	12	14	14	15	5	14	23
Dissolved Organic Carbon	mg/L	2	2.2	0.85	5.3	4.6	2.5	2.9	4.1	3.2	2.1		5.6	2.4	3		1.9	2.8	7		8.2
Phenols	µg/L	<1	<1	<1	<1	3.1	<1	1.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			0.0012				<0.0010				<0.001				0.002				0.003	
Barium	mg/L	0.019	0.03	0.039	0.024	0.027	0.033	0.043	0.034	0.04	0.04	0.08	0.03	0.06	0.05	0.03	0.04	0.03	0.05	0.03	0.02
Boron	mg/L	0.015	0.042	0.035	0.11	0.1	0.051	0.11	0.11	0.1	0.03	0.04	0.1	0.1	0.12	0.09	0.12	0.11	0.12	0.08	0.12
Cadmium	mg/L			<0.00010				<0.00010				<0.0001				<0.0001				<0.0001	
Calcium	mg/L	9.3	14	18	12	15	15	21	19	26	19	30	14	33	30	23	23	23	20	14	15
Chromium	mg/L			<0.0050				<0.0050				<0.001				0.001				0.002	
Copper	mg/L			<0.0010				0.0012				<0.001				0.001				0.001	
Iron	mg/L	0.26	3.7	9.2	6.4	8.8	4.6	7.1	9.5	15.7	4.46	18.8	6.91	10.4	17.2	14.1	18.6	16.1	24.3	18.2	19.1
Lead	mg/L			<0.00050				<0.00050				<0.001				<0.001				<0.001	
Magnesium	mg/L	0.78	2.7	3.9	2.5	3	3	4.2	3.9	5	3	6	3	6	5	4	5	4	4	3	3
Manganese	mg/L	0.17	1.8	2.9	1.9	2.2	2.2	3.1	3	3.44	2.4	4.73	2.02	4.33	4.67	3.09	2.94	2.88	2.64	2.01	1.73
Mercury	mg/L			<0.1				<0.1				<0.0001				<0.0001				<0.0001	
Phosphorus	mg/L	<0.10	<0.10	<0.10	<0.10	0.089	0.057	0.037	0.048	0.08	0.012	0.003	0.051	0.021	0.042	0.061	0.082	0.087	0.16	0.22	0.262
Potassium	mg/L			2.4				2.7				3				2				2	
Sodium	mg/L	13	30	39	26	23	32	31	21	20	34	47	27	24	20	13	15	14	17	12	18
Zinc	mg/L			<0.0050				<0.0050				<0.01				<0.01				<0.01	
Total Dissolved Solids	mg/L	84	206	304	225	145	95	195	150	197	197	343	142	242	221	165	162	142	221	96	99

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2																			
		Jan-91	Feb-91	Apr-91	Jul-91	Aug-91	Oct-91	Jan-92	Feb-92	Mar-92	Apr-92	Jul-92	Aug-92	Nov-92	Jan-93	Mar-93	Apr-93	Oct-93	Feb-94	Apr-94	May-94
pH	units	6.75	5.86	6.18	6.3	6.81	6.48	6.8	8	5.5	6.53	6.6	7.2	6.5	6.57	6.5	6.76	6.83	6.64	6.46	6.77
Conductivity	µmho/cm	1780	2270	1390	1208	729	902	1003	1400	1271	1124	1244	1700	2000	2560	2200	2260	2140	2130	2390	2140
Chloride	mg/L	129	180	170	224	59	83	108	136	120	100	131	215	220	327	273	204	205	208		275
Phosphate - ortho	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.02		<0.02
Sulphate	mg/L																				
Alkalinity	mg/L	636	730	362	326	247	283	414	415	385	453	466	679	601	761	804	808	838	925	976	962
Hardness	mg/L	685	902	447	328	257	306	362	505	438	534	577	592	688	763	791	1135	928	795	974	950
Total Kjeldahl Nitrogen	mg/L	5.35	18.1	11.8	13	6.75	6.95	10.5	16.8	14.1	3.75	6.9	18.9	16.8	25	19.3	5.25	9.85	9.15	11.3	13.5
Ammonia	mg/L	3.9	15.1	10.4	8.35	5.7	6.1	8.6	14.4	12.5	3	5.2	12.9	15.1	22.6	16.6	3.15	6.85	7	8.6	10.4
Nitrate	mg/L	0.05	0.20	0.05	0.05	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.05	0.05	0.05	0.15	0.10
Nitrite	mg/L	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.01	0.02	0.02	0.03	0.04	0.01	0.03	0.01	<0.005	<0.005	0.01
Biochemical Oxygen Demand	mg/L										292										
Chemical Oxygen Demand	mg/L	962	2202	718	1084	276	366	542	998	698	402	1010	1256	1324	1258	1398	304	1014	368	466	488
Dissolved Organic Carbon	mg/L	350	700	227	154	93	111	155	275	234	105	242	255	430	440	182	570	250	90	87.5	133
Phenols	µg/L	353	595	156	375	131	193	258	35.6	337.6	160	265	333	450	475	260	392.6	300		226	55
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	76	200	71	86	84		110	34	200	99	120	130	180	170	130	200	20	42	22	3.1
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L																				
Mercury	mg/L																				
Phosphorus	mg/L	0.02	0.04	0.02	0.10	0.05	0.02	0.20	0.10	0.05	0.10	0.05	0.05	0.02	0.02	0.05	0.05	0.02	<0.02	0.10	0.05
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2																			
		Sep-94	Oct-94	Nov-94	Dec-94	Feb-95	Mar-95	Apr-95	May-95	Jul-95	Sep-95	Oct-95	Nov-95	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96
pH	units	7.86	8.24	8.44	7.5	7.08	6.52	6.54	7.54	6.31	6.91	6.85	6.74	6.6	6.7	6.9	7.1	7.3	7.1	7.4	6.9
Conductivity	µmho/cm	2030	1560	1610	2820	3080	3260	3240	2780	3650	3090	3090	3000	4539	4000	4200	3500	3500	3100	3200	3000
Chloride	mg/L	277	249	268	382	391	372	284	317	293	347	341	302	405	380	390	400	370	370	350	330
Phosphate - ortho	mg/L	0.10	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.01		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphate	mg/L																				
Alkalinity	mg/L	658	645	699	1130	1200	1260	1210	878	1400	1190	1210	1240	1438	1800	2000	1900	1600	1400	1400	1500
Hardness	mg/L	846	845	885	1100	906	1430	1450	1550	1480	1070	1210	1460	1474	1500	1600	1600	1400	1100	1100	1000
Total Kjeldahl Nitrogen	mg/L	18	17.1	21.2	35	46	20.8	15.6		8.25	34.8	24.5	8.9	15.1	36	34	28	26	19	20	26
Ammonia	mg/L	14.1	12.2	16.9	31.8	38.2	16.6	7.85	18.4	4.75	28.7	16.9	6	<0.05	31	25	20	19	18	18	23
Nitrate	mg/L	0.05	0.05	0.05	0.05	0.05	0.40	0.15	0.05	0.05	0.05	0.05	8.15	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L	0.03	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Biochemical Oxygen Demand	mg/L			155				1400		1830			1310	8	67	48	160	64	120	120	200
Chemical Oxygen Demand	mg/L	800	441	467	238	448	2060	2260	884		538	914		17	440	430	430	280	290	380	280
Dissolved Organic Carbon	mg/L	210	123	128	165	143	615	105	315	740	173	357	645		130	130	140	82	87	86	64
Phenols	µg/L	95	43.5	100	97.5	110	285	513	264	700	302	320	410		180	180	190	160	110	100	16
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	130	12.8	66.2	0.39	24.8	89.6			234	65.7	1.1	26.1	22	120	160	160	140	100	76	110
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L																				
Mercury	mg/L																				
Phosphorus	mg/L	<0.02	0.04	0.04	0.20	0.05	0.10	0.20		0.10	0.10	0.20	8.04		0.28	0.12	0.24	0.24	0.20	0.27	0.28
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2																
		Apr-97	Jul-97	Oct-97	Dec-97	Apr-98	Jul-98	Nov-99	Apr-00	Jun-00	Sep-00	Apr-01	Jul-01	Oct-01	Nov-01	Apr-02	Jun-02	Sep-02
pH	units	6.79	6.82	7.1	6.42	6.6	7	6.4	7.65	6.57	7.89	7.89	8.08	7.57	7.57	7.58	7.3	7.51
Conductivity	µmho/cm	2580	2930	3040	2460	2400	2600	2400	1900	1700	1600	1600	1900	1500	1500	1400	1300	1500
Chloride	mg/L	267	339	342	242	260	270	240	180	140	130	150	140	130	120	91	63	75
Phosphate - ortho	mg/L								<0.1					<0.5				<0.5
Sulphate	mg/L																	
Alkalinity	mg/L	1022	1165	1194	974	740	1000	1000	650	560	520	520	550		470	550	430	660
Hardness	mg/L	788	1238	768	687	820	780	530	540	510	470	520	520	470	430	510	500	540
Total Kjeldahl Nitrogen	mg/L	27.8	18.3	22.9	25.8	24	29	32	27	22	25	26	33		24	15	11	16
Ammonia	mg/L	17	15	20	20	20	23	22	22	20	2	20	19		15	12	6.4	7.8
Nitrate	mg/L			<0.1					0.20					<0.05				<0.05
Nitrite	mg/L			<0.1					0.02					<0.01				<0.01
Biochemical Oxygen Demand	mg/L									19						8.8		83
Chemical Oxygen Demand	mg/L	492	348	306	277	340	260	210	170	130	280	160	220		170	160	130	100
Dissolved Organic Carbon	mg/L	79	63	48	60	53	58	52	50	35	43	40	40		36	37	26	92
Phenols	µg/L	12	19	7	5	6.9	2	2.3	3.5	6.3	2.2	20	13	7.4	<1	5.7	9.8	70
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	76	103	80.9	78.8	88	51	67	68	53	48	62	71	59	55	37	36	11
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L					26	21	11	14	12	12	12	12	9.9	9	14	14	20
Mercury	mg/L																	
Phosphorus	mg/L			0.17		0.65	0.19		0.41		0.52			0.26				0.22
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2													
		Nov-03	Apr-04	Jun-04	Jun-04	Sep-04	Nov-04	Apr-05	Jun-05	Sep-05	Nov-05	Apr-06	Jun-06	Apr-07	Oct-07
pH	units	6.8	6.5	6.5	6.5	6.5	7.28	7.42	7.36	7.9	7.99	7.6	7.7	7.87	7.32
Conductivity	µmho/cm	1100	1000	1100	1300	1200	1100	1010	1010	938	899	1210	1120	785	978
Chloride	mg/L	61	45	48	60	65	68	65	66	65	74	94	64	50	73
Phosphate - ortho	mg/L			<0.5	<0.5	<0.5	<0.5		<1						<0.10
Sulphate	mg/L		170	97	160		100	89	85.1		85	124	109	83.6	
Alkalinity	mg/L	410	360	500	350	520	380	347	339	315	337	422	408	246	315
Hardness	mg/L	420	420	450	460	570	430	364	344	279	306	430	390	266	339
Total Kjeldahl Nitrogen	mg/L	18	9.5	10	13	11	11	12.3	12.6	4	11	4.8	11	6.8	
Ammonia	mg/L	9.3	6.7	7	10	8	8.5	8.1	9.8	4.37	8.4	3.9	8.79	6.8	8.19
Nitrate	mg/L				<0.05	<0.05	0.05			1.90		<0.1	<0.1		0.55
Nitrite	mg/L				<0.01	0.02	<0.01					<0.01	0.01		<0.05
Biochemical Oxygen Demand	mg/L				9.9	55	<5			21					31
Chemical Oxygen Demand	mg/L	140	99	180	160	140	85	130	110	68	63	110	120	55.8	128
Dissolved Organic Carbon	mg/L	28	16	32	34	27	23	26.4	38.2	24	24.5	26	32.4	19.2	24.9
Phenols	µg/L	<1	8.2	10	11	12	110	3	1	5		<1	<1	5	
Arsenic	mg/L		<0.01	<0.01	<0.01		<0.01	<0.2	<0.2	<0.2	<0.001	<0.001	<0.001	<0.003	
Barium	mg/L		0.13	0.15	0.14	0.25	0.22	0.24	0.22	0.18	0.15	0.082	0.21	0.066	0.159
Boron	mg/L		0.45	0.48	0.6	0.62	0.58	0.68	0.59	0.55	0.58	0.66	0.64	0.453	
Cadmium	mg/L		<0.002	<0.002	<0.002	0.008	<0.005	<0.005	<0.005	<0.005	<0.0001	<0.0001	0.0006	<0.0001	0.0006
Calcium	mg/L														
Chromium	mg/L		0.002	0.003	0.002	0.018	0.008	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	0.035	0.005
Copper	mg/L		0.013	0.029	<0.002	0.047	0.014	<0.02	0.02	<0.02	<0.001	0.003	0.004	<0.002	0.006
Iron	mg/L	24	27	40	0.42	59	44	43.6	33.4	23.9	0.1	3.6	31	6.93	23.6
Lead	mg/L		<0.01	<0.01	<0.01	0.031	<0.02	<0.05	<0.05	<0.05	<0.0005	<0.0005	0.0014	<0.001	0.004
Magnesium	mg/L														
Manganese	mg/L	11	11	12	8.5	11	9.3	7.77	5.71	4.4	5.2	8	6.4	3.86	5.28
Mercury	mg/L			<0.05	<0.05		0.05							<0.0001	<0.0001
Phosphorus	mg/L		0.07	0.04	0.03	0.65	0.28				0.21	<0.005	0.06	0.10	
Potassium	mg/L														
Sodium	mg/L														
Zinc	mg/L		0.088	0.11	0.013	0.66	0.22	0.13	0.54	0.04	0.012	0.14	0.053	0.036	0.171
Total Dissolved Solids	mg/L												732		

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2													
		Apr-08	Jun-08	Sep-08	Dec-08	Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10	Apr-11	Jul-11
pH	units	7.03	7.07	7.38	7.28	7.18	7.32	7.35	7.81	7.42	8.2	7.56	7.78	7.65	7.75
Conductivity	µmho/cm	1200	1180	1200	962	1090	967	850	890	888	828	747	802	898	735
Chloride	mg/L	149	72	69	45	62	52	44	60	68	63	55	54	63	51
Phosphate - ortho	mg/L							<0.10							
Sulphate	mg/L	85	101		82.3	74	71.2	78.7	95.9	86.5	87.5	78.7	78.9	77.9	111
Alkalinity	mg/L	381	442	513	373	430	376	338	302	317	275	274	288	312	211
Hardness	mg/L	490	457	473	387	401	365	330	341	327	295	270	289	311	248
Total Kjeldahl Nitrogen	mg/L	14.9	12.2	9.52	7.76	10.5	7.87	6.89	7.17	8.01	7.85	8.36	8.27	9.47	8.44
Ammonia	mg/L	2.77	9.8	0.76	8.21	9.17	8.24	2.84	0.04	3.13	7.34	7.32	5.93	6.75	6.56
Nitrate	mg/L			<0.05	<0.05	<0.05	<0.10	<0.05	0.05	<0.05	0.14	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L			<0.05				<0.05							
Biochemical Oxygen Demand	mg/L			29	27	<5	8	<5	6	<5	17	<5	<5	<5	<5
Chemical Oxygen Demand	mg/L	100	91	66	49	50	45	38	41	66	67	70	56	53	59
Dissolved Organic Carbon	mg/L	22.7	26.6	30.6	28.7	18.5	20.8	14.5	19.6	21.1	20.3	18.6	21.8	22.9	20.9
Phenols	µg/L		7	13	32	1	1	2					<1	<1	1
Arsenic	mg/L							<0.003							
Barium	mg/L	0.127	0.116	0.109	0.104	0.136	0.143	0.088	0.149	0.144	0.152	0.205	0.152	0.167	0.127
Boron	mg/L	0.452	0.4	0.4	0.343	0.59	0.469	0.42	0.491	0.441	0.566	0.56	0.523	0.658	0.464
Cadmium	mg/L	<0.001	<0.001	<0.001				<0.001							
Calcium	mg/L														
Chromium	mg/L	0.005	0.007	0.005				0.003							
Copper	mg/L	0.003	<0.002	<0.002				<0.002							
Iron	mg/L	11.5	9.22	21.4	132	33.3	29.3	22	25.7	26.1	21.6	29.2	21.7	23.8	16.4
Lead	mg/L	<0.001	<0.001	<0.001				<0.002							
Magnesium	mg/L														
Manganese	mg/L	4.68	6.56	35.5	88.8	11.7	12.6	9.44	6.57	5.86	5.43	5.14	4.08	4.22	4.21
Mercury	mg/L	<0.0001	<0.0001	11.3				<0.0001							
Phosphorus	mg/L	0.10	<0.05	0.07	0.07	0.06	0.07	0.06	<0.05	0.03	<0.05	0.05	<0.05	<0.05	<0.05
Potassium	mg/L														
Sodium	mg/L														
Zinc	mg/L	0.035	0.006	0.014				0.012							
Total Dissolved Solids	mg/L					640	566	566			520	460	504	526	518

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2														
		Oct-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14	Apr-15
pH	units	7.9	7.52	7.42	6.91	7.15	6.71	6.79	7.21	6.72	7.03	6.91	7.08	6.93	7.04	7.01
Conductivity	µmho/cm	729	861	964	856	790	845	901	914	834	793	750	725	694	778	802
Chloride	mg/L	40	51	64	45	40	45	52	61	32	37	32	31	21	33	30
Phosphate - ortho	mg/L	<0.10				<0.03				0.12				<0.03		
Sulphate	mg/L	107	76.9	86	73	75	73	81	105	90	80	72	74	73	72	64
Alkalinity	mg/L	280	305	317	304	269	306	331	270	301	262	270	257	250	296	310
Hardness	mg/L	277	313	309	286	252	272	344	337	309	290	283	271	265	290	319
Total Kjeldahl Nitrogen	mg/L	12.1	17	9.89	13.8	9.19	12.1	8.25	6.46	8.07	4.69	7.9	3.98	7.5	4.43	4.46
Ammonia	mg/L	9.73	10.6	8.27	7.5	7.88	7.88	6.63	4.4	4.1	4.78	7.42	2.79	4.8	3.84	3.37
Nitrate	mg/L	1.13	0.76	0.53	0.15	0.26	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.05				<0.10		<0.10		<0.10				<0.10		
Biochemical Oxygen Demand	mg/L	10	21	2	4	4	3	2	3	7	2	5	5	3	2	4
Chemical Oxygen Demand	mg/L	55	62	53	70	225	93	56	92	125	43	90	44	57	33	88
Dissolved Organic Carbon	mg/L	18.4	22.2	17	18.3	17.1	16.8	18.3	18.3	14.5	13	13.7	10.4	11.2	13.2	12.1
Phenols	µg/L	3	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	<0.003				<0.001				<0.001			<0.001	<0.001		
Barium	mg/L	0.172	0.163	0.13	0.14	0.14	0.15		0.14	0.06	0.11	0.12	0.07	0.1	0.08	0.06
Boron	mg/L	0.6	0.603	0.53	0.61	0.46	0.49	0.73	0.61	0.54	0.62	0.6	0.61	0.5	0.61	0.65
Cadmium	mg/L	<0.001				<0.0001				0.0002			<0.0001	<0.0001		
Calcium	mg/L			89	85	76	81	103	92	84	83	82	74	78	80	85
Chromium	mg/L	0.005				0.004				0.004			<0.001	0.001		
Copper	mg/L	<0.002				0.001				0.002			0.002	<0.001		
Iron	mg/L	24.8	21.2	14.7	19	20.3	24.6	27.4	14.7	15.1	11.1	17.6	4.79	12.6	8.8	5.02
Lead	mg/L	<0.002				<0.001				<0.001			<0.001	<0.001		
Magnesium	mg/L			21	18	15	17	21	26	24	20	19	21	17	22	26
Manganese	mg/L	3.51	3.77	4.09	3.86	3.33	3.22	3.65	4.3	5.01	4.15	3.31	4.93	4.19	4.96	5.76
Mercury	mg/L	<0.0001				<0.0001				<0.0001				<0.0001		
Phosphorus	mg/L	0.33	0.52	0.22	0.16	0.19	0.12	0.11	0.09	0.15	0.06	0.11	0.05	0.11	0.05	0.07
Potassium	mg/L					15				15				13		
Sodium	mg/L			49	49	44	44		62	46	48	41	40	35	44	50
Zinc	mg/L	0.01				0.03				0.03			0.15	<0.01		
Total Dissolved Solids	mg/L	508	496	627	556	514	549	586	594	542	515	488	471	451	506	521

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2										
		Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16	Apr-17	Jul-17	Sep-17	Dec-17
pH	units	7.95	7.38	7.9	6.64	7.26	7.34	7.1	7.04	7.25	7.28	7.1
Conductivity	µmho/cm	723	663	678	580	670	670	590	720	680	660	670
Chloride	mg/L	26	20	31	31	30	20	21	25	20	16	16
Phosphate - ortho	mg/L		<0.03				<0.010				<0.010	
Sulphate	mg/L	67	69	53	110	75	61	48	65	76	76	70
Alkalinity	mg/L	331	260	265	130	220	250	220	250	250	240	240
Hardness	mg/L	298	240	263	160	180	230	200	230	240	230	210
Total Kjeldahl Nitrogen	mg/L	3.78	5.72	7.61	1	1.4	6.6	7.3	6	2.6	3.9	3.3
Ammonia	mg/L	2.76	4.77	5.57	0.52	0.94	5.9	5.9	4.4	2.1	3.4	2.8
Nitrate	mg/L	0.14	<0.10	<0.10	1.58	0.46	<0.1	0.17	2.31	0.58	0.22	0.34
Nitrite	mg/L		<0.10		<0.010	0.027	0.022	0.053	0.024	0.022	0.116	0.053
Biochemical Oxygen Demand	mg/L		<1	19	<2.0	5	<2.0	<2.0	<2.0	8	<2.0	3
Chemical Oxygen Demand	mg/L	44	44	77	39	36	110	93	41	22	31	19
Dissolved Organic Carbon	mg/L	10.2	10	11.3	7.2	7.1	11	10	9.3	8.6	7.8	6.5
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1
Arsenic	mg/L		<0.001				<0.001	<0.001			<0.0010	
Barium	mg/L	0.07	0.09	0.13	0.039	0.045	0.085	0.1	0.081	0.067	0.056	0.045
Boron	mg/L	0.59	0.54	0.62	0.51	0.6	0.58	0.51	0.57	0.66	0.58	0.4
Cadmium	mg/L		<0.0001				0.00014	0.00035			0.001	
Calcium	mg/L	83	68	74	44	51	66	59	64	66	63	58
Chromium	mg/L		0.001				<0.005	<0.005			<0.0050	
Copper	mg/L		<0.001				0.0012	0.0014			0.0084	
Iron	mg/L	8.86	13.1	26.4	0.13	<0.10	<0.1	14	9.9	2.8	2.1	2.3
Lead	mg/L		<0.001				<0.0005	<0.0005			<0.00050	
Magnesium	mg/L	22	17	19	12	13	16	13	17	18	18	16
Manganese	mg/L	4.99	4.17	4.6	1.5	1.2	3.5	3	2.3	1.8	2.4	2.9
Mercury	mg/L		<0.0001				<0.1				<0.1	
Phosphorus	mg/L	0.09	0.08	0.23					<0.10	<0.10	<0.10	<0.10
Potassium	mg/L		11				13	12				
Sodium	mg/L	42	30	39	56	49	39	28	43	47	37	29
Zinc	mg/L		0.01				0.038	0.054			0.11	
Total Dissolved Solids	mg/L	470	431	441	396	410	522	332	434	416	436	425

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHE-2															
		Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	7.41	7.74	7.34	7.21	7.3	6.86	7.63	7.26	7.1	7.36	7.21	7.5	7.03	6.8	7.36	7.15
Conductivity	µmho/cm	670	690	600	570	687	565	632	600	583	576	521	562	583	540	545	589
Chloride	mg/L	22	17	16	15	30	19	18	13	26	19	24	21	25	24	18	26
Phosphate - ortho	mg/L			<0.10				<0.6				<0.010				0.065	
Sulphate	mg/L	59	62	55	47	58	65	59	59	52	50	52	47	49	45	37	39
Alkalinity	mg/L	260	270	230	210	324	256	247	242	212	236	201	237	213	204	213	224
Hardness	mg/L	220	230	210	180	251	246	246	218	229	221	188	207	232	199	185	214
Total Kjeldahl Nitrogen	mg/L	5.3	3.5	5.6	4.9	4.9	1.36	2.9	5.86	5.62	3.98	5.16	7.06		5.9	6.17	6.46
Ammonia	mg/L	4.8	3.3	5.3	4.8	5.05	<0.010	2.59	3.88	1.13	1.82	4.64	5.71	0.51	4.59	3.97	6.3
Nitrate	mg/L	0.58	0.26	<0.10	0.42	0.56	<0.10	<0.10	<0.10	0.86	0.9	0.54	0.33	0.59	0.66	0.53	0.26
Nitrite	mg/L	0.011	0.086	0.018	0.013			<0.10				<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	<2	<2	<2	16	<1	4	6	4	2	6		5	5	9		1
Chemical Oxygen Demand	mg/L	37	30	37	27	34	26	51	<5	26	18	28	26	20	19	26	35
Dissolved Organic Carbon	mg/L	9.3	8.4	9.1	8.8	12.4	9.2		11.4	8.2	9		7.3	8.3	8.2		9.2
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	<1	1	3	<1
Arsenic	mg/L			<0.0010				<0.001				<0.001				<0.001	
Barium	mg/L	0.094	0.062	0.099	0.09	0.13	0.06	0.06	0.11	0.1	0.07	0.09	0.1	0.09	0.1	0.1	0.09
Boron	mg/L	0.51	0.6	0.49	0.46	0.58	0.59	0.53	0.47	0.47	0.57	0.45	0.5	0.59	0.53	0.45	0.52
Cadmium	mg/L			<0.00010				0.0004				<0.0001				<0.0001	
Calcium	mg/L	64	64	62	53	69	67	72	66	62	62	57	63	70	60	56	66
Chromium	mg/L			<0.0050				<0.001				0.001				0.001	
Copper	mg/L			0.0014				0.007				0.005				<0.001	
Iron	mg/L	16	0.11	15	11	19.2	0.49	3.19	16	17	0.1	14.5	17.8	16	14	12.5	16.4
Lead	mg/L			<0.00050				<0.001				<0.001				<0.001	
Magnesium	mg/L	15	18	14	12	19	19	16	13	18	16	11	12	14	12	11	12
Manganese	mg/L	2.6	2	2.7	2.4	2.88	0.92	1.63	2.68	2.64	1.24	2.34	2.42	2.41	2.21	1.97	2.02
Mercury	mg/L			<0.1				<0.0001				<0.0001				<0.0001	
Phosphorus	mg/L	0.047	0.14	0.042	0.021	0.026	0.011	0.019	0.018	0.02	0.049	0.184	0.022	0.02	0.017	0.052	0.099
Potassium	mg/L			12				12				10				13	
Sodium	mg/L	31	39	30	25	40	34	37	30	32	30	22	24	31	28	25	28
Zinc	mg/L			0.11				0.25				0.26				0.08	
Total Dissolved Solids	mg/L	275	380	430	290	447	367	411	390	379	374	339	365	379	351	354	383

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHH																			
		Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Jun-04	Sep-04	Apr-05	Sep-05	Apr-06
pH	units	6.33	6.4	6.6	6.4	7	6.6	6.71	7.3	6.9	6.93	6.87	6.3	6.67	6.5	6.5	6.1	6.4	7.25	7.32	7.2
Conductivity	µmho/cm	4840	4330	4100	3700	3700	3800	3700	4000	3700	3700	* <4.2	3600	3400	3700	3300	3600	3200	3260	3390	3390
Chloride	mg/L	925	865	* 110	790	830	830	780	830	830	810	850	840	820	750	750	810	820	773	831	779
Phosphate - ortho	mg/L																<0.5	<0.5			
Sulphate	mg/L															0.12	<0.1	0.27	5	8	<1
Alkalinity	mg/L	1017	988	1000	960	840	810	860	930	840	820	770	850	870	800	790	840	880	647	663	673
Hardness	mg/L	1180	1106	1000	910	800	800	1000	870	870	800	850	820	770	730	750	710	790	740	630	700
Total Kjeldahl Nitrogen	mg/L	5.46	4.97	5	4.9	5.8	6.4	5.7	7.4	8.2	15	10	8.8	8.7	9	16	8.3	9.1	7.6	7	8
Ammonia	mg/L	2.8	2.55	1.9	2.2	2.7	2	2.1	3	2.9	6.8	4.5	5.1	6.2	6.4	6.7	6.9	6.4	4.39	7.05	3.6
Nitrate	mg/L																<0.05	<0.05			<0.1
Nitrite	mg/L																<0.01	<0.01			<0.01
Biochemical Oxygen Demand	mg/L																21	6.1			
Chemical Oxygen Demand	mg/L	1762	1104	940	520	350	290	350	380	330	270	310	180	140	100	150	130	130	140	120	120
Dissolved Organic Carbon	mg/L	640	313	310	190	120	110	150	130	110	84	94	27	32	24	21	23	22	36.5	33.1	38
Phenols	µg/L	750	529	600	430	290	230	340	190	27	130	210	82	80	63	82	60	26	24	13	15
Arsenic	mg/L															<0.01	<0.01		<0.2	<0.2	0.003
Barium	mg/L															0.47	0.42	0.48	0.44	0.39	0.42
Boron	mg/L															0.38	0.37	0.39	0.38	0.37	0.38
Cadmium	mg/L															0.005	<0.002	<0.005	0.009	<0.005	<0.0001
Calcium	mg/L																				
Chromium	mg/L															<0.002	0.002	<0.004	<0.01	<0.01	<0.03
Copper	mg/L															0.006	0.002	<0.006	<0.02	<0.02	0.002
Iron	mg/L	238	201	200	160	160	170	150	180	160	170	170	140	130	120	110	110	130	134	101	110
Lead	mg/L															<0.01	<0.01	<0.02	<0.05	<0.05	<0.0005
Magnesium	mg/L																				
Manganese	mg/L			3.8	3	2.6	2.7	3	2.6	2.4	2.4	2.7	1.9	1.8	1.5	1.6	1.5	1.9	1.77	1.23	1.3
Mercury	mg/L																<0.05				
Phosphorus	mg/L															0.09	0.11	0.20	0.01	0.07	0.07
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L															<0.005	<0.005	<0.005	0.02	<0.01	<0.005
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHH														
		Oct-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12	Sep-12	Apr-13	Sep-13
pH	units	7.1	7.43	6.88	6.95	7.12	7.01	7.13	7.12	7.11	7.36	7.67	7.18	6.8	6.76	6.69
Conductivity	µmho/cm	3380	3320	3110	2990	3290	3170	3100	2870	2480	2870	2040	2780	2740	2590	2620
Chloride	mg/L	749	798	762	752	737	792	766	717	672	748	664	583	568	528	536
Phosphate - ortho	mg/L															
Sulphate	mg/L	<1	0.43	1.51	0.79	0.62	7.8	1.66	<0.2	<0.2	<0.10	6.24	5	6	9	7
Alkalinity	mg/L		588	563	564	595	585	545	551	499	529	447	500	528	520	506
Hardness	mg/L	710	659	644	633	724	825	640	641	536	621	472	439	444	468	448
Total Kjeldahl Nitrogen	mg/L	8	8.62	8.19	7.65	7.36	4.8	7.97	7.54	8.07	7.18	7.51	7.03	6.88	6.47	4.46
Ammonia	mg/L	6.5	5.33	1.65	7.09	5.65	3.17	1.63	0.61	5.19	1.75	5.8	5.5	5.4	4.68	4.46
Nitrate	mg/L						<0.05	<0.50	<0.10	<0.10	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L														<0.10	
Biochemical Oxygen Demand	mg/L						11	18	29	16	18	21	30	26	8	26
Chemical Oxygen Demand	mg/L	150	97.3	101	107	90	100	101	97	87	77	94	91	91	78	84
Dissolved Organic Carbon	mg/L	37.1	38.8	33.7	34.7	35.2	29.1	32	31.9	30.1	1.7	29.4	26	25.6	22.7	24.6
Phenols	µg/L	12	28	29	10	17	7	13	6	6	5	<1	2	<1	1	<2
Arsenic	mg/L	<0.2	0.004	0.006												<0.01
Barium	mg/L	0.42	0.432	0.413	0.363	0.378	0.384	0.341	0.301	0.362	0.291	0.299	0.26	0.26		0.25
Boron	mg/L	0.4	0.352	0.276	0.243	0.202	0.333	0.307	0.188	0.339	0.376	0.264	0.48	0.34	0.39	0.38
Cadmium	mg/L	0.008	<0.0001	<0.0001	<0.0001	<0.0001										<0.0001
Calcium	mg/L												110	115	120	112
Chromium	mg/L	<0.01	0.01	0.014	0.008	0.026										0.01
Copper	mg/L	<0.02	<0.002	<0.002	<0.002	<0.002										<0.001
Iron	mg/L	110	117	102	91.9	98.5	87	94.3	81.5	75.8	71.1	65.1	65.2	57.5	65.5	61.8
Lead	mg/L	<0.05	<0.001	<0.001	<0.001	<0.001										<0.001
Magnesium	mg/L												40	38	41	41
Manganese	mg/L	1.4	1.35	1.3	1.17	1.3	0.8	0.803	0.607	0.657	0.616	0.475	0.53	0.43	0.45	0.44
Mercury	mg/L		<0.0001	<0.0001	<0.0001	<0.0001										
Phosphorus	mg/L	0.10	0.06	0.06	0.06	0.05	0.06	0.04	0.05	<0.05	0.07	0.15	0.05	0.03	0.02	0.03
Potassium	mg/L															
Sodium	mg/L												335	363		365
Zinc	mg/L	<0.01	<0.004	<0.004	<0.004	<0.004										<0.001
Total Dissolved Solids	mg/L						1840	1740	1690	1660	1450	1500	1810	1780	1680	1700

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHH															
		Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.76	6.79	6.8	7.02	7.04	7.09	7.07	7.29	7.37	7.02	6.74	7.3	7.1	7.19	7.17	7.28
Conductivity	µmho/cm	2450	2460	2410	2330	2100	2100	2000	2100	2000	1900	1870	1890	1870	1790	1760	1820
Chloride	mg/L	496	499	470	446	390	370	340	370	370	350	344	334	329	324	321	287
Phosphate - ortho	mg/L																
Sulphate	mg/L	14	14	18	25	53	39	53	51	48	42	50	54	47	58	56	53
Alkalinity	mg/L	474	480	484	483	430	430	410	440	430	430	418	409	411	406	376	411
Hardness	mg/L	433	437	173	401	360	340	310	320	310	330	303	351	346	308	348	346
Total Kjeldahl Nitrogen	mg/L	5.78	6.34	5.62	5.98	5.3	5.4	4.7	4.7	4.7	4.5	4.1	4	5.67	3.75	3.56	3.97
Ammonia	mg/L	5.2	4.46	4.59	3.56	4.7	4.7	4	4.1	4.1	4.1	3.6	3.84	3.29	3.26	3.39	3.41
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L					<0.010	<0.010	<0.010	<0.010	<0.010	<0.010						
Biochemical Oxygen Demand	mg/L	23	26	33	4	13	11	13	15	18	<2	17	24	22	4	20	19
Chemical Oxygen Demand	mg/L	91	74	73	78	83	79	68	64	64	59	55	53	54	47	38	37
Dissolved Organic Carbon	mg/L	27.2	24.3	22.7	22.1	22	19	19	19	19	18	19.5	18.8	17	15.2	13.2	14.6
Phenols	µg/L	<1	1	<1	1	<1	<1	<1	10	2.3	1.7	2	6	5	<4	<10	2
Arsenic	mg/L																
Barium	mg/L	0.25	0.29	0.24	0.23	0.2	0.2	0.18	0.19			0.16	0.21	0.18	0.17	0.17	0.18
Boron	mg/L	0.39	0.38	0.41	0.39	0.38	0.39	0.38	0.35	0.17	0.19	0.37	0.38	0.36	0.33	0.41	0.33
Cadmium	mg/L									0.36	0.36						
Calcium	mg/L	104	109	102	98	89	85	77	79			75	86	84	77	85	84
Chromium	mg/L									76	80						
Copper	mg/L																
Iron	mg/L	56.5	52.3	51.8	51.5	48	43	41	41			34.1	40.6	35.5	33.4	31.5	37.2
Lead	mg/L									39	39						
Magnesium	mg/L	42	40	39	38	35	31	28	30			28	33	33	28	33	33
Manganese	mg/L	0.42	0.4	0.37	0.36	0.37	0.31	0.32	0.33	28	31	0.22	0.31	0.31	0.29	0.3	0.29
Mercury	mg/L									0.32	0.3						
Phosphorus	mg/L	0.03	0.02	0.02	<0.05			<0.10	<0.10			0.047	0.01	0.029	0.034	0.04	0.026
Potassium	mg/L									0.025	0.022						
Sodium	mg/L	376	379	374	299	320	290	270	260	260	270	238	244	264	214	267	250
Zinc	mg/L																
Total Dissolved Solids	mg/L	1590	1600	1570	1510	1190	1530	1080	1190	900	1010	1220	1230	1220	1160	1140	1180

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHK																			
		Oct-94	Dec-94	Feb-95	Apr-95	Jul-95	Oct-95	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03
pH	units	8.25	7.95	7.82	7.75	7.14	7.16	6.15	5.98	6.1	5.9	6.7	7.2	6.59	6.9	7.23	6.65	6.73	6.9	6.26	7.2
Conductivity	µmho/cm	265	198	173	103	110	125	300	382	320	470	660	440	250	200	230	200	120	110	100	110
Chloride	mg/L	10	2	2	7	13	20	59	87	64	99	78	62	34	20	22	15	10	7	6	5
Phosphate - ortho	mg/L																				
Sulphate	mg/L																				
Alkalinity	mg/L	70	8	77	32	22	18	9	10	9	13	220	42	19	20	44	26	13	14	17	14
Hardness	mg/L	46	17	38	42	44	46	90	90	64	120	210	91	38	25	44	32	20	19	18	18
Total Kjeldahl Nitrogen	mg/L	2	1.3	0.7	0.4	0.1	0.05	0.17	0.3	0.17	0.51	0.78	0.43	0.66	0.2	0.47	0.22	<0.16	0.26	<0.16	<0.16
Ammonia	mg/L	0.05	0.9	0.35	0.05	0.05	0.05	<0.001	<0.01	0.08	<0.03	<0.03	<0.03	0.1	0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate	mg/L																				
Nitrite	mg/L																				
Biochemical Oxygen Demand	mg/L																				
Chemical Oxygen Demand	mg/L	10.7	51.1	30.8	14.5		NDIS	8	5	<10	22	46	66	35	47	18	31	15	14	<10	<10
Dissolved Organic Carbon	mg/L	9.6	12	8.3	3.4	5	8	5	3	0.6	1.6	3.8	1.6	2.2	1.9	1.8	0.85	1	0.78	1.1	0.59
Phenols	µg/L	1	0.6	1	0.4	0.2	0.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	27.6	0.056	0.035	0.09	0.094	0.194	0.12	0.02	0.39	1.7	<0.01	0.097	0.16	0.45	0.014	0.017	<0.01	0.015	0.015	0.017
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L									0.047	0.2	0.027	0.37	0.48	0.46	1.2	0.28	0.053	0.03	0.015	0.009
Mercury	mg/L																				
Phosphorus	mg/L																				
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHK																	
		Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Oct-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12	Sep-12
pH	units	7.2	6.9	6.8	6.95	7	6.9	6.46	6	6.83	6.89	6.43	6.6	6.68	6.78	6.69	7.33	6.43	6.4
Conductivity	µmho/cm	92	96	72	98	75	92	81	99	1090	109	92	111	108	86	91	112	96	127
Chloride	mg/L	3	3	2	3	2	3	3	4	4	8	6	10	7	4	4	7	6	7
Phosphate - ortho	mg/L		<0.5																
Sulphate	mg/L	20	20	13.2	24	15	24	18.5	19.1	20.5	15.7	16.5	20.1	22.5	18.7	16.1	20.4	14	18
Alkalinity	mg/L	11	5	16	14	13		<10	14	23	15	10	12	13	13	16	20	20	28
Hardness	mg/L	15	23	12	19	15	20	16	18	32	26	22	27	27	20	24	25	21	28
Total Kjeldahl Nitrogen	mg/L	<0.16	<0.16	0.3	0.2	0.2	0.2	0.23	<0.10	<0.10	0.36	0.27	<0.10	<0.10	0.27	0.19	<0.10	<0.10	0.18
Ammonia	mg/L	0.03	<0.02	0.11	<0.05	<0.05	<0.05	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.06	<0.02	<0.02
Nitrate	mg/L		0.41			0.30						0.74	0.68	0.74	0.52	0.50	0.59	0.70	1.06
Nitrite	mg/L		<0.01		<0.3	<0.01													
Biochemical Oxygen Demand	mg/L		<5									<5	<5	<5	<5	<5	<5	1	<1
Chemical Oxygen Demand	mg/L	21	<10	<4	6	<4	8	<5.0	<5.0	12	34	<5	<5	9	<5	<5	<5	100	<5
Dissolved Organic Carbon	mg/L	0.6	0.73	1.1	1.1	0.8	0.9	1.6		1.9	2.3	1.4	1.7	1.2	1.8	4.9	3.5	<5	1.2
Phenols	µg/L	4.9	1.7	3	6	<1	<1	<1	<1		<1	<1	<1	<1	2	<1	<1	<1	<1
Arsenic	mg/L	<0.01		<0.2	<0.2	<0.001	<0.2	<0.003	<0.003										
Barium	mg/L	0.007	0.008	<0.02	<0.02	0.007	<0.02	0.007	0.007	0.01	0.011	0.008	0.01	0.01	0.01	0.009	0.011	<0.01	0.01
Boron	mg/L	0.039	0.044	<0.02	0.1	0.032	0.05	0.04	0.05	0.032	0.04	0.038	0.047	0.042	0.044	0.036	0.047	0.05	0.05
Cadmium	mg/L	<0.002	<0.005	<0.005	<0.005	0.0011	<0.005	<0.0001	<0.0001	<0.0001	<0.0001								
Calcium	mg/L																	5	8
Chromium	mg/L	<0.002	<0.004	<0.01	<0.01	<0.005	<0.01	<0.003	<0.003	<0.003	<0.003								
Copper	mg/L	<0.002	<0.006	<0.02	<0.02	0.002	<0.02	<0.002	0.007	0.002	<0.002								
Iron	mg/L	0.037	0.021	0.04	<0.02	<0.05	2.22	0.02	<0.005	0.737	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.03	<0.03
Lead	mg/L	<0.01	<0.02	<0.05	<0.05	<0.0005	<0.05	<0.001	<0.001	<0.001	<0.001								
Magnesium	mg/L																	2	2
Manganese	mg/L	0.004	0.011	0.01	<0.01	<0.002	0.02	<0.002	0.002	0.443	0.005	0.003	0.004	0.007	0.005	<0.003	0.003	<0.01	<0.01
Mercury	mg/L							<0.0001	<0.0001	<0.0001	<0.0001								
Phosphorus	mg/L	<0.03	<0.06	<0.1	0.06	<0.005	<0.1	<0.02	0.12	<0.05		0.05	0.03	0.02	<0.05	<0.05	0.10	0.03	0.02
Potassium	mg/L																		
Sodium	mg/L																	7	8
Zinc	mg/L	0.005	0.037	<0.01	<0.01	0.008	0.03	0.014	0.01	0.005	<0.004								
Total Dissolved Solids	mg/L											72	70	86	50	52	70	62	83

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHK																	
		Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.16	6.08	6.19	6.29	6.44	6.47	6.36	6.61	6.44	6.64	6.69	6.46	7.01	6.71	6.39	6.42	6.37	6.68
Conductivity	µmho/cm	97	95	100	86	97	90	64	98	69	79	63	81	93	71	63	67	59	72
Chloride	mg/L	6	5	6	5	4	5	1.7	6.3	1.5	2.8	1.8	2.3	2	7	3	9	2	2
Phosphate - ortho	mg/L																		
Sulphate	mg/L	16	16	17	13	14	16	11	18	13	15	10	13	9	10	9	12	8	8
Alkalinity	mg/L	17	14	21	14	20	14	15	15	12	12	15	15	65	15	14	14	13	24
Hardness	mg/L	28	26	26	26	26	26	16	28	17	19	15	21	21	26	21	23	21	21
Total Kjeldahl Nitrogen	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.2	0.2	0.28	0.253	0.128	<0.1
Ammonia	mg/L	<0.02	<0.02	0.04	0.05	<0.02	0.036	<0.050	<0.050	<0.050	<0.050	0.052	<0.050	0.01	0.04	0.024	<0.010	<0.01	<0.010
Nitrate	mg/L	0.55	0.98	0.79	0.55	0.58	0.48	0.27	0.61	0.29	0.45	0.29	0.48	0.51	0.56	0.49	0.5	0.43	0.39
Nitrite	mg/L	<0.10						<0.010	<0.010	<0.010	<0.010	<0.010	<0.010						
Biochemical Oxygen Demand	mg/L	<1	1	<1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	3	2	1	2	<1
Chemical Oxygen Demand	mg/L	<5	9	<5	<5	<5	<5	12	9.7	8.1	<4.0	8.6	<4.0	<5	<5	8	<5	9	<5
Dissolved Organic Carbon	mg/L	1.4	1	1.3	1.9	1.8	1.3	1.3	0.94	0.87	0.86	0.78	0.79	1.1	1.4	1.2	1.1	0.9	1.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.2	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001																
Barium	mg/L		0.01	0.01	<0.01	<0.01	<0.01	0.0063	0.011	0.0066	0.0079	0.0064	0.009	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	mg/L	0.05	0.04	0.04	0.04	0.04	0.04	0.022	0.049	0.039	0.031	0.021	0.032	0.02	0.03	0.03	0.03	0.02	0.04
Cadmium	mg/L		<0.0001																
Calcium	mg/L	8	7	7	7	7	7	4.3	7.7	4.5	5.2	4	5.8	5	7	5	6	5	5
Chromium	mg/L		0.001																
Copper	mg/L		0.001																
Iron	mg/L	0.05	<0.03	<0.03	<0.03	<0.03	0.03	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	mg/L		<0.001																
Magnesium	mg/L	2	2	2	2	2	2	1.2	2.1	1.3	1.5	1.2	1.6	2	2	2	2	2	2
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0020	0.0033	0.003	0.0022	<0.0020	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	mg/L																		
Phosphorus	mg/L	0.02	0.02	0.02	0.04	0.02	<0.05			<0.10	<0.10	0.027	<0.020	0.009	0.02	0.022	0.057	0.044	0.38
Potassium	mg/L																		
Sodium	mg/L		7	7	6	7	7	5.5	7.3	5.3	4.8	4.5	5.7	5	5	5	4	5	5
Zinc	mg/L																		
Total Dissolved Solids	mg/L	63	62	65	56	63	58	56	64	60	80	20	75	60	46	41	44	38	47

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHL																			
		Oct-94	Dec-94	Feb-95	Apr-95	Jul-95	Oct-95	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03
pH	units		7.84	7.3	7.46	7.43	7.2	6.79	6.41	6.6	6.2	6.5	7.4	6.9	7.4	6.84	7.23	7.6	6.4	7.63	6.9
Conductivity	µmho/cm		530	507	473	910	915	858	1176	520	480	440	230	830	560	200	580	410	730	350	380
Chloride	mg/L	30	28	29	26	53	62	73	120	73	70	55	39	77	48	24	41	32	54	24	24
Phosphate - ortho	mg/L																				
Sulphate	mg/L																				
Alkalinity	mg/L		242	232	208	411	374	305	427	130	130	140	56	250	220	57	230	140	340	140	140
Hardness	mg/L		260	258	231	450	465	364	393	180	160	140	85	190	240	140	110	140	320	130	150
Total Kjeldahl Nitrogen	mg/L	0.45	0.3	1.45	1.15	0.55	0.9	0.89	1.08	0.41	1.2	0.28	0.37	0.22	0.33	0.48	0.39	0.32	0.75	0.25	0.16
Ammonia	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.09	0.32	0.28	0.15	0.13	0.03	0.15	0.07	0.08	0.08	0.02	0.03	0.15	0.12
Nitrate	mg/L																				
Nitrite	mg/L																				
Biochemical Oxygen Demand	mg/L																				
Chemical Oxygen Demand	mg/L	35.3	25.5	67.1	37.7		298	332	413	<10	22	31	<10	46	96	10	16	34	190	12	20
Dissolved Organic Carbon	mg/L	7	4.8	15.2	12.3	50	97.5	91	118	5.4	3.3	2.6	1.1	18	33	2	3.3	6.1	71	2.7	3.5
Phenols	µg/L	17.5	0.8	0.8	0.6	34	75	53	74	8.8	<1	<1	<1	9.5	30	<1	1.7	6.1	57	<10	1.8
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	0.128	0.389	0.0851	0.118	13.6	17.5	11	623	21	18	21	8.3	21	26	17	15	20	37	17	21
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L									4.6	4	3.5	1.1	4	5.8	4.1	2.8	3.3	6.6	3	3.5
Mercury	mg/L																				
Phosphorus	mg/L																				
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHL																	
		Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12	Sep-12
pH	units	6.8	7	7.18	7.2	7.1	7	6.72	6.2	6.5	7.09	6.84	7.08	6.94	7.1	6.83	6.47	6.5	6.42
Conductivity	µmho/cm	470	240	203	91	300	123	143	91	1030	217	116	107	95	92	87	84	87	90
Chloride	mg/L	35	14	10	3	23	5	6	3	5	16	6	7	5	4	3	4	3	4
Phosphate - ortho	mg/L		<0.5																
Sulphate	mg/L	8.5	14	22	15	30	19	20.8	18	20.3	29.3	19.2	14.8	18	16.9	14.7	18.3	14	12
Alkalinity	mg/L	200	99	61	25	87		37	22	13	49	22	25	16	31	18	16	22	25
Hardness	mg/L	160	82	67	26	110	39	43	22	24	67	33	31	26	28	22	22	21	23
Total Kjeldahl Nitrogen	mg/L	0.36	<0.16	0.3	0.1	0.5	0.3	0.24	<0.10	<0.10	0.3	<0.10	<0.10	<0.10	0.26	<0.10	<0.10	<0.10	0.16
Ammonia	mg/L	0.09	0.03	0.12	<0.05	0.24	0.05	0.11	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.03	<0.02	<0.02
Nitrate	mg/L		<0.05			<0.1						0.20	0.38	0.37	0.38	0.33	0.38	0.27	0.43
Nitrite	mg/L		<0.01		<0.3	<0.01													
Biochemical Oxygen Demand	mg/L		<5									<5	<5	<5	<5	<5	<5	1	<1
Chemical Oxygen Demand	mg/L	22	<10	<4	6	19	12	<5.0	6	7	<5	12	<5	<5	<5	<5	7	<5	<5
Dissolved Organic Carbon	mg/L	5.1	2.1	2	0.8	4.7	1.2	2	1.5	1.9	2.6	1.2	1.1	0.8	2.7	1.7	1.9	<5	1.1
Phenols	µg/L	6	1.2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1
Arsenic	mg/L	<0.01		<0.2	<0.2	<0.001	<0.2	<0.003	<0.003										
Barium	mg/L	0.022	0.011	<0.02	<0.02	0.025	<0.02	0.01	0.008	0.009		0.01	0.01	0.01	0.01	0.023	0.01	<0.01	<0.01
Boron	mg/L	0.12	0.064	0.05	0.08	0.1	0.03	0.036	0.025	0.046	0.072	0.034	0.033	0.023	0.031	0.029	0.029	0.04	0.03
Cadmium	mg/L	<0.002	<0.005	<0.005	<0.005	0.0001	<0.005	<0.0001	<0.0001	<0.0001	<0.0001								
Calcium	mg/L																	5	6
Chromium	mg/L	<0.002	<0.004	<0.01	<0.01	<0.005	<0.01	<0.003	<0.003	<0.003	<0.003								
Copper	mg/L	<0.002	<0.006	<0.02	<0.02	0.003	<0.02	<0.002	0.005	<0.002	0.004								
Iron	mg/L	22	11	11.2	2.18	19	2.77		0.587	<0.005	2.12	0.822	0.378	0.32	0.428	0.799	0.437	0.28	0.42
Lead	mg/L	<0.01	<0.02	<0.05	<0.05	<0.0005	<0.05	<0.001	<0.001	<0.001	<0.001								
Magnesium	mg/L																	2	2
Manganese	mg/L	3.3	1.7	1.39	0.44	2.2	0.73	0.701	0.321	0.006	0.654	0.246	0.169	0.136	0.159	0.24	0.146	0.12	0.11
Mercury	mg/L							<0.0001	<0.0001	<0.0001	<0.0001								
Phosphorus	mg/L	0.07	0.09	<0.1	0.09	0.07	<0.1	0.03	0.03	0.10		0.07	<0.02	0.02	<0.05	<0.05	<0.05	<0.01	<0.01
Potassium	mg/L																		
Sodium	mg/L																	6	6
Zinc	mg/L	0.008	0.006	0.02	0.01	0.006	<0.01	0.007	0.005	<0.004	0.015								
Total Dissolved Solids	mg/L											72	66	74	56	48	62	57	58

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHL																	
		Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.28	6.23	6.38	6.58	6.5	6.83	6.56	6.85	6.88	6.88	6.75	6.72	7.18	6.89	6.55	6.66	6.41	6.65
Conductivity	µmho/cm	84	92	101	84	85	89	78	90	84	82	76	80	102	75	71	66	66	72
Chloride	mg/L	3	4	4	3	3	3	4.9	2	1.7	2.3	2	1.1	2	6	3	8	3	3
Phosphate - ortho	mg/L																		
Sulphate	mg/L	13	13	16	14	13	14	13	12	13	13	12	12	10	10	10	10	9	9
Alkalinity	mg/L	23	22	26	17	18	23	23	22	22	20	17	21	68	21	18	20	16	22
Hardness	mg/L	23	23	23	23	23	23	21	25	20	21	20	20	21	23	23	17	23	18
Total Kjeldahl Nitrogen	mg/L	<0.10	0.16	<0.10	<0.10	<0.10	<0.07	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	0.1	0.175	0.221	0.237	<.1
Ammonia	mg/L	<0.02	<0.02	0.04	0.09	<0.02	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.01	0.04	0.01	<0.010	<0.01	<0.010
Nitrate	mg/L	0.22	0.66	0.45	0.38	0.32	0.27	0.13	0.34	0.24	0.36	0.23	0.24	0.25	0.32	0.41	0.46	0.37	0.32
Nitrite	mg/L	<0.10						<0.010	<0.010	<0.010	<0.010	<0.010	<0.010						
Biochemical Oxygen Demand	mg/L	<1	1	<1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	2	3	2	1	3	<1
Chemical Oxygen Demand	mg/L	15	<5	<5	<5	<5	13	19	10	<4.0	<4.0	<4.0	<4.0	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	0.9	1.1	1	1.8	1.3	0.5	1.2	0.76	0.62	0.73	0.73	0.67	1.2	1.4	0.9	0.9	0.6	1.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001																
Barium	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01	0.008	0.011	0.0071	0.0087	0.0068	0.0079	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	mg/L	0.04	0.03	0.03	0.03	0.03	0.03	0.019	0.032	0.019	0.026	0.025	0.021	0.02	0.03	0.03	0.03	0.03	0.02
Cadmium	mg/L		<0.0001																
Calcium	mg/L	6	6	6	6	6	6	5.3	6.4	5.1	5.1	5.1	5	5	6	6	5	6	4
Chromium	mg/L		<0.001																
Copper	mg/L		0.001																
Iron	mg/L	0.24	0.45	0.47	0.4	0.84	0.41	<0.10	0.64	<0.10	0.61	0.26	0.25	<0.03	0.17	0.26	0.12	0.09	0.05
Lead	mg/L		<0.001																
Magnesium	mg/L	2	2	2	2	2	2	2	2.2	1.8	1.9	1.8	1.8	2	2	2	1	2	2
Manganese	mg/L	0.09	0.12	0.09	0.09	0.14	0.08	0.036	0.12	0.036	0.11	0.057	0.067	0.04	0.09	0.08	0.04	0.03	0.03
Mercury	mg/L																		
Phosphorus	mg/L	0.08	0.04	<0.01	<0.01	0.07	<0.05			<0.10	<0.10	0.055	<0.020	0.017	0.002	0.028	0.006	0.028	0.007
Potassium	mg/L																		
Sodium	mg/L		7	12	7	6	8	5.8	6.2	5.1	5.3	4.9	5.1	6	5	5	4	5	6
Zinc	mg/L																		
Total Dissolved Solids	mg/L	55	60	66	55	55	58	70	34	58	74	<10	80	66	49	46	43	43	47

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHM																			
		Oct-94	Dec-94	Feb-95	Mar-95	Apr-95	May-95	Jul-95	Sep-95	Oct-95	Nov-95	Apr-97	Oct-97	Apr-98	Oct-98	Nov-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01
pH	units	8.39	8.12	7.37	7.21	7.5	7.14	7.15	6.99	7.26	7.92	6.79	6.83	6.9	6.4	6.3	6.6	7.3	6.95	7.8	7.05
Conductivity	µmho/cm	425	271	331	296	307	284	335	305	345	580	970	1257	760	390	480	530	660	430	360	430
Chloride	mg/L	36	16	20	14	17	13	27	19	24	51	78	110	250	50	63	66	62	48	28	38
Phosphate - ortho	mg/L																				
Sulphate	mg/L																				
Alkalinity	mg/L	156	99	133	119	122	114	116	113	138	228	387	514	270	150	140	190	210	130	100	160
Hardness	mg/L	89	59	106	107	107	100	116	113	140	250	448	650	340	190	180	190	230	130	87	140
Total Kjeldahl Nitrogen	mg/L	1.5	0.55	0.75		0.95	1.05	0.85	1.25	0.6	1.95	0.94	0.98	0.56	0.43	0.32	1.1	1.2	0.34	<0.16	0.75
Ammonia	mg/L	0.9	0.35	0.5		0.45	0.65	0.5	0.65	0.65	1.5	0.35	0.37	0.33	0.2	0.22	0.62	0.21	0.25	0.11	0.13
Nitrate	mg/L																				
Nitrite	mg/L																				
Biochemical Oxygen Demand	mg/L																				
Chemical Oxygen Demand	mg/L	52.9	17	22.4	30.3	23.2	83.6		4	10	72	127	485	12	13	22	26	130	14	20	27
Dissolved Organic Carbon	mg/L	12.9	6.4	4.6	9.1	3.5	4.8	6.5	3.5	2.9	42	50	144	9.9	3.3	3.5	4.9	3.8	3.5	3.3	5.6
Phenols	µg/L	185	4.4	1.6	0.2	1.2	0.4	11	1.2	2.2	22.2	51	41	5.4	<1	<1	<1	<1	<1	<1	4.2
Arsenic	mg/L																				
Barium	mg/L																				
Boron	mg/L																				
Cadmium	mg/L																				
Calcium	mg/L																				
Chromium	mg/L																				
Copper	mg/L																				
Iron	mg/L	7.69	6.06	12.1	11.4	13.2	11.7	14.8	14.3	16.9	27.2	29.7	35.1	22	15	13	16	22	16	12	17
Lead	mg/L																				
Magnesium	mg/L																				
Manganese	mg/L													6.1	4	3.8	4.5	6.2	4	2.7	3.9
Mercury	mg/L																				
Phosphorus	mg/L																				
Potassium	mg/L																				
Sodium	mg/L																				
Zinc	mg/L																				
Total Dissolved Solids	mg/L																				

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHM																	
		Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Apr-09	Oct-09	Apr-10	Oct-10
pH	units	7.57	7.7	7	7.72	7.5	7.5	6.9	7.69	7.74	7.8	7.7	7.46	6.62	7.36	7.43	7.67	7.51	7.58
Conductivity	µmho/cm	450	340	330	300	320	300	230	267	319	662	309	261	223	324	229	250	200	192
Chloride	mg/L	27	21	20	17	14	14	8	10	15	40	14	11	8	17	14	16	12	10
Phosphate - ortho	mg/L							<0.5											
Sulphate	mg/L						16	21	21.4	24	56	22	20.1	22.4	27.2	18.2	23.9	22	22.7
Alkalinity	mg/L	170	120	140	130	120	110	83	96	126	261		93	79	120	77	83	63	67
Hardness	mg/L	140	110	120	120	110	110	78	98	120	280	120	94	75	135	85	76	70	73
Total Kjeldahl Nitrogen	mg/L	0.55	0.72	0.44	0.26	0.17	0.19	0.16	0.3	0.3	1	0.3	0.2	0.13	0.23	0.18	<0.10	<0.10	0.27
Ammonia	mg/L	0.13	0.1	0.08	0.12	0.11	0.09	0.04	0.12	0.06	0.49	0.07	<0.02	<0.02	<0.02	0.02	<0.02	0.1	<0.02
Nitrate	mg/L							<0.05			<0.1					<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L							<0.01		<0.3	<0.01								
Biochemical Oxygen Demand	mg/L							<5								<5	<5	<5	<5
Chemical Oxygen Demand	mg/L	24	24	14	11	<10	16	<10	<4	8	28	13	6.5	7	9	<5	<5	6	<5
Dissolved Organic Carbon	mg/L	4.1	4.4	3.6	3.9	2.6	2.7	1.9	2.6	2.8	10.1	2.3	2.4	2	3.2	1.7	1.7	1.5	3.7
Phenols	µg/L	<1	1.6	<1	<10	<1	3.2	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	1
Arsenic	mg/L						<0.01		<0.2	<0.2	0.002	<0.2	<0.003	<0.003					
Barium	mg/L						0.013	0.01	<0.02	<0.02	0.058	<0.02	0.012	0.009	0.017	0.009	0.011	0.009	0.01
Boron	mg/L						0.079	0.07	0.07	0.11	0.29	0.08	0.084	0.052	0.086	0.058	0.066	0.041	0.052
Cadmium	mg/L						<0.002	<0.005	<0.005	<0.005	0.0005	<0.0005	<0.0001	<0.0001	<0.001				
Calcium	mg/L																		
Chromium	mg/L						<0.002	<0.004	<0.01	<0.01	<0.005	<0.01	<0.003	<0.003	0.004				
Copper	mg/L						<0.002	<0.006	<0.02	<0.02	<0.001	<0.02	<0.002	<0.002	<0.002				
Iron	mg/L	17	13	12	11	8.9	8.1	5.7	7.38	8.74	23	9.27	7.14	5.82	9.35	6.3	7.13	5.69	6.66
Lead	mg/L						<0.01	<0.02	<0.05	<0.05	<0.0005	<0.05	<0.001	<0.001	<0.001				
Magnesium	mg/L																		
Manganese	mg/L	3.6	2.6	2.6	2.4	2	2	1.4	1.78	2.11	6.7	2.41	1.95	1.65	3.04	1.58	1.93	1.59	1.94
Mercury	mg/L												<0.0001	<0.0001	<0.0001				
Phosphorus	mg/L						0.10	0.11	<0.1	0.13	0.11	<0.1	0.11	0.14	0.15	0.14	0.09	0.08	0.09
Potassium	mg/L																		
Sodium	mg/L																		
Zinc	mg/L						<0.005	0.006	<0.01	<0.01	0.009	0.03	0.013	<0.004	<0.004				
Total Dissolved Solids	mg/L															150	158		112

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHM																	
		Apr-11	Oct-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19
pH	units	7.54	7.26	6.89	6.77	6.71	6.58	6.63	7.08	7.08	7.1	6.92	6.97	6.93	7.15	7.06	7.08	7.3	7.18
Conductivity	µmho/cm	182	174	182	191	178	189	174	168	172	162	420	160	580	150	140	150	205	130
Chloride	mg/L	8	7	6	7	6	8	7	6	6	5	19	3.6	33	4.2	3.6	2.7	10	7
Phosphate - ortho	mg/L																		
Sulphate	mg/L	20.8	26.1	18	20	18	23	22	21	20	19	41	19	49	20	17	19	22	17
Alkalinity	mg/L	57	61	63	65	65	60	56	50	55	54	140	52	190	45	46	45	93	41
Hardness	mg/L	67	66	56	63	66	63	60	60	58	51	160	51	210	45	41	44	67	46
Total Kjeldahl Nitrogen	mg/L	0.29	<0.10	<0.10	0.16	6.72	0.14	0.11	0.11	0.1	0.14	0.4	0.12	0.98	<0.10	<0.10	0.11	0.2	0.2
Ammonia	mg/L	0.04	0.11	0.05	0.05	0.05	0.06	0.1	0.11	0.06	0.035	0.21	<0.050	0.61	<0.050	<0.050	0.063	0.07	0.08
Nitrate	mg/L	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L					<0.10						<0.010	<0.010	0.018	<0.010	<0.010	<0.010		
Biochemical Oxygen Demand	mg/L	<5	<5	1	<1	<1	<1	1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	1	2
Chemical Oxygen Demand	mg/L	<5	<5	<5	6	<5	9	<5	<5	<5	<5	27	5.1	34	<4.0	11	4.4	6	<5
Dissolved Organic Carbon	mg/L	1	2	<5	1.2	1.1	2.5	1.1	2.3	1.4	0.8	4.4	0.86	6.8	0.75	0.69	0.76	3.3	2.5
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L						<0.01												
Barium	mg/L	0.009	0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	0.038	0.0089	0.063	0.0082	0.0072	0.0088	0.01	<0.01
Boron	mg/L	0.046	0.045	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.2	0.048	0.45	0.041	0.04	0.036	0.06	0.04
Cadmium	mg/L						<0.0001												
Calcium	mg/L			14	17	18	17	16	16	15	14	41	14	53	12	11	12	17	12
Chromium	mg/L						0.001												
Copper	mg/L						<0.001												
Iron	mg/L	5.21	6.36	6.78	6.66	6.81	7.69	8.31	7.69	8.59	8	23	8.9	32	9	8.5	9.8	12.1	9.21
Lead	mg/L						<0.001												
Magnesium	mg/L			5	5	5	5	5	5	5	4	14	4.1	17	3.7	3.2	3.5	6	4
Manganese	mg/L	1.62	1.83	1.78	1.75	1.83	1.97	1.94	1.93	1.87	1.73	5.3	1.8	6.6	1.7	1.5	1.6	2.21	1.54
Mercury	mg/L																		
Phosphorus	mg/L	0.09	0.15	0.13	0.08	0.08	0.18	0.06	0.07	0.06	<0.05			<0.10	<0.10	0.046	0.036	0.038	0.008
Potassium	mg/L																		
Sodium	mg/L			10	10		11	10	9	9	11	18	8	26	7.1	6.3	7.5	9	7
Zinc	mg/L																		
Total Dissolved Solids	mg/L	108	136	118	124	116	123	113	109	112	105	294	86	342	128	40	160	133	84

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHP																	
		Jun-04	Jun-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12
pH	units	6.5	7.1	7.4	6.13	6.49	6.6	6.5	6.19	4.26	6.22	6.47	6.39	6.58	6.83	6.56	6.55	6.32	6.39
Conductivity	µmho/cm	61	61	81	51	222	30	264	48	258	173	142	38	190	34	146	99	181	34
Chloride	mg/L	7	8	14	7	61	1	73	10	64	44	25	1	44	1	37	19	52	2
Phosphate - ortho	mg/L	<0.5	<0.5	<0.5															
Sulphate	mg/L	5	3.3	5.4	4	3	4	4	0.18	21.6	4.8	4.44	3.61	4.09	3.02	3.42	6.49	3.24	1
Alkalinity	mg/L	9	7	15	7	4	6		<10	< 5	<5	<5	5	5	8	6	6	6	7
Hardness	mg/L	15	27	19	16	58	10	52	12	38	29	31	12	28	10	21	18	39	7
Total Kjeldahl Nitrogen	mg/L	0.3	0.49	0.72	1	1.9	0.5	0.7	0.33	0.27	0.78	0.55	0.66	<0.10	0.44	0.71	0.51	<0.10	<0.10
Ammonia	mg/L	<0.02	0.09	<0.02	0.1	0.05	0.06	<0.05	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	0.04	<0.02
Nitrate	mg/L	0.39	0.41	0.50			0.30						1.18	2.16	0.51	0.39	0.69	0.43	0.36
Nitrite	mg/L	<0.01	<0.01	<0.01		<0.3	<0.01												
Biochemical Oxygen Demand	mg/L	<5	<5	<5									<5	<5	<5	<5	<5	<5	<1
Chemical Oxygen Demand	mg/L	44	120	56	67	57	38	32	25.7	<5	19	8	35	18	25	14	<5	<5	5
Dissolved Organic Carbon	mg/L	6.5	13	18	37.5	15	12.7	8.3	2.6	3.5	2.2	3	2.9	2.7	2.3	8.8	3.2	5.2	<5
Phenols	µg/L	<1	3	<1	1	<1	<1	2	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	<0.01	<0.01		<0.2	<0.2	<0.001	<0.2	<0.003	<0.003									
Barium	mg/L	0.01	0.016	0.018	<0.02	0.07	0.009	0.09	0.015	0.064	0.037	0.039	0.011	0.042	0.008	0.032	0.021	0.051	<0.01
Boron	mg/L	0.025	<0.01	<0.01	<0.02	0.05	<0.01	<0.02	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	0.016	<0.010	<0.010	<0.01
Cadmium	mg/L	<0.002	<0.002	<0.005	<0.005	<0.005	<0.0001	<0.005	<0.0001	<0.0001	<0.0001	<0.0001							
Calcium	mg/L																		3
Chromium	mg/L	<0.002	<0.002	<0.004	<0.01	<0.01	<0.005	<0.01	<0.003	<0.003	<0.003	<0.003							
Copper	mg/L	<0.002	0.003	<0.006	<0.02	<0.02	0.002	<0.02	<0.002	<0.002	<0.002	<0.002							
Iron	mg/L	0.013	0.09	0.032	0.04	0.02	<0.05	<0.02	0.03	<0.005	<0.005	0.024	0.013	<0.010	0.015	<0.010	<0.010	<0.010	<0.03
Lead	mg/L	<0.01	<0.01	<0.02	<0.05	<0.05	<0.0005	<0.05	<0.001	<0.001	<0.001	<0.001							
Magnesium	mg/L																		<1
Manganese	mg/L	0.005	0.008	0.007	<0.01	<0.01	0.008	<0.01	<0.002	0.006	0.004	0.004	<0.003	0.004	<0.003	0.007	0.003	0.006	<0.01
Mercury	mg/L	<0.05	<0.05						<0.0001	<0.0001	<0.0001	<0.0001							
Phosphorus	mg/L	<0.03	0.09	<0.06	<0.1	5.10	<0.05	<0.1	1.80	1.02	3.49	0.94	4.80	1.35	<0.02	0.75	0.83	0.37	0.33
Potassium	mg/L																		
Sodium	mg/L																		3
Zinc	mg/L	<0.005	0.038	0.012	0.01	<0.01	0.007	0.03	0.008	<0.004	<0.004	<0.004							
Total Dissolved Solids	mg/L												56	104	194	60	48	146	22

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHP																		
		Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.06	6.18	5.94	4.28	6.36	6.51	6.46	6.59	6.26	6.36	6.55	6.6	6.5	6.34	6.77	6.57	6.37	6.49	6.29
Conductivity	µmho/cm	330	83	174	192	135	205	140	29	290	180	200	260	210	506	323	31	366	26	220
Chloride	mg/L	81	14	42	37	25	41	28	<1.0	71	42	48	64	50	140	87	2	102	<1	64
Phosphate - ortho	mg/L																			
Sulphate	mg/L	4	5	3	14	4	3	5	2.1	2.6	3	1.9	2.1	2.1	3	1	1	4	1	<1
Alkalinity	mg/L	<5	10	6	<5	7	8	11	8.8	5.5	7.2	7.4	10	7.5	47	10	9	7	8	8
Hardness	mg/L	72	15	35	32	28	35	25	8.8	64	43	28	70	24	82	50	10	47	10	32
Total Kjeldahl Nitrogen	mg/L	0.27	0.17	0.16	0.26	0.22	0.19	0.27	0.21	0.28	0.19	0.12	0.15	0.12	0.5	0.3	0.21	0.275	<0.100	0.164
Ammonia	mg/L	<0.02	<0.02	<0.02	0.05	0.08	<0.02	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.02	<0.01	0.038	<0.010	<0.010	<0.010
Nitrate	mg/L	0.79	0.44	0.44	0.51	0.77	0.87	0.68	0.43	0.57	0.33	0.48	0.32	0.49	0.6	0.4	0.23	0.39	0.28	0.25
Nitrite	mg/L								<0.010	<0.010	<0.010	<0.010	<0.010	<0.010						
Biochemical Oxygen Demand	mg/L	<1	<1	<1	<1	<1	1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	<1	<1	2	<1	<1
Chemical Oxygen Demand	mg/L	11	5	16	10	12	<5	15	21	23	12	12	11	<4.0	7	9	19	<5	10	<5
Dissolved Organic Carbon	mg/L	2.2	2.4	2.1	4.5	3.2	2.5	<0.5	1.6	1.8	1.7	1.8	1.9	2.8	1.4	6.4	2.1	2.1	1.7	2.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			<0.001																
Barium	mg/L	0.09		0.04	0.05	0.03	0.04	0.03	0.0077	0.078	0.056	0.036	0.099	0.049	0.1	0.12	<0.01	0.07	<0.01	0.05
Boron	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L			<0.0001																
Calcium	mg/L	27	6	14	13	11	14	10	3.1	24	16	10	26	9	31	20	4	19	4	13
Chromium	mg/L			<0.001																
Copper	mg/L			<0.001																
Iron	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	mg/L			<0.001																
Magnesium	mg/L	1	<1	<1	<1	<1	<1	<1	0.25	0.74	0.6	0.41	1.1	0.36	1	<1	<1	<1	<1	<1
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0020	0.0052	0.0071	<0.0020	0.0067	<0.0020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	mg/L																			
Phosphorus	mg/L	0.28	0.20	0.26	0.52	0.34	0.78	0.8			<0.10	<0.10	1.1	0.57	0.573	0.008	1.07	10.3	0.249	0.118
Potassium	mg/L																			
Sodium	mg/L	27	8	16	17	14	20	14	0.96	27	25	18	35	27	60	35	3	42	<2	32
Zinc	mg/L																			
Total Dissolved Solids	mg/L	214	54	113	125	88	133	91	56	220	114	172	260	125	329	210	20	238	17	143

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHQ																	
		Nov-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12	Sep-12	Apr-13
pH	units	6.35	6.45	6.63	6.2	6.5	6.57	5.92	6.37	6.38	5.93	6.11	6.5	6.25	6.21	5.81	6.24	6	5.7
Conductivity	µmho/cm	230	184	206	144	193	141	213	95	99	93	105	103	102	74	96	86	101	104
Chloride	mg/L	5	4	8	5	8	4	9	2	3	4	4	3	4	1	6	3	4	2
Phosphate - ortho	mg/L	<0.5																	
Sulphate	mg/L		61.5	67	39	63	46.6	69.6	27.6	11	9.42	21.5	18.6	17.2	12	12.2	11	15	16
Alkalinity	mg/L	34	11	10	7		<10	10	7	24	25	18	23	23	15	16	18	14	18
Hardness	mg/L	110	66	78	53	73	50	76	33	32	30	35	31	28	19	21	17	26	32
Total Kjeldahl Nitrogen	mg/L	0.18	1.2	0.7	0.4	0.6	0.25	0.13	0.15	0.38	0.44	<0.10	0.17	0.61	0.49	0.11	0.51	0.29	0.14
Ammonia	mg/L	<0.02	0.12	<0.05	0.06	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.05	<0.02	<0.02	<0.02
Nitrate	mg/L	0.24			0.30						0.48	0.43	0.91	1.24	1.14	1.77	2.01	2.14	4.62
Nitrite	mg/L	<0.01		<0.3	<0.01														<0.10
Biochemical Oxygen Demand	mg/L	<5									<5	<5	<5	<5	<5	<5	1	<1	<1
Chemical Oxygen Demand	mg/L	<10	8	10	20	50	10.2	14	<5	6	18	8	16	24	86	6	<5	9	<5
Dissolved Organic Carbon	mg/L	2.4	8.9	7.8	7.8	12.9	1.8	3.4	1.7	2.4	4.2	2.4	4.9	5.1	3.2	3.1	<5	2.4	1.7
Phenols	µg/L	32	1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	<0.01	<0.2	<0.2	<0.001	<0.2	<0.003	<0.003											
Barium	mg/L	0.03	0.05	0.05	0.034	0.05	0.033	0.05	0.025	0.044	0.042	0.047	0.036	0.046	0.025	0.034	0.02	0.03	
Boron	mg/L	0.13	0.13	0.21	0.11	0.16	0.125	0.143	0.075	0.032	0.029	0.08	0.033	0.051	0.02	0.027	0.03	0.03	0.03
Cadmium	mg/L	<0.005	<0.005	<0.005	0.0001	<0.005	<0.0001	<0.0001	<0.0001	<0.0001									
Calcium	mg/L																5	7	8
Chromium	mg/L	<0.004	<0.01	<0.01	<0.005	<0.01	0.011	<0.003	<0.003	<0.003									
Copper	mg/L	<0.006	<0.02	<0.02	0.004	<0.02	<0.002	0.002	0.003	0.003									
Iron	mg/L	0.064	0.06	0.03	<0.05	0.08	0.059	<0.005	<0.005	0.021	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.03	<0.03	<0.03
Lead	mg/L	<0.02	<0.05	<0.05	<0.0005	<0.05	<0.001	<0.001	<0.001	<0.001									
Magnesium	mg/L																1	2	3
Manganese	mg/L	0.34	0.05	0.03	0.017	0.02	0.013	0.018	0.013	0.047	1.2	1.22	3.67	5.76	4.7	6.19	4	3.66	2.89
Mercury	mg/L	<0.05					<0.0001	<0.0001	<0.0001	<0.0001									
Phosphorus	mg/L	0.08	<0.1	3.10	<0.05	<0.1	2.54	1.26	2.32	0.94	3.16	1.10	0.03	1.02	0.56	1.40	1.16	0.42	0.20
Potassium	mg/L																		
Sodium	mg/L																3	4	
Zinc	mg/L	0.01	<0.01	0.01	<0.005	0.02	0.008	<0.004	<0.004	0.051									
Total Dissolved Solids	mg/L										78	68	78	60	50	74	56	66	68

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	BHQ																
		Sep-13	Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	5.55	5.75	5.79	5.98	6.03	5.96	6.03	5.9	6	6.13	6	5.93	6.12	5.79	5.46	6.09	5.96
Conductivity	µmho/cm	74	55	57	68	54	62	63	61	69	49	49	46	48	107	* 947	1340	1210
Chloride	mg/L	1	1	1	<1	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5	4	13	* 280	294	157
Phosphate - ortho	mg/L																	
Sulphate	mg/L	9	9	6	8	6	7.9	9.5	8.1	6.4	4.8	8.6	7	7	6	7	137	197
Alkalinity	mg/L	11	9	7	14	10	7.8	6.7	5.9	4.5	6.7	4.8	27	7	8	7	55	57
Hardness	mg/L	21	18	18	18	18	20	19	18	20	14	15	18	18	41	* 264	211	89
Total Kjeldahl Nitrogen	mg/L	0.23	0.24	0.16	0.15	0.17	<0.10	0.21	<0.10	0.23	<0.10	<0.10	0.3	0.8	0.265	0.296	0.695	1.21
Ammonia	mg/L	<0.02	0.07	0.05	<0.02	<0.025	<0.050	<0.050	<0.050	<0.050	0.061	<0.050	0.03	0.05	0.014	0.049	0.087	0.038
Nitrate	mg/L	2.94	1.76	1.98	1.54	1.54	2.54	1.88	2.38	4.78	1.47	1.45	1.63	1.18	3.53	4.78	0.68	5.48
Nitrite	mg/L						<0.010	<0.010	<0.010	<0.010	<0.010	<0.010						
Biochemical Oxygen Demand	mg/L	<1	<1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	<1	2	<1	3	<1
Chemical Oxygen Demand	mg/L	9	8	17	<5	<5	15	21	6	4.6	5.4	<4.0	<5	10	5	5	17	47
Dissolved Organic Carbon	mg/L	2	1.1	2.8	1.9	1.4	1.2	1.1	0.97	1	0.96	1	1.9	6.6	1.1	2.4	8.3	17
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	<0.001																
Barium	mg/L	0.02	0.02	0.02	0.02	0.02	0.023	0.025	0.023	0.031	0.022	0.023	0.02	0.02	0.05	* 0.53	0.29	0.1
Boron	mg/L	0.01	0.02	0.02	0.02	0.02	0.018	0.023	0.02	0.015	0.017	0.016	0.01	0.01	0.02	0.02	0.02	0.05
Cadmium	mg/L	0.0001																
Calcium	mg/L	5	4	4	4	4	4.8	4.6	4.2	4.5	3.5	3.4	4	4	10	63	55	24
Chromium	mg/L	<0.001																
Copper	mg/L	0.001																
Iron	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	0.04
Lead	mg/L	<0.001																
Magnesium	mg/L	2	2	2	2	2	2.1	1.9	1.8	2	1.3	1.5	2	2	4	26	18	7
Manganese	mg/L	1.59	0.74	0.27	0.09	0.05	0.059	0.093	0.041	0.04	0.03	0.037	0.02	0.03	0.06	* 22.9	13.9	4.97
Mercury	mg/L																	
Phosphorus	mg/L	0.32	2.22	1.20	0.95	0.3			<0.10	<0.10	2	1.8	0.544	0.009	0.287	0.605	0.386	0.353
Potassium	mg/L																	
Sodium	mg/L	3	3	3	2	2	2.4	2.8	2.3	1.9	1.8	1.8	<2	<2	2	* 36	174	221
Zinc	mg/L	<0.01																
Total Dissolved Solids	mg/L	48	36	37	44	35	66	52	46	90	<10	20	30	31	70	* 616	871	786

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PW1															
		Apr-07	Jun-07	Sep-07	Dec-08	Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10	Apr-11	Jul-11	Oct-11	Dec-11
pH	units	6.83	6.64	6.71	7.39	6.88	6.92	7.06	7.39	7.37	7.41	7.24	8	7.24	7.36	7.7	7.46
Conductivity	µmho/cm	1740	1800	1720	1920	1290	1380	1220	1180	1050	1040	932	941	965	930	738	889
Chloride	mg/L	339	327	388	400	156	160	140	134	116	116	106	102	109	94	93	95
Phosphate - ortho	mg/L			<0.10				<0.10								<0.10	
Sulphate	mg/L	71.7	74.2		95.5	199	256	215	217	185	174	165	147	152	133	152	135
Alkalinity	mg/L	288	303	260	232	209	221	209	227	203	206	208	195	197	202	182	195
Hardness	mg/L	248	267	261	297	216	273	255	261	224	226	207	202	200	194	184	199
Total Kjeldahl Nitrogen	mg/L	18.5	19	18.5	17	10.7	12	10.1	10.6	10.1	10.1	10.5	10.3	10.5	10.2	9.71	10.3
Ammonia	mg/L	23.1	15.9	18.3	17.4	10.1	9.06	3.7	1.06	8.49	7.56	6.55	7.04	7.93	8.93	8.46	8.42
Nitrate	mg/L			<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L			<0.05				<0.05								<0.05	
Biochemical Oxygen Demand	mg/L			26	20	<5	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chemical Oxygen Demand	mg/L	58.3	63	60	50	79	68	57	56	51	34	41	38	27	35	33	35
Dissolved Organic Carbon	mg/L	21.6	22.2	19.9	19.1	19.3	22.5	19.6	17.4	14.8	14.3	12.9	10	12.6	14.1	11.5	9.8
Phenols	µg/L	6	7	6	7	1	2	3	6	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	<0.003						<0.003								0.003	
Barium	mg/L	0.219	0.193	0.241	0.242	0.182	0.196	0.163	0.17	0.14	0.123	0.151	0.055	0.126	0.093	0.128	0.097
Boron	mg/L	0.331	0.245		0.227	0.659	0.74	0.877	0.803	0.494	0.68	0.527	0.381	0.474	0.304	0.3	0.337
Cadmium	mg/L	<0.0001	<0.002	<0.0001				<0.001								<0.001	
Calcium	mg/L																
Chromium	mg/L	0.009	0.007	0.008				0.006								0.005	
Copper	mg/L	<0.002	<0.002	<0.002				0.009								<0.002	
Iron	mg/L	98.2	70.2	88.3	83.6	87.9	79.3	64.3	63.9	51.8	17	44.6	0.441	42.1	6.6	38.6	27.5
Lead	mg/L	<0.001	<0.002	<0.001				<0.002								<0.002	
Magnesium	mg/L																
Manganese	mg/L	0.536	0.473	0.881	1.39	5.34	5.52	5.65	4.84	4.34	4.26	1.2	3.15	3.73	3.07	3.18	3
Mercury	mg/L	<0.0001	<0.0001	<0.0001				<0.0001								<0.0001	
Phosphorus	mg/L	<0.02	<0.05	0.05	0.08	0.08	0.05	0.04	0.05	0.04	<0.05	0.06	<0.05	0.05	<0.05	0.08	<0.05
Potassium	mg/L																
Sodium	mg/L																
Zinc	mg/L	0.008	<0.005	<0.004				<0.005								0.01	
Total Dissolved Solids	mg/L					818	850	766	672	704	642	578	588	550	556	534	546

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PW1																			
		Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14	Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16
pH	units	7.08	6.77	6.85	6.7	6.74	7.16	6.67	6.93	6.85	6.89	6.96	6.87	7.08	7.16	6.8	7.17	6.96	6.96	6.91	7.09
Conductivity	µmho/cm	930	915	914	933	916	901	866	880	900	947	988	1020	908	881	879	876	910	880	880	880
Chloride	mg/L	88	85	87	88	91	92	88	92	100	110	111	115	104	108	104	115	120	100	100	100
Phosphate - ortho	mg/L			<0.03				<0.09				<0.03				<0.03					
Sulphate	mg/L	122	115	112	113	109	109	98	101	100	111	122	120	95	96	17	98	99	94	90	90
Alkalinity	mg/L	206	208	202	221	219	189	190	176	176	176	188	221	192	175	180	166	170	170	170	160
Hardness	mg/L	195	169	196	188	196	212	188	207	222	231	259	250	231	236	228	249	230	240	220	220
Total Kjeldahl Nitrogen	mg/L	8.43	9.42	9.37	1.68	8.3	7.24	6.91	6.02	7.27	8.56	8.04	7.86	6.93	6.79	5.65	7.48	6.6	6.5	5.9	6.6
Ammonia	mg/L	8.22	8.05	7.41	<0.02	7.39	7.14	6.45	7.01	7.07	6.99	6.95	6.36	6.2	5.49	5.09	5.45	6.1	6	6.1	5.3
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1
Nitrite	mg/L			<0.10				<0.10				<0.10				<0.10		<0.010	<0.010	<0.01	<0.01
Biochemical Oxygen Demand	mg/L	2	1	2	2	4	1	1	3	5	3	3	1	2	<1	<1	<1	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L	30	30	33	36	28	19	29	31	20	29	27	26	26	32	30	26	38	19	34	30
Dissolved Organic Carbon	mg/L	10	8.3	8.5	9.2	7.6	8.1	7.8	8.1	7.4	8.5	10.3	10.1	8.5	6.8	7.6	6.7	7.1	5.8	5.7	6.2
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			<0.01				<0.01			<0.001	0.002				0.002				0.0015	0.0018
Barium	mg/L	0.1	0.12	0.12	0.12	0.09	0.1	0.11	0.12	0.12	0.1	0.13	0.12	0.11	0.11	0.1	0.11	0.087	0.093	0.1	0.097
Boron	mg/L	0.4	0.35	0.32	0.41	0.34	0.32	0.31	0.35	0.33	0.36	0.5	0.45	0.45	0.41	0.37	0.35	0.38	0.32	0.29	0.29
Cadmium	mg/L			0.0007				<0.0001			<0.0001	<0.0001				<0.0001				<0.0001	<0.0001
Calcium	mg/L	55	48	57	54	57	62	54	60	64	66	74	72	66	68	65	70	65	68	64	62
Chromium	mg/L			0.004				0.004			<0.001	0.001				0.001				<0.005	<0.005
Copper	mg/L			<0.001				0.001			<0.001	<0.001				<0.001				<0.001	<0.001
Iron	mg/L	33.3	38.3	35.5	46.3	40	38.3	37.6	40.5	39.9	10.8	48.9	45.1	43	40.1	37.8	39.2	18	20	37	38
Lead	mg/L			<0.001				<0.001			<0.001	<0.001				<0.001				<0.0005	<0.0005
Magnesium	mg/L	14	12	13	13	13	14	13	14	15	16	18	17	16	16	16	18	16	17	16	16
Manganese	mg/L	2.98	3.42	3.45	3.34	3.22	3.04	3.21	3.61	3.63	4.02	4.2	4.05	3.79	3.51	3.6	3.66	3.7	3.4	3.3	3.4
Mercury	mg/L			<0.0001				<0.0001				<0.0001				<0.0001				<0.1	
Phosphorus	mg/L	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	<0.05	<0.05	<0.05				
Potassium	mg/L			16				16				19				16				15	15
Sodium	mg/L	91	84	83	82	78	88	77	79	78	76	81	80	76	75	63	69	63	63	57	57
Zinc	mg/L			<0.01				<0.01			0.01	<0.01				<0.01				<0.005	<0.005
Total Dissolved Solids	mg/L	604	595	594	606	595	586	563	572	585	616	642	663	590	573	571	569	526	580	458	474

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PW1																			
		Apr-17	Jul-17	Sep-17	Dec-17	Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	6.93	7.06	7.03	6.98	7.06	6.85	7.04	6.93	6.63	6.62	6.9	6.75	6.94	6.82	6.92	7.13	6.77	6.61	6.82	6.81
Conductivity	µmho/cm	900	830	830	860	840	830	790	850	817	735	783	283	806	794	803	811	806	814	843	840
Chloride	mg/L	110	97	100	100	110	100	110	110	112	106	100	60	106	108	117	117	138	103	108	131
Phosphate - ortho	mg/L			<0.050				<0.010				<0.6				<0.010				<0.010	
Sulphate	mg/L	86	84	73	75	81	69	66	73	72	74	68	<1	64	66	61	60	63	66	60	61
Alkalinity	mg/L	180	160	170	180	170	170	180	170	178	173	163	27	168	158	168	174	153	174	176	179
Hardness	mg/L	230	220	200	210	220	220	220	230	224	238	241	82	236	232	232	241	261	250	245	252
Total Kjeldahl Nitrogen	mg/L	6	6.2	5.9	5.7	5.7	5.2	5.4	5	5	4.26	4.8	0.113	6.28	5.56	5.56	5.49	5.72	4.27	4.61	5.62
Ammonia	mg/L	6	6.1	5.6	5.1	5.3	5.3	5.3	5	4.85	0.13	5.34	<0.010	5.08	4.55	5.35	4.82	4.54		3.5	4.88
Nitrate	mg/L	<0.50	<0.10	<0.10	<0.50	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	2.39	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.050	0.015	<0.010	<0.050	<0.050	<0.010	0.012	0.022			<0.10				<0.10				<0.10	
Biochemical Oxygen Demand	mg/L	3	20	4	4	3	2	<2	13	6	6	6	3	5	4		7	5	4		3
Chemical Oxygen Demand	mg/L	27	30	21	20	26	22	23	22	19	5	18	<5	21	23	18	18	<5	9	<5	23
Dissolved Organic Carbon	mg/L	5.7	5.5	5.3	5.6	6	5.4	5.5	5.7	6.5	6.2		1.4	5.5	6.2		4.9	5.2	4.6		5.2
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	4	<1	3	<1	<1	<1	<1
Arsenic	mg/L			0.0017				0.0016				0.002				0.002				0.002	
Barium	mg/L	0.098	0.094	0.089	0.087	0.087	0.076	0.088	0.075	0.09	0.09	0.09	0.09	0.09	0.1	0.09	0.08	0.08	0.9	0.09	0.07
Boron	mg/L	0.29	0.27	0.24	0.21	0.23	0.22	0.23	0.24	0.24	0.26	0.24	0.02	0.24	0.23	0.2	0.21	0.28	0.22	0.23	0.39
Cadmium	mg/L			<0.00010				<0.00010				<0.0001				<0.0001				<0.0001	
Calcium	mg/L	64	61	56	59	63	63	63	65	65	69	70	28	68	68	68	70	75	72	70	73
Chromium	mg/L			<0.0050				<0.0050				0.001				0.001				0.001	
Copper	mg/L			0.0013				<0.0010				<0.001				<0.001				<0.001	
Iron	mg/L	38	36	34	35	36	18	35	23	40.2	37.1	34.9	0.68	34.5	35.2	35.5	39.1	34.5	41.4	37	35
Lead	mg/L			<0.00050				<0.00050				<0.001				<0.001				<0.001	
Magnesium	mg/L	17	16	15	15	15	16	16	16	15	16	16	3	16	15	15	16	18	17	17	17
Manganese	mg/L	3.4	3.1	2.9	3.1	3.1	3.1	3.1	3.2	3.28	3.39	3.19	0.08	3.19	3.31	3.25	3.01	3.4	3.4	3.34	2.97
Mercury	mg/L			<0.1				<0.1				<0.0001				<0.0001				<0.0001	
Phosphorus	mg/L	<0.10	<0.10	<0.10	<0.10	0.03	0.022	0.024	0.022	0.023	0.026	0.004	<0.002	0.025	0.023	0.027	0.031	0.025	0.026	0.0525	0.022
Potassium	mg/L			14				14				13				12				13	
Sodium	mg/L	57	54	50	49	49	50	48	48	47	48	40	9	48	44	39	42	46	44	41	45
Zinc	mg/L			<0.0050				<0.0050				<0.01				<0.01				<0.01	
Total Dissolved Solids	mg/L	526	536	620	530	390	420	450	450	531	478	509	184	524	516	522	527	524	529	548	546

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW1A															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	8.67	8.09	8.07	8.08	7.92	8.04	7.86	7.89	7.33	7.29	7.26	6.93	7.07	7.83	7.81	7.83
Conductivity	µmho/cm	154	155	149	140	140	140	145	130	138	133	131	133	140	134	134	136
Chloride	mg/L	1	1	1	1	0	1	1	1	<1	<1	1	1	1	1	1	1
Phosphate - ortho	mg/L				<0.10				<0.10		<0.03		<0.09		<0.03		<0.03
Sulphate	mg/L		9.96	8.74	8.34	8.98	11.9	9.31	9.47	8	8	9	8	8	8	7	7
Alkalinity	mg/L	67	65	64	62	62	63	60	58	63	58	60	60	65	56	57	60
Hardness	mg/L	66	72	63	63	62	65	60	62	54	52	61	56	66	61	61	61
Total Kjeldahl Nitrogen	mg/L	<0.10	0.16	<0.10	<0.10	<0.10	0.26	0.25	<0.10	1.21	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1
Ammonia	mg/L	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.08	<0.02	<0.02	<0.02	<0.02	0.06	0.06	<0.02	<0.025
Nitrate	mg/L	<0.05	0.27	0.19	0.28	0.24	0.17	0.23	0.20	0.23	0.25	0.10	0.28	0.27	0.25	0.25	0.25
Nitrite	mg/L	<0.10			<0.05				<0.05		<0.10		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	1	<1	<1	<1	<1	<1	<1	<1
Chemical Oxygen Demand	mg/L	6	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	5	<5	<5	<5	8
Dissolved Organic Carbon	mg/L	2	1.4	2.9	0.8	13	4.6	0.6	0.8	<5	0.6	<5	0.5	<0.5	1.4	0.9	0.6
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Barium	mg/L	0.036	0.033	0.03	0.025	0.027	0.032	0.026	0.027	0.02	0.02		0.02	0.02	0.02	0.02	0.02
Boron	mg/L	0.019	0.029	0.02	0.02	0.022	0.017	0.014	0.016	0.01	0.01	0.01	<0.01	0.01	0.02	0.02	0.01
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		<0.0001		<0.0001
Calcium	mg/L									15	16	18	16	18	18	18	18
Chromium	mg/L	<0.003			0.004				<0.003		<0.001		<0.001		<0.001		<0.001
Copper	mg/L	0.002			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Iron	mg/L	<0.010	0.01	<0.010	<0.010			<0.010	<0.010	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									4	3	4	4	5	4	4	4
Manganese	mg/L	<0.003	<0.03	0.004	0.003	<0.003	0.003	0.004	<0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	0.10	0.28	0.16	0.26	<0.02	1.04	0.91	0.46	0.24	0.12	0.17	0.24	0.15	0.16	0.12	<0.05
Potassium	mg/L										3		3		3		3
Sodium	mg/L									3	3		3	4	4	4	3
Zinc	mg/L	<0.004			<0.005				0.011		<0.01		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L			90	92	98	72	82	96	90	86	85	86	91	87	87	88

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW1A											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.52	7.94	7.83	7.9	7.91	8.03	7.89	8.03	7.88	7.84	7.75	7.73
Conductivity	µmho/cm	140	140	140	140	140	140	138	140	140	134	140	131
Chloride	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5	4	<1	6	1	1
Phosphate - ortho	mg/L		<0.010		0.012		<0.010		<0.6		<0.010		<0.010
Sulphate	mg/L	8.6	6.8	6.8	7.2	7.4	6.7	8	7	7	7	7	6
Alkalinity	mg/L	59	61	61	63	64	62	73	63	64	61	62	67
Hardness	mg/L	53	56	54	53	56	52	61	66	61	57	70	59
Total Kjeldahl Nitrogen	mg/L	<0.10	0.12	<0.10	<0.10	<0.10	0.13	0.1	<0.1	<0.100	<0.100	0.156	<0.100
Ammonia	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.02	0.02	0.021	<0.010	<0.01	<0.010
Nitrate	mg/L	0.23	0.18	0.22	0.19	0.19	0.21	0.26	0.18	0.22	0.18	0.17	0.14
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	<1	1		4	
Chemical Oxygen Demand	mg/L	13	10	9.7	<4.0	<4.0	<4.0	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	0.71	0.45	0.48	0.42	<0.50	<0.50	<0.5		<0.5		0.8	
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.021	0.024	0.019	0.022	0.019	0.02	0.02	0.02	0.02	0.02	0.02	0.03
Boron	mg/L	0.016	0.015	0.022	0.016	0.014	0.015	<0.01	0.01	0.01	0.01	0.02	0.02
Cadmium	mg/L		<0.0001		<0.00010		<0.00010		<0.0001		<0.0001		<0.0001
Calcium	mg/L	16	16	15	15	16	15	18	20	18	18	20	18
Chromium	mg/L		<0.005		<0.0050		<0.0050		0.001		<0.001		<0.001
Copper	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Iron	mg/L	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	mg/L		<0.00050		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	3.5	3.7	3.7	3.6	3.6	3.3	4	4	4	3	5	4
Manganese	mg/L	<0.002	0.0044	<0.0020	<0.0020	<0.0020	<0.0020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.035	0.032	0.021	0.01	0.119	0.019	0.03	0.027
Potassium	mg/L		2.8		2.6		2.6		3		2		3
Sodium	mg/L	3.7	3.4	3.8	3.4	3.9	3.6	4	4	4	3	4	4
Zinc	mg/L		<0.005		<0.0050		<0.0050		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L	90	108	88	106	75	80	90	91	91	87	91	85

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW1B															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.16	7.49	6.34	6.86	6.93	7.25	7.09		6.56	6.31	6.64	6.3	6.69	6.67	6.88	7.12
Conductivity	µmho/cm	263	207	172	304	128	223	131		134	125	232	281	167	388	349	294
Chloride	mg/L	5	1	3	2	2	2	2		2	1	3	3	2	6	3	2
Phosphate - ortho	mg/L				<0.10						0.12		0.31		<0.03		<0.03
Sulphate	mg/L		30.7	57.2	72.2	25	32.1	19.1		25	15	43	50	27	45	69	32
Alkalinity	mg/L	89	69	9	78	44	91	39		36	43	67	79	51	134	103	115
Hardness	mg/L	119	106	67	149	57	120	62		53	56	121	129	80	187	186	148
Total Kjeldahl Nitrogen	mg/L	0.54	1.15	1.06	3	2.47	1.99	1.14		0.66	0.34	0.61	1.45	<0.10	0.47	0.65	0.82
Ammonia	mg/L	0.02	<0.02	<0.02	<0.02	0.03	0.06	<0.02		<0.02	<0.02	<0.02	0.04	0.06	0.08	<0.02	<0.025
Nitrate	mg/L	0.38	0.10	0.30	0.22	0.12	0.18	0.23		<0.10	<0.10	0.24	0.64	0.42	1.32	0.72	<0.10
Nitrite	mg/L	<0.05			<0.05						<0.10		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	<5	<5	<5	<5	<5	<5		2	1	<1	4	3	<1	2	1
Chemical Oxygen Demand	mg/L	27	43	81	14	341	128	41		48	30	58	111	79	62	76	349
Dissolved Organic Carbon	mg/L	9.9	6.3	3.8	6.6	4.5	11.9	23.6	5.1	<5	3.7	3.6	5.2	4.9	6.8	6.3	5
Phenols	µg/L	2	6	<1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Barium	mg/L	0.045	0.026	0.016	0.054	0.018	0.041	0.018	0.036	0.02	0.02		0.04	0.02	0.06	0.03	0.03
Boron	mg/L	0.23	0.122	0.048	0.251	0.088	0.181	0.071	0.081	0.09	0.07	0.11	0.16	0.09	0.28	0.22	0.18
Cadmium	mg/L	<0.001			<0.001				<0.001		0.0002		0.0003		0.0003		0.0002
Calcium	mg/L									18	19	42	45	27	65	63	51
Chromium	mg/L	<0.003			<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Copper	mg/L	0.007			0.01				0.014		0.006		0.008		0.009		0.009
Iron	mg/L	0.163	0.26	0.064	0.058	0.12	<0.010	0.063	0.043	0.08	0.62	0.04	<0.03	0.07	0.05	0.07	0.06
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									2	2	4	4	3	6	7	5
Manganese	mg/L	0.183	0.05	0.003	0.008	0.005	0.01	<0.003	0.053	<0.01	0.17	<0.01	0.03	<0.01	0.01	<0.01	0.02
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	3.42	7.95	10.30	0.03	0.03	12.20	7.88		6.01	6.77	3.90	21.70	6.49	3.62	7.79	18.1
Potassium	mg/L										1		2		2		2
Sodium	mg/L									2	2		4	2	8	4	3
Zinc	mg/L	0.557			0.445				0.35		0.24		0.24		0.24		0.14
Total Dissolved Solids	mg/L			124	242	260	142	96		87	81	151	183	109	252	227	191

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW1B											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.31	6.87	7.25	6.93	7.41	6.92	7.26	7.49	6.89	6.7	6.98	7.09
Conductivity	µmho/cm	360	280	340	220	310	390	275	217	174	384	185	254
Chloride	mg/L	2	<1.0	1.8	1.2	2.1	<1.0	7	2	2	10	4	3
Phosphate - ortho	mg/L		<0.010		0.012		<0.010				0.02		0.46
Sulphate	mg/L	53	17	53	17	38	30	43	23	32	97	21	26
Alkalinity	mg/L	130	120	110	94	120	160	115	84	49	93	65	133
Hardness	mg/L	180	130	160	88	150	150	147	110	85	192	101	165
Total Kjeldahl Nitrogen	mg/L	0.76	1.3	0.4	0.62	0.27	0.3	0.9	0.8	0.537	1.26	0.644	0.484
Ammonia	mg/L	<0.050	0.071	<0.050	<0.050	0.055	<0.050	0.03	0.03	0.099	0.013	0.013	0.01
Nitrate	mg/L	0.21	<0.10	0.33	0.12	0.35	0.2	0.36	<0.10	<0.10	0.11	<0.10	0.11
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2.0	<2	<2	<1		<1		3	
Chemical Oxygen Demand	mg/L	180	240	65	61	37	21	36	29	92	55	82	29
Dissolved Organic Carbon	mg/L	5.6	4	4.7	3.6	4.2	4.5	4.3		3.4		3.6	
Phenols	µg/L	<1	<1	<1	2.7	<1	<1	<1	<1	3	<1	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.03	0.044	0.038	0.025	0.027	0.033	0.03	0.04	0.02	0.06	0.02	0.04
Boron	mg/L	0.17	0.14	0.16	0.11	0.16	0.16	0.11	0.12	0.06	0.2	0.08	0.17
Cadmium	mg/L		0.00032		0.00015		0.00017		0.0003		0.0004		0.0002
Calcium	mg/L	62	45	56	31	51	53	49	39	29	67	34	53
Chromium	mg/L		<0.005		<0.0050		<0.0050		<0.001		<0.001		<0.001
Copper	mg/L		0.01		0.0049		0.0079		0.009		0.008		0.009
Iron	mg/L	<0.1	0.22	0.48	0.13	<0.10	<0.10	<0.03	0.1	0.04	0.05	0.04	0.24
Lead	mg/L		0.00054		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	5.7	3.5	5.7	2.8	4.7	5.2	6	3	3	6	4	8
Manganese	mg/L	<0.0020	0.012	0.012	0.07	<0.0020	<0.0020	<0.01	0.05	<0.01	0.02	<0.01	<0.01
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	7	3.6	0.72	0.082	2.62	11.4	0.92	0.535
Potassium	mg/L		2.1		1.4		1.6		<1		2		4
Sodium	mg/L	3.1	2.5	3.1	2.3	3.2	3.8	3	7	3	4	3	4
Zinc	mg/L		0.3		0.17		0.11		0.21		0.4		0.15
Total Dissolved Solids	mg/L	254	150	210	176	210	235	179	141	113	250	120	165

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW3A															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	9.08	8.26	8.02	7.83	7.97	8.14	7.72	7.82	7.55	7.31	7.09	7.04	7.19	7.58	7.46	7.91
Conductivity	µmho/cm	559	895	796	784	707	686	677	634	676	678	646	589	614	582	654	666
Chloride	mg/L	79	105	98	95	83	92	95	89	80	79	79	75	72	67	79	86
Phosphate - ortho	mg/L				<0.10				<0.10		<0.03		<0.09		0.05		<0.03
Sulphate	mg/L		79.8	73.7	74	80.5	70.3	64	75.9	51	50	50	43	48	38	56	48
Alkalinity	mg/L	89	242	203	201	179	190	149	151	172	170	170	144	143	133	156	149
Hardness	mg/L	166	345	292	278	245	260	229	236	189	217	231	202	231	207	243	252
Total Kjeldahl Nitrogen	mg/L	0.53	0.24	0.22	<0.10	0.1	0.56	0.28	<0.10	<0.10	0.15	0.24	0.14	<0.10	0.18	<0.10	0.13
Ammonia	mg/L	0.09	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	0.04	0.06	0.03	0.07	<0.02	0.04	0.15	0.06	<0.025
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.05			<0.05				<0.05		<0.10	<0.10	<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	12	<5	<5	<5	<5	<5	<5	1	2	<1	1	1	<1	<1	<1
Chemical Oxygen Demand	mg/L	14	<5	8	<5	11	8	<5	<5	<5	5	<5	5	<5	8	11	10
Dissolved Organic Carbon	mg/L	4.6	4.6	4.8	3.1	5.1	8	2.1	2.2	<5	2.6	2.4	1.8	1.6	2.2	2.4	2.3
Phenols	µg/L	3	1	<1	4	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Barium	mg/L	0.067	0.09	0.084	0.084	0.077	0.068	0.065	0.072	0.07	0.07		0.06	0.06	0.06	0.06	0.06
Boron	mg/L	0.07	0.094	0.104	0.137	0.104	0.113	0.11	0.094	0.11	0.12	0.16	0.09	0.09	0.09	0.1	0.09
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		<0.0001		<0.0001
Calcium	mg/L									56	64	66	58	66	60	71	73
Chromium	mg/L	0.031			<0.003				0.005		0.003		<0.001		<0.001		<0.001
Copper	mg/L	0.006			<0.002				<0.002		0.001		<0.001		<0.001		<0.001
Iron	mg/L	0.023	0.47	0.025	0.414	0.544	0.136	0.028	<0.010	0.17	<0.03	0.04	<0.03	<0.03	0.15	0.24	0.05
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									12	14	16	14	16	14	16	17
Manganese	mg/L	<0.003	1.12	1.05	1.23	1.41	1.25	1.31	0.785	1.08	1.05	1.19	0.67	0.35	0.54	0.5	0.49
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	0.84	0.38	0.52	0.18	0.03	0.17	0.18	0.07	0.05	0.04	0.04	0.04	0.10	0.06	0.05	<0.05
Potassium	mg/L										3		3		4		4
Sodium	mg/L									40	45		40	42	33	37	35
Zinc	mg/L	<0.004			0.012				<0.005		<0.01		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L			520	518	428	414	384	416	439	441	420	383	399	378	425	433

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW3A											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.68	7.9	7.79	7.93	7.99	7.68	7.57	7.95	7.67	7.58	7.62	7.52
Conductivity	µmho/cm	700	750	710	720	660	680	653	639	628	647	630	619
Chloride	mg/L	91	98	94	98	87	89	100	91	91	99	81	85
Phosphate - ortho	mg/L		<0.010		<0.010		<0.010		<0.6		<0.010		0.011
Sulphate	mg/L	50	51	48	51	39	36	34	38	32	34	25	27
Alkalinity	mg/L	160	160	160	150	160	160	190	152	141	146	139	149
Hardness	mg/L	240	280	250	230	230	230	235	239	215	220	222	188
Total Kjeldahl Nitrogen	mg/L	<0.10	0.19	0.13	<0.10	<0.10	0.14	0.1	0.2	0.249	0.225	<0.100	<0.1
Ammonia	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.04	0.05	0.023	0.08	<0.01	<0.01
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	<1	<1		1	
Chemical Oxygen Demand	mg/L	20	15	9.5	6.3	8.6	4.8	<5	<5	9	<5	<5	<5
Dissolved Organic Carbon	mg/L	2.4	2.2	1.9	1.7	1.4	1.5	3		1.4		1.7	
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.0010		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.066	0.073	0.066	0.062	0.063	0.066	0.07	0.06	0.08	0.07	0.07	0.06
Boron	mg/L	0.078	0.079	0.084	0.063	0.084	0.1	0.13	0.1	0.12	0.11	0.14	0.11
Cadmium	mg/L		<0.00010		<0.00010		<0.00010		<0.0001		<0.0001		<0.0001
Calcium	mg/L	70	80	73	67	87	89	66	71	63	65	64	54
Chromium	mg/L		<0.0050		<0.0050		<0.0050		<0.001		<0.001		<0.001
Copper	mg/L		<0.0010		<0.0010		<0.0010		<0.001		0.001		0.001
Iron	mg/L	<0.10	0.11	0.15	0.25	0.14	<0.10	0.04	0.03	0.55	0.06	0.07	0.04
Lead	mg/L		<0.00050		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	16	18	17	17	15	16	17	15	14	14	15	13
Manganese	mg/L	0.21	0.33	0.21	0.25	0.15	0.062	0.25	0.13	0.56	0.36	0.5	0.034
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.031	0.044	0.022	0.004	0.031	0.036	0.027	0.038
Potassium	mg/L		4.2		3.8		3.8		4		4		3
Sodium	mg/L	33	33	33	30	32	35	43	32	39	37	45	42
Zinc	mg/L		<0.0050		<0.0050		<0.0050		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L	410	704	402	464	325	375	424	415	408	421	410	402

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW3B															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.32	6.05	6.83	6.91	7.01	7.05	7.13	7.06	6.42	6.29	6.28	6.25	6.23	6.56	6.6	6.67
Conductivity	µmho/cm	246	300	256	204	256	358	245	217	306	398	436	284	450	218	389	160
Chloride	mg/L	54	64	65	43	63	105	58	55	74	96	110	67	108	43	98	29
Phosphate - ortho	mg/L				<0.10				0.21		<0.03		<0.09		<0.03		<0.03
Sulphate	mg/L		24	6.32	8.08	8.45	8.23	10.2	7.03	9	6	10	6	5	6	4	5
Alkalinity	mg/L	13	<5	9	13	14	12	15	13	16	12	16	16	14	14	16	16
Hardness	mg/L	36	52	51	37	45	77	37	39	39	81	78	51	107	42	91	30
Total Kjeldahl Nitrogen	mg/L	0.55	0.37	0.45	0.65	<0.10	0.37	0.47	<0.10	<0.10	0.12	0.1	0.33	0.12	0.24	0.12	0.15
Ammonia	mg/L	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.06	0.07	<0.02	<0.025
Nitrate	mg/L	1.58	1.48	1.27	1.51	0.67	1.16	0.56	0.49	0.36	0.88	0.36	0.63	0.98	0.77	0.93	0.49
Nitrite	mg/L	<0.05			<0.05				<0.05		<0.10		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	12	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1
Chemical Oxygen Demand	mg/L	<5	9	8	9	12	8	<5	<5	5	12	10	16	9	7	9	10
Dissolved Organic Carbon	mg/L	4.7	2.2	1.6	3.5	2.3	4.2	2.3	3.5	<5	1.7	1.9	2	1	3	1.8	2.1
Phenols	µg/L	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Barium	mg/L	0.029	0.042	0.247	0.027	0.038	0.09	0.048	0.049	0.07	0.09		0.05	0.1	0.04	0.08	0.05
Boron	mg/L	0.029	0.24	0.014	0.015	0.016	0.018	0.015	0.013	0.02	0.01	0.02	0.01	0.01	0.01	0.01	<0.01
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		0.0004		<0.0001
Calcium	mg/L									14	29	28	17	38	15	33	12
Chromium	mg/L	<0.003			<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Copper	mg/L	0.002			<0.002				<0.002		0.001		<0.001		<0.001		0.001
Iron	mg/L	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									1	2	2	2	3	1	2	<1
Manganese	mg/L	0.059	0.03	0.024	0.012	0.017	0.007	0.004	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	2.24	1.69	6.40	4.08	0.02	1.88	0.49	3.24	0.92	3.77	1.75	7.18	1.76	0.54	0.36	0.61
Potassium	mg/L										3		2		2		1
Sodium	mg/L									36	33		29	40	22	32	14
Zinc	mg/L	<0.004			<0.005				0.008		<0.01		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L			196	126	160	234	122	162	199	259	283	185	292	142	253	104

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW3B											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.26	6.7	6.61	6.71	6.67	6.52	6.47	7.43	6.39	6.52	6.68	6.5
Conductivity	µmho/cm	560	290	400	550	750	480	469	402	801	450	404	579
Chloride	mg/L	140	67	100	140	210	130	125	99	218	116	87	134
Phosphate - ortho	mg/L		<0.010		<0.010		<0.010		<0.6		<0.010		<0.010
Sulphate	mg/L	7.9	4.1	8	4.1	6.8	6.6	8	6	5	10	7	7
Alkalinity	mg/L	15	13	15	12	11	12	30	32	9	14	18	16
Hardness	mg/L	76	84	77	85	130	67	71	68	152	67	62	117
Total Kjeldahl Nitrogen	mg/L	<0.10	0.11	0.18	<0.10	<0.10	0.18	0.3	0.2	0.239	0.117	0.211	<0.1
Ammonia	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.02	0.05	0.078	<0.010	<0.01	<0.010
Nitrate	mg/L	0.35	0.56	0.34	0.5	0.37	0.47	0.32	0.36	0.49	0.45	0.32	0.69
Nitrite	mg/L	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	1	1		<1	
Chemical Oxygen Demand	mg/L	25	8.5	16	<4.0	4.7	5.9	<5	<5	38	10	14	24
Dissolved Organic Carbon	mg/L	2.2	1.5	1.4	1.5	1.4	1.7	3.4		1.6		2.5	
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.11	0.12	0.1	0.12	0.21	0.091	0.13	0.08	0.26	0.1	0.08	0.14
Boron	mg/L	0.014	0.014	0.043	0.012	0.016	0.013	<0.01	<0.01	0.02	0.01	0.02	0.01
Cadmium	mg/L		0.00056		<0.00010		<0.00010		<0.0001		<0.0001		0.00021
Calcium	mg/L	28	30	28	31	46	24	25	24	56	27	23	42
Chromium	mg/L		<0.005		<0.0050		<0.0050		<0.001		<0.001		<0.001
Copper	mg/L		0.0018		<0.0010		<0.0010		<0.001		0.001		0.001
Iron	mg/L	<0.10	0.2	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	mg/L		<0.0005		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	1.6	1.9	1.8	2	3.1	1.8	2	2	3	<1	1	3
Manganese	mg/L	0.0054	0.015	0.017	0.0063	0.0072	0.0045	<0.01	<0.01	0.01	<0.01	0.01	<0.01
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.67	0.37	0.571	0.004	1.72	0.272	0.221	0.509
Potassium	mg/L		3.1		2.5		2.3		2		2		4
Sodium	mg/L	43	51	41	52	85	45	60	37	83	48	53	52
Zinc	mg/L		<0.005		<0.0050		<0.0050		<0.01		0.05		<0.01
Total Dissolved Solids	mg/L	342	414	266	478	330	650	305	261	521	292	263	37

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW4A															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	8.34	8.13	7.79	7.97	8.13	7.73	7.93	8.14	7.84	7.64	7.45	7.4	7.76	7.68	7.58	7.94
Conductivity	µmho/cm	2470	3530	3590	3860	3750	4230	4190	3700	4100	4300	4180	4130	4590	4250	4210	4030
Chloride	mg/L	429	748	789	852	838	1100	963	939	811	822	834	855	895	842	854	807
Phosphate - ortho	mg/L				<1.00				<0.10		<0.03		<0.09		<0.03		<0.03
Sulphate	mg/L		4.53	3.2	<1.00	5.03	6.52	13.6	<0.10	<1	4	<3	4	2	<1	1	<1
Alkalinity	mg/L	435	652	665	652	700	888	720	736	741	723	729	696	768	710	725	755
Hardness	mg/L	268	557	656	613	648	854	695	649	584	588	671	614	641	575	605	586
Total Kjeldahl Nitrogen	mg/L	0.78	1.04	1.09	1.27	0.57	1.61	1.3	1	0.78	0.93	0.88	1.08	1	1.62	0.68	1.15
Ammonia	mg/L	0.57	0.55	0.73	0.35	0.05	0.42	0.42	0.71	0.5	0.53	0.53	0.47	0.76	0.92	0.27	0.369
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.50	<0.10	<0.20	<0.05	<0.05	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.05			<0.50				<0.05		<0.10	<0.10	<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	563	132	832	75	190	409	820	894	990	996	1040	1320	1040	982	38
Chemical Oxygen Demand	mg/L	1050	1760	1630	1680	1550	2130	1200	1460	1460	1580	1520	1490	1920	1550	1270	1300
Dissolved Organic Carbon	mg/L	484	6.13	501	634	253	602	637	559	496	412	489	529	646	501	440	456
Phenols	µg/L	111	215	206	223	215	230	221	234	255	206	199	212	246	199	217	180
Arsenic	mg/L				0.003				0.004		<0.001		<0.01		<0.001		<0.01
Barium	mg/L	0.465	0.96	1.21	1.26	1.11	1.39	1.23	1.37	1.3	1.2		1.3	1.4	1.2	1.2	1.2
Boron	mg/L	0.153	0.145	0.128	0.167	0.144	0.184	0.212	0.199	0.21	0.19	0.2	0.2	0.3	0.26	0.3	0.3
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		<0.0001		<0.001
Calcium	mg/L									176	176	201	180	184	171	178	172
Chromium	mg/L	0.006			0.017				0.014		0.005		0.007		<0.001		<0.01
Copper	mg/L	<0.002			<0.002				<0.002		<0.001		<0.001		<0.001		<0.01
Iron	mg/L	<0.010	<0.01	0.087	0.058	0.47	0.022	0.846	0.104	1.76	1.79	1.69	1.5	0.5	1.13	1.6	1.2
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.01
Magnesium	mg/L									35	36	41	40	44	36	39	38
Manganese	mg/L	0.023	1.19	0.262	0.285	0.324	0.375	0.393	0.404	0.45	0.5	0.48	0.42	0.5	0.34	0.4	0.4
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	0.75	0.50	0.52	0.38	<0.02	0.06	0.05	0.50	0.04	0.04	0.06	0.06	0.10	0.03	0.1	<0.05
Potassium	mg/L										10		11		10		13
Sodium	mg/L									688	751		754	800	754	787	742
Zinc	mg/L	<0.004			0.028				0.006		<0.01		<0.01		<0.01		<0.1
Total Dissolved Solids	mg/L			2840	3180	2970	3960	3010	2970	2660	2800	2720	2680	2980	2760	2740	2620

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW4A											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.82	7.91	7.88	7.95	8.04	7.8	7.93	8.13	7.95	8.08	8.1	8.05
Conductivity	µmho/cm	4000	4300	4200	4300	4100	4200	3910	4010	3890	3890	3860	3810
Chloride	mg/L	860	850	830	840	880	900	812	875	837	861	784	780
Phosphate - ortho	mg/L		<0.010		<0.010		<0.010		<0.2		<0.010		<0.010
Sulphate	mg/L	<10	<10	<5.0	<1.0	<5.0	<1.0	<1	<1	<10	<1	<1	<1
Alkalinity	mg/L	690	680	670	680	690	670	687	666	660	678	625	658
Hardness	mg/L	570	560	530	520	540	550	518	531	498	480	512	452
Total Kjeldahl Nitrogen	mg/L	0.7	0.98	0.78	0.91	0.71	0.71	1	1.4	1.14	1.15	1.04	0.953
Ammonia	mg/L	0.46	0.49	0.5	0.55	0.59	0.72	0.59	0.64	0.552	0.376	0.256	0.341
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.22	<0.10	0.17	<0.10	0.15
Nitrite	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	>230	65	480	>270	>200	>200	354	810	229		21	
Chemical Oxygen Demand	mg/L	1200	1500	1100	1100	1100	1100	833	962	921	987	832	741
Dissolved Organic Carbon	mg/L	430	430	390	410	400	380	311		348		302	
Phenols	µg/L	200	200	190	180	200	180	142	187	210	180	162	
Arsenic	mg/L		<0.0010		<0.0010		<0.0010		<0.005		<0.001		<0.001
Barium	mg/L	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.17	1.09	1.05	0.99	1
Boron	mg/L	0.28	0.27	0.27	0.29	0.28	0.3	0.3	0.31	0.31	0.3	0.34	0.32
Cadmium	mg/L		<0.00010		<0.00010		<0.00010		<0.0005		<0.0001		<0.0001
Calcium	mg/L	170	160	150	150	160	160	148	155	145	141	149	130
Chromium	mg/L		<0.0050		<0.0050		<0.0050		<0.005		<0.001		<0.001
Copper	mg/L		<0.0010		<0.0010		<0.0010		<0.005		0.002		<0.001
Iron	mg/L	1.2	0.96	1.1	0.74	0.81	0.7	0.59	0.5	0.37	0.45	0.44	0.42
Lead	mg/L		<0.00050		<0.00050		<0.00050		<0.005		<0.001		<0.001
Magnesium	mg/L	36	37	36	35	35	36	36	35	33	31	34	31
Manganese	mg/L	0.41	0.41	0.39	0.37	0.38	0.38	0.3	0.37	0.34	0.32	0.3	0.3
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0005		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.028	<0.020	0.018	0.019	0.026	0.05	0.033	0.023
Potassium	mg/L		9.9		9.5		9.5		13		11		8
Sodium	mg/L	700	740	710	710	670	760	742	694	698	611	757	713
Zinc	mg/L		<0.0050		<0.0050		<0.0050		<0.05		<0.01		<0.01
Total Dissolved Solids	mg/L	2820	3880	2830	3320	2570	2730	2540	2610	2530	2530	2510	

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW4B															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.67	7.45	7.13	7	6.89	7.29	7.14	7.46	6.78	6.77	6.73	6.54	6.66	6.83	6.3	6.67
Conductivity	µmho/cm	1400	1330	1350	1400	1230	1040	1080	936	963	996	963	917	946	1070	1280	1380
Chloride	mg/L	237	221	189	176	147	131	128	113	92	95	93	102	103	125	279	296
Phosphate - ortho	mg/L				<0.10				<0.10		<0.03		0.10		<0.03		<0.03
Sulphate	mg/L		153	197	260	249	210	189	185	140	137	128	113	115	116	69	101
Alkalinity	mg/L	160	152	192	217	198	189	188	186	205	209	231	187	185	182	61	57
Hardness	mg/L	161	155	227	257	211	197	194	174	164	174	188	178	195	232	404	409
Total Kjeldahl Nitrogen	mg/L	61.4	7.06	7.05	7.97	8.21	8.72	7.98	7.27	6.66	9.56	7.29	7.8	7.36	8.47	0.12	1.01
Ammonia	mg/L	7.51	6.77	6.45	2.59	5.73	7.34	5.47	6.29	6.61	6.64	6.98	7.36	7.21	7.24	<0.02	0.079
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	5.51	5.14
Nitrite	mg/L	<0.05			<0.05				<0.05		<0.10	<0.10	<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	18	<5	15	22	10	15	<5	19	19	21	13	24	15	2	<1
Chemical Oxygen Demand	mg/L	33	28	62	67	68	60	43	43	38	51	<5	41	33	32	8	16
Dissolved Organic Carbon	mg/L	10.7	10.7	17.3	23.9	20.6	17.8	16.6	17.4	12	10.9	10.2	7.9	8.1	9	3.9	3
Phenols	µg/L	3	3	2	4	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				0.005				0.005		<0.01		<0.01		0.003		<0.001
Barium	mg/L	0.105	0.106	0.13	0.161	0.137	0.142	0.104	0.111	0.1	0.09		0.09	0.1	0.11	0.1	0.1
Boron	mg/L	0.224	0.2	0.553	0.952	0.753	0.766	0.669	0.403	0.49	0.44	0.47	0.34	0.38	0.4	0.13	0.12
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		<0.0001		0.0013
Calcium	mg/L									46	50	54	50	55	65	132	134
Chromium	mg/L	0.006			0.008				0.006		0.008		0.01		0.002		<0.001
Copper	mg/L	0.006			<0.002				<0.002		<0.001		<0.001		<0.001		0.004
Iron	mg/L	0.974	4.6	2.16	9.61	0.568	16.5	2.45	2.66							0.76	2.97
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									12	12	13	13	14	17	18	18
Manganese	mg/L	3.55	3.1	5.16	7.11	5.59	5.53	4.77	4.14	4.12	4.2	4.54	3.89	4.41	4.97	0.52	1.01
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	10.70	3.32	6.30	1.29	0.05	1.79	2.12	6.31	1.06	8.33	2.64	6.24	1.95	5.61	0.07	0.07
Potassium	mg/L										13		14		16		7
Sodium	mg/L									118	103		98	100	108	85	104
Zinc	mg/L	0.011			0.01				0.006		<0.01		<0.01		<0.01		0.01
Total Dissolved Solids	mg/L			852	876	936	712	678	656	626	647	626	596	615	696	832	897

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW4B										
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.63	6.72	7.06	6.86	6.93	6.46	6.53	6.78	6.9	7.03	6.93
Conductivity	µmho/cm	690	1400	1000	1100	1300	1200	1350	904	900	882	925
Chloride	mg/L	100	310	200	230	330	280	313	163	171	178	160
Phosphate - ortho	mg/L		<0.01		<0.010		<0.010	<0.6		<0.010		<0.010
Sulphate	mg/L	57	77	50	56	47	66	89	34	28	24	34
Alkalinity	mg/L	94	63	110	72	68	51	63	156	162	141	147
Hardness	mg/L	200	330	340	310	420	310	428	264	250	273	266
Total Kjeldahl Nitrogen	mg/L	<0.20	0.33	0.23	0.21	0.22	0.1	0.4	3.95	4.12		3.79
Ammonia	mg/L	<0.05	0.15	0.065	<0.050	<0.050	<0.050	0.1	3.74	3.6	3.87	2.32
Nitrate	mg/L	4.64	1.27	3.51	3.85	4.12	2.98	3.74	1.43	<0.10	<0.1	<0.10
Nitrite	mg/L	<0.010	0.013	<0.010	<0.010	<0.010	0.015	<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	3	<2	4	3	15		12	
Chemical Oxygen Demand	mg/L	23	20	12	<4.0	9	4.1	<5	12	16	21	9
Dissolved Organic Carbon	mg/L	3.7	2.1	2.1	2.1	1.8	2.1		3.9		4.1	
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Arsenic	mg/L		<0.001		<0.0010		<0.0010	<0.001		0.001		0.001
Barium	mg/L	0.046	0.11	0.073	0.1	0.1	0.089	0.14	0.08	0.08	0.07	0.08
Boron	mg/L	0.17	0.1	0.17	0.092	0.12	0.073	0.13	0.23	0.18	0.21	0.16
Cadmium	mg/L		0.00093		0.00071		0.00079	0.0011		<0.0001		<0.0001
Calcium	mg/L	67	110	110	100	140	110	145	76	72	78	75
Chromium	mg/L		<0.005		<0.0050		<0.0050	<0.001		0.001		0.001
Copper	mg/L		0.0046		0.005		0.0041	0.005		<0.001		<0.001
Iron	mg/L	1	1.8	1.3	0.18	0.4	<0.10	0.5	21.8	33	31.7	33.4
Lead	mg/L		<0.0005		<0.00050		<0.00050	<0.001		<0.001		<0.001
Magnesium	mg/L	9.2	15	16	14	18	9.5	16	18	17	19	19
Manganese	mg/L	0.24	0.4	0.39	0.16	0.24	0.14	0.66	4.27	3.78	3.57	3.69
Mercury	mg/L		<0.1		<0.1		<0.1	<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.027	<0.020	0.003	0.07	1.95	1	7.11
Potassium	mg/L		6.9		7		5.6	8		12		12
Sodium	mg/L	43	85	39	57	53	79	86	52	48	53	45
Zinc	mg/L		0.0081		0.0058		0.0068	<0.01		<0.01		0.05
Total Dissolved Solids	mg/L	440	1590	732	1000	725	890	878	588	585	573	601

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW5															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.83	7.57	7.12	7.35	7.66	7.75	7.57	7.36	6.79	6.9	6.62	6.56	6.7	6.94	6.77	7.21
Conductivity	µmho/cm	484	146	61	74	344	409	424	435	138	588	309	354	466	407	342	357
Chloride	mg/L	33	9	2	3	22	36	23	32	2	58	14	13	44	35	20	29
Phosphate - ortho	mg/L				<0.10				<0.10		<0.03		<0.09		<0.03		<0.03
Sulphate	mg/L		16.2	6.92	6.24	41.2	57.4	42.6	46	12	65	32	65	37	31	19	31
Alkalinity	mg/L	126	39	21	26	107	137	144	168	54	136	110	137	121	119	130	101
Hardness	mg/L	165	51	16	14	119	163	156	161	45	201	110	122	163	146	124	115
Total Kjeldahl Nitrogen	mg/L	0.83	0.65	0.25	0.17	<0.10	0.74	0.68	0.53	<0.10	0.48	0.17	0.2	0.26	0.34	0.49	0.64
Ammonia	mg/L	0.15	0.03	<0.02	<0.02	<0.02	0.37	0.15	0.51	0.02	0.32	0.12	0.09	0.17	0.13	0.49	0.184
Nitrate	mg/L	0.12	<0.05	0.08	0.10	0.05	<0.05	<0.05	0.20	0.21	0.19	<0.10	<0.10	0.10	<0.10	0.2	0.11
Nitrite	mg/L	<0.05			<0.05				<0.05		<0.10		<0.10		<0.10		<0.1
Biochemical Oxygen Demand	mg/L	<5	8	<5	8	<5	<5	<5	<5	3	5	5	4	3	3	5	2
Chemical Oxygen Demand	mg/L	23	35	12	11	12	11	<5	9	<5	20	<5	7	43	8	12	221
Dissolved Organic Carbon	mg/L	2.4	1.9	2.2	1.5	4.1	9.8	3.3	3.3	<5	4.4	1.3	2.6	4.4	3.2	5	4
Phenols	µg/L	1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Barium	mg/L	0.047	0.009	0.003	0.004	0.02	0.039	0.029	0.08	<0.01	0.04	0.02	0.02	0.03	0.03	0.02	0.02
Boron	mg/L	0.158	0.038	0.017	0.037	0.103	0.205	0.274	0.242	0.03	0.29	0.15	0.22	0.25	0.01	0.32	0.26
Cadmium	mg/L	<0.001			<0.001				<0.001		0.0005		0.0002		0.0002		0.0002
Calcium	mg/L									13	59	31	34	47	42	35	33
Chromium	mg/L	<0.003			<0.003				0.003		0.003		0.006		<0.001		<0.001
Copper	mg/L	0.003			<0.002				0.025		0.006		0.004		0.005		0.005
Iron	mg/L	7.51	2.78	0.322	0.46	1.86	2.7	2.12	1.49	0.07	0.67	0.23	0.08	0.1	0.07	0.06	0.08
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									3	13	8	9	11	10	9	8
Manganese	mg/L	2.11	0.5	0.146	0.179	1.4	2.16	1.95	2.19	0.56	2.71	1.26	1.14	1.67	1.48	1.35	1.19
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	8.46	6.19	5.38	2.24	0.03	<0.05	2.00	5.83	1.11	8.88	2.52	1.76	1.12	4.37	5.94	19.2
Potassium	mg/L										7		5		6		5
Sodium	mg/L									7	30	21	26	30	27	25	24
Zinc	mg/L	0.026			<0.005				0.015		0.01		0.01		<0.01		<0.01
Total Dissolved Solids	mg/L			94	88	228	264	250	304	90	382	201	230	303	265	222	232

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW5											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.58	7.19	7.1	7.22	7.34	7.02	6.54	7.17	6.83	6.83	6.96	6.78
Conductivity	µmho/cm	90	220	150	280	270	260	261	259	212	278	179	244
Chloride	mg/L	1.8	4.5	2.4	13	10	8.1	16	19	15	31	12	26
Phosphate - ortho	mg/L		<0.01		<0.010		<0.010		<0.6		<0.010		<0.010
Sulphate	mg/L	12	16	17	20	21	13	17	15	13	19	7	18
Alkalinity	mg/L	23	83	50	99	100	110	77	90	68	89	58	84
Hardness	mg/L	22	61	41	79	93	92	87	95	85	97	64	99
Total Kjeldahl Nitrogen	mg/L	<0.10	0.13	0.12	0.12	0.14	0.61	0.3	0.2	22.3	0.171	0.129	<0.1
Ammonia	mg/L	0.051	<0.05	<0.050	<0.050	0.12	0.56	0.09	0.06	0.028	<0.010	<0.01	<0.010
Nitrate	mg/L	1.89	0.3	0.73	<0.10	<0.10	<0.10	0.17	<0.10	0.1	0.11	0.14	0.1
Nitrite	mg/L	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	2	<2.0	<2.0	<2.0	<2	<2	4	2	10		2	
Chemical Oxygen Demand	mg/L	11	6.9	4.1	<4.0	<4.0	4.3	<5	<5	<5	<5	8	<5
Dissolved Organic Carbon	mg/L	1.2	0.96	0.78	1.3	1.4	1.4	1.2		1.4		1.3	
Phenols	µg/L	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.0057	0.015	0.0095	0.017	0.019	0.032	0.02	0.02	0.02	0.02	0.01	0.03
Boron	mg/L	0.024	0.12	0.062	0.14	0.18	0.19	0.14	0.14	0.08	0.16	0.06	0.13
Cadmium	mg/L		0.00012		<0.00010		0.00024		<0.0001		<0.0001		<0.0001
Calcium	mg/L	6.5	17	11	22	26	25	25	28	24	29	19	28
Chromium	mg/L		<0.005		<0.0050		<0.0050		<0.001		<0.001		<0.001
Copper	mg/L		0.0035		0.0023		0.0077		0.003		0.005		0.004
Iron	mg/L	0.12	0.14	<0.10	<0.10	<0.10	<0.10	<0.03	<0.03	0.43	<0.03	0.03	0.07
Lead	mg/L		<0.0005		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	1.5	4.3	3.1	5.9	6.7	7	6	6	6	6	4	7
Manganese	mg/L	0.13	0.49	0.16	0.27	0.39	0.2	0.51	0.79	0.56	0.73	0.57	1.09
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.81	12	1.28	0.008	0.195	0.147	1.12	0.64
Potassium	mg/L		3.7		3.7		7.6		4		4		6
Sodium	mg/L	6	19	7.6	17	16	18	14	14	9	14	12	16
Zinc	mg/L		<0.005		<0.0050		0.014		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L	76	212	120	206	125	200	170	168	138	181	116	159

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW8															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.4	7.59	6.91	6.72	7.09	7.11	7.26	7.41	6.97	6.88	6.77	6.78	6.68	7.36	7.53	7.61
Conductivity	µmho/cm	746	454	793	970	1010	1140	839	318	966	825	1150	1020	475	444	233	473
Chloride	mg/L	97	60	98	159	153	227	124	48	93	107	132	124	57	44	18	53
Phosphate - ortho	mg/L				<0.10				<0.10		<0.03		0.10		<0.03		<0.03
Sulphate	mg/L		69	147	171	175	159	99.7	33.1	130	107	145	90	34	24	9	38
Alkalinity	mg/L	81	60	98	93	124	128	162	64	217	125	217	209	112	117	74	104
Hardness	mg/L	123	73	173	226	216	271	159	45	157	175	244	242	79	85	26	95
Total Kjeldahl Nitrogen	mg/L	3.8	2.6	3.34	2.9	3.18	4.28	3	0.89	1.9	0.9	1.8	1.04	0.42	0.36	0.13	0.18
Ammonia	mg/L	1.17	1.04	1.05	0.64	1.31	1.43	0.57	0.75	1.23	0.88	0.97	0.32	0.16	0.09	0.05	0.145
Nitrate	mg/L	0.06	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	3.45	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.05			<0.05				<0.05		<0.10		0.44		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	14	<5	<5	<5	<5	<5	<5	2	5	2	1	1	<1	<1	<1
Chemical Oxygen Demand	mg/L	25	7	23	25	37	35	17	<5	23	<5	31	32	17	10	12	24
Dissolved Organic Carbon	mg/L	4.4	3.1	5.7	9.1	10.2	17.3	8.4	3.8	9	9.4	8.2	7.6	3.8	4.9	3.4	4.5
Phenols	µg/L	1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.01		<0.01		<0.001		<0.001
Barium	mg/L	0.082	0.038	0.093	0.122	0.121	0.152	0.075	0.021	0.08	0.08	0.12	0.09	0.04	0.03	0.01	0.04
Boron	mg/L	0.221	0.128	0.258	0.62	0.693	1.63	1.02	0.344	0.95	1.2	1.6	1.4	0.53	0.63	0.32	0.58
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		<0.0001		<0.0001
Calcium	mg/L									43	47	63	59	20	21	7	25
Chromium	mg/L	<0.003			0.004				<0.003		0.003		0.002		<0.001		<0.001
Copper	mg/L	<0.002			<0.002				<0.002		0.001		0.003		0.005		0.007
Iron	mg/L	23.8	14	2.76	44.3	48.2	47.2	23.6	5.12	19.1	16.2	18	8.57	4.17	1	0.52	0.07
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									12	14	21	23	7	8	2	8
Manganese	mg/L	2.31	1.2	2.57	4.36	3.44	3.68	1.98	0.462	1.81	1.49	1.69	0.81	0.48	0.4	0.16	0.51
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	4.84	3.50	2.28	1.23	0.04	0.84	1.10	0.95	0.39	1.41	0.67	1.44	0.93	0.76	0.53	1.34
Potassium	mg/L										10		14		10		11
Sodium	mg/L									99	97	133	110	64	55	34	53
Zinc	mg/L	0.006			0.008				<0.005		<0.01		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L			486	614	660	714	476	200	628	536	748	663	309	289	151	307

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW8											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.24	7.7	7.26	7.66	7.66	7.46	6.74	7.68	7.03	7.24	7.41	7.36
Conductivity	µmho/cm	990	220	1000	840	850	330	769	323	842	817	823	996
Chloride	mg/L	120	13	130	95	96	38	104	34	106	122	96	133
Phosphate - ortho	mg/L		<0.01		<0.010		<0.010		<0.6		<0.010		0.056
Sulphate	mg/L	110	8.1	100	57	68	13	61	14	59	58	47	64
Alkalinity	mg/L	210	74	210	210	210	87	183	92	202	173	179	211
Hardness	mg/L	230	33	240	160	200	55	180	72	224	208	231	242
Total Kjeldahl Nitrogen	mg/L	0.48	0.31	0.45	0.39	0.21	0.25	0.4	0.4	0.52	0.375	0.531	0.538
Ammonia	mg/L	<0.05	<0.05	0.057	<0.050	0.05	<0.050	0.1	0.05	<0.010	<0.010	<0.01	<0.010
Nitrate	mg/L	<0.10	<0.10	<0.10	1.62	<0.10	0.17	0.11	1.1	0.64	0.3	0.19	0.14
Nitrite	mg/L	<0.01	<0.01	<0.010	0.035	<0.010	<0.010		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2.0	<2	<2	3	1	2		1	
Chemical Oxygen Demand	mg/L	27	16	25	9.2	13	4.1	8	9	13	7	12	6
Dissolved Organic Carbon	mg/L	6.9	2.8	5.5	5.4	4.2	2.7	6		4		4.1	
Phenols	µg/L	<1	<1	<1	2.1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.13	0.016	0.15	0.099	0.13	0.033	0.11	0.03	0.14	0.12	0.11	0.15
Boron	mg/L	1.1	0.27	1.1	0.87	0.66	0.29	0.64	0.45	0.54	0.64	0.6	0.93
Cadmium	mg/L		<0.0001		0.00015		<0.00010		<0.0001		0.0003		0.0003
Calcium	mg/L	60	8.6	61	41	52	15	49	19	60	57	61	64
Chromium	mg/L		<0.005		<0.0050		<0.0050		<0.001		<0.001		<0.001
Copper	mg/L		0.0082		0.015		0.0085		0.013		0.013		0.014
Iron	mg/L	0.62	0.16	0.23	0.1	<0.10	<0.10	<0.03	0.04	<0.03	<0.03	<0.03	0.03
Lead	mg/L		<0.0005		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	19	2.8	21	13	16	4.5	14	6	18	16	19	20
Manganese	mg/L	1.5	0.14	1.4	0.31	0.8	0.2	0.87	0.14	0.78	0.82	0.82	0.95
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.17	0.18	0.48	0.033	0.079	0.105	0.03	0.082
Potassium	mg/L		7.2		20		11		9		21		23
Sodium	mg/L	110	29	99	80	73	38	70	34	70	64	78	89
Zinc	mg/L		<0.005		<0.0050		<0.0050		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L	606	274	610	514	390	170	500	210	547	531	535	647

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW9															
		Sep-08	Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	6.74	6.79	6.39	6.53	6.65	6.81	6.47	6.58	6.23	6.22	6.07	5.99	6.11	6.3	6.23	6.28
Conductivity	µmho/cm	24	23	21	21	19	20	20	23	23	24	22	20	21	22	23	21
Chloride	mg/L	0.4	1	1	1	2	1	1	0	1	<1	<1	<1	1	<1	<1	<1
Phosphate - ortho	mg/L				<0.10				<0.10		0.12		0.11		0.05		<0.03
Sulphate	mg/L		3.4	3.08	3.25	3.34	3.54	3.49	3.35	3	4	3	4	3	2	2	2
Alkalinity	mg/L	<5	5	5	5	<5	5	5	5	6	6	6	10	9	5	7	7
Hardness	mg/L	<10	<10	<10	<10	<10	<10	<10	<10	5	7	7	7	5	7	5	7
Total Kjeldahl Nitrogen	mg/L	0.67	0.4	0.22	<0.10	<0.10	0.47	0.53	<0.10	<0.10	<0.10	0.18	0.15	<0.10	<0.10	0.19	<0.07
Ammonia	mg/L	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	0.1	0.17	<0.02	<0.02	0.03	<0.02	0.06	<0.02	<0.02	<0.025
Nitrate	mg/L	0.10	0.13	<0.05	0.13	0.10	0.10	0.07	0.05	<0.10	<0.10	<0.10	0.18	<0.10	0.23	0.16	0.16
Nitrite	mg/L	<0.05			<0.05				<0.05		<0.10	<0.10	<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<5	10	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	1	<1
Chemical Oxygen Demand	mg/L	28	7	14	6	15	11	<5	<5	<5	5	11	7	<5	<5	13	7
Dissolved Organic Carbon	mg/L	2.7	2.3	1.4	2.1	1.1	2.3	5.1	3.7	<5	7.3	1.4	1.2	1.3	2.4	2.1	1.6
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L				<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Barium	mg/L	0.003	0.006	0.005	0.004	0.005	0.007	0.007	0.007	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
Boron	mg/L	0.012	<0.010	<0.010	0.014	0.02	<0.010	<0.010	<0.010	0.03	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	<0.001			<0.001				<0.001		<0.0001		<0.0001		<0.0001		<0.0001
Calcium	mg/L									2	3	3	3	2	3	2	3
Chromium	mg/L	<0.003			<0.003				<0.003		<0.001		<0.001		<0.001		<0.001
Copper	mg/L	0.002			<0.002				0.002		0.001		0.001		0.001		0.001
Iron	mg/L	0.015	0.111	0.041	0.016	0.018	<0.010	0.036	<0.010	0.04	0.04	<0.03	0.1	<0.03	0.05	0.05	0.04
Lead	mg/L	<0.001			<0.002				<0.002		<0.001		<0.001		<0.001		<0.001
Magnesium	mg/L									<1	<1	<1	<1	<1	<1	<1	<1
Manganese	mg/L	0.01	<0.03	0.005	0.004	0.005	<0.003	<0.003	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	mg/L	<0.0001			<0.0001				<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	17.50	13.90	15.20	3.23	<0.02	2.37	12.30	9.77	2.93	5.48	2.58	5.60	2.61	2.38	5.48	2.08
Potassium	mg/L										<1		<1		<1		<1
Sodium	mg/L									<2	<2		<2	<2	<2	<2	<2
Zinc	mg/L	0.005			<0.005				0.009		<0.01		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L			142	86	64	<20	20	60	15	16	14	13	14	14	15	14

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW9											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.32	6.59	6.38	6.7	6.59	6.43	6.36	6.72	6.52	6.4	6.27	6.12
Conductivity	µmho/cm	21	21	29	31	21	20	20	24	23	19	19	20
Chloride	mg/L	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	4	4	<1	<1	<1	<1
Phosphate - ortho	mg/L		0.011		0.016		0.016		<0.6		0.081		0.028
Sulphate	mg/L	3.3	1.9	4.8	2	2.9	1.5	2	2	2	2	1	1
Alkalinity	mg/L	6.4	5.9	5.4	11	5.6	6.7	<5	8	10	6	5	6
Hardness	mg/L	6.5	6.9	8.6	6.4	6.9	6.8	7	5	18	16	12	16
Total Kjeldahl Nitrogen	mg/L	<0.10	0.24	0.13	0.12	<0.10	0.12	8.5	0.2	0.257	0.185	<0.100	0.144
Ammonia	mg/L	<0.05	<0.05	<0.050	<0.050	0.053	<0.050	0.03	0.03	0.086	0.05	<0.010	<0.01
Nitrate	mg/L	0.19	0.13	0.13	0.24	0.13	<0.50	<0.10	0.15	<0.10	<0.10	<0.1	<0.10
Nitrite	mg/L	<0.01	<0.01	<0.010	<0.010	<0.010	<0.050		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	<1	<1		<1	
Chemical Oxygen Demand	mg/L	24	18	<4.0	<4.0	5	<4.0	10	<5	<5	10	32	<5
Dissolved Organic Carbon	mg/L	1.7	1.4	1.2	1.2	1.2	1.2	1.6		1.3		1.5	
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	18	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.0042	0.0059	0.0079	0.004	0.004	0.0063	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Boron	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	0.01	<0.01	0.01
Cadmium	mg/L		<0.0001		<0.00010		<0.00010		<0.0001		<0.0001		<0.0001
Calcium	mg/L	2.3	2.3	3	2.2	2.4	2.3	3	2	4	3	3	3
Chromium	mg/L		<0.005		<0.0050		<0.0050		<0.001		<0.001		<0.001
Copper	mg/L		0.0014		<0.0010		0.0015		<0.001		<0.001		<0.001
Iron	mg/L	<0.10	0.11	0.14	<0.10	<0.10	<0.10	<0.03	<0.03	0.51	<0.03	0.04	<0.03
Lead	mg/L		<0.0005		<0.00050		0.00075		<0.001		<0.001		<0.001
Magnesium	mg/L	0.21	0.25	0.3	0.25	0.21	0.24	<1	<1	2	2	1	2
Manganese	mg/L	<0.0020	0.0028	0.0057	<0.0020	<0.0020	<0.0020	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	2.8	4.4	<0.002	0.039	1.13	2.99	1.85	0.479
Potassium	mg/L		0.42		0.35		0.42		<1		1		2
Sodium	mg/L	0.92	0.73	1.3	0.66	0.75	0.64	<2	5	<2	<2	<2	<2
Zinc	mg/L		<0.005		<0.0050		<0.0050		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L	40	70	102	72	20	90	13	16	15	12	12	13

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW10													
		Dec-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.4	6.98	7.17	7.49	7.33	7.51	7.4	6.91	6.88	6.52	6.57	6.82	6.61	6.9
Conductivity	µmho/cm	1110	1260	1160	1110	1030	1050	897	909	944	799	757	773	780	911
Chloride	mg/L	105	101	109	94	98	88	84	62	63	57	65	54	72	98
Phosphate - ortho	mg/L			<0.10				<0.10		<0.03	<0.09		<0.03		<0.03
Sulphate	mg/L	133	197	145	154	130	103	96.9	68	68	132	120	131	126	121
Alkalinity	mg/L	278	265	284	303	324	316	301	319	324	176	148	165	141	168
Hardness	mg/L	262	268	259	252	259	273	237	234	233	260	275	309	317	323
Total Kjeldahl Nitrogen	mg/L	19	16.2	17.1	19.1	20.3	17.1	13.3	10.5	13.9	2.42	3.22	4.02	4.2	2.75
Ammonia	mg/L	16.5	14.2	13.8	15.8	19.8	11.4	12.1	10.3	10.6	1.99	2.28	2.88	2.46	2.16
Nitrate	mg/L	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	0.46	0.55	1.09
Nitrite	mg/L			<0.05				<0.05		<0.10	<0.10		1		1.01
Biochemical Oxygen Demand	mg/L	201	<5	8	8	<5	<5	<5	3	4	<1	12	15	15	11
Chemical Oxygen Demand	mg/L	90	79	56	76	73	38	22	37	49	39	110	58	104	62
Dissolved Organic Carbon	mg/L	17.9	18.2	18.6	18.1	18.5	16.1	11.9	14	9.6	8.7	10.6	10.8	10	9.7
Phenols	µg/L	5	<1	1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L			<0.003				<0.003		<0.01	<0.01		<0.001		<0.001
Barium	mg/L	0.124	0.119	0.12	0.113	0.123	0.096	0.094	0.07	0.08	0.07	0.08	0.1	0.07	0.07
Boron	mg/L	0.39	0.645	0.545	0.382	0.531	0.513	0.26	0.42	0.36	0.27	0.23	0.28	0.28	0.25
Cadmium	mg/L			<0.001				<0.001		<0.0001	<0.0001		0.0005		0.0003
Calcium	mg/L								64	67	71	77	86	89	88
Chromium	mg/L			0.006				0.006		0.008	0.004		<0.001		<0.001
Copper	mg/L			<0.002				<0.002		<0.001	<0.001		0.018		0.02
Iron	mg/L	40.5	47.2	53.8	46.7	42.4	37.6	36.4	38.4	33.7	43.5	46.6	5.43	10.1	17.4
Lead	mg/L			<0.002				<0.002		<0.001	<0.001		<0.001		<0.001
Magnesium	mg/L								18	16	20	20	23	23	25
Manganese	mg/L	3.87	3.57	3.89	3.29	3.55	4.03	3.64	3.86	3.62	8.72	9.18	8.45	9.25	8.73
Mercury	mg/L			<0.0001				<0.0001		<0.0001	<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	12.70	10.90	2.09	0.05	0.97	1.46	0.99	0.87	1.31	4.66	8.49	0.44	0.76	1
Potassium	mg/L									18	7		10		7
Sodium	mg/L								70	72	41	46	37	34	46
Zinc	mg/L			<0.005				<0.005		<0.01	<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L		752	670	700	624	568	550	591	614	519	492	502	507	592

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW10											
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.81	7.04	6.81	7.28	7.21	6.87	6.46	7.16	6.75	7.14	6.9	7.08
Conductivity	µmho/cm	660	990	620	710	740	1000	729	730	668	745	697	771
Chloride	mg/L	33	120	43	34	58	170	83	90	60	86	82	93
Phosphate - ortho	mg/L		<0.010		0.023		<0.010		<0.6		<0.010		<0.010
Sulphate	mg/L	100	110	65	130	100	90	67	58	41	63	50	48
Alkalinity	mg/L	180	170	180	170	180	160	186	179	232	196	181	202
Hardness	mg/L	220	350	200	260	270	350	228	286	233	271	270	268
Total Kjeldahl Nitrogen	mg/L	1	3.9	0.79	2.2	1.2	2	0.7	9.4	1.43	1.89	1.44	1.7
Ammonia	mg/L	0.45	2.6	0.19	0.83	0.73	1.6	0.15	1.51	0.136	0.21	0.867	0.261
Nitrate	mg/L	0.74	0.56	0.58	1.54	0.11	0.55	0.24	0.89	0.21	0.39	<0.10	<0.1
Nitrite	mg/L	0.031	1.21	0.041	0.064	0.103	0.862		0.35		0.31		<0.1
Biochemical Oxygen Demand	mg/L	24	15	7	3	7	63	2	21	4		10	
Chemical Oxygen Demand	mg/L	52	100	29	77	35	71	19	130	63	33	33	22
Dissolved Organic Carbon	mg/L	11	8.4	6.8	13	9.7	9	11.2		11.8		8.4	
Phenols	µg/L	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001		<0.0010		<0.0010		<0.001		<0.001		<0.001
Barium	mg/L	0.061	0.087	0.059	0.048	0.064	0.074	0.06	0.05	0.05	0.05	0.05	0.06
Boron	mg/L	0.3	0.24	0.29	0.23	0.24	0.22	0.27	0.25	0.26	0.19	0.22	0.18
Cadmium	mg/L		0.00056		0.00057		<0.00010		0.0004		0.0001		0.0001
Calcium	mg/L	61	95	54	71	77	98	65	80	67	77	75	76
Chromium	mg/L		<0.005		<0.0050		<0.0050		<0.001		0.001		0.001
Copper	mg/L		0.018		0.072		0.0043		0.032		0.004		0.002
Iron	mg/L	0.17	26	<0.10	0.14	0.39	17	0.06	1.84	0.06	6.35	12.7	20.9
Lead	mg/L		<0.0005		<0.00050		<0.00050		<0.001		<0.001		<0.001
Magnesium	mg/L	17	26	15	20	20	27	16	21	16	19	20	19
Manganese	mg/L	5.6	15	4.9	7.3	7.4	11	4.19	7.34	4.9	8.16	5.61	6.98
Mercury	mg/L		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L			<0.10	<0.10	0.072	0.39	0.064	0.498	0.162	0.099	0.99	0.493
Potassium	mg/L		8.1		4.4		6.3		5		5		6
Sodium	mg/L	40	41	39	26	31	44	50	36	48	37	44	44
Zinc	mg/L		<0.005		<0.0050		0.0052		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L	500	958	424	572	445	735	474	474	434	484	453	501

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW11												
		Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	7.27	7.86	7.94	7.85	8.05	6.85	7.14	6.86	6.73	7.08	7.24	7.02	7.38
Conductivity	µmho/cm	911	597	400	785	277	145	879	164	857	832	862	770	779
Chloride	mg/L	103	39	20	92	13	8	84	9	88	78	80	75	76
Phosphate - ortho	mg/L		<0.10					<0.03		<0.09				
Sulphate	mg/L	131	47.9	19.4	114	17.2	8	87	10	90	83	76	64	65
Alkalinity	mg/L	181	190	171	202	104	53	238	59	214	217	231	205	212
Hardness	mg/L	289	188	94	251	74	94	297	82	153	277	292	250	249
Total Kjeldahl Nitrogen	mg/L	0.98	0.68	0.91	1.41	0.5	0.12	1.09	<0.10	1.64	1.27	1.12	0.92	1.04
Ammonia	mg/L	0.83	0.19	0.12	0.18	<0.02	0.04	0.91	<0.02	1.17	1.12	0.98	0.82	0.986
Nitrate	mg/L	0.11	6.28	1.25	0.47	0.51	0.47	0.16	0.43	0.16	0.24	0.14	0.16	0.31
Nitrite	mg/L		<0.05					<0.10	<0.10	<0.10				
Biochemical Oxygen Demand	mg/L	<5	<5	<5	<5	<5	3	8	3	7	6	8	7	6
Chemical Oxygen Demand	mg/L	11	8	27	19	<5	<5	20	<5	33	30	36	13	20
Dissolved Organic Carbon	mg/L	4.8	5.4	7.9	7.7	2.5	<5	6.3	1.1	6.6	6.8	6.7	6.2	5.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.003					<0.001		<0.001				
Barium	mg/L	0.071	0.043	0.14	0.063	0.018	0.02	0.06		0.04	0.07	0.05	0.04	0.05
Boron	mg/L	0.315	0.201	1.33	0.824	0.184	0.12	0.43	0.1	0.3	0.53	0.45	0.5	0.43
Cadmium	mg/L		<0.001					0.0001		0.0001				
Calcium	mg/L						26	86	23	43	78	84	72	70
Chromium	mg/L		<0.003					0.002		<0.001				
Copper	mg/L		0.003					0.009		0.007				
Iron	mg/L	0.039	0.715	0.044	<0.010	<0.010	0.04	0.13	0.03	<0.03	0.04	0.12	0.03	<0.03
Lead	mg/L		<0.002					<0.001		<0.001				
Magnesium	mg/L						7	20	6	11	20	20	17	18
Manganese	mg/L	4.27	5.11	0.007	1.44	0.438	1.04	3.67	0.47	2.62	3.94	2.49	1	1.66
Mercury	mg/L		<0.0001					<0.0001		<0.0001				
Phosphorus	mg/L	2.28	2.53	0.03	0.07	1.49	0.39	4.09	0.75	0.70	1.54	0.86	0.2	0.4
Potassium	mg/L							7		7				
Sodium	mg/L						24	71		42	72	73	66	64
Zinc	mg/L		<0.005					<0.01		<0.01				
Total Dissolved Solids	mg/L	580	336	260	536	104	94	571	107	557	541	560	500	506

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	OW11										
		Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.92	7.83	7.73	7.77	7.64	7.91	7.52	7.21	7.45	7.41	7.52
Conductivity	µmho/cm	200	390	230	740	360	140	711	662	712	606	625
Chloride	mg/L	6.3	20	3.5	68	38	<1.0	74	70	75	56	54
Phosphate - ortho	mg/L									<0.010		
Sulphate	mg/L	8.2	17	5.9	58	22	7.4	52	44	48	39	37
Alkalinity	mg/L	83	120	100	220	100	64	200	192	212	184	193
Hardness	mg/L	190	56	61	140	160	56	245	212	238	212	203
Total Kjeldahl Nitrogen	mg/L	<0.10	<0.20	0.11	0.94	0.12	<0.10	1.1	0.975	0.788	0.395	0.2
Ammonia	mg/L	<0.050	<0.050	<0.050	0.8	0.11	<0.050	0.65	0.129	0.154	0.021	<0.01
Nitrate	mg/L	0.82	4.69	1.16	0.35	0.3	0.19	0.28	0.38	0.46	0.55	0.74
Nitrite	mg/L	<0.010	<0.010	0.019	0.076	<0.010	<0.010			<0.10		
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	3	<2	<2	9	6		4	4
Chemical Oxygen Demand	mg/L	16	28	9.3	5.6	9	<4.0	14	11	34	<5	13
Dissolved Organic Carbon	mg/L	2.9	2.7	2.9	4.2	1.5	<0.50	12	3.6		3.2	3.1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L		<0.001							<0.001		<0.001
Barium	mg/L	0.028	0.012	0.013	0.03	0.022	0.019	0.04	0.04	0.03	0.03	0.03
Boron	mg/L	0.24	0.031	0.47	0.45	0.32	0.014	0.44	0.4	0.35	0.34	0.3
Cadmium	mg/L		<0.0001							0.0002		
Calcium	mg/L	56	16	18	39	45	16	70	60	69	60	55
Chromium	mg/L		<0.005							<0.001		
Copper	mg/L		0.0014							0.009		
Iron	mg/L	0.24	<0.10	<0.10	<0.10	<0.10	<0.10	<0.03	0.05	0.07	0.06	0.37
Lead	mg/L		<0.0005							<0.001		
Magnesium	mg/L	13	3.7	4	10	11	3.6	17	15	16	15	16
Manganese	mg/L	0.42	0.0059	0.0056	1.2	0.091	<0.0020	1.21	1.12	2.44	0.72	1.69
Mercury	mg/L									<0.0001		
Phosphorus	mg/L			<0.10	<0.10	2.3	0.035	0.016	0.535	2.33	0.269	0.556
Potassium	mg/L		2.2							6		
Sodium	mg/L	39	5.9	31	48	41	3.9	52	52	49	53	49
Zinc	mg/L		<0.005							<0.01		
Total Dissolved Solids	mg/L	126	404	178	462	215	75	462	430	463	394	406

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-2
GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	New Supply Well	
		Apr-21	Oct-21
pH	units	6.43	6.30
Conductivity	µmho/cm	188	190
Chloride	mg/L	32	43
Phosphate - ortho	mg/L		
Sulphate	mg/L	6	7
Alkalinity	mg/L	8	8
Hardness	mg/L	63	61
Total Kjeldahl Nitrogen	mg/L	<0.100	<0.100
Ammonia	mg/L	<0.010	<0.010
Nitrate	mg/L	0.97	0.96
Nitrite	mg/L		
Biochemical Oxygen Demand	mg/L	2	<1
Chemical Oxygen Demand	mg/L	<5	<5
Dissolved Organic Carbon	mg/L	1.4	1.4
Phenols	µg/L	<1	<1
Arsenic	mg/L		
Barium	mg/L	0.07	0.07
Boron	mg/L	0.02	0.07
Cadmium	mg/L		
Calcium	mg/L	22	21
Chromium	mg/L		
Copper	mg/L		
Iron	mg/L	0.06	0.14
Lead	mg/L		
Magnesium	mg/L	2	2
Manganese	mg/L	0.05	0.16
Mercury	mg/L		
Phosphorus	mg/L	<0.002	<0.002
Potassium	mg/L		
Sodium	mg/L	10	9
Zinc	mg/L		
Total Dissolved Solids	mg/L	122	124

NOTES: 1) Blank indicates parameter not analysed.
2) '*' - Value is suspect and considered to be anomalous

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	BHB												
		Sep-00	Oct-01	Sep-02	Oct-03	Sep-04	Sep-05	Oct-06	Sep-07	Dec-08	Oct-09	Jan-11	Oct-11	Sep-12
1,2-Dichlorobenzene	3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.1	<0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.4
1,4-Dichlorobenzene	1	0.9	0.7	0.9	1.1	0.7	0.7	0.7	0.27	<0.10	<0.10	<0.10	<0.10	<0.4
Benzene	5 **	0.8	0.7	0.4	0.3	<0.3	0.2	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Chlorobenzene	30	0.7	0.9	0.8	0.9	0.6	0.6	0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.2
Chloroethane		<0.3	0.6	0.4	<0.3	<0.3	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.2
Ethyl benzene	2.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.5
m/p-Xylenes	300 ***								<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Methylene Chloride	50 **	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.30	<0.30	<0.30	<0.30	<0.30	<4.0
o-Xylene	300 ***								<0.10	<0.10	<0.10	<0.10	<0.10	<0.5
Toluene	24	<0.4	0.6	<0.4	<0.4	<0.4	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Vinyl Chloride	2 **								<0.17	<0.17	<0.17	<0.17	<0.17	<0.2
Xylenes - total	300	<0.9	<0.9	<0.9	<0.9	<0.9	<0.1	<0.1	<0.20	<0.20	<0.20	<0.20	<0.20	

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	BHB								
		Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300				<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	BHC												
		Sep-00	Oct-01	Sep-02	Oct-03	Sep-04	Sep-05	Oct-06	Sep-07	Dec-08	Oct-09	Jan-11	Sep-11	Sep-12
1,2-Dichlorobenzene	3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.1	<0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.4
1,4-Dichlorobenzene	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.4
Benzene	5 **													
Chlorobenzene	30	<0.3	<0.3	<0.3	<0.3	<0.3	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.2
Chloroethane														
Ethyl benzene	2.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.5
m/p-Xylenes	300 ***								<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Methylene Chloride	50 **	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.30	<0.30	<0.30	<0.30	<0.30	<4.0
o-Xylene	300 ***								<0.10	<0.10	<0.10	<0.10	<0.10	<0.5
Toluene	24	<0.4	<0.4	<0.4	<0.4	<0.4	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Vinyl Chloride	2 **								<0.17	<0.17	<0.17	<0.17	<0.17	<0.2
Xylenes - total	300	<0.9	<0.9	<0.9	<0.9	<0.9	<0.1	<0.1	<0.20	<0.20	<0.20	<0.20	<0.20	

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	BHC								
		Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300				<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	BHE-2								
		Apr-00	Oct-01	Sep-02	Nov-07	Dec-08	Oct-09	Jan-11	Oct-11	Sep-12
1,2-Dichlorobenzene	3	<0.4	<2	<0.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.4
1,4-Dichlorobenzene	1	0.8	<1	0.9	0.33	0.36	<0.10	<0.10	<0.10	<0.4
Benzene	5 **	0.4	<1.5	<0.3	<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Chlorobenzene	30	<0.3	<1.5	<0.3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.2
Chloroethane		<0.3	<1.5	<0.3	<0.20	<0.20	<0.20	<0.20	<0.20	<0.2
Ethyl benzene	2.4	<0.4	<2	<0.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.5
m/p-Xylenes	300 ***				<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Methylene Chloride	50 **	<0.3	<1.5	<0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<4.0
o-Xylene	300 ***				<0.10	<0.10	<0.10	<0.10	<0.10	<0.5
Toluene	24	<0.4	<2	<0.4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.5
Vinyl Chloride	2 **				<0.17	<0.17	<0.17	<0.17	<0.17	<0.2
Xylenes - total	300	<0.5	<4.5	<0.9	<0.20	<0.20	<0.20	<0.20	<0.20	

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	BHE-2								
		Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	0.7	<0.4	0.5	<0.20	0.35	0.36	<0.4	<0.4	<0.4
Benzene	5 **	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300				<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	PW1													
		Sep-07	Oct-09	Jan-11	Oct-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	1.8	<0.10	<0.10	<0.10	0.5	<0.4	0.4	0.5	0.27	0.26	0.25	<0.4	<0.4	<0.4
Benzene	5 **	0.83	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	0.17	0.15	0.15	<0.5	<0.5	<0.5
Chloroethane		<0.20	<0.20	<0.20	<0.20	<0.2	<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	0.12	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	0.17	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW1A													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **						<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane							<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW1B													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.20	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.50	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.20	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.50	<0.4	<0.4	<0.4
Benzene	5 **						<0.5	<0.5	<0.5	<10	<10	<0.25	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.20	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.25	<0.5	<0.5	<0.5
Chloroethane							<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.20	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.25	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.40	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.25	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.60	<4.0	<0.2	<4.0		<0.50	<0.50	<1.3	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.25	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.40	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.50	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.34	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.50	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.40					<0.10	<0.10	<0.25	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW3A													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<0.20	<0.20	<0.20	<0.20	<0.2	<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW3B													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<0.20	<0.20	<0.20	<0.20	<0.2	<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW4A													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.20	<0.10	<0.10	<0.20	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<1.0	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.20	<0.10	<0.10	<0.20	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<1.0	<0.4	<0.4	<0.4
Benzene	5 **						1	0.9	1.3	<10	2.2	2.3	1.7	1.9	1.4
Chlorobenzene	30	<0.20	<0.10	<0.10	<0.20	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.50	<0.5	<0.5	<0.5
Chloroethane							19.7	<0.2	<0.2				<0.2	4.2	6.3
Ethyl benzene	2.4	0.3	0.27	0.6	<0.20	1.2	0.8	<0.5	2.5	<0.10	<0.10	0.74	1.1	0.9	0.6
m/p-Xylenes	300 ***	<0.40	0.33	0.65	<0.40	1.5	1.1	<0.5	1.5	<0.10	<0.10	0.93	1	1.3	0.6
Methylene Chloride	50 **	<0.60	14	26	17	<4.0	<0.2	<4.0		11	12	13	<4.0	20	<4.0
o-Xylene	300 ***	0.2	0.25	0.39	<0.20	1	0.7	<0.5	0.9	<0.10	<0.10	0.59	0.7	0.8	<0.4
Toluene	24	16	18	28	18	28.7	26.6	13.9	27.9	19	21	26	27	35.9	35.2
Vinyl Chloride	2 **	1.9	4.1	13	1.6	4.4	5.3	5.4	7.1	<0.20	<0.20	2	1.5	<0.2	2
Xylenes - total	300	<0.40	0.58	1	<0.40					<0.10	<0.10	1.5	1.7	2.1	0.6

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW4B													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	0.47	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **						<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	0.21	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane							<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW5													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<0.20	<0.20	<0.20	<0.20	<0.2	<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW8													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<0.20	<0.20	<0.20	<0.20	<0.2	<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW9													
		Sep-08	Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane		<0.20	<0.20	<0.20	<0.20	<0.2	<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20					<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	OW10												
		Oct-09	Jan-11	Sep-11	Sep-12	Dec-13	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.4	<0.20	<0.20	<0.50	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	0.44	<0.10	<0.10	0.6	0.6	<0.4	<0.4	<0.20	0.21	<0.50	<0.4	<0.4	<0.4
Benzene	5 **					<0.5	<0.5	<0.5	0.11	<0.10	<0.25	<0.5	<0.5	<0.5
Chlorobenzene	30	0.26	<0.10	<0.10	0.3	<0.2	<0.2	<0.2	0.15	<0.10	<0.25	<0.5	<0.5	<0.5
Chloroethane						<4.0	<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.5	<0.10	<0.10	<0.25	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.25	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<4.0	<0.2	<4.0		<0.50	<0.50	<1.3	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.4	<0.10	<0.10	<0.25	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.5	<0.20	<0.20	<0.50	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.50	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20					<0.10	<0.10	<0.25	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-3
GROUNDWATER ORGANIC CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	ODWQS	W14												
		Sep-08	Oct-09	Jan-11	Oct-11	Sep-12	Sep-14	Dec-15	Sep-16	Sep-17	Sep-18	Sep-19	Oct-20	Oct-21
1,2-Dichlorobenzene	3	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
1,4-Dichlorobenzene	1	<0.10	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4	<0.20	<0.20	<0.20	<0.4	<0.4	<0.4
Benzene	5 **						<0.5	<0.5	<10	<10	<0.10	<0.5	<0.5	<0.5
Chlorobenzene	30	<0.10	<0.10	<0.10	<0.10	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
Chloroethane							<0.2	<0.2				<0.2	<0.2	<0.2
Ethyl benzene	2.4	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5	<0.10	<0.10	<0.10	<0.5	<0.5	<0.5
m/p-Xylenes	300 ***	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Methylene Chloride	50 **	<0.30	<0.30	<0.30	<0.30	<4.0	<4.0		<0.50	<0.50	<0.50	<4.0	<4.0	<4.0
o-Xylene	300 ***	<0.10	<0.10	<0.10	<0.10	<0.5	<0.5	<0.4	<0.10	<0.10	<0.10	<0.4	<0.4	<0.4
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5	<0.20	<0.20	<0.20	<0.5	<0.5	<0.5
Vinyl Chloride	2 **	<0.17	<0.17	<0.17	<0.17	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.2	<0.2	<0.2
Xylenes - total	300	<0.20	<0.20	<0.20	<0.20				<0.10	<0.10	<0.10	<0.5	<0.5	<0.5

NOTES: 1) ODWQS - Ontario Drinking Water Quality Standards (2006)
2) Blank indicates parameter not analysed.
3) * - Indicates trace concentration detected below the Limit of Quantitation.
** - Indicates health related drinking water standard.
*** - Drinking water standard is total concentration of all xylenes.
4) Concentrations are in µg/L.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W10 - McCauley House Well																
		Jun-87	Sep-87	Oct-87	Nov-87	Jan-88	Mar-88	May-88	Jun-88	Jul-88	Aug-88	Sep-88	Oct-88	Nov-88	Dec-88	Jan-89	Apr-89	May-89
pH	units	6.52	4.16	7.18		7.22	7.62	7.02	6.88	7.08	6.9	6.5	6.5	6.5	6.9	7	7.3	6.54
Conductivity	µmho/cm	87	149	157		189	164	177	189	186	185	179	178	192	201	203	196	61
Chloride	mg/L	10	23	31		13	11	12	15	16	16	15	13	15	16	16	14	1.4
Phosphate - ortho	mg/L										0.03	0.07	0.05	0.06	0.03	0.06	0.02	0.02
Sulphate	mg/L																	
Alkalinity	mg/L	11	45	49		85	55	49	53	52	47	45	50	53	53	54	54	
Hardness	mg/L	14	15	17		56	58	54	72	1	73	69	65	75	74	80	77	20
Total Kjeldahl Nitrogen	mg/L																	
Ammonia	mg/L	0.1		0.05		0.05	0.05	0.05	0.15	0.1	0.1	0.05	0.15	0.05	0.05	0.1	0.05	0.1
Nitrate	mg/L	1.60	4.35	0.15		0.65	0.85	1.25	1.20	1.25	1.20	1.25	1.25	1.35	1.40	1.40	1.20	0.70
Nitrite	mg/L										0.01	0.01	0.01	0.03	0.03	0.01	0.01	0.01
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L										2	2	2	6	10	8	2	10
Dissolved Organic Carbon	mg/L										0.7	0.8	0.7	1.5	0.8	1.5	1	2
Phenols	µg/L	1	0.4	0.2	0.2	1	0.4	0.6	0.4	0.2	0.2	0.8	0.2	0.8	1.6	0.2	0.8	0.8
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	0.02	0.11	0.37	0.09	0.45	0.18	0.19	0.83	0.07	0.15	0.058	0.113	0.05	0.05	0.05	0.05	0.34
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L										0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W10 - McCauley House Well																
		Jul-89	Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	Apr-91	Jul-91	Oct-91	Jul-93	Oct-93	Apr-94	Jul-94	Apr-95	Jul-95	Oct-95	Apr-96
pH	units	6.2	7.74	6.48	6.14	6.37	6.64	6.08	6.3	6.7	7.38	6.48	6.21	6.29	6.77	6.32	6.93	6.7
Conductivity	µmho/cm	157	154	159	37	125	156	145	147	136	117	111	108	150	109	185	190	225
Chloride	mg/L	17	15	19	12	12	14	16	17	16	11	10	13	23	14	35	35	31
Phosphate - ortho	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		<0.02	0.02	0.02	0.02	<0.01
Sulphate	mg/L																	
Alkalinity	mg/L	30	32	28	23	24	40	24	25	22	19	21	18	19	16	18	21	27
Hardness	mg/L	61	51	63	40	45	64		37	48		32	34	42	31	52	56	66
Total Kjeldahl Nitrogen	mg/L										0.2	0.15	<0.05	0.1		0.2	0.2	0.1
Ammonia	mg/L	0.35	0.05	0.05	0.15	0.1	0.2	0.1	0.05	0.1								
Nitrate	mg/L	1.65	1.00	1.30	1.20	0.90	1.45	2.10	1.60	1.60	1.55	0.80	1.10	1.05	1.00	1.20	1.20	<0.05
Nitrite	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.005	0.01	0.01	0.01	0.01	
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L	12	14	18	2	14	26	2	2	2		6	22	8	8.7		2	2
Dissolved Organic Carbon	mg/L	0.7	0.9	0.6	0.8	1.4	0.6	0.8	0.7	0.8	1.1	0.9	0.7	0.7	0.5	0.8	1.5	0.5
Phenols	µg/L	2	0.2	0.2	0.2	0.4	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.4	0.6	0.2	0.4	2
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	0.01	0.044	0.051	0.01	9.3	0.081	0.11	0.056	0.058		0.049	0.051	0.11	0.125		0.065	<0.02
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.02	<0.02	0.02	0.02	0.02	
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W10 - McCauley House Well																	
		Jun-96	Jul-96	Oct-97	Oct-98	Apr-99	Oct-99	Nov-99	Jun-00	Oct-01	Jun-07	Oct-07	Apr-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11
pH	units	6.3	6.4	6.85	6.8		6.6	6.4	6.7	6.77	6.37	6.1	6.9	7.11	6.83	7.11	6.83	7.04	6.73
Conductivity	µmho/cm	230	240	148	160		240	170	230	260	45	74	52	26	335	26	335	399	93
Chloride	mg/L	41	48		25		44	25	34	48	2.0	6.6	2.9	0.3	90	0.3	90	97	14
Phosphate - ortho	mg/L	<0.1	<0.1		<0.5		<0.5			<0.5									
Sulphate	mg/L										2.47		3.79	1.67	8.89	1.67	8.89	8.81	5.97
Alkalinity	mg/L	24	15		27		17	22	28	31	16		15	9	13	9	13	16	17
Hardness	mg/L	76	80		56		64	54	62	63	17		18	<10	83	<10	83	94	27
Total Kjeldahl Nitrogen	mg/L	1.7	0.41		<0.16		<0.16	<0.16	0.21	<0.16	<0.10		<0.1	<0.10	<0.10	<0.10	<0.10	0.24	<0.10
Ammonia	mg/L			<0.01	<0.03		<0.03	<0.03	<0.02	<0.02	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04
Nitrate	mg/L	1.50	1.40		<0.25		<0.25			0.17				<0.05	1.07	<0.05	1.07	0.68	<0.05
Nitrite	mg/L	<0.05	<0.05		<0.25		<0.01			<0.01									
Biochemical Oxygen Demand	mg/L						<5			<5				<5	<5		<5	<5	<5
Chemical Oxygen Demand	mg/L	15	<10		<10		<10	<10	<10	<10	<5		7	<5	<5		<5	<5	<5
Dissolved Organic Carbon	mg/L	19	1.4		0.64		0.3	0.33	3.1	1.1	1.4		1.2	1.2	1.4		1.8	0.9	3.3
Phenols	µg/L	1	1		1		1	1	3.1	1	<1		<1	<1	<1		<1	<1	<1
Arsenic	mg/L																		
Barium	mg/L										0.005		0.008	0.002	0.084		0.139	0.108	0.025
Boron	mg/L										<0.01		<0.01	<0.010	<0.010	<0.010	<0.010	0.012	<0.010
Cadmium	mg/L										<0.002		<0.001						
Calcium	mg/L																	30.9	9.45
Chromium	mg/L										<0.003		<0.003						
Copper	mg/L										<0.002		<0.002						
Iron	mg/L	0.14	0.096		0.12		0.18	0.15	0.24	0.37	0.018		0.007	<0.010	0.115	<0.010	0.115	<0.010	<0.010
Lead	mg/L										<0.002		<0.001						
Magnesium	mg/L																	4.14	0.77
Manganese	mg/L	0.014			0.03		0.013	0.008	0.011	0.01	<0.002		<0.003	<0.003	0.027	<0.003	0.027	0.048	0.025
Mercury	mg/L										<0.0001		<0.0001						
Phosphorus	mg/L	0.01	<0.06		<0.06		<0.06			<0.06	<0.05		<0.05	<0.05	<0.02		<0.02	<0.05	<0.05
Potassium	mg/L																		
Sodium	mg/L																	36.8	6.64
Zinc	mg/L										<0.005		0.008						
Total Dissolved Solids	mg/L																	232	136
Total Suspended Solids	mg/L																	<10	35

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W11 - Trailer																
		Jul-83	Mar-84	Sep-84	Jun-85	Jul-85	Sep-85	May-87	Oct-87	Nov-87	Mar-88	May-88	Jun-88	Jul-88	Aug-88	Sep-88	Oct-88	Nov-88
pH	units	8.01	6.45	6.67		6.63		7.13	7.55	6.68	7.48	7.14	6.87	6.87	6.9	6.5	6.6	6.5
Conductivity	µmho/cm	1525	1580	1540	1400	2020	2470	1480	1108	1291	741	749	896	1089	1256	1500	1470	1260
Chloride	mg/L	315	283	283	230	333	384	287	185	230	102	93	123	159	201	253	233	212
Phosphate - ortho	mg/L																	
Sulphate	mg/L																	
Alkalinity	mg/L	276	316	350		436		432	343	386	250	255	288	372	335	465	375	327
Hardness	mg/L	644	560	495		580		324	348	413	210	218	239	348	376	406	420	317
Total Kjeldahl Nitrogen	mg/L																	
Ammonia	mg/L																	
Nitrate	mg/L																	
Nitrite	mg/L																	
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L																	
Dissolved Organic Carbon	mg/L																	
Phenols	µg/L	550	54	240	176	220	270	40	8.4	2.2	0.6	1	29.4	43	23.6	15.4	10.6	4.4
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	47.5	45	60.5		61.6		1.95	24	8.5	0.48	24	33.65	34.53	41	55	30	17.79
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L																	
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W11 - Trailer																
		Dec-88	Apr-89	Jul-89	Jan-90	Apr-90	Jul-90	Aug-90	Oct-90	Jan-91	Apr-91	Jul-91	Oct-91	Jan-92	Apr-92	Aug-92	Nov-92	Mar-93
pH	units	7.1	6.9	6.6	7.7	7.18	6.87	6.81	6.88	7.33	6.92	7	7.3	7.2	6.92	7.7	7	7.88
Conductivity	µmho/cm	1084	1159	1540	1420	1000		1520	1420	1276	1490	1109	1400	1035	1440	920	1340	1023
Chloride	mg/L	162	160	260	236	129	191	270	235	204	181	148	245	167	198	139	207	154
Phosphate - ortho	mg/L																	
Sulphate	mg/L																	
Alkalinity	mg/L	317	343	468	459	357		413	394	417	509	350	330	292	460	292	407	297
Hardness	mg/L	282	366	442	419	276	336		278	379	403	278	276	243	439	226	314	258
Total Kjeldahl Nitrogen	mg/L																	
Ammonia	mg/L																	
Nitrate	mg/L																	
Nitrite	mg/L																	
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L																	
Dissolved Organic Carbon	mg/L																	
Phenols	µg/L	3	6	44	5	0.8	9.2	5.2	2	4.6	171	7	2	1.8	4.4	1.2	2	1
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	6.8	1.7	43	5	6.1	0.23	44	20	13	32	6.7	5.9	0.13	28	5.6	27	2.7
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L																	
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W11 - Trailer																
		Jul-93	Oct-93	Apr-94	Jul-94	Oct-94	Dec-94	Feb-95	Apr-95	Jul-95	Oct-95	Apr-96	Jun-96	Jul-96	Oct-96	Apr-97	Oct-97	Apr-98
pH	units	7.77	6.88	7.11	6.9	8.22	7.9	7.38	7.17	7.41	7.13	6.4	6.7	7.1	7	6.35	6.6	6.5
Conductivity	µmho/cm	713	1125	872	602	549	552	489	456	475	575	1160	960	840	940	1173	837	1100
Chloride	mg/L	97	158		55	55	57	51	44	41	64	129	96	93	100	131	90	140
Phosphate - ortho	mg/L																	
Sulphate	mg/L																	
Alkalinity	mg/L	211	353	301	222	212	186	167	142	162	178	195	220	200	260	230	199	280
Hardness	mg/L		271	226	154	147	145	121	119	154	176	354	280	260	310	352	272	370
Total Kjeldahl Nitrogen	mg/L																	
Ammonia	mg/L																	
Nitrate	mg/L																	
Nitrite	mg/L																	
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L																	
Dissolved Organic Carbon	mg/L																	
Phenols	µg/L	1.6	0.6	0.8	1	2	0.8	0.4	0.2	0.6	1.4	2	1	1.6	17	1	1	1
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L		29	6.8	14	21.8	30.9	5.46	119		15.6	2.05	49	24	49	38	7.89	30
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L																	
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W11 - Trailer																
		Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06
pH	units	6.73	6.7	6.8	7	7.3	7.79	7.06	6.6	6.4	7.14	6.6	6.9	6.5	7.79	7.81	7.8	7.4
Conductivity	µmho/cm	980	1200	840	810	740	550		1200	780	560	720	860	620	709	750	890	890
Chloride	mg/L	110	140	59	54	47	59	49	86	43	42	31	63	39	69	45	91	58
Phosphate - ortho	mg/L																	
Sulphate	mg/L																	
Alkalinity	mg/L	310	230	130	130	160	130	210	290	210	140	190	230	160	146	176	208	
Hardness	mg/L	350	320	240	270	250	180	250	400	270	230	270	330	250	272	279	330	320
Total Kjeldahl Nitrogen	mg/L																	
Ammonia	mg/L																	
Nitrate	mg/L																	
Nitrite	mg/L																	
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L																	
Dissolved Organic Carbon	mg/L																	
Phenols	µg/L	20	2	3	1	10	1	2.1	4.4	1	1	2.2	1	31	2	130	1	4
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	98	18	26	1.9	12	0.82	3.5	32	4.7	0.39	11	1.6	30	0.54	62.6	0.68	4.51
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L																	
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W11 - Trailer												
		Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Apr-12	Sep-12	Apr-14	Sep-14
pH	units	7.39	6.8	7.86	7.79	7.48	7.41	7.48	7.41	8.07	7.66	7.23	7.4	7.35
Conductivity	µmho/cm	694	787	558	314	677	551	677	551	609	650	659	464	544
Chloride	mg/L	60	47	50	20	49	37	49	37	54	48	44	34	34
Phosphate - ortho	mg/L													
Sulphate	mg/L	126	172	92.5	40.4	77.4	60.5	77.4	60.5	82.8	61	47	48	37
Alkalinity	mg/L	125	163	111	70	198	177	198	177	154	199	230	129	179
Hardness	mg/L	251	286	224	101	242	206	242	206	197	193	225	164	193
Total Kjeldahl Nitrogen	mg/L	2.16	6.56	1.37	1.43	1.26	0.61	1.26	0.61	0.61	0.45	2.26	0.31	1.29
Ammonia	mg/L	1.35	5.04	1.14	0.22	0.75	0.44	0.75	0.44	<0.02	0.06	1.98	0.06	0.74
Nitrate	mg/L					0.87	0.08	0.87	0.08	0.35	0.78	0.21	0.52	0.31
Nitrite	mg/L													
Biochemical Oxygen Demand	mg/L					<5	39	<5	14	<5	1	113	7	25
Chemical Oxygen Demand	mg/L	10.2	36	15	11	12	14	19	47	11	21	116	53	48
Dissolved Organic Carbon	mg/L	4.7	6.1	4.3	5.8	4.4	4.9	8.7	18	5.9	6	6	5.1	5.6
Phenols	µg/L	<1	2	<1	2	<1	6	<1	34	6	<1	17	1	3
Arsenic	mg/L	<0.003	<0.003											
Barium	mg/L	0.075	0.104	0.107	0.03	0.052	0.059	0.045	0.107	0.041	0.04	0.07	0.03	0.05
Boron	mg/L	0.378	0.455	0.331	0.181	0.306	0.276	0.306	0.276	0.597	0.51	0.49	0.4	0.52
Cadmium	mg/L	<0.0001	<0.0001	<0.001	<0.001									
Calcium	mg/L									65.6	64	77	54	64
Chromium	mg/L	<0.003	<0.003	0.014	0.014									
Copper	mg/L	<0.002	<0.002	<0.002	<0.003									
Iron	mg/L	3.76	8.82	10.8	1.83	0.079	14.8	0.079	14.8	0.793	<0.03	1.04	0.18	1.75
Lead	mg/L	<0.001	<0.001	<0.001	0.006									
Magnesium	mg/L									8.12	8	8	7	8
Manganese	mg/L	2.31	3.73	2.91	0.122	0.723	1.39	0.723	1.39	0.095	0.05	1.49	0.07	1.51
Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001									
Phosphorus	mg/L	0.10	0.50	0.09	0.13	0.06	0.21	0.02	0.56	0.07	0.07	1.07	0.05	0.51
Potassium	mg/L													
Sodium	mg/L									51.1	45	44	33	39
Zinc	mg/L	0.006	0.008	0.004	0.035									
Total Dissolved Solids	mg/L									358	422	428	302	354
Total Suspended Solids	mg/L									166	<2	65	148	663

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W11 - Trailer											
		Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Sep-18	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.52	7.62	7.15	7.44	7.4	7.42	7.65	7.67	7.71	7.48	7.61	7.31
Conductivity	µmho/cm	507	485	460	470	370	450	440	426	474	473	450	328
Chloride	mg/L	34	31	31	19	30	21	27	30	40	44	35	31
Phosphate - ortho	mg/L												
Sulphate	mg/L	34	28	37	27	24	30	28	26	31	23	24	23
Alkalinity	mg/L	161	166	140	170	110	160	150	144	145	172	129	141
Hardness	mg/L	168	164	150	150	130	150	140	158	169	173	184	146
Total Kjeldahl Nitrogen	mg/L	0.24	1.36	0.19	1.5	0.2	0.28	0.1	0.7	0.764	1.98	1.17	0.59
Ammonia	mg/L	<0.02	0.502	<0.050	1.2	<0.050	0.13	<0.050	0.17	0.071	1.34	<0.01	0.498
Nitrate	mg/L	0.44	0.45	0.28	0.21	0.32	0.22	0.2	0.43	0.2	0.37	0.16	<0.1
Nitrite	mg/L			<0.010	0.021	<0.010	<0.010	0.2					
Biochemical Oxygen Demand	mg/L	<1	7	<2.0	<2.0	<2.0	<2.0	<2	5	4	5	4	8
Chemical Oxygen Demand	mg/L	19	56	26	32	8	8.1	5.8	14	130	49	91	51
Dissolved Organic Carbon	mg/L	7.7	6.1	3.2	3.2	2.4	2.5	2.7	3.7	3.2	3	2.5	11.5
Phenols	µg/L	<1	3	<1	5.4	<1	10	<1	<1	<1	<1	<1	<1
Arsenic	mg/L												
Barium	mg/L	0.03	0.05	0.042	0.052	0.038	0.049	0.035	0.05	0.04	0.05	0.04	0.04
Boron	mg/L	0.47	0.37	0.31	0.32	0.24	0.31	0.28	0.32	0.27	0.2	0.22	0.09
Cadmium	mg/L												
Calcium	mg/L	54	54	46	49	41	46	44	50	53	56	57	47
Chromium	mg/L												
Copper	mg/L												
Iron	mg/L	<0.03	0.14	<0.10	<0.10	<0.10	0.7	<0.10	<0.03	0.03	0.82	0.04	0.32
Lead	mg/L												
Magnesium	mg/L	8	7	7.2	7.4	6.4	7.4	7.1	8	9	8	10	7
Manganese	mg/L	0.06	0.18	0.23	2.1	0.089	0.68	0.018	0.65	0.05	1.59	0.05	0.37
Mercury	mg/L												
Phosphorus	mg/L	0.02	0.62	<0.020	<0.10			0.044	0.023	0.63	0.462	0.438	0.327
Potassium	mg/L												
Sodium	mg/L	41	34	31	27	22	23	24	18	27	19	22	16
Zinc	mg/L												
Total Dissolved Solids	mg/L	330	315	286	368	244	270	195	277	308	307	292	213
Total Suspended Solids	mg/L	2	54	67	71	150	30	180	77	118	124	118	124

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W12 - Butler New House Well																
		Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	Apr-91	Jul-91	Oct-91	Jan-92	Apr-92	Aug-92	Dec-92	Mar-93	Jul-93	Oct-93	Apr-94	Jul-94
pH	units	8.14	9.07	8.67	7.58	8.32	8.61	8.8	8.7		8.36	9	8.39	8.4	8.14	8.43	8.53	7.54
Conductivity	µmho/cm	207	193	190	204	200	202	208	208		210	215	215	219	223	228	229	256
Chloride	mg/L	5	4	6	5	7	7	7	9		10	10	9	11	11	12	12	30
Phosphate - ortho	mg/L	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.02		0.02	0.02	0.02	0.02	0.02	0.02		<0.02
Sulphate	mg/L																	
Alkalinity	mg/L	76	76	76	76	74		75	74		73	74	76	77	74	76	76	68
Hardness	mg/L	38	31	36	35	40	39	20	42		47	29	43	43		47	50	97
Total Kjeldahl Nitrogen	mg/L	0.3	0.05	0.05	0.55	0.05	0.05	0.05	0.1		0.05	0.05	0.1	0.05	0.05	0.15	<0.05	0.05
Ammonia	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1		0.05	0.05	0.05	0.05	0.05	0.05	0.05	<0.05
Nitrate	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.10	0.05	0.10	0.05
Nitrite	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.01	0.01	<0.05	0.01
Biochemical Oxygen Demand	mg/L										0.4							
Chemical Oxygen Demand	mg/L	4	2	2	38	2	2	2	2		8	56	6	8	10	16	4	20
Dissolved Organic Carbon	mg/L	0.5	0.2	0.5	0.9	0.5	0.5	0.3	0.4		0.7	0.8	0.4	0.2	0.6	0.4	0.4	0.8
Phenols	µg/L	0.8	0.4	0.4	0.4	0.4	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.6	0.2	0.4	2
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	0.01	0.013	0.032	0.02	0.015	0.028	0.021	0.027	0.074	0.093	0.028	0.024	0.013	1.6	0.015	0.016	0.3
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L																	
Phosphorus	mg/L	0.02	0.02	0.02	0.06	0.02	0.02	0.02	0.02		0.02	0.02	0.02	0.02	0.02	0.02	<0.02	<0.02
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W12 - Butler New House Well																
		Oct-94	Dec-94	Jul-95	Apr-97	Oct-97	Apr-98	Jul-99	Oct-99	Apr-00	Oct-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04
pH	units		8.21	8.26	8.23	8.67	8.1	8.15	7.1	8.22	8.05	7.75	7.65	8.24	8.2	7.97	7.7	7.8
Conductivity	µmho/cm		241	245	244	243	240	170	270	260	280	250	270	260	270	250	280	270
Chloride	mg/L	15	13	18	16	12	16	19	19	15	21	18	22	21	19	21	27	17
Phosphate - ortho	mg/L	0.02	0.02	0.02					<0.5				<0.5		<0.5		<0.5	
Sulphate	mg/L																	19
Alkalinity	mg/L		76	77	72	77	77	75	73	77	75	75	82	81	79	81	79	78
Hardness	mg/L	52	45	65	64	48	67	76	79	78	100	74	73	74	75	80	89	83
Total Kjeldahl Nitrogen	mg/L	0.1	0.05	0.1	0.22	0.11	<0.16	<0.16	0.16	0.2	<0.16	0.18	0.2	0.34	0.2	<0.16	<0.16	<0.16
Ammonia	mg/L	0.05	0.05	0.05	0.16	0.04	0.05	0.03	0.03	0.03	0.04	0.02	0.04	0.04	0.02	0.05	0.05	0.04
Nitrate	mg/L	0.05	0.05	0.05		<0.1			<0.25				<0.05		<0.05		<0.05	
Nitrite	mg/L	0.01	0.01	0.01		<0.1			<0.01				<0.01		<0.01		<0.01	
Biochemical Oxygen Demand	mg/L								<5				<5		<5		<5	
Chemical Oxygen Demand	mg/L	47.1	8.51		4	2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dissolved Organic Carbon	mg/L	0.3	0.5	0.4	<1	<1	0.36	0.51	0.35	0.27	<1.6	0.29	0.55	0.46	0.5	0.2	0.77	0.9
Phenols	µg/L	0.4	0.4	0.2	<1	<1	<1	<1	<1	2.6	<10	<1	<1	<1	<1	<10	<1	<1
Arsenic	mg/L																	
Barium	mg/L																	
Boron	mg/L																	0.13
Cadmium	mg/L																	
Calcium	mg/L																	
Chromium	mg/L																	
Copper	mg/L																	
Iron	mg/L	0.0553	0.8		0.02	0.01	<0.01	0.02	0.025	0.022	0.037	0.1	0.019	0.015	0.015	0.064	0.026	
Lead	mg/L																	
Magnesium	mg/L																	
Manganese	mg/L						0.017	0.022	0.022	0.021	0.031	0.021	0.021	0.021	0.021	0.023	0.026	
Mercury	mg/L																	
Phosphorus	mg/L	0.02	0.02	0.02		<0.01			<0.06		<0.06		<0.06		<0.06		<0.06	<0.002
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L																	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W12 - Butler New House Well								
		Sep-04	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Apr-12	Sep-12	Apr-13
pH	units	8	7.61	7.83	7.61	7.83	7.77	6.95	6.94	6.89
Conductivity	µmho/cm	280	99	235	99	235	127	163	233	127
Chloride	mg/L	22	11	38	11	38	13	24	31	15
Phosphate - ortho	mg/L	<0.5								
Sulphate	mg/L		1.7	4.12	1.7	4.12	2.01	<1	5	<3
Alkalinity	mg/L	82	28	56	28	56	41	42	58	41
Hardness	mg/L	89	33	87	33	87	47	50	86	50
Total Kjeldahl Nitrogen	mg/L	<0.16	<0.10	<0.10	<0.10	<0.10	0.28	0.13	0.2	<0.10
Ammonia	mg/L	0.04	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.01								
Biochemical Oxygen Demand	mg/L	<5	<5	<5	<5	<5	<5	3	1	<1
Chemical Oxygen Demand	mg/L	<10	<5	<5	5	<5	<5	<5	5	<5
Dissolved Organic Carbon	mg/L	<0.5	1.1	0.9	0.6	1.4	0.8	<5	0.9	0.6
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L									
Barium	mg/L	0.038	0.012	0.03	0.012	0.028	0.013	0.01	0.02	0.002
Boron	mg/L	0.13	<0.010	0.019	<0.010	0.019	<0.010	<0.01	0.01	<0.01
Cadmium	mg/L	<0.005								
Calcium	mg/L						14	15	26	15
Chromium	mg/L	<0.004								
Copper	mg/L	1.2								
Iron	mg/L	0.026	<0.010	<0.010	<0.010	<0.010	<0.010	<0.03	<0.03	<0.03
Lead	mg/L	<0.02								
Magnesium	mg/L						2.85	3	5	3
Manganese	mg/L	0.025	<0.003	<0.003	<0.003	<0.003	<0.003	<0.01	<0.01	<0.01
Mercury	mg/L									
Phosphorus	mg/L	<0.06	<0.05	<0.02	0.02	<0.05	<0.05	0.01	0.02	<0.01
Potassium	mg/L									
Sodium	mg/L						6.66	7	7	5
Zinc	mg/L	0.007								0.02
Total Dissolved Solids	mg/L						48	106	151	83
Total Suspended Solids	mg/L						10	2	33	<2

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W14 - Oxley New House Well																
		Jul-98	Nov-98	Oct-99	Nov-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Sep-04	Apr-05	Sep-05	Apr-06
pH	units	6.8	6.37	7.2	6.8	6.28	7.44	6.7	6.39	6.28	6.3	6.16	6.2	6.7	6.2	6.53	7.02	7
Conductivity	µmho/cm	110	82	60	59	56	58	28	44	38	35	32	54	38	62	26	61	42
Chloride	mg/L	<0.5	2.5	0.2	0.4	0.5	0.2	0.3	0.4	0.2	0.4	0.5	0.7	0.4	0.3	0.4	3.0	1.0
Phosphate - ortho	mg/L														<0.5			
Sulphate	mg/L													3.5	5	3.6	12	4
Alkalinity	mg/L	55	34	19	18	20	15	11	11	11	9	9	21	11	9	6	16	15
Hardness	mg/L	42	33	20	21	23	18	12	15	15	12	14	19	15	12	10	17	16
Total Kjeldahl Nitrogen	mg/L	<0.16	<0.16	<0.16	<0.16	0.24	<0.16	0.37	0.8	0.26	<0.16	<0.16	<0.16	<0.16	<0.16	0.2	0.02	0.1
Ammonia	mg/L	<0.03	<0.03	0.03	<0.03	0.02	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.05	<0.05
Nitrate	mg/L														0.19			0.10
Nitrite	mg/L														<0.01			<0.01
Biochemical Oxygen Demand	mg/L														<5			
Chemical Oxygen Demand	mg/L	<10	<10	<10	<10	<10	<10	12	<10	130	21	<10	<10	<10	15	<4	9	7
Dissolved Organic Carbon	mg/L	1.5	2.7	1.6	1.1	1.6	1.8	3.5	1.5	1.5	0.88	2.2	1.4	1.6	0.97	2	2.6	1.4
Phenols	µg/L	<1	<1	<1	<1	<1	<1	9.1	<1	<1	1.9	<1	<1	<1	2.4	1	<1	<1
Arsenic	mg/L															<0.2	<0.2	<0.001
Barium	mg/L														0.013	0.03	<0.02	0.023
Boron	mg/L													<0.01	<0.01	<0.02	0.02	<0.01
Cadmium	mg/L														<0.005	<0.005	<0.005	<0.0001
Calcium	mg/L																	
Chromium	mg/L														<0.004	<0.01	<0.01	<0.005
Copper	mg/L														0.063	<0.02	0.04	0.034
Iron	mg/L	0.6	0.2	0.22	0.15	0.06	0.12	0.15	0.13	0.069	0.043	2	0.57	0.28	0.16	1.86	0.98	1
Lead	mg/L														<0.02	<0.05	<0.05	0.0019
Magnesium	mg/L																	
Manganese	mg/L	0.023	0.01	0.009	0.008	0.017	0.022	0.017	0.009	0.01	0.035	0.019	0.11	0.032	0.092	0.02	0.06	0.021
Mercury	mg/L																	
Phosphorus	mg/L													0.003	<0.002	0.02	0.01	0.01
Potassium	mg/L																	
Sodium	mg/L																	
Zinc	mg/L														0.017	0.02	0.14	0.46
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W14 - Oxley New House Well												
		Oct-06	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12	Sep-12	Sep-13	Sep-14	Sep-15
pH	units	6.8	7.45	6.54	6.85	6.54	6.85	6.72	6.7	6.29	6.43	5.99	6.73	6.27
Conductivity	µmho/cm	39	51	33	38	33	38	28	35	28	51	36	36	39
Chloride	mg/L	<1	0.2	0.3	0.2	0.3	0.2	0.4	0.4	<1	<1	<1	<1	<1
Phosphate - ortho	mg/L				<0.10		<0.10		<0.10		<0.03	<0.09	<0.03	<0.03
Sulphate	mg/L	4		3.11	2.98	3.11	2.98	4.23	4.93	1	5	4	3	4
Alkalinity	mg/L		22	11	14	11	14	6	10	7	21	14	13	13
Hardness	mg/L	13	18	14	15	14	15	11	11	5	18	10	12	
Total Kjeldahl Nitrogen	mg/L	0.2	0.2	<0.10	<0.10	<0.10	<0.10	0.39	0.24	0.12	0.18	<0.10	<0.10	0.13
Ammonia	mg/L	<0.05	<0.02	0.09	<0.02	0.09	<0.02	<0.02	0.07	<0.02	0.02	<0.02	0.07	<0.025
Nitrate	mg/L		0.06	<0.05	<0.05	<0.05	<0.05	0.26	0.13	0.12	<0.10	<0.10	<0.10	0.33
Nitrite	mg/L		<0.05		<0.05		<0.05		<0.05		<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		<5	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1
Chemical Oxygen Demand	mg/L	<4	6	<5	<5	9	<5	<5	16	<5	20	8	<5	<5
Dissolved Organic Carbon	mg/L	1.4	2	1.7	1.6	2.1	2	1.9	1.9	<5	2	1.7	1.7	1
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1
Arsenic	mg/L	<0.2			<0.003		<0.003		<0.003		<0.001	<0.001	<0.001	<0.001
Barium	mg/L	<0.02	0.019	0.011	0.02	0.012	0.021	0.012	0.017	0.01	0.02	0.02	0.02	0.01
Boron	mg/L	<0.02	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	<0.005	<0.001		<0.001		<0.001		<0.001		<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L							3.42	3.56	2	7	4	5	5
Chromium	mg/L	<0.01	<0.003		<0.003		<0.003		<0.003		<0.001	<0.001	<0.001	<0.001
Copper	mg/L	<0.02	0.003		0.006		0.006		0.006		0.022	0.06	0.272	0.212
Iron	mg/L	<0.02	0.195	<0.010	0.198	<0.010	0.198	0.016	<0.010	<0.03	0.06	0.49	0.58	0.45
Lead	mg/L	<0.05	<0.001		<0.002		<0.002		<0.002		<0.001	0.00	0.006	0.004
Magnesium	mg/L							0.51	0.41	<1	<1	<1	<1	<1
Manganese	mg/L	0.18	0.286	0.023	0.264	0.023	0.264	0.014	0.047	0.01	0.28	0.07	0.09	0.01
Mercury	mg/L		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.00	<0.05	0.05	0.03	<0.02	<0.05	<0.05	3.06	<0.01	0.02	<0.01	<0.01	<0.05
Potassium	mg/L								0.25		<1	<1	<1	<1
Sodium	mg/L							1.12	1.42	2	<2	<2	<2	<2
Zinc	mg/L	0.44	0.01		0.007		0.048		0.046		<0.01	0.02	0.03	0.02
Total Dissolved Solids	mg/L							26	26	18	33	23	23	25
Total Suspended Solids	mg/L							<10	237	<2	<2	<2	7	<3

NOTE: Blank indicates parameter not analysed.

TABLE C-4
DOMESTIC WELL GROUNDWATER GENERAL CHEMISTRY RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	- W14 - Oxley New House Well									
		Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	7.59	6.53	6.47	6.63	6.44	6.91	6.58	6.56	6.51	6.45
Conductivity	µmho/cm	100	23	39	30	40	44	29	48	30	44
Chloride	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	4	<1	5	<1	<1
Phosphate - ortho	mg/L	0.043		0.01		<0.010	<0.6		<0.010		<0.010
Sulphate	mg/L	3.2	1.3	2.3	2.3	2.9	3	2	2	2	2
Alkalinity	mg/L	48	8	15	11	16	15	11	24	11	21
Hardness	mg/L	42	10	13	11	13	10	10	18	12	12
Total Kjeldahl Nitrogen	mg/L	0.34	0.2	<0.10	<0.10	<0.10	0.1	0.24	<0.100	0.339	<0.100
Ammonia	mg/L	0.2	<0.050	<0.050	0.075	<0.050	0.04	0.034	<0.010	<0.01	<0.010
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.17	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L	<0.10	0.028	<0.010	<0.010	<0.010	<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L	<2.0	<2.0	<2.0	<2	<2	<1	3		<1	
Chemical Oxygen Demand	mg/L	18	13	5.7	<4.0	<4.0	<5	5	11	<5	<5
Dissolved Organic Carbon	mg/L	1.9	2.6	1.5	1.2	1.1		1.7		5.9	
Phenols	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	<0.0010		<0.0010		<0.0010	<0.001		<0.001		<0.001
Barium	mg/L	0.0079	0.028	0.015	0.023	0.019	0.01	0.01	0.02	0.02	0.02
Boron	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	<0.01	0.01	<0.01	0.01	0.03
Cadmium	mg/L	<0.00010		<0.00010		<0.00010	<0.0001		<0.0001		<0.0001
Calcium	mg/L	14	2.7	4	3.1	4.2	4	4	7	5	5
Chromium	mg/L	<0.0050		<0.0050		<0.0050	<0.001		<0.001		<0.001
Copper	mg/L	0.0032		0.071		0.17	0.157		0.091		0.104
Iron	mg/L	0.57	0.9	0.11	0.93	0.2	0.57	0.22	0.16	0.36	0.29
Lead	mg/L	0.00054		0.0012		0.0026	0.006		0.005		0.004
Magnesium	mg/L	1.7	0.87	0.69	0.75	0.74	<1	<1	<1	<1	<1
Manganese	mg/L	0.012	0.015	0.059	0.016	0.019	0.01	<0.01	0.06	<0.01	0.04
Mercury	mg/L	<0.1		<0.1		<0.1	<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	<0.10			<0.020	<0.020	0.006	0.009	0.019	0.012	0.009
Potassium	mg/L	1.6		0.25		0.34	<1		<1		<1
Sodium	mg/L	2.8	1.2	1.2	1.1	1.6	<2	<2	<2	<2	<2
Zinc	mg/L	0.066		0.017		0.0087	0.02		0.01		0.01
Total Dissolved Solids	mg/L	58	72	58	45	20	29	19	31	20	29
Total Suspended Solids	mg/L	<10	<10	<10	<10	<10	10	12	14	12	14

NOTE: Blank indicates parameter not analysed.

TABLE C-5
LABORATORY PARAMETER ANALYSIS LIST
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

	Parameters		***List A***	***List B***	***List C***	***List D***	***ICAP scan***
Field	pH		x	x	x		
	conductivity		x	x	x		
	DO			x(1)			
	temperature		x	x	x		
Chemical	pH		x	x	x		
	conductivity		x	x	x		
	hardness		x	x			
	alkalinity		x	x			
	chloride		x	x			
	TKN		x	x	x		
	ammonia		x	x			
	iron		x	x	x		
	manganese		x	x			
	phenols		x	x			
	COD		x	x			
	DOC		x	x			
	nitrate		x				
	nitrite		x				
	phosphorous		x				
	phosphates		x				
	BOD		x				
	VOCs	benzene	x				
		chlorobenzene	x				
		ethylbenzene	x				
		methylene chloride	x				
		toluene	x				
		xylenes	x				
		1,2-dichloro-benzene	x				
		1,4-dichloro-benzene	x				
	sulphate			x			
	total phosphorous (DL<0.005 m/L)			x			
	boron			x			
	arsenic					x	
	barium					x	x
	cadmium					x	x
	chromium					x	x
	copper					x	x
	lead					x	x
	mercury					x	
	zinc					x	x

NOTE: Dissolved Oxygen is obtained at surface water stations only.

TABLE C-6
RELATIVE PERCENT DIFFERENCES - FIELD DUPLICATES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

		GROUNDWATER											
		BHH			BHC			W14			BHC		
		April 2021			April 2021			April 2021			July 2021		
PARAMETER	**UNITS**	Original	Duplicate	**RPD (%)**	Original	Duplicate	**RPD (%)**	Original	Duplicate	**RPD (%)**	Original	Duplicate	**RPD (%)**
Alkalinity	mg/L	376	376	**0**	64	65	**2**	11	12	**9**	75	76	**1**
Ammonia: total	mg/L	3.39	33	**163**	0.659	0.678	**3**	<0.01	<0.010		0.589	0.724	**21**
Arsenic	mg/L												
Barium	mg/L	0.17	0.17	**0**	0.03	0.03	**0**	0.02	0.02	**0**	0.05	0.03	**50**
Biochemical Oxygen Demand	mg/L	20	18	**11**	3	3	**0**	<1	<1		5	7	**33**
Boron	mg/L	0.41	0.36	**13**	0.11	0.11	**0**	0.01	<0.01		0.12	0.15	**22**
Cadmium	mg/L												
Calcium	mg/L	85	85	**0**	23	24	**4**	5	5	**0**	20	20	**0**
Chemical Oxygen Demand	mg/L	38	41	**8**	15	12	**22**	<5	<5		5	<5	**200**
Chloride	mg/L	321	322	**0**	20	21	**5**	<1	2		18	20	**11**
Chromium	mg/L												
Conductivity	µS/cm	1760	780	**77**	218	221	**1**	30	31	**3**	213	217	**2**
Copper	mg/L												
Dissolved Organic Carbon	mg/L	13.2	13.1	**1**	2.8	3	**7**	5.9	1.9	**103**	7	4.2	**50**
Hardness	mg/L	348	348	**0**	74	76	**3**	12	12	**0**	66	66	**0**
Iron	mg/L	31.5	32.5	**3**	16.1	15.9		0.36	0.36	**0**	24.3	24.1	**1**
Lead	mg/L												
Magnesium	mg/L	33	33	**0**	4	4	**0**	<1	<1		4	4	**0**
Manganese	mg/L	0.3	0.3	**0**	2.88	2.88	**0**	<0.01	<0.01		2.64	2.65	**0**
Mercury	mg/L												
Nitrate	mg/L	<0.10	<0.1		<0.10	<0.10		<0.10	<0.10		<0.10	<0.10	
Nitrite	mg/L												
pH	units	7.17	7.36	**3**	7.18	7.19	**0**	6.51	6.5	**0**	6.77	6.8	**0**
Phenols	mg/L	<0.01	<0.001		<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	
Phosphate - ortho	mg/L												
Phosphorus	mg/L	0.04	0.029	**32**	0.087	0.085	**2**	0.012	0.013	**8**	0.16	0.162	**1**
Potassium	mg/L												
Sodium	mg/L	267	271	**1**	14	14	**0**	<2	<2		17	17	**0**
Sulphate	mg/L	56	50	**11**	6	7	**15**	2	2	**0**	7	7	**0**
Total Dissolved Solids	mg/L	1140	1160	**2**	142	144	**1**	20	20	**0**	221	141	**44**
Total Kjeldahl Nitrogen	mg/L	3.56	3.3	**8**	0.767			0.339			0.916	1	**9**
Total Suspended Solids	mg/L	100	101	**1**	42	9	**129**	4	<2		7	15	**73**
Zinc	mg/L												

NOTES: 1) Blank indicates parameter not analysed.
2) RPD = Relative Percent Difference

$$RPD = \frac{X1-X2}{Xavg} \times 100$$

TABLE C-6
RELATIVE PERCENT DIFFERENCES - FIELD DUPLICATES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

		GROUNDWATER					
		BHC			W14		
		October 2021			October 2021		
PARAMETER	**UNITS**	Original	Duplicate	**RPD (%)**	Original	Duplicate	**RPD (%)**
Alkalinity	mg/L	70	70	**0**	21	22	**5**
Ammonia: total	mg/L	<0.01	<0.01		<0.010	<0.01	
Arsenic	mg/L	0.003	0.003	**0**	<0.001	<0.001	
Barium	mg/L	0.03	0.03	**0**	0.02	0.02	**0**
Biochemical Oxygen Demand	mg/L						
Boron	mg/L	0.08	0.1	**22**	0.03	0.02	**40**
Cadmium	mg/L	<0.0001	<0.0001		<0.0001	<0.0001	
Calcium	mg/L	14	15	**7**	5	24	**131**
Chemical Oxygen Demand	mg/L	14	8	**55**	<5	7	
Chloride	mg/L	9	9	**0**	<1	2	
Chromium	mg/L	0.002	0.002	**0**	<0.001	6	
Conductivity	µS/cm	148	147	**1**	44	43	**2**
Copper	mg/L	0.001	<0.001		0.104	<0.001	
Dissolved Organic Carbon	mg/L						
Hardness	mg/L	47	50	**6**	12	19	**45**
Iron	mg/L	18.2	18.1	**1**	0.29	0.105	**94**
Lead	mg/L	<0.001	<0.001		0.004	<0.001	
Magnesium	mg/L	3	3	**0**	<1	0.3	
Manganese	mg/L	2.01	2.01	**0**	0.04	0.04	**0**
Mercury	mg/L	<0.0001	<0.001		<0.0001	<0.0001	
Nitrate	mg/L	<0.10	<0.1		<0.10	<0.10	
Nitrite	mg/L	<0.10	<0.1		<0.10	<0.10	
pH	units	7.14	7.09	**1**	6.45	6.51	**1**
Phenols	mg/L	<0.001	<0.001		<0.001	<0.001	
Phosphate - ortho	mg/L	0.224	0.224	**0**	<0.010	0.011	
Phosphorus	mg/L	0.22	0.329	**40**	0.009	0.009	**0**
Potassium	mg/L	2	2	**0**	<1	<1	
Sodium	mg/L	12	12	**0**	<2	<2	
Sulphate	mg/L	1	1	**0**	2	2	**0**
Total Dissolved Solids	mg/L	96	96	**0**	29	28	**4**
Total Kjeldahl Nitrogen	mg/L	1.0	0.9	**9**	<0.100	0.289	**200**
Total Suspended Solids	mg/L	18	7	**88**	5	5	**0**
Zinc	mg/L	<0.01	<0.01		0.01	0.01	**0**

NOTES: 1) Blank indicates parameter not analysed.
2) RPD = Relative Percent Difference

$$RPD = \frac{X1-X2}{Xavg} \times 100$$

TABLE C-6
RELATIVE PERCENT DIFFERENCES - FIELD DUPLICATES
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

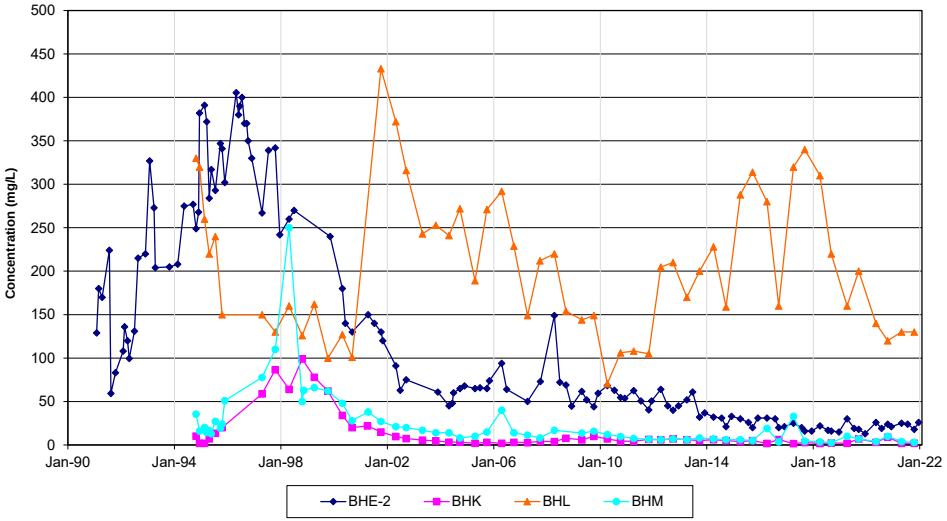
		SURFACE WATER								
		SW33			SW26			SW26		
		April 2021			July 2021			October 2021		
PARAMETER	**UNITS**	Original	Duplicate	**RPD (%)**	Original	Duplicate	**RPD (%)**	Original	Duplicate	**RPD (%)**
Alkalinity	mg/L	9	9	**0**	14	16	**13**	<5	7	
Ammonia: total	mg/L	<0.010	<0.010		<0.010	<0.010		<0.010	<0.010	
Arsenic	mg/L	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	
Barium	mg/L	0.01	0.01	**0**	0.02	0.02		<0.01	0.01	
Biochemical Oxygen Demand	mg/L	<1	<1		4	4	**0**	4	1	**120**
Boron	mg/L	<0.01	0.01		0.01	<0.01		<0.01	0.01	
Cadmium	mg/L	<0.0001	<0.0001		<0.0001	<0.0001		<0.0001	<0.0001	
Calcium	mg/L	4	4	**0**	8	8	**0**	3	3	**0**
Chemical Oxygen Demand	mg/L	14	10	**33**	34	32	**6**	30	10	**100**
Chloride	mg/L	9	9	**0**	8	8	**0**	8	5	**46**
Chromium	mg/L	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	
Conductivity	µS/cm	58	56	**4**	62	66	**6**	27	30	**11**
Copper	mg/L	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	
Dissolved Organic Carbon	mg/L	5.2	5.5	**6**	12.2	12.3	**1**	8.7	9.3	**7**
Hardness	mg/L	14	14	**0**	28	28	**0**	7	7	**0**
Iron	mg/L	0.2	0.19	**5**	3.01	2.98	**1**	0.23	0.72	**103**
Lead	mg/L	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	
Magnesium	mg/L	1	1	**0**	2	2	**0**	<1	<1	
Manganese	mg/L	<0.01	<0.01		0.55	0.54	**2**	0.01	0.06	**143**
Mercury	mg/L	<0.0001	<0.0001		<0.0001	<0.0001		<0.0001	<0.0001	
Nitrate	mg/L	<0.10	<0.10		<0.10	<0.10		<0.10	<0.10	
Nitrite	mg/L	<0.10	<0.10		<0.10	<0.10		<0.10	<0.10	
pH	units	6.8	6.85	**1**	6.19	6.27	**1**	6.41	6.45	**1**
Phenols	mg/L	0.003	0.004	**29**	0.006	0.004	**40**	<0.001	<0.001	
Phosphorus	mg/L	0.01	0.009	**11**	0.028	0.026	**7**	0.009	0.016	**56**
Sodium	mg/L	5	5	**0**	<2	<2		<2	<2	
Sulphate	mg/L	2	2	**0**	<1	<1		<1	<1	
Total Dissolved Solids	mg/L	38	36	**5**	40	43	**7**	18	20	**11**
Total Kjeldahl Nitrogen	mg/L	0.266	0.477	**57**	0.821	0.82	**0**	0.519	0.979	**61**
Total Suspended Solids	mg/L	<2	<2		9	6	**40**	<2	22	
Zinc	mg/L	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01	

NOTES: 1) Blank indicates parameter not analysed.
2) RPD = Relative Percent Difference

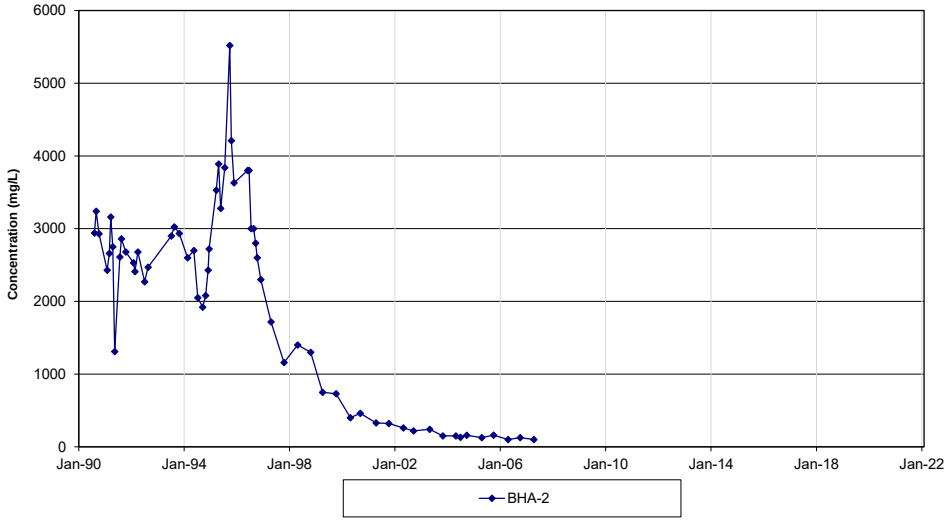
$$RPD = \frac{X1-X2}{Xavg} \times 100$$

FIGURE C-1
GROUNDWATER TIME CONCENTRATION GRAPHS - CHLORIDE

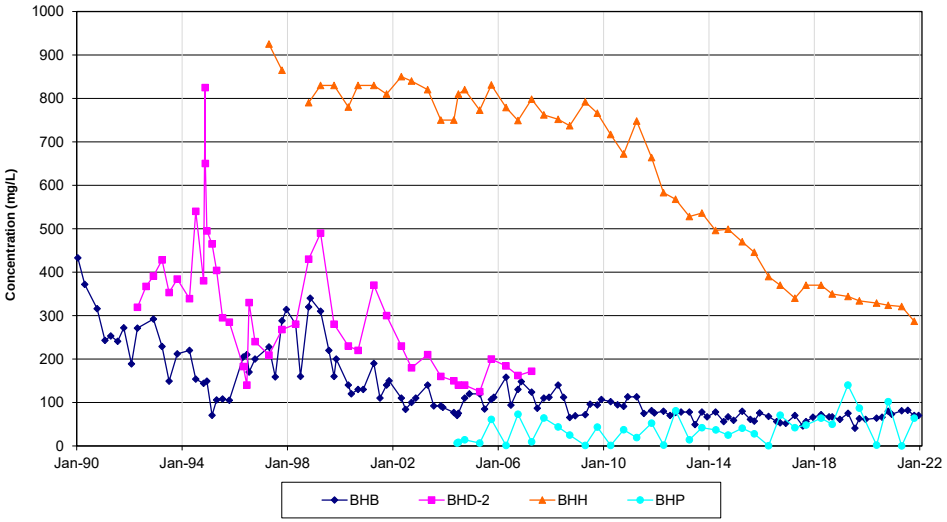
Northwest Boreholes BHE-2, BHK, BHL, BHM



Former Refuse Monitor BHA-2



Southeast Boreholes BHB, BHD-2, BHH, BHP



Downgradient Borehole BHC & Crossgradient Borehole BHQ

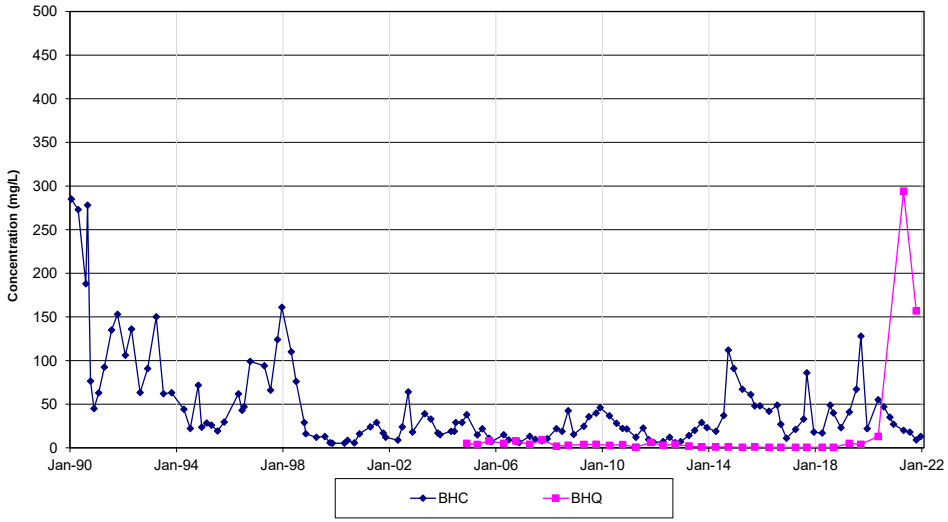
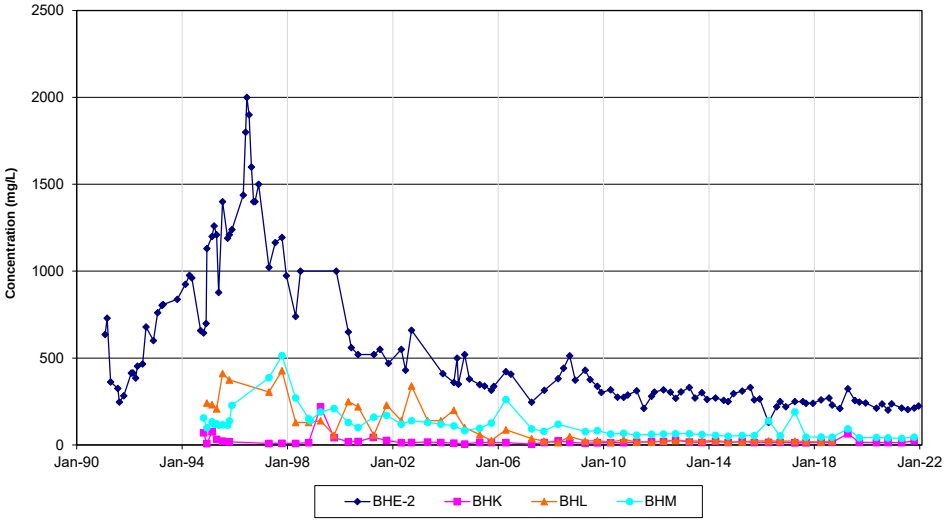
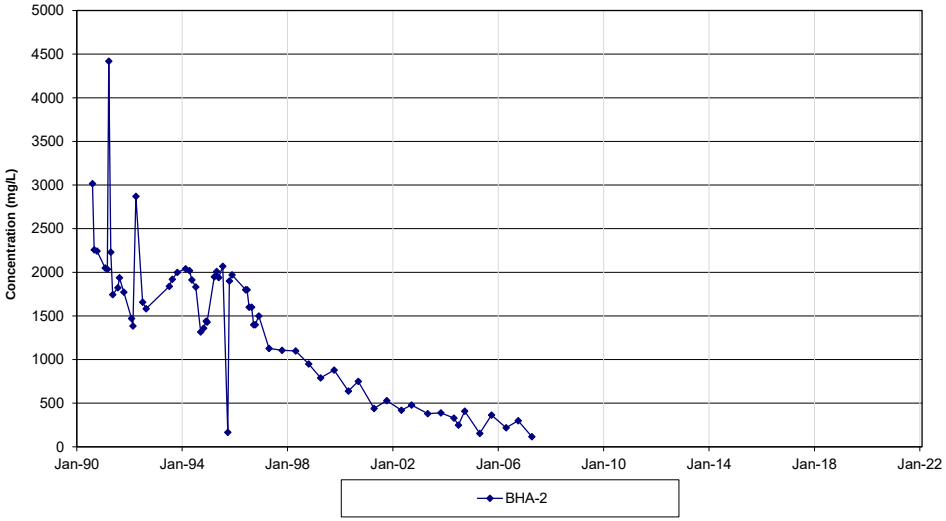


FIGURE C-2
GROUNDWATER TIME CONCENTRATION GRAPHS - ALKALINITY

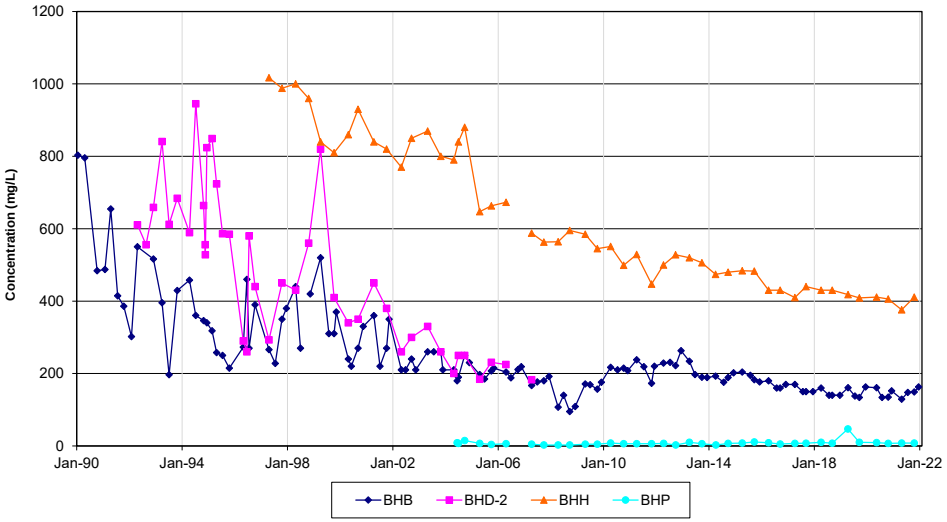
Northwest Boreholes BHE-2, BHK, BHL, BHM



Former Refuse Monitor BHA-2



Southeast Boreholes BHB, BHD-2, BHH, BHP



Downgradient Borehole BHC & Crossgradient Borehole BHQ

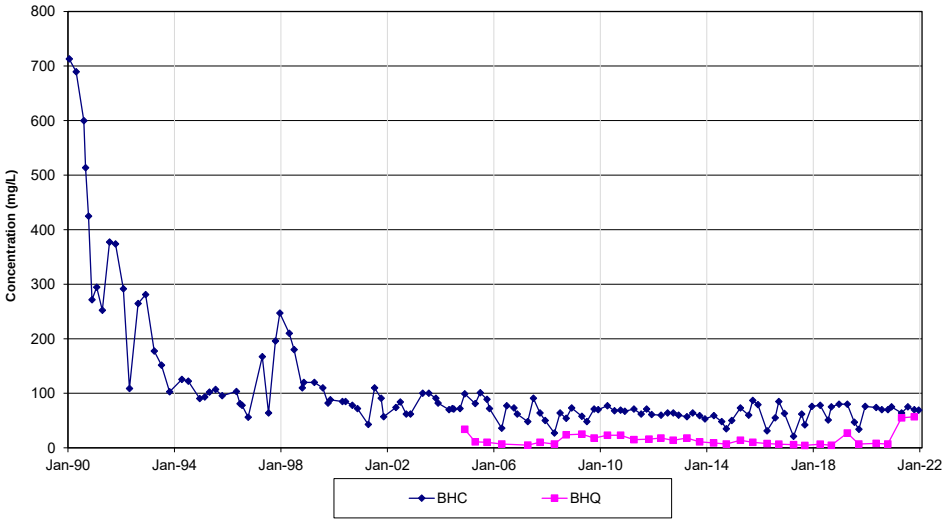
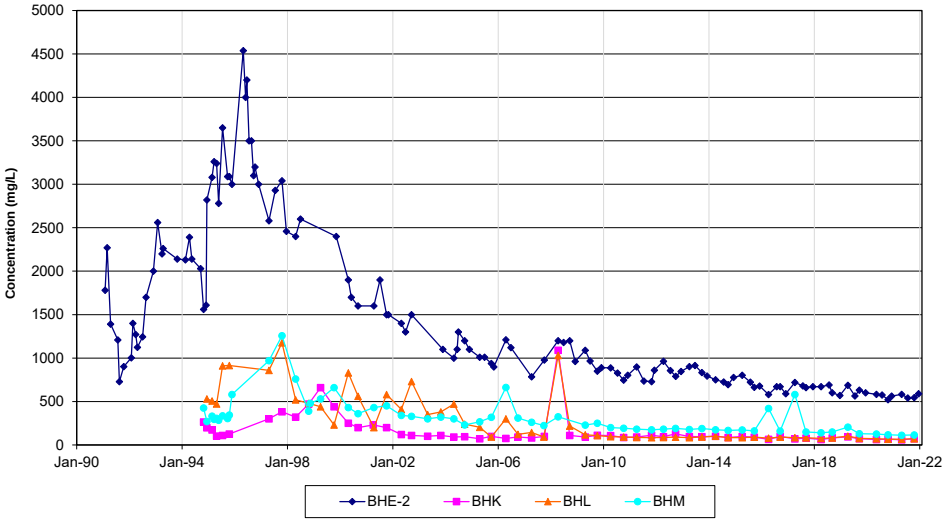


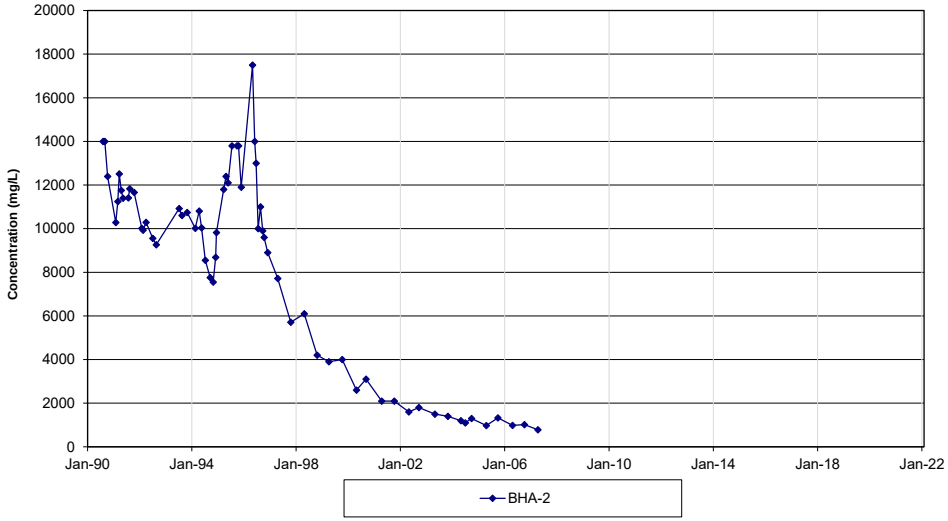
FIGURE C-3

GROUNDWATER TIME CONCENTRATION GRAPHS - CONDUCTIVITY

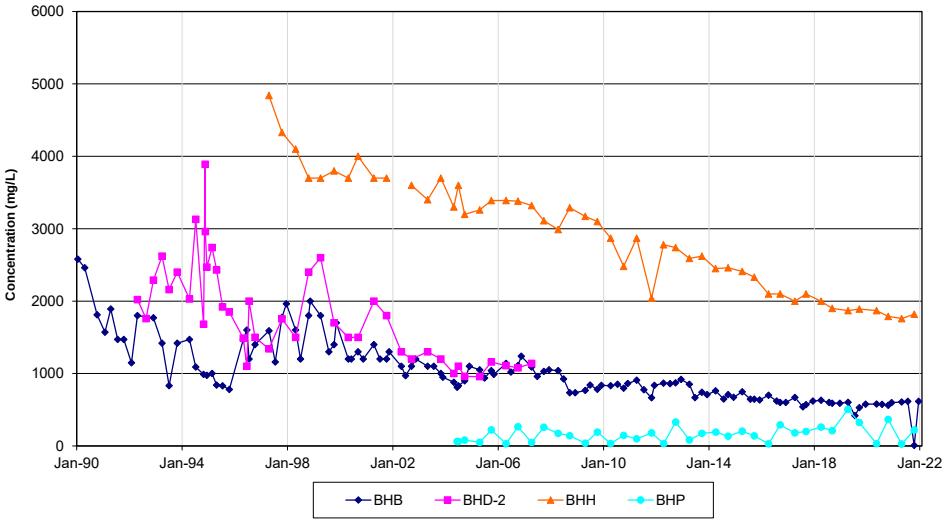
Northwest Boreholes BHE-2, BHK, BHL, BHM



Former Refuse Monitor BHA-2



Southeast Boreholes BHB, BHD-2, BHH, BHP



Downgradient Borehole BHC & Crossgradient Borehole BHQ

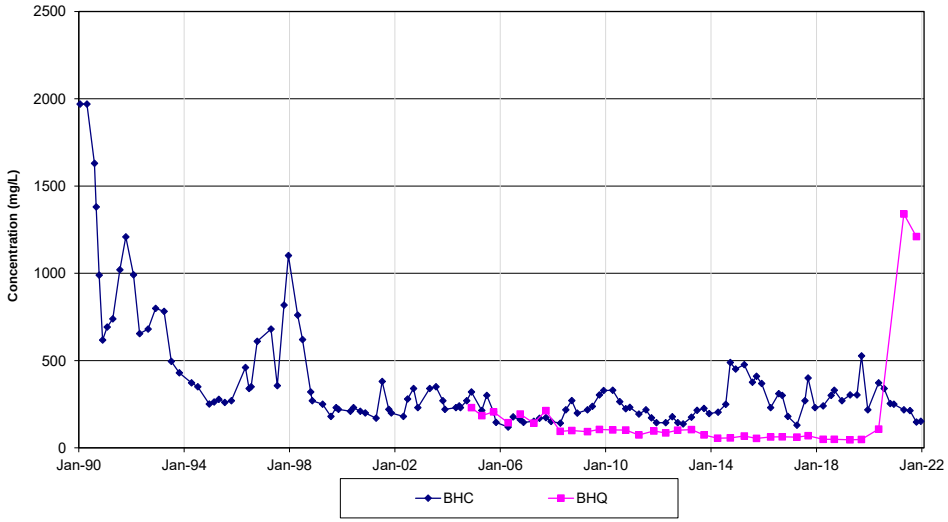
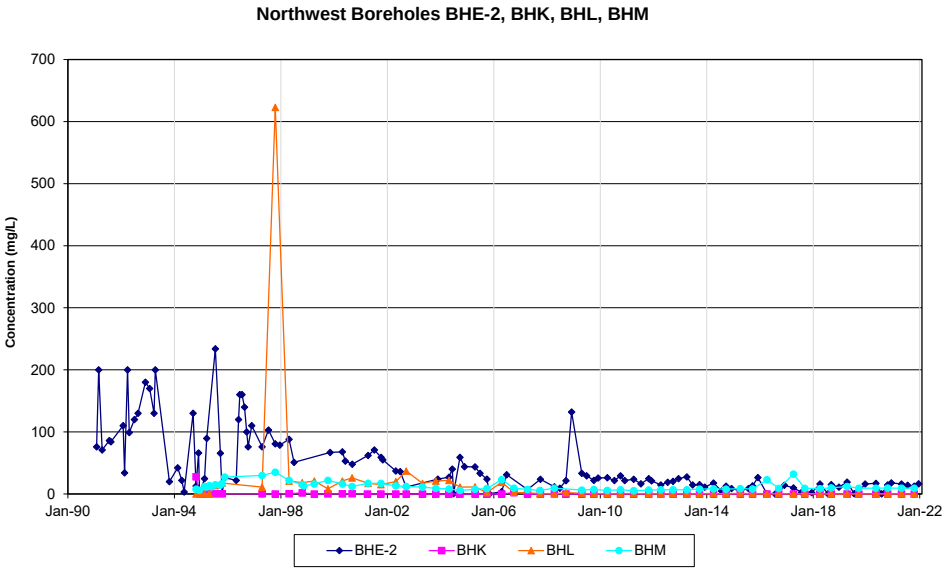
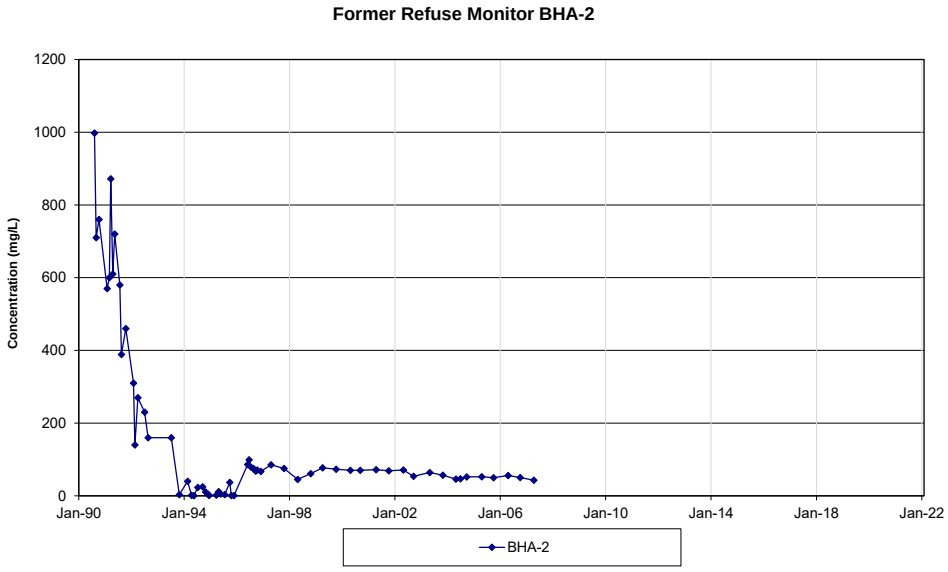
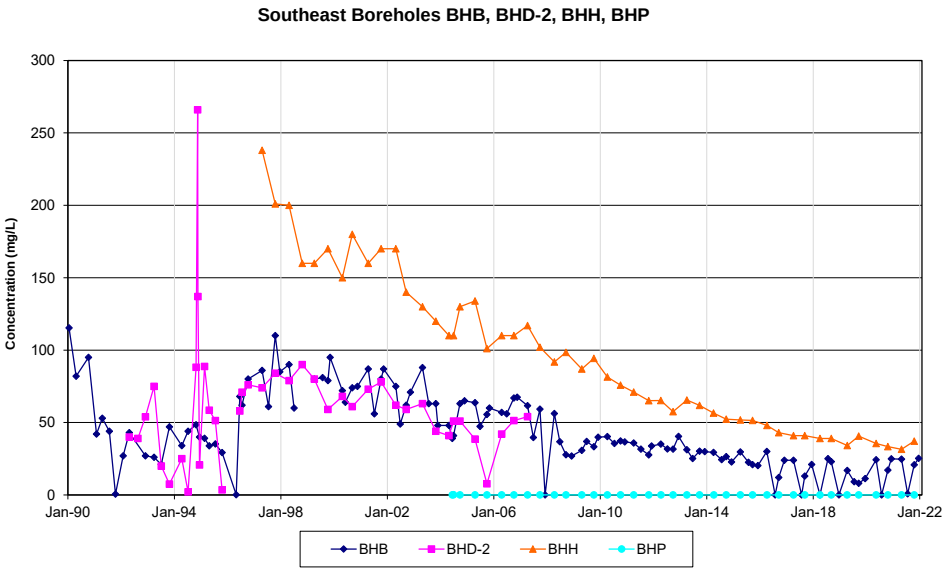


FIGURE C-4
GROUNDWATER TIME CONCENTRATION GRAPHS - IRON







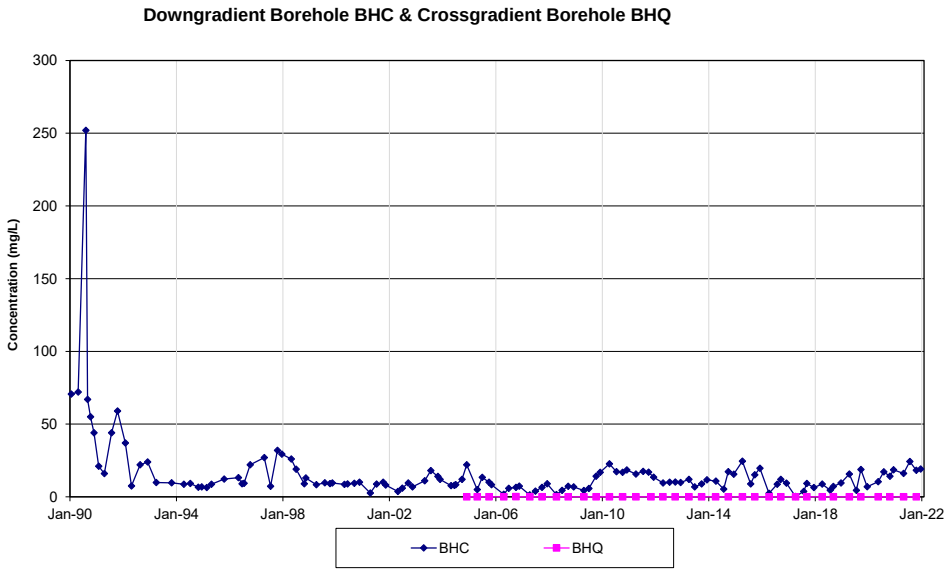
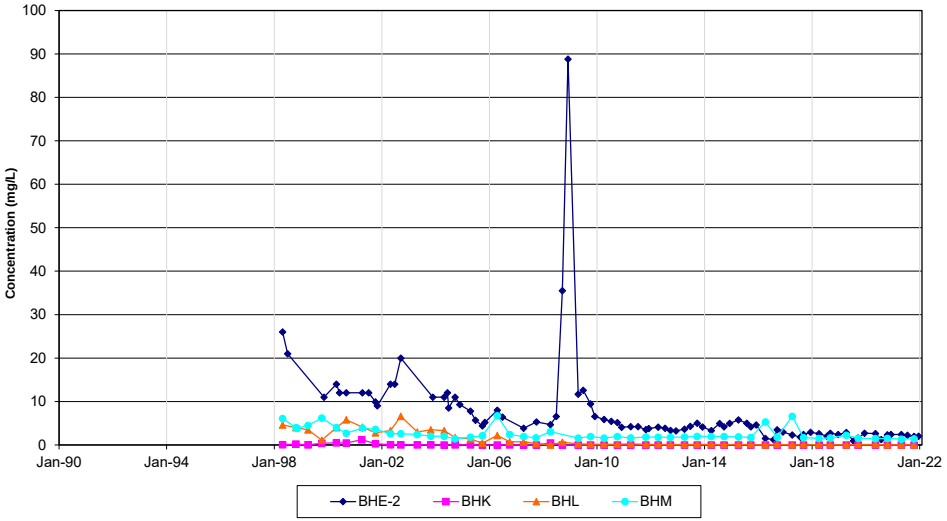


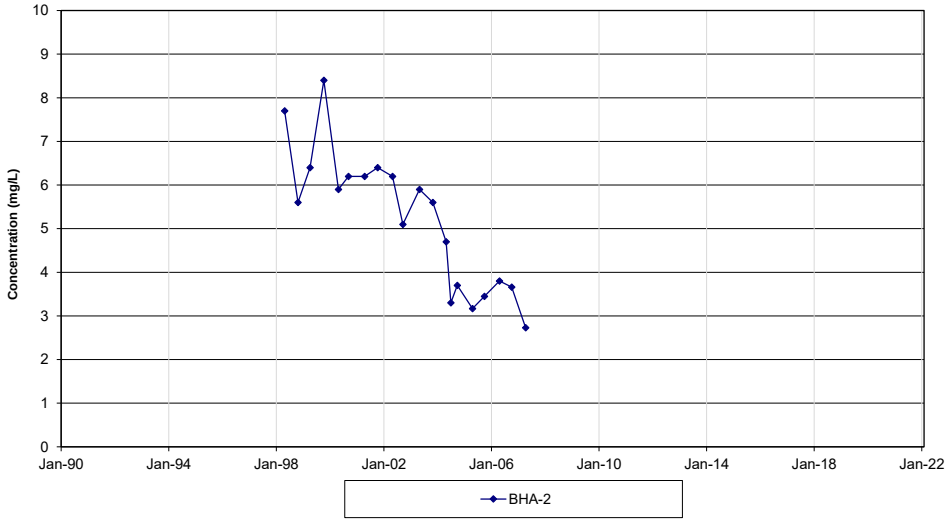
FIGURE C-5

GROUNDWATER TIME CONCENTRATION GRAPHS - MANGANESE

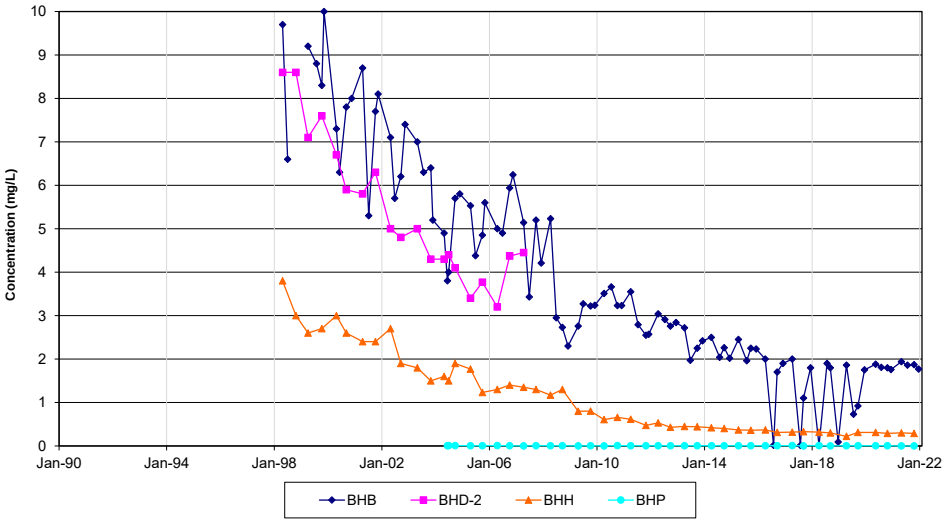
Northwest Boreholes BHE-2, BHK, BHL, BHM



Former Refuse Monitor BHA-2



Southeast Boreholes BHB, BHD-2, BHH, BHP



Downgradient Borehole BHC & Crossgradient Borehole BHQ

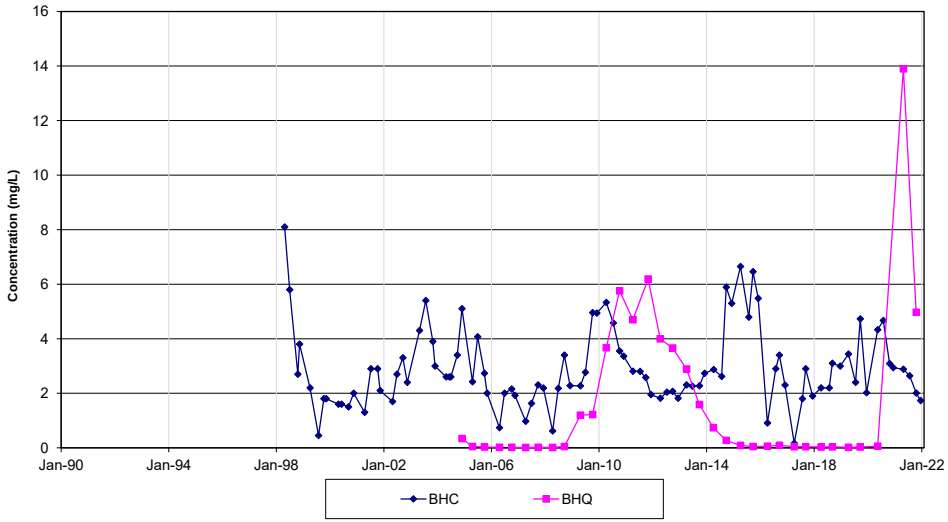
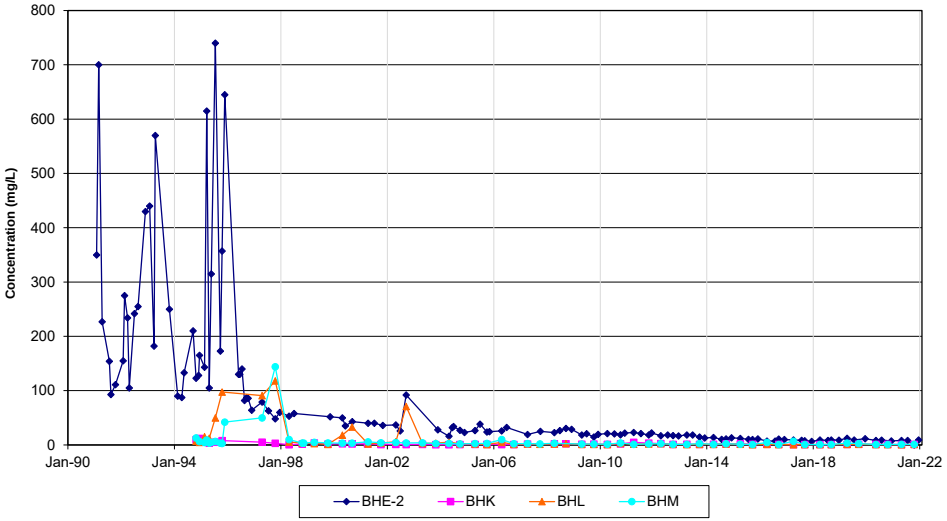


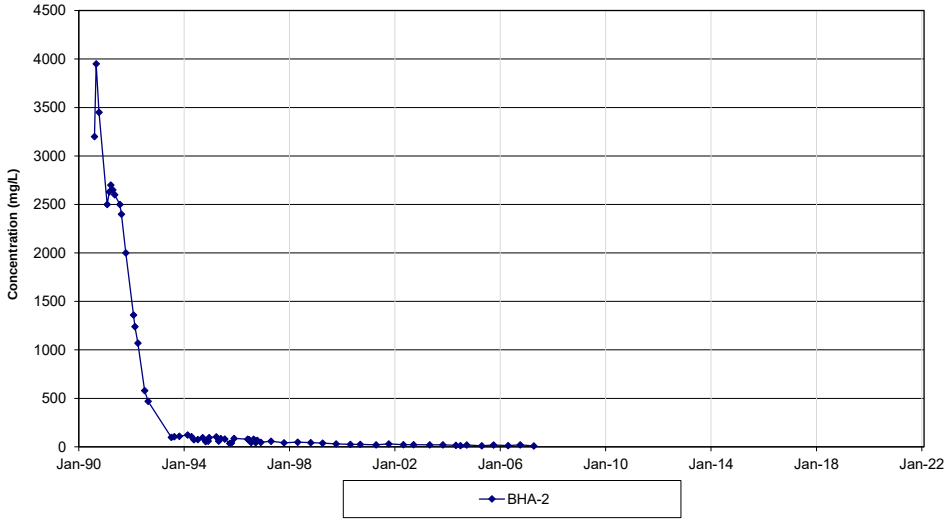
FIGURE C-6

GROUNDWATER TIME CONCENTRATION GRAPHS - DISSOLVED ORGANIC CARBON

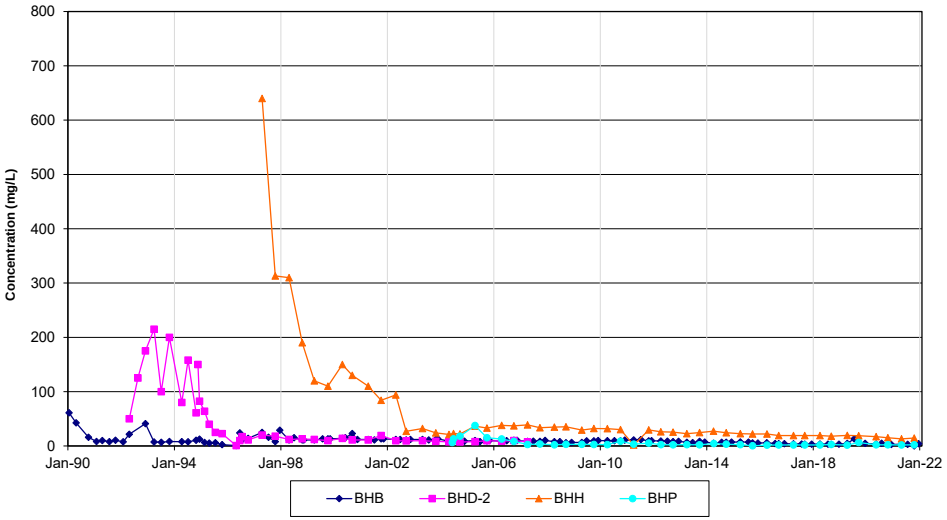
Northwest Boreholes BHE-2, BHK, BHL, BHM



Former Refuse Monitor BHA-2



Southeast Boreholes BHB, BHD-2, BHH, BHP



Downgradient Borehole BHC & Crossgradient Boreholes BHQ

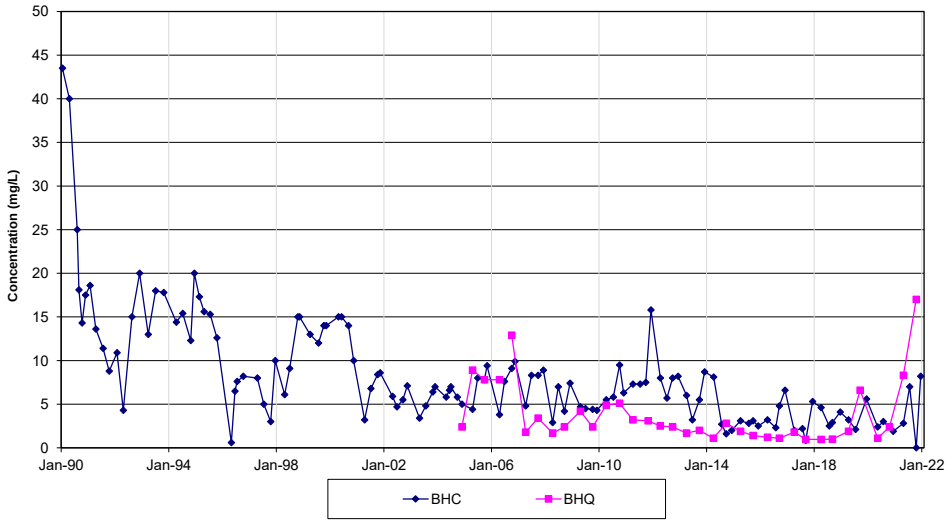
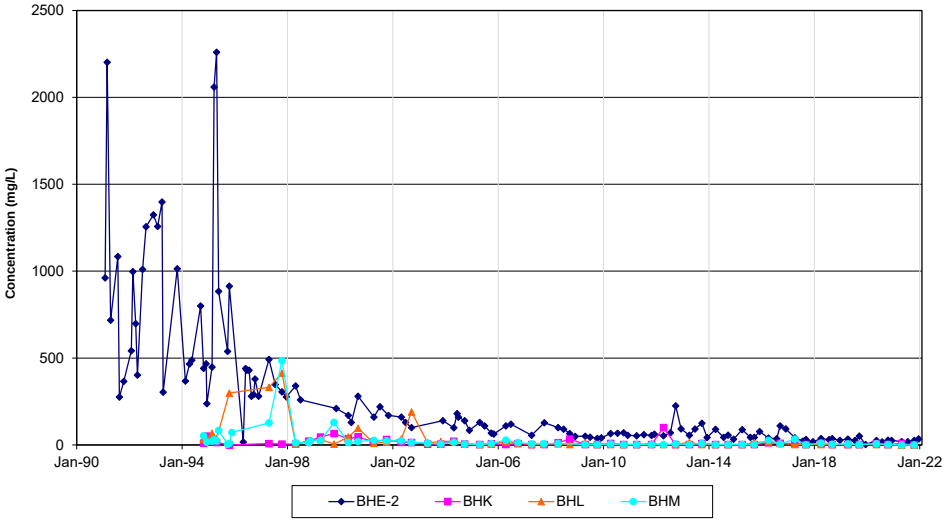


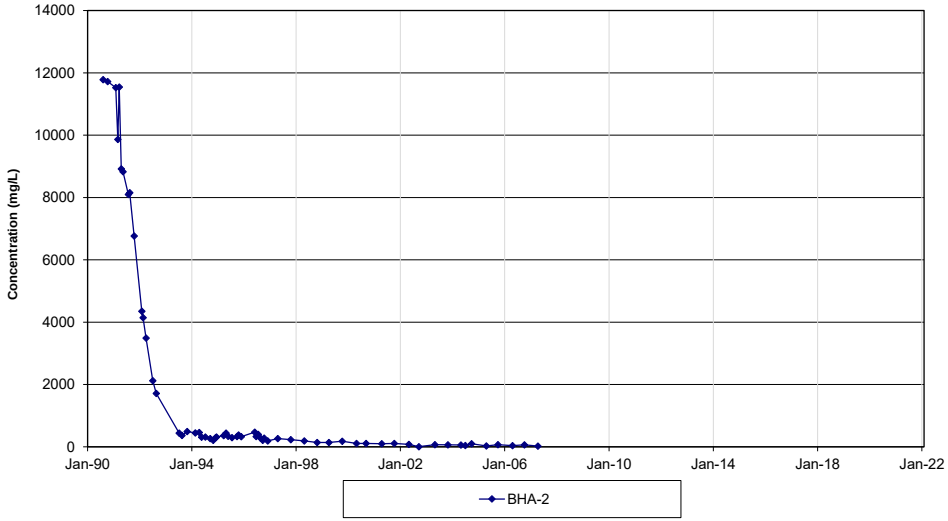
FIGURE C-7

GROUNDWATER TIME CONCENTRATION GRAPHS - CHEMICAL OXYGEN DEMAND

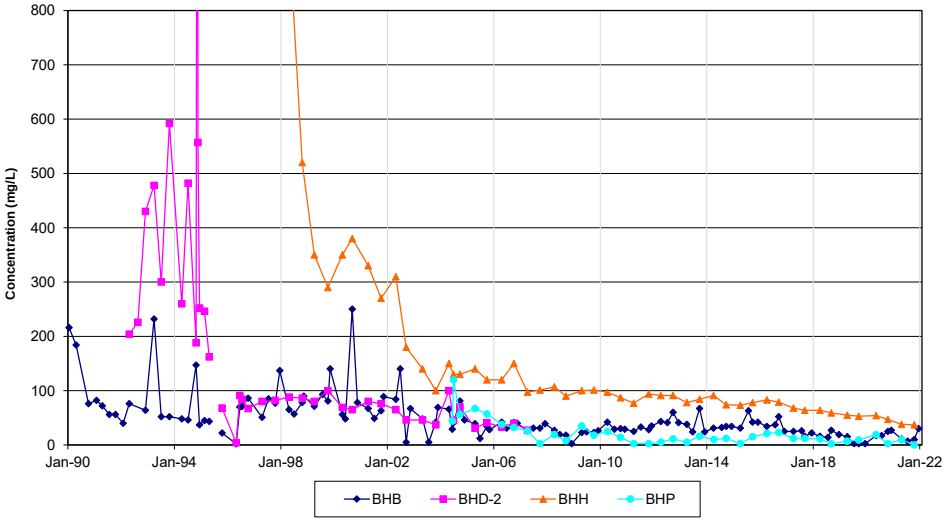
Northwest Boreholes BHE-2, BHK, BHL, BHM



Former Refuse Monitor BHA-2



Southeast Boreholes BHB, BHD-2, BHH, BHP



Downgradient Borehole BHC & Crossgradient Boreholes BHQ

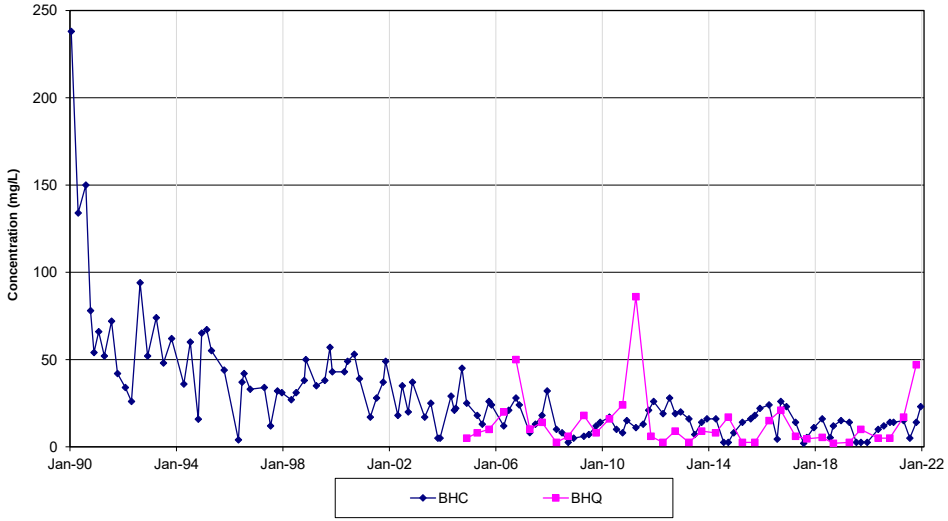
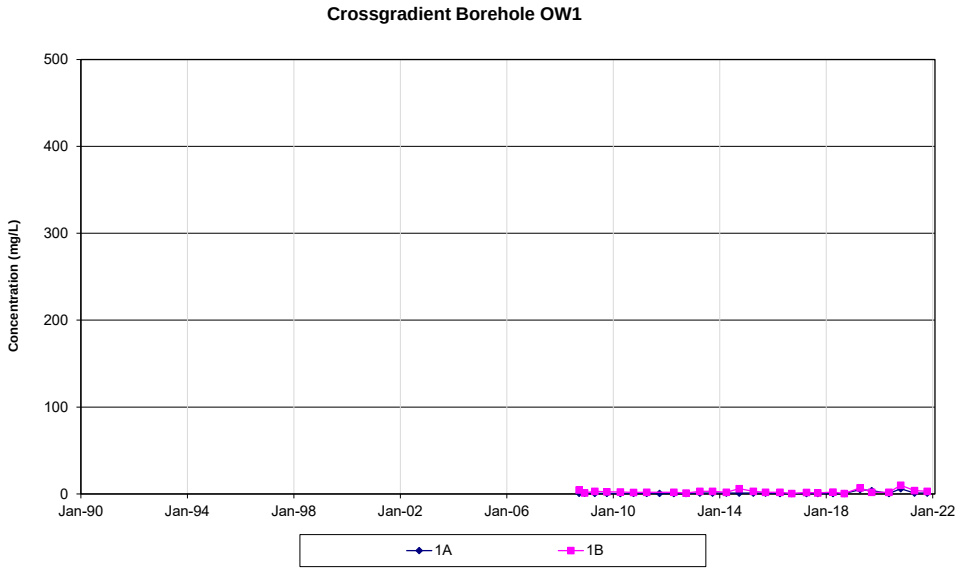
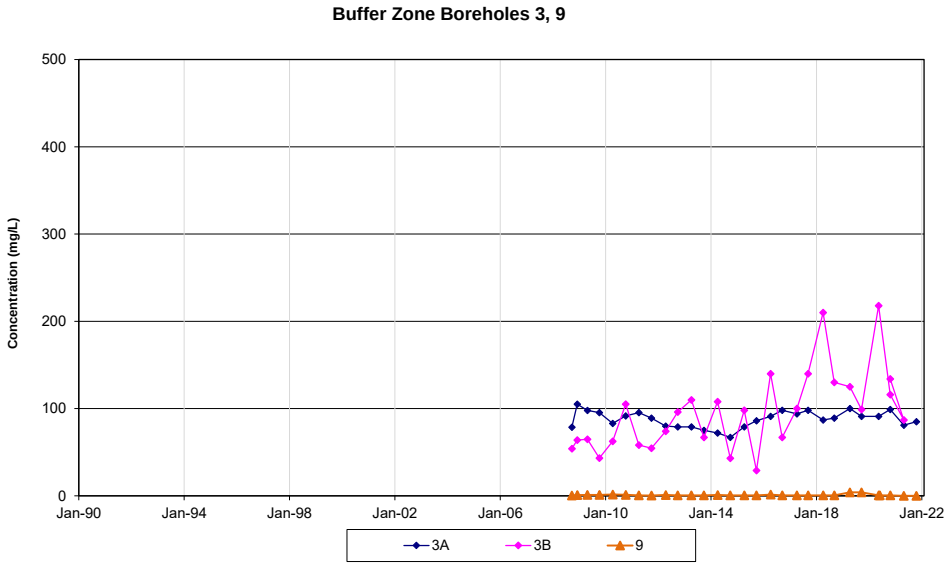
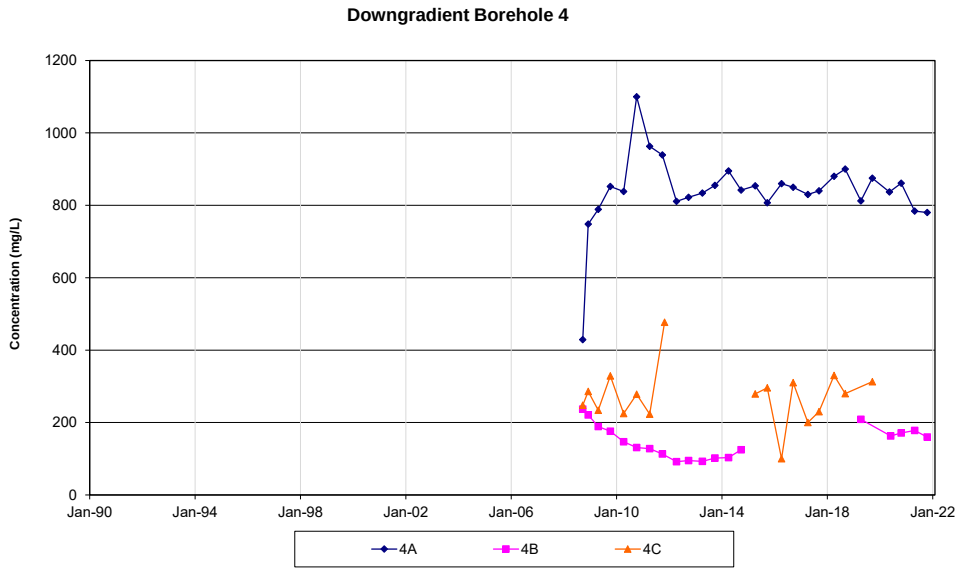


FIGURE C-8
GROUNDWATER TIME CONCENTRATION GRAPHS - CHLORIDE







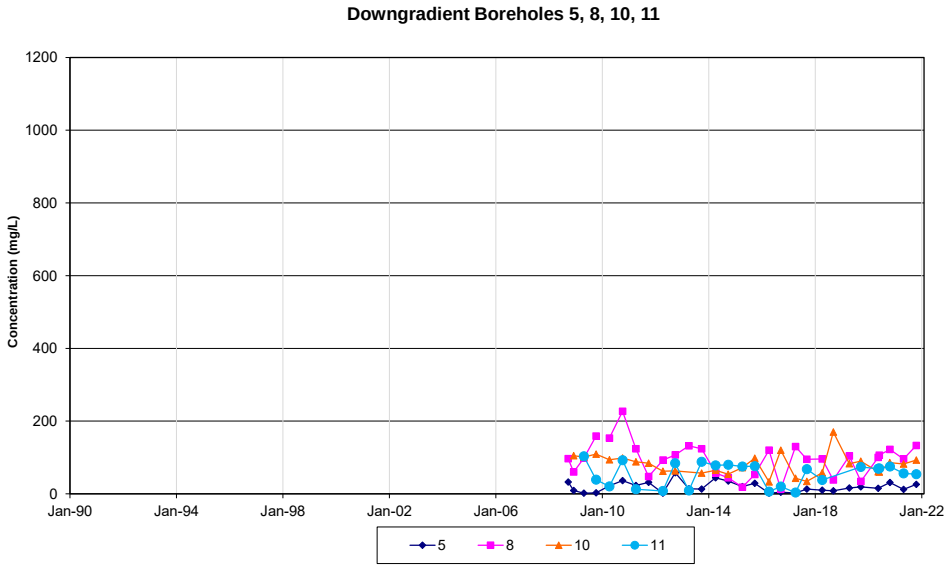
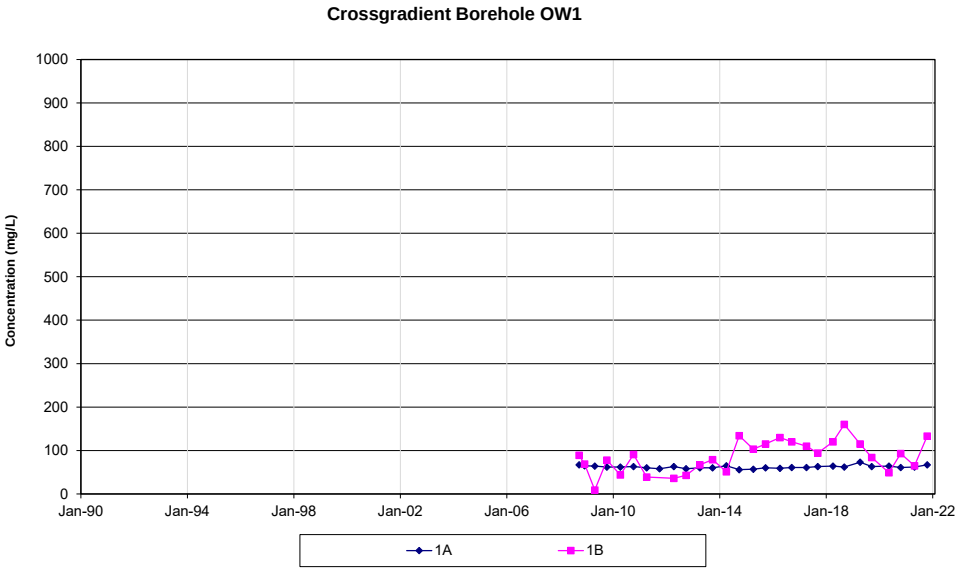
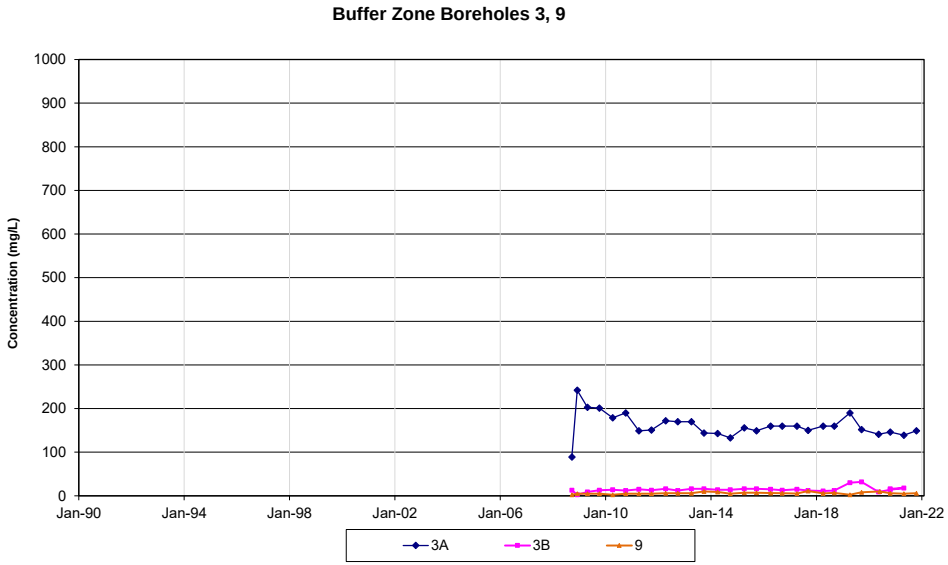
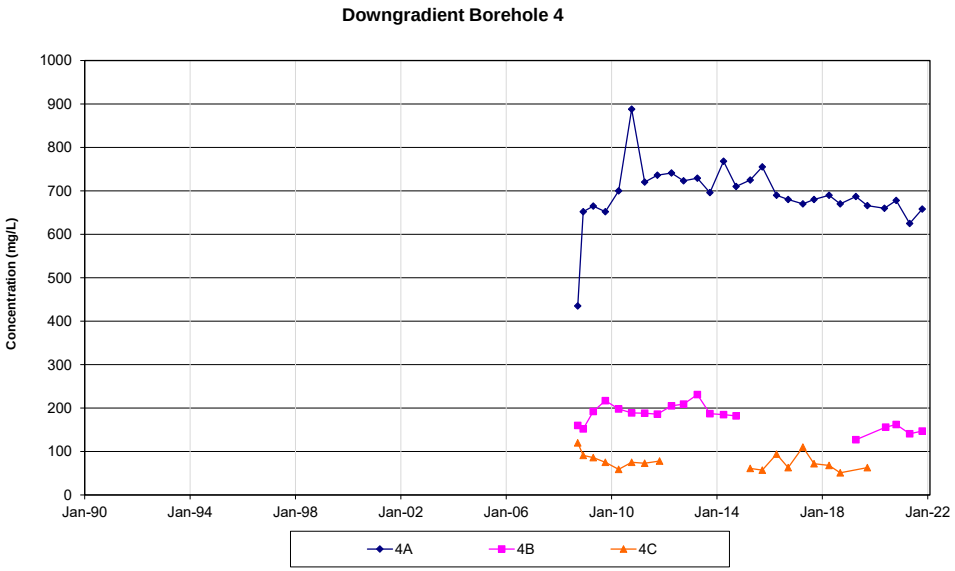


FIGURE C-9

GROUNDWATER TIME CONCENTRATION GRAPHS - ALKALINITY







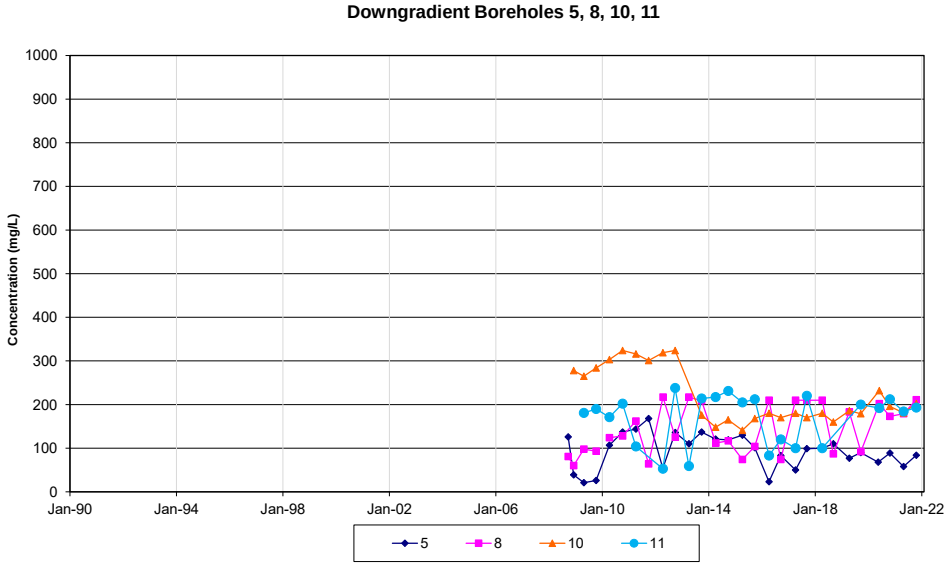
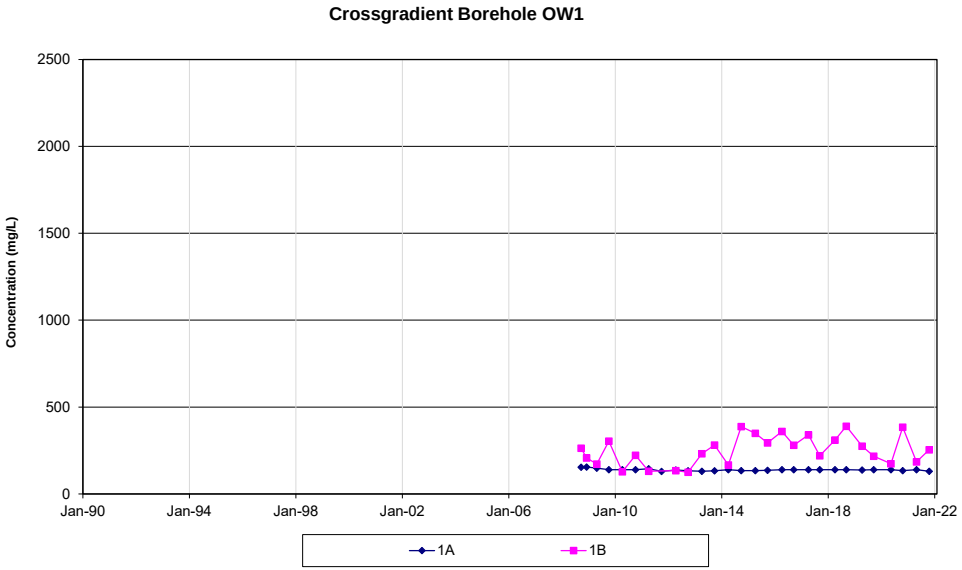
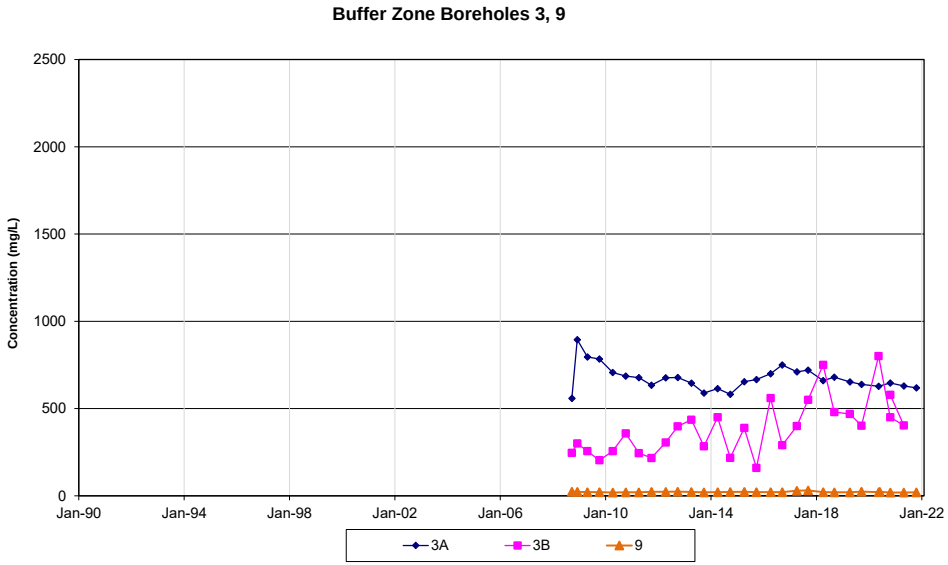
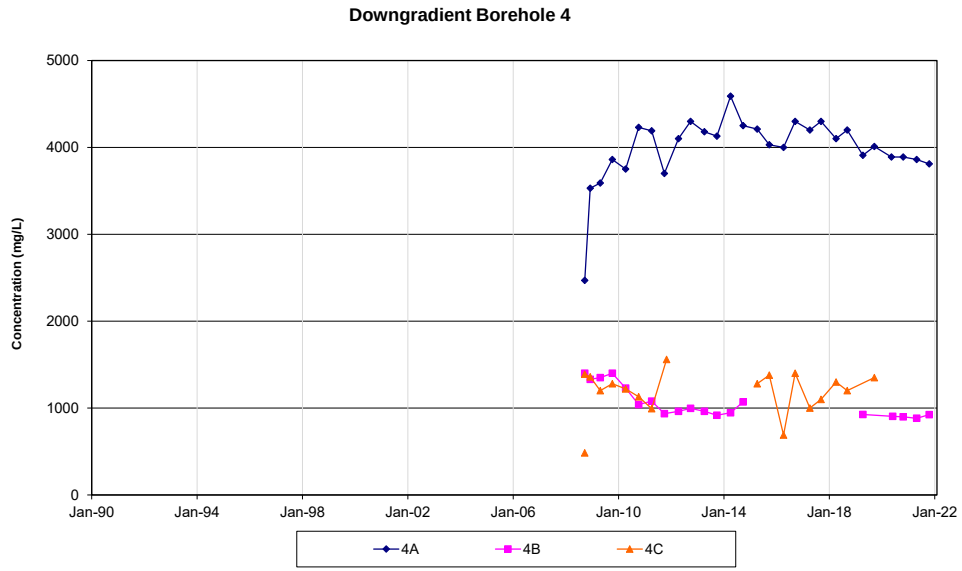


FIGURE C-10

GROUNDWATER TIME CONCENTRATION GRAPHS - CONDUCTIVITY







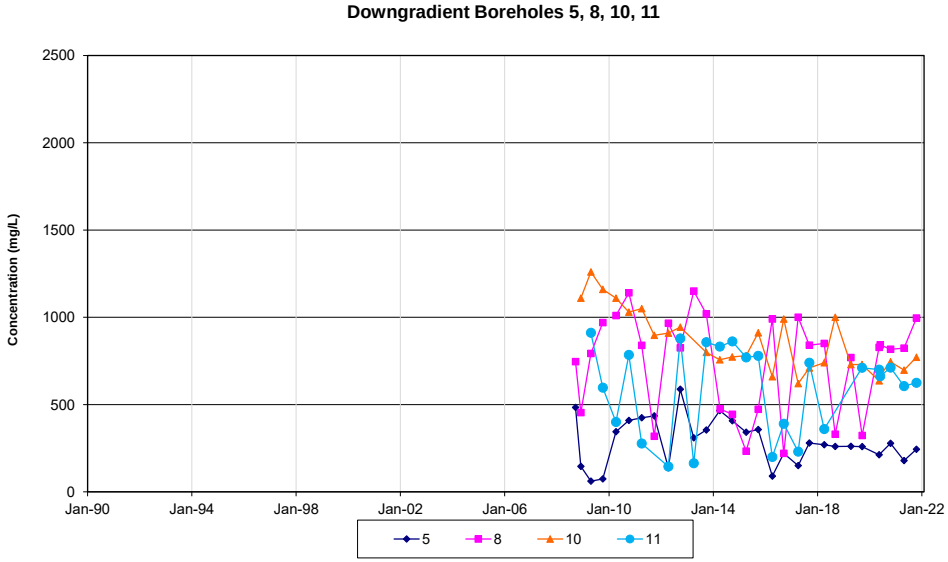
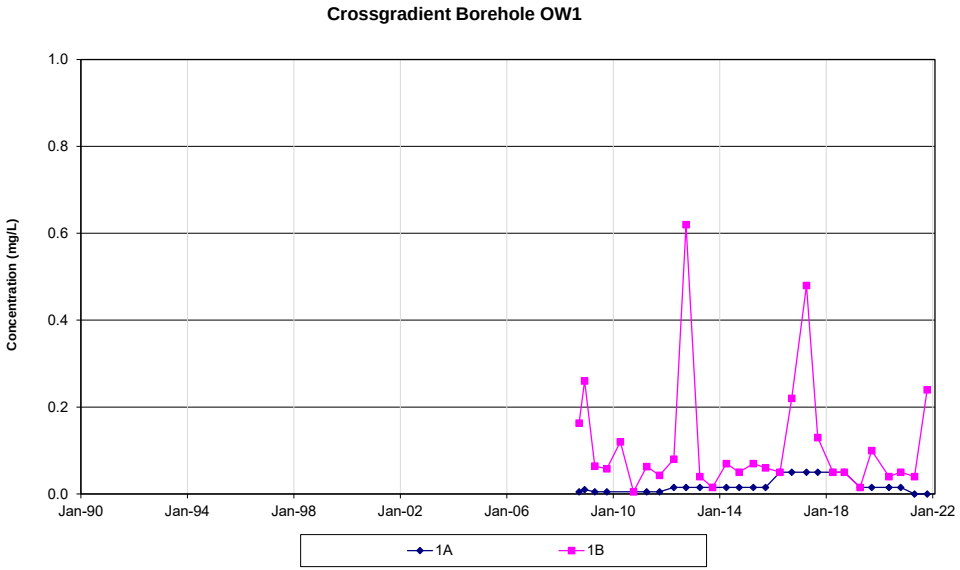
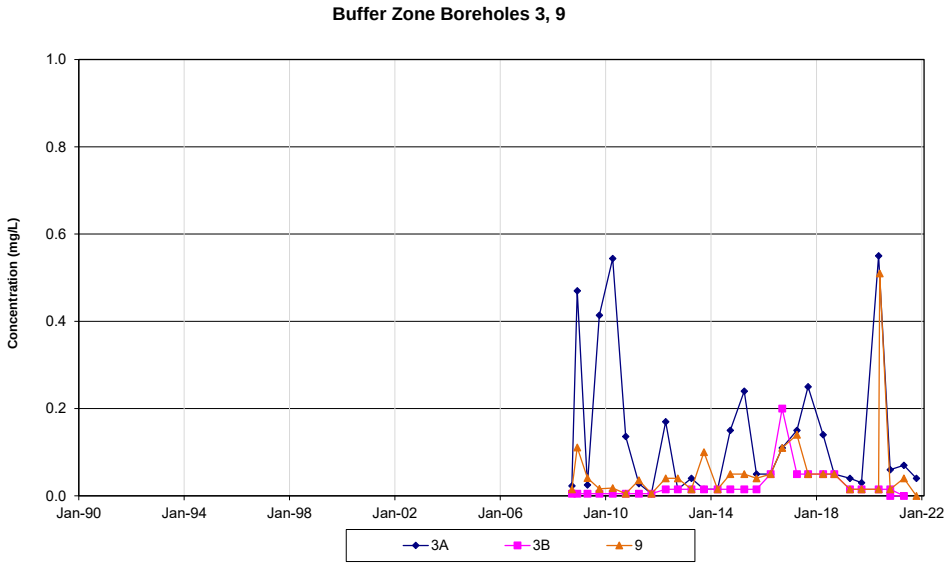
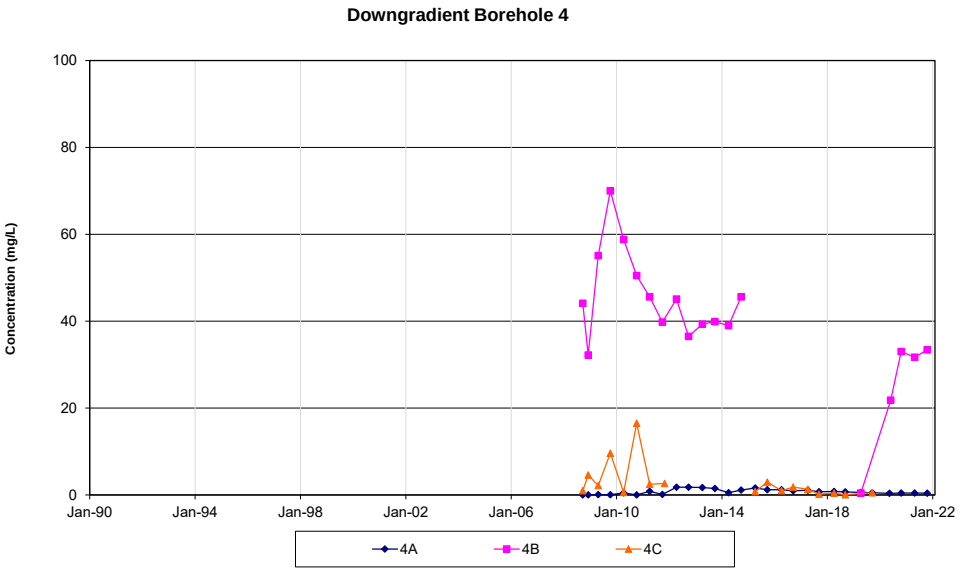


FIGURE C-11
GROUNDWATER TIME CONCENTRATION GRAPHS - IRON







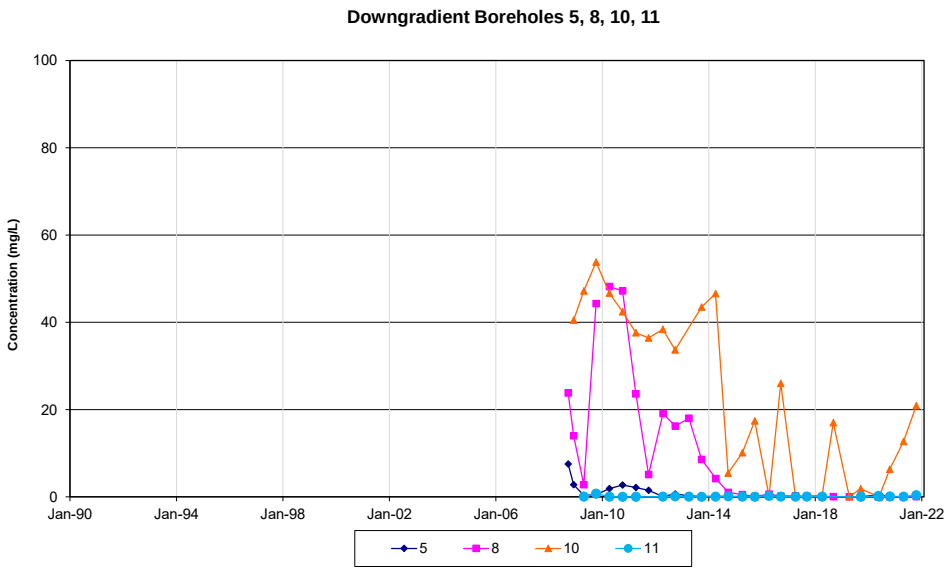
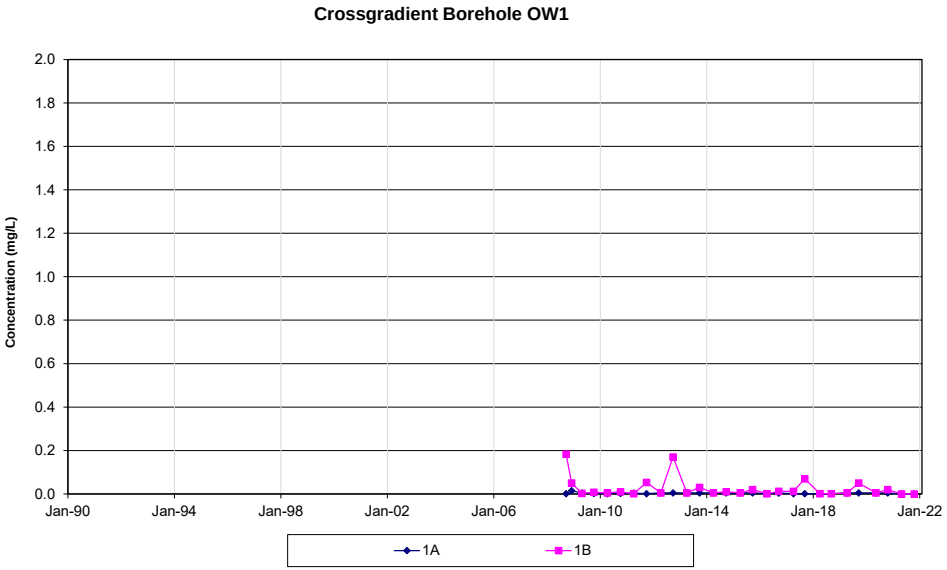
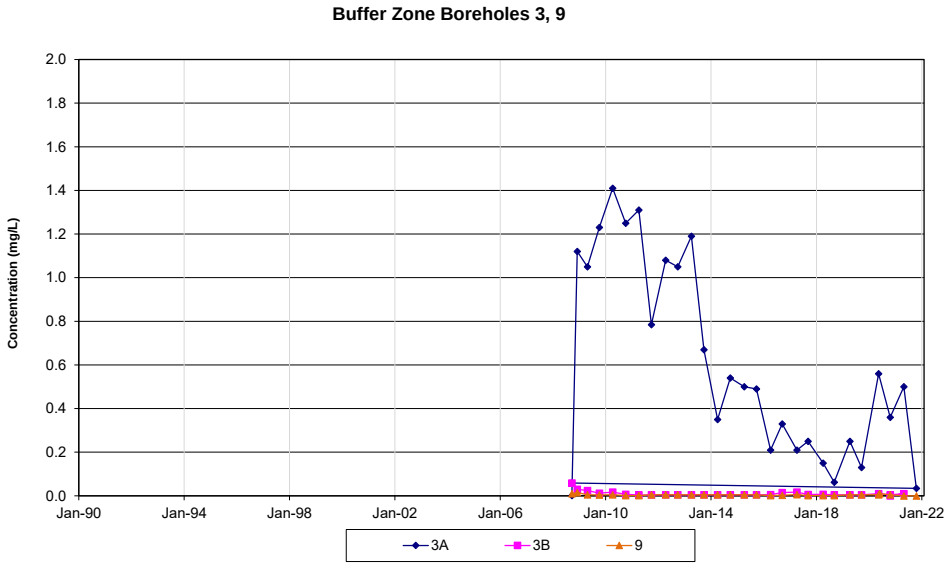
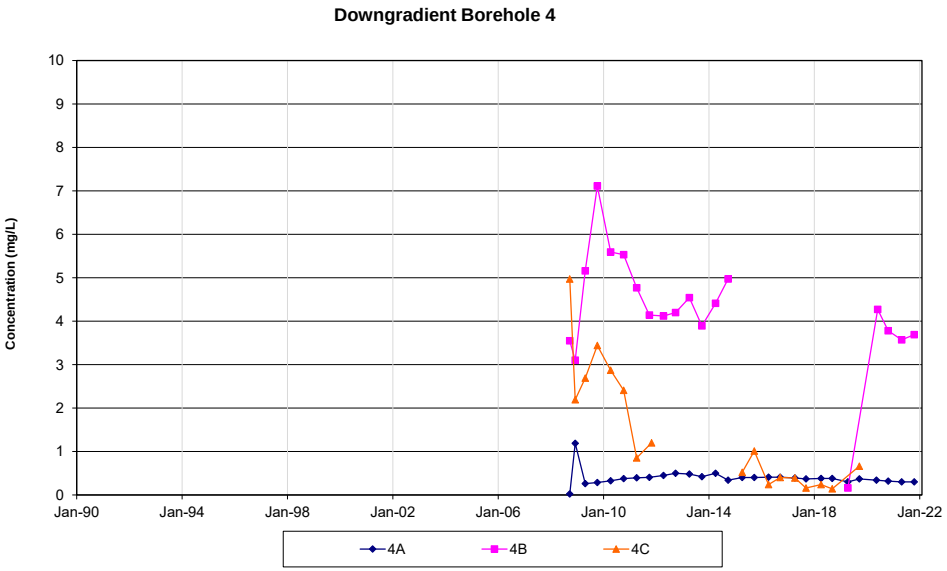


FIGURE C-12

GROUNDWATER TIME CONCENTRATION GRAPHS - MANGANESE







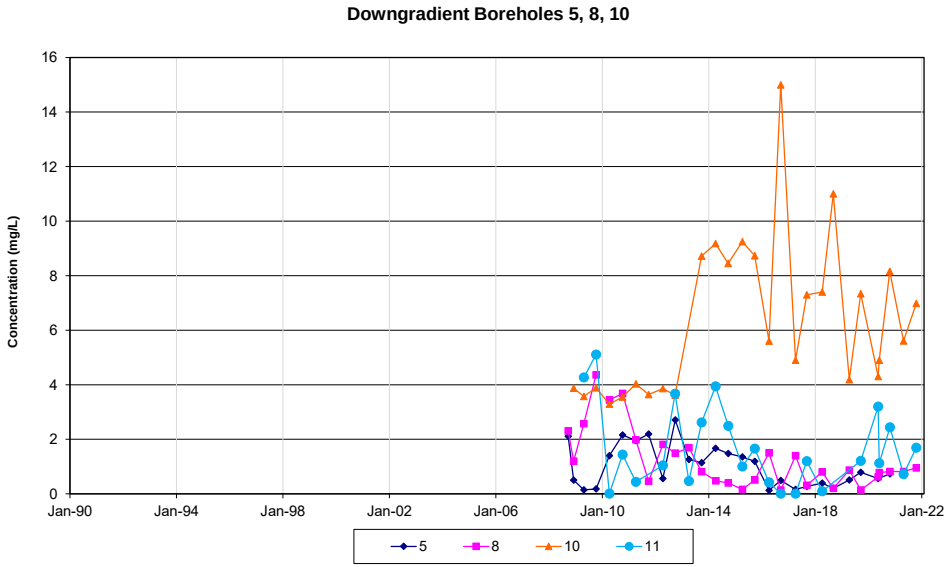
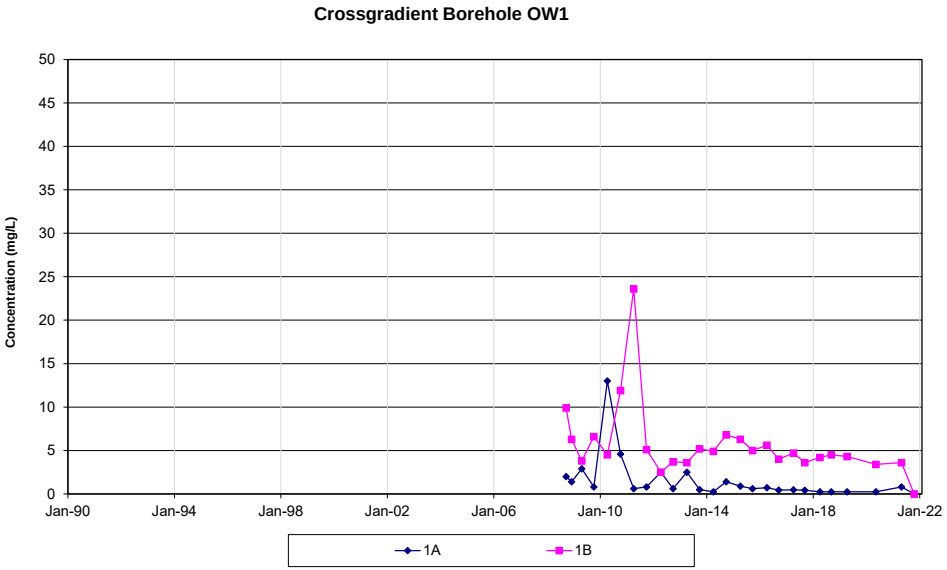
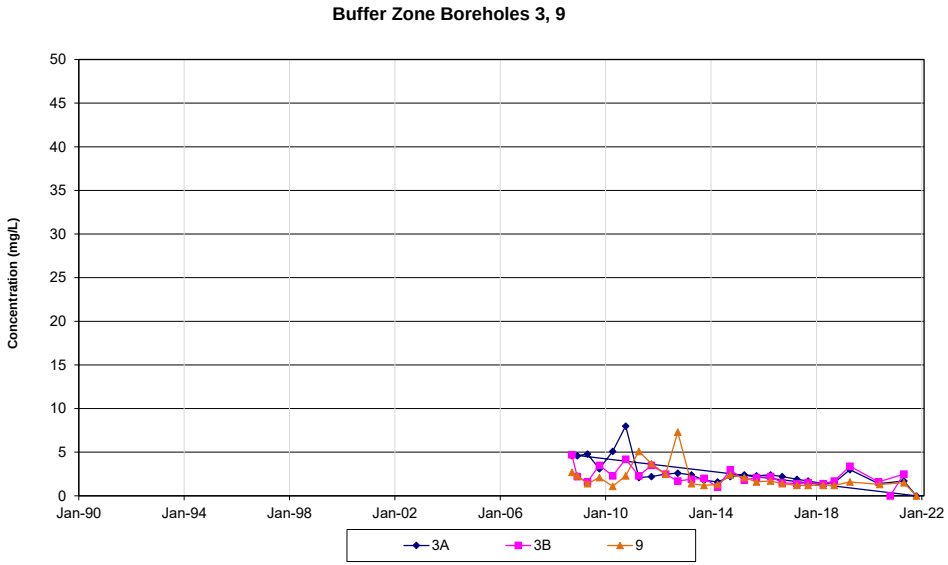
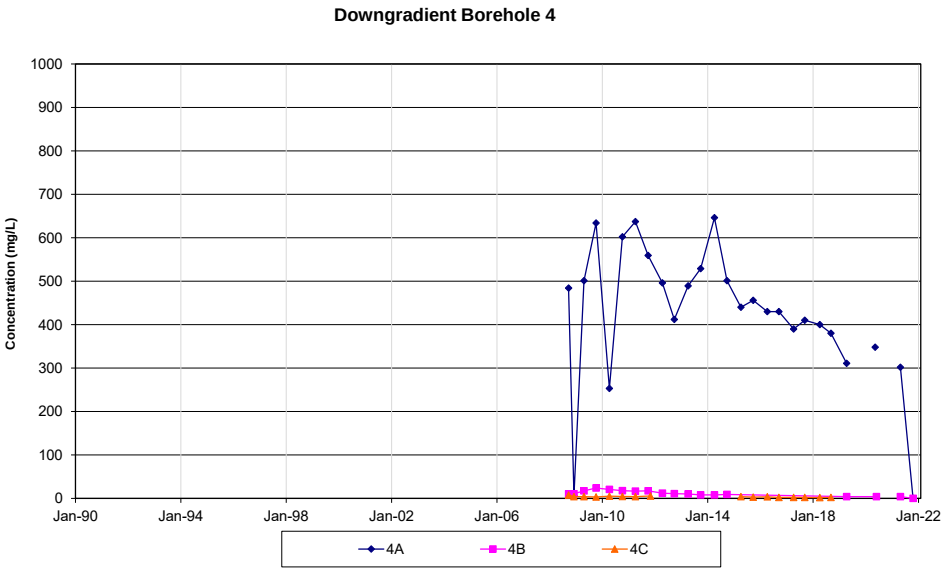


FIGURE C-13

GROUNDWATER TIME CONCENTRATION GRAPHS - DISSOLVED ORGANIC CARBON







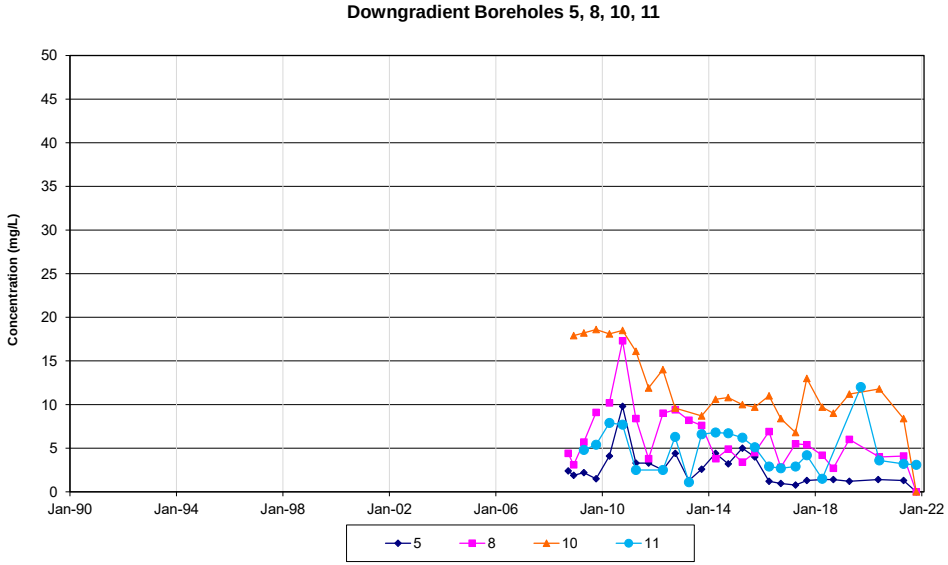
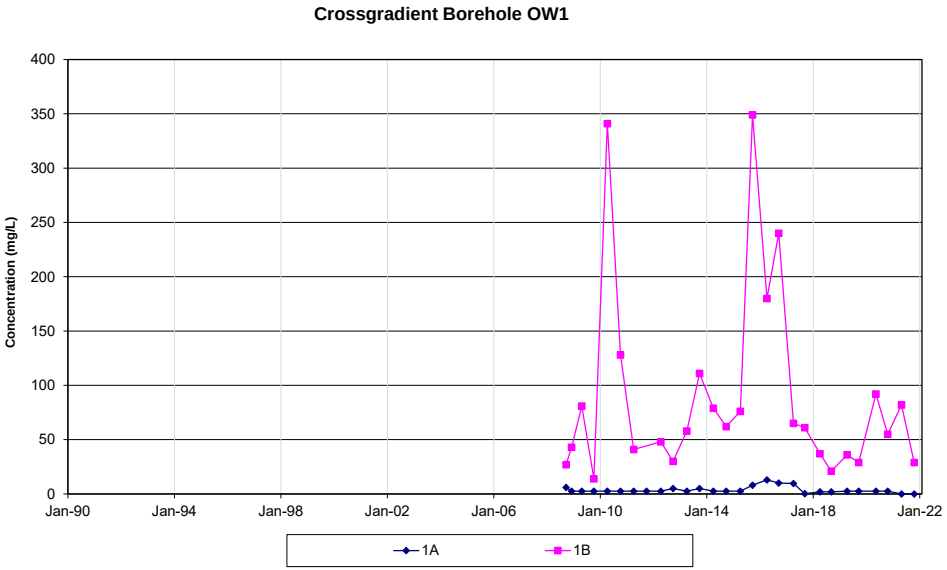
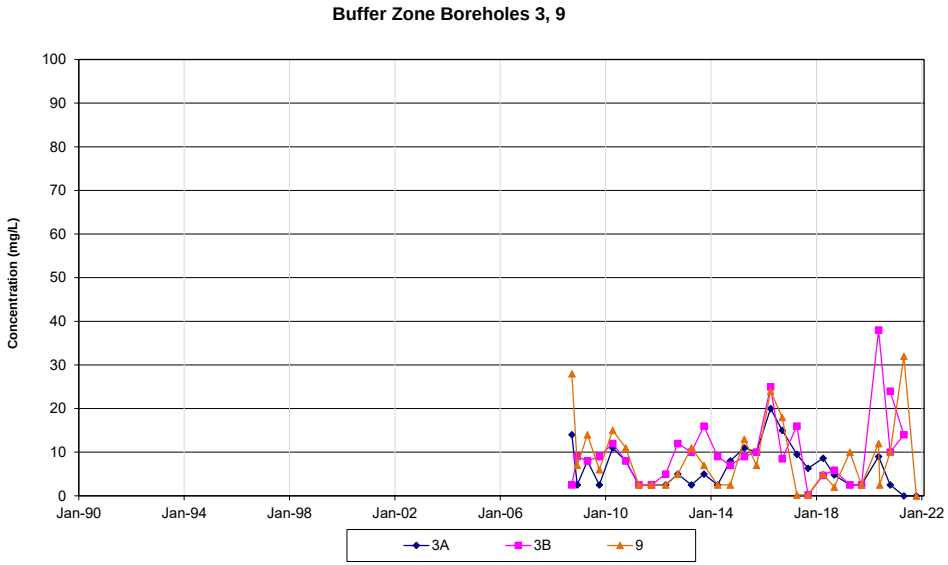
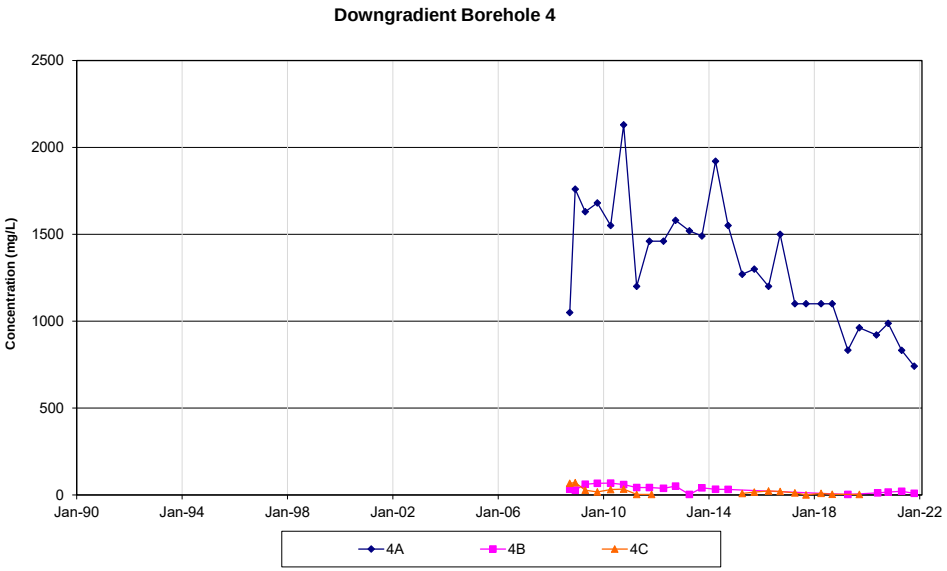


FIGURE C-14

GROUNDWATER TIME CONCENTRATION GRAPHS - CHEMICAL OXYGEN DEMAND







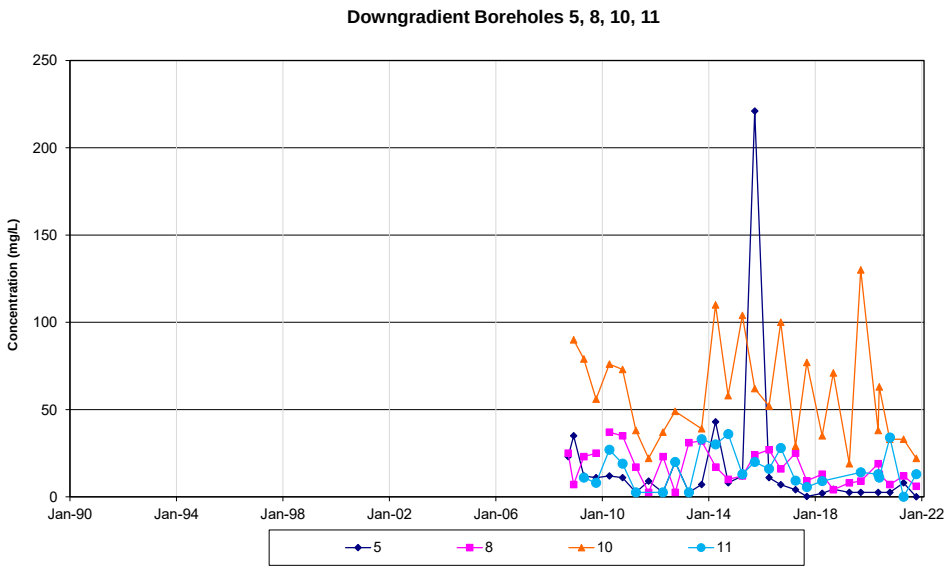
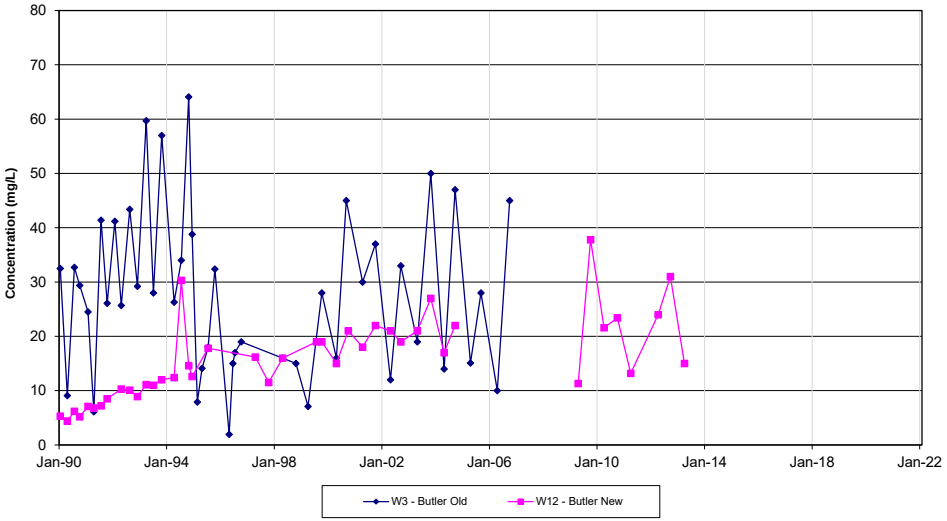


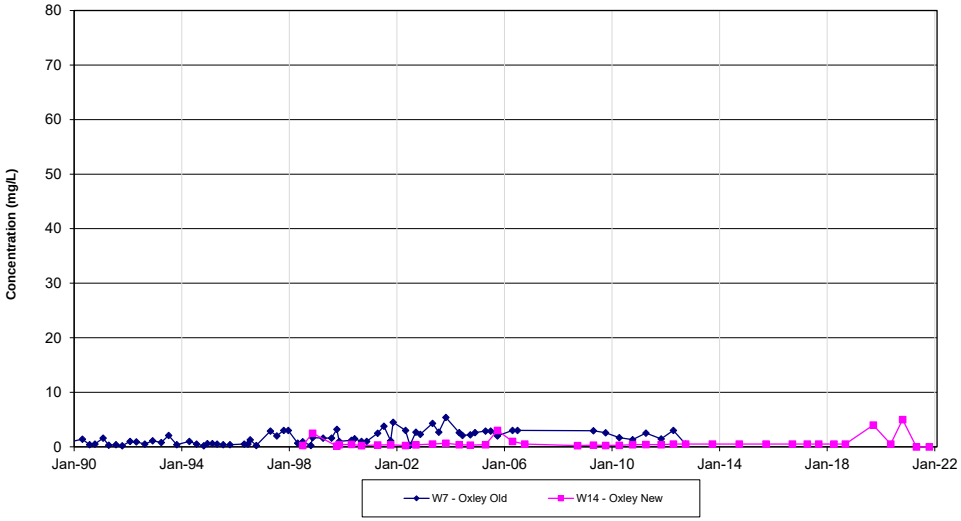
FIGURE C-15

GROUNDWATER TIME CONCENTRATION GRAPHS - CHLORIDE

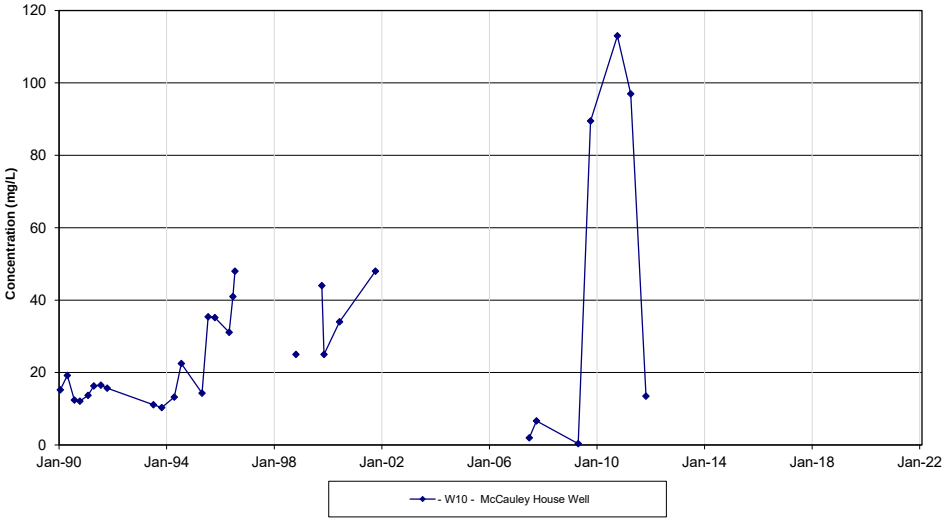
Butler Wells



Oxley Wells



McCauley Well



Well W11

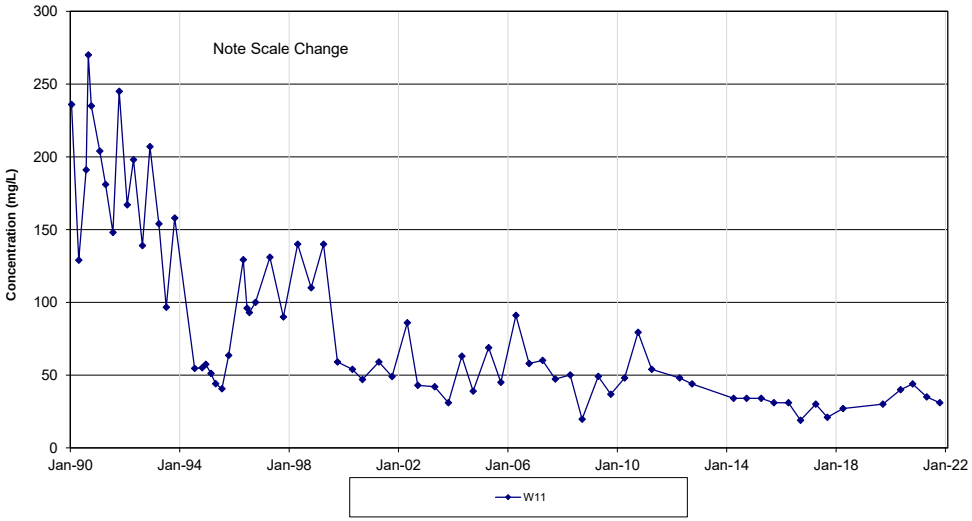
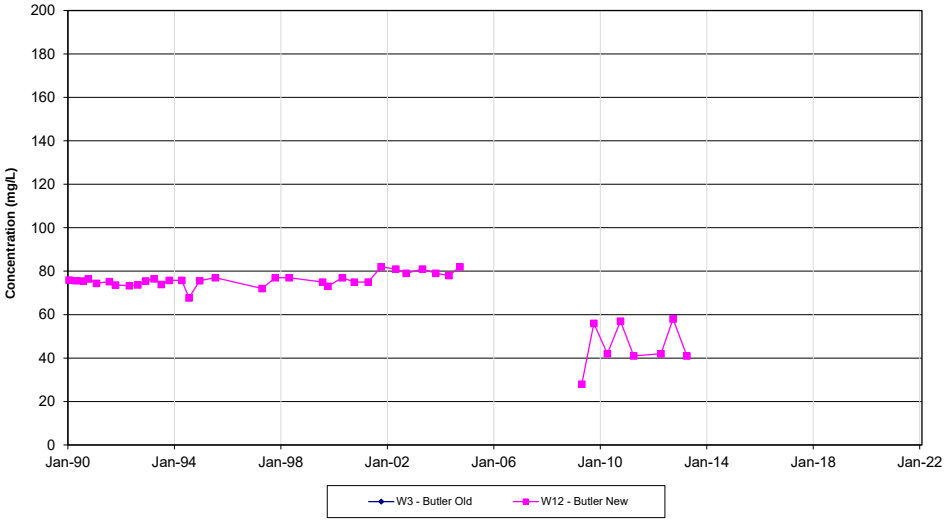


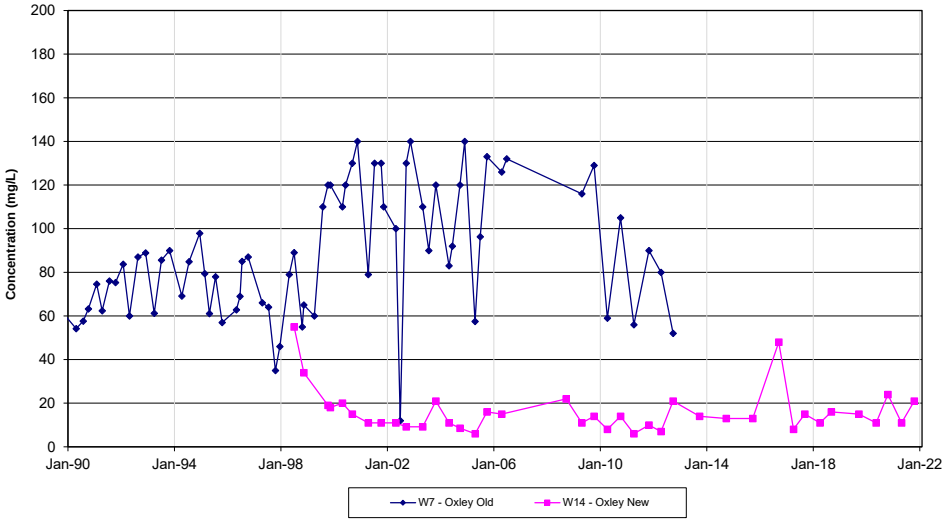
FIGURE C-16

GROUNDWATER TIME CONCENTRATION GRAPHS - ALKALINITY

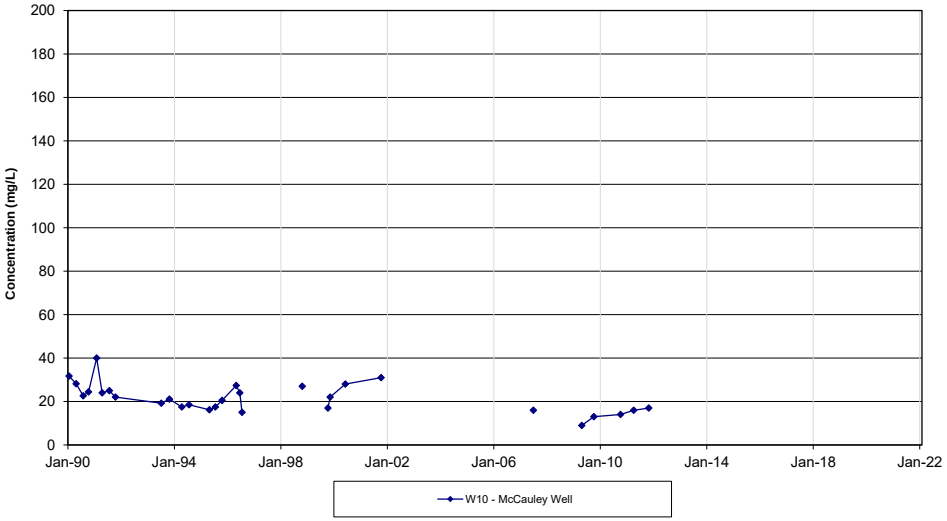
Butler Wells



Oxley Wells



McCauley Well



Well W11

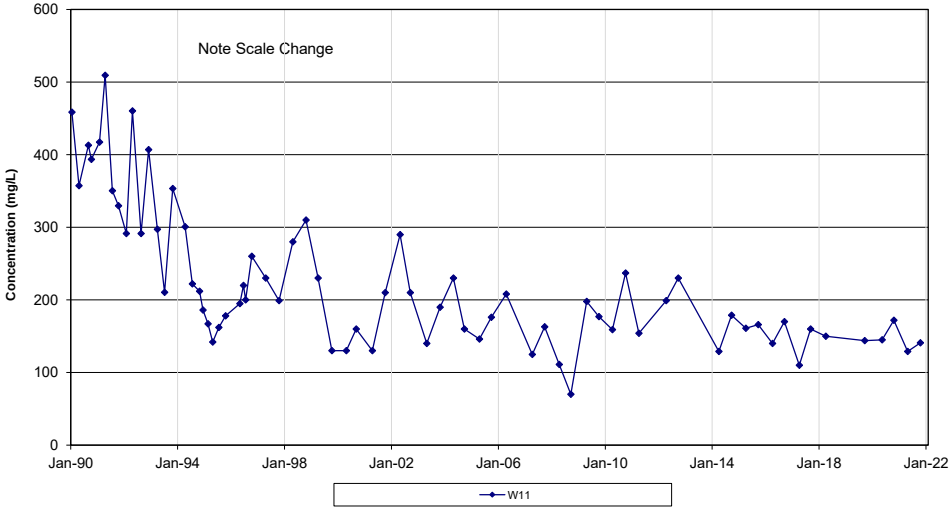
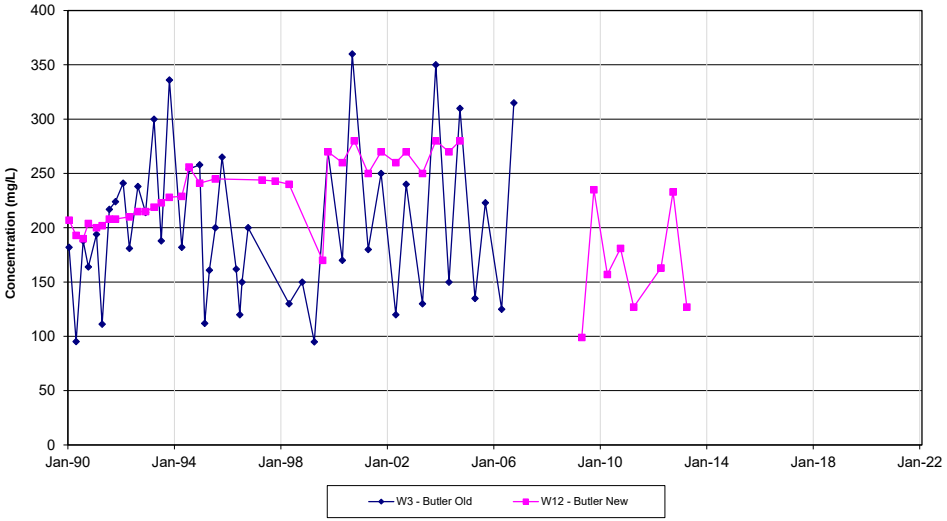


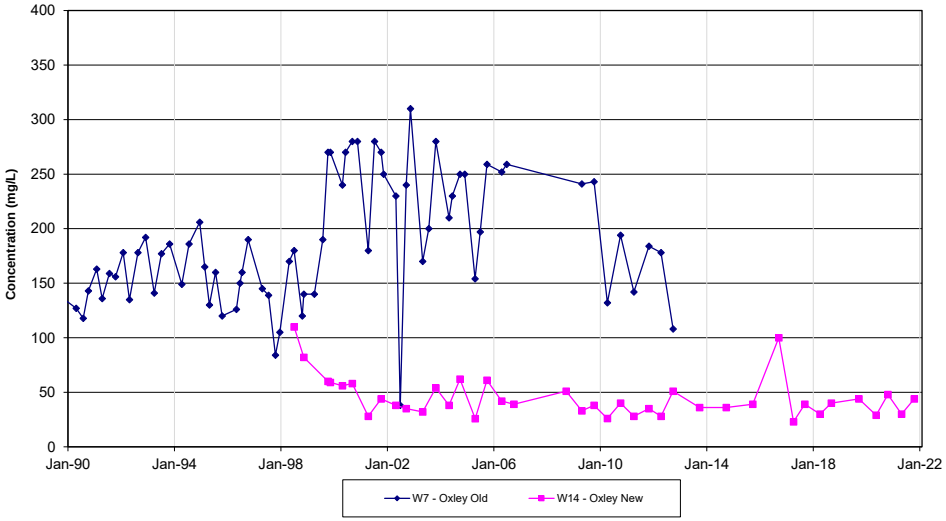
FIGURE C-17

GROUNDWATER TIME CONCENTRATION GRAPHS - CONDUCTIVITY

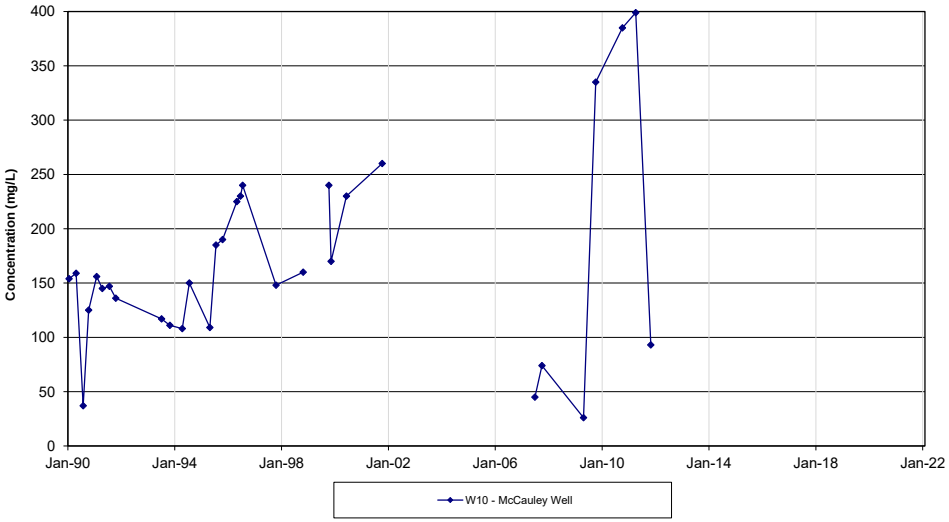
Butler Wells



Oxley Wells



McCauley Well



Well W11

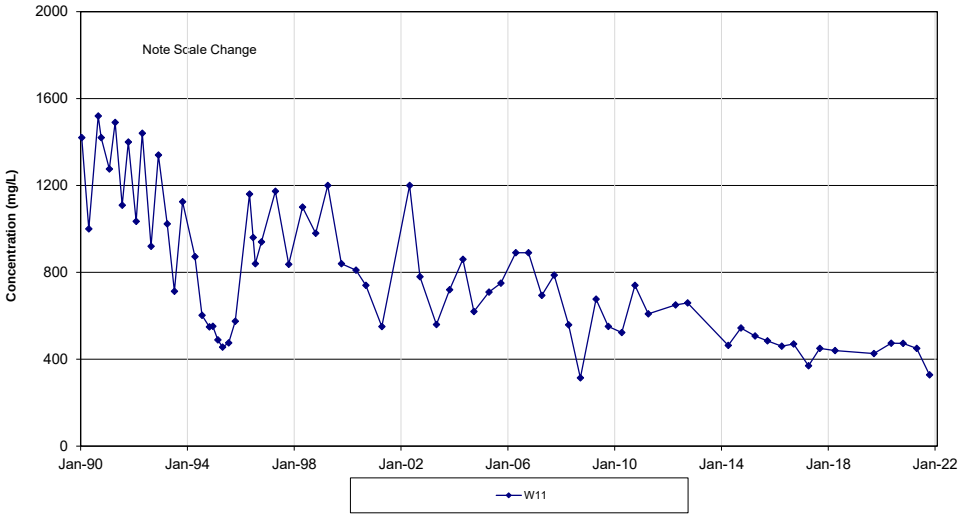
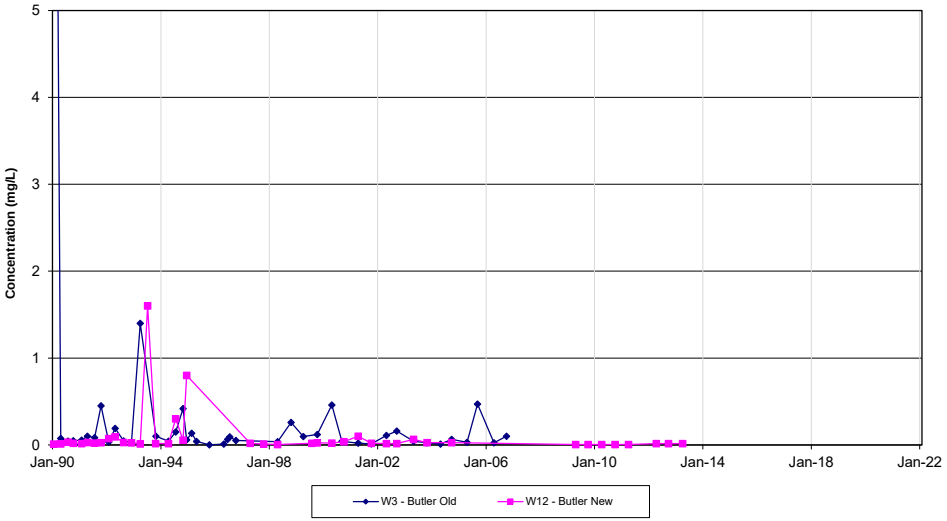


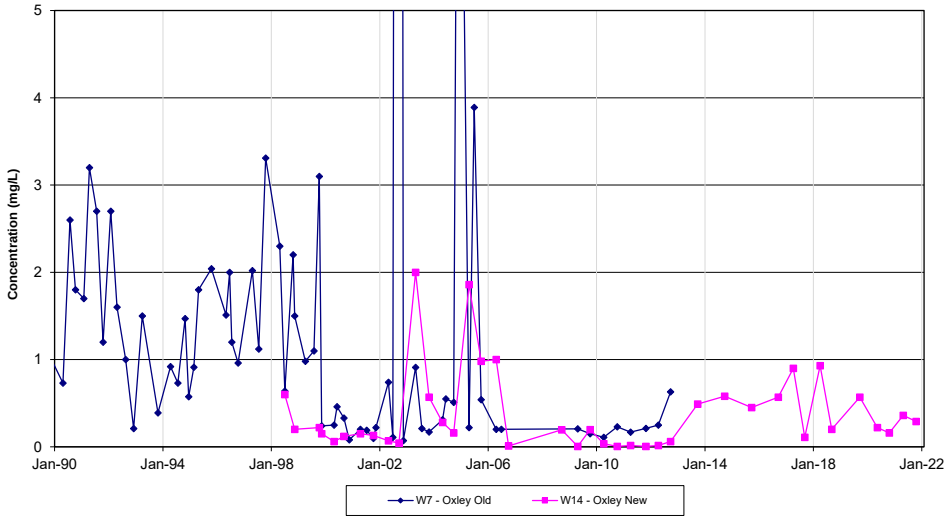
FIGURE C-18

GROUNDWATER TIME CONCENTRATION GRAPHS - IRON

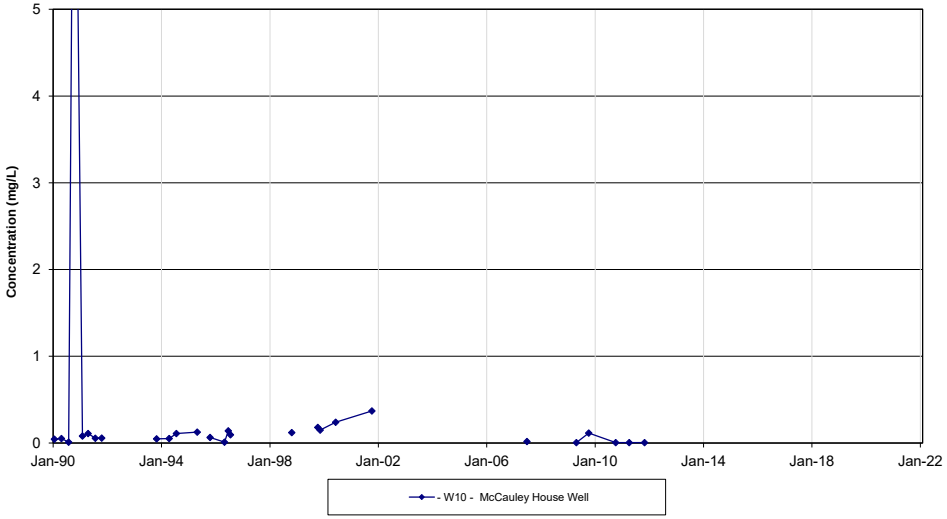
Butler Wells



Oxley Wells



McCauley Well



Well W11

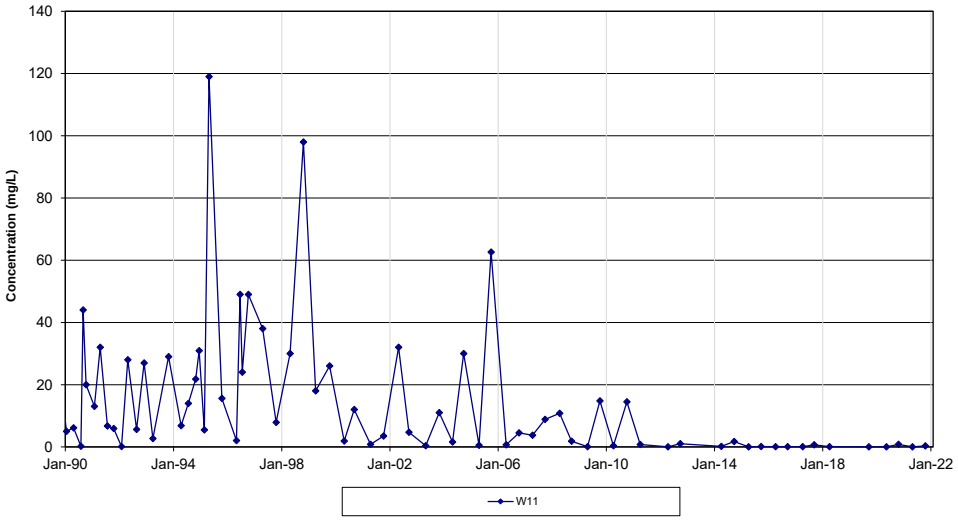
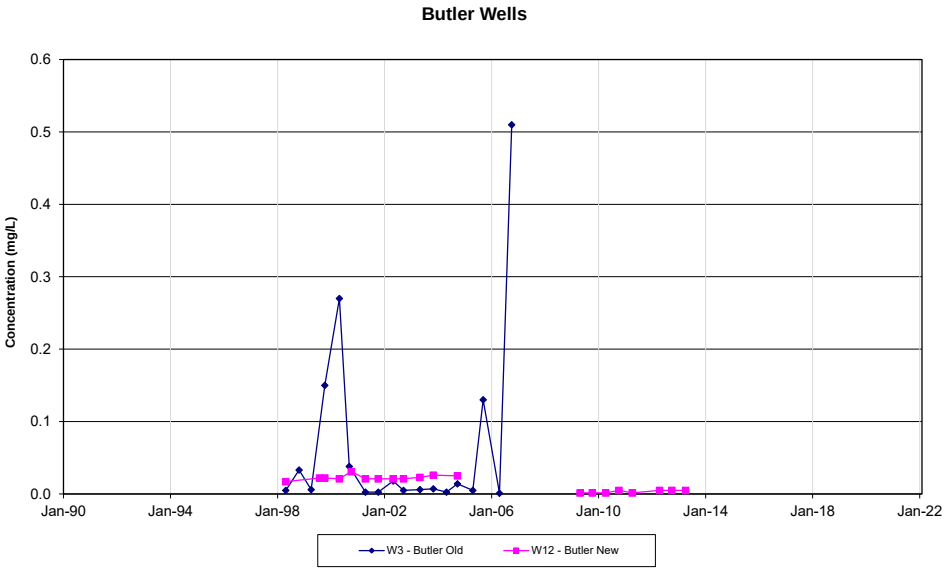
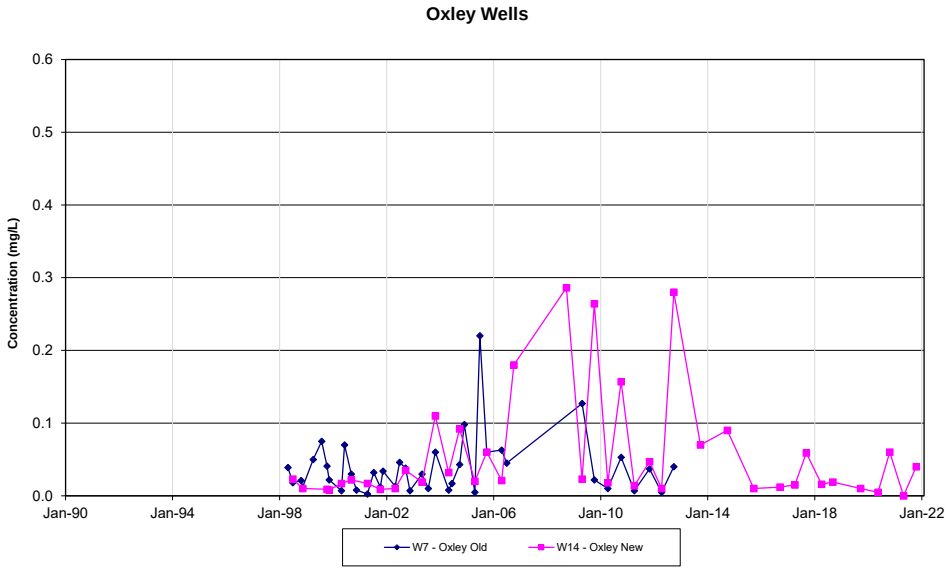
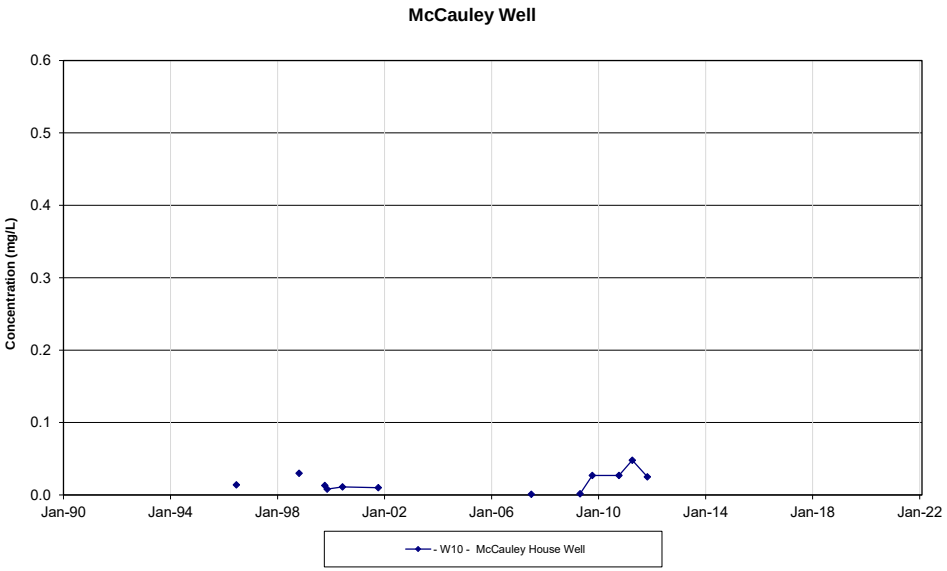


FIGURE C-19

GROUNDWATER TIME CONCENTRATION GRAPHS - MANGANESE







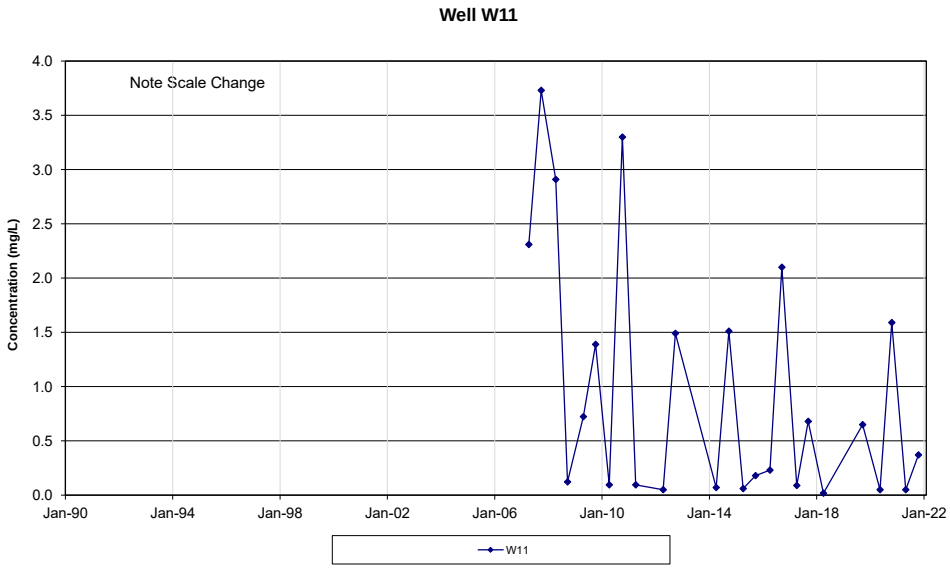
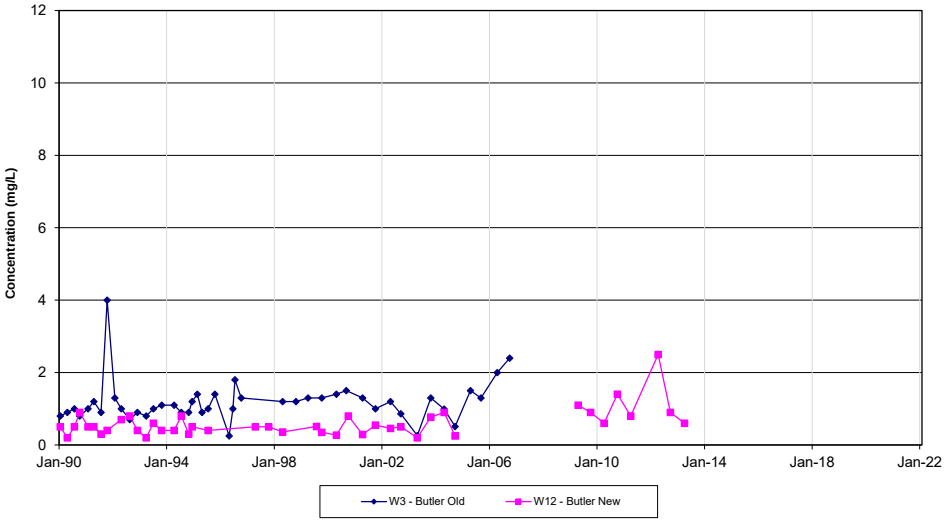


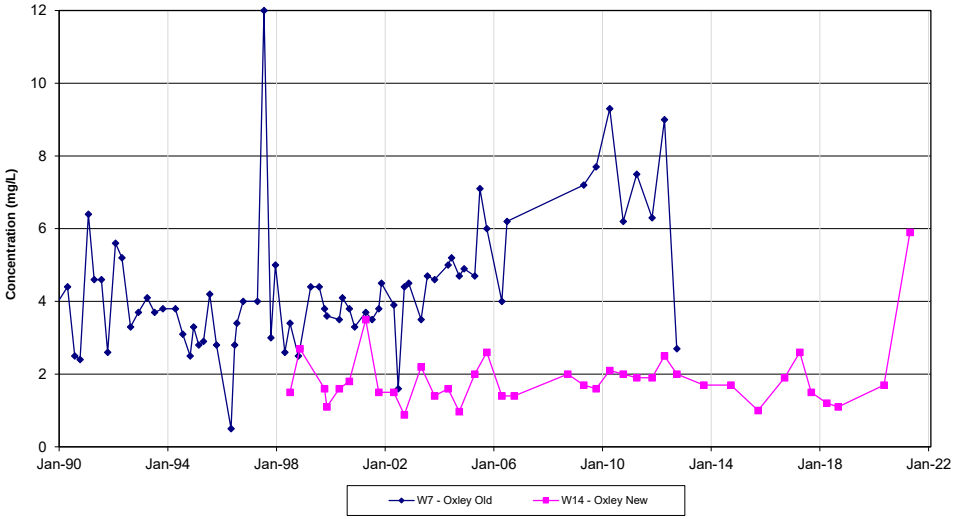
FIGURE C-20

GROUNDWATER TIME CONCENTRATION GRAPHS - DISSOLVED ORGANIC CARBON

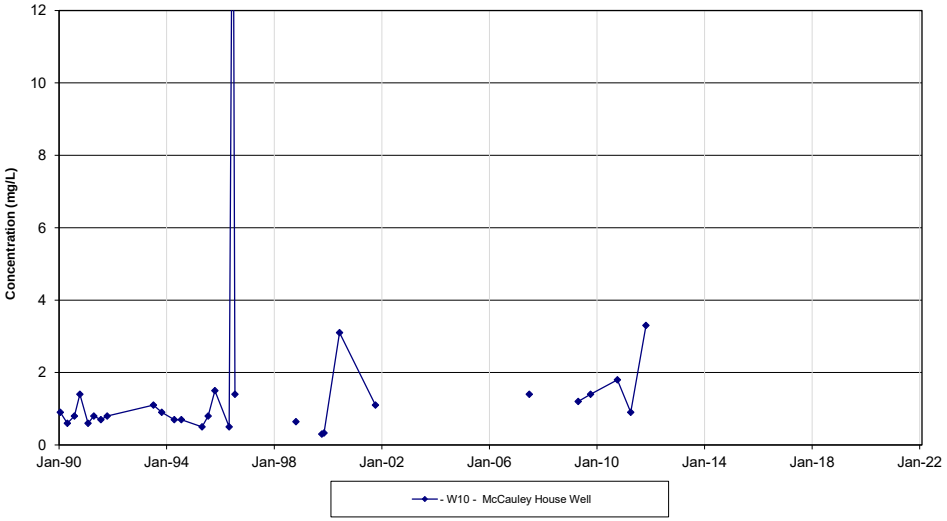
Butler Wells



Oxley Wells



McCauley Well



Well W11

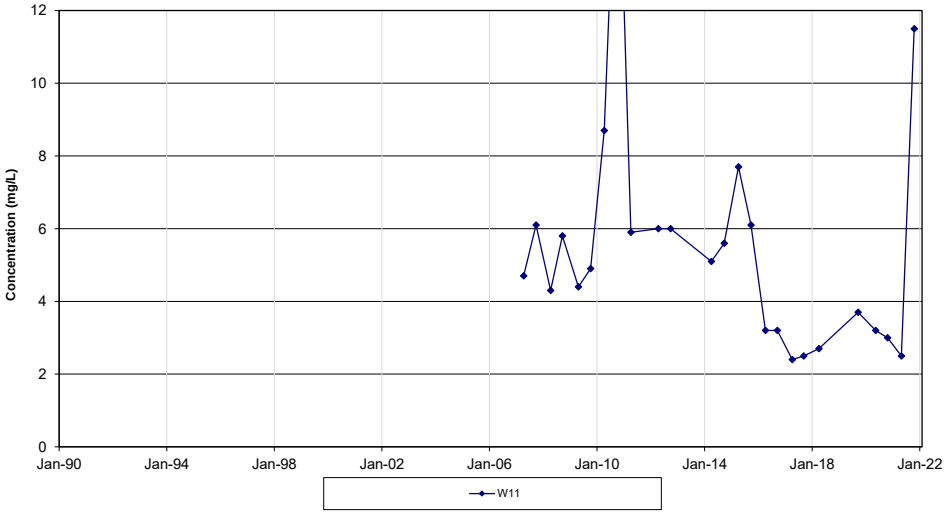
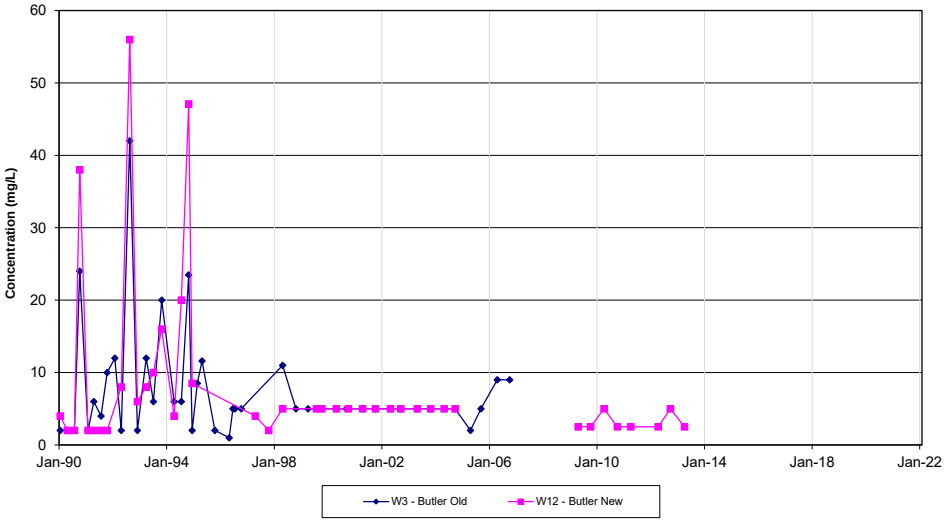


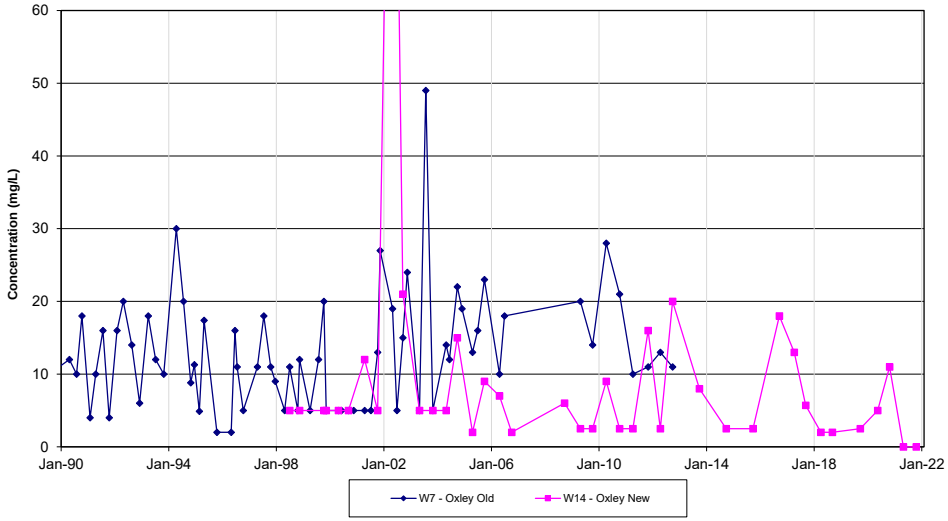
FIGURE C-21

GROUNDWATER TIME CONCENTRATION GRAPHS - CHEMICAL OXYGEN DEMAND

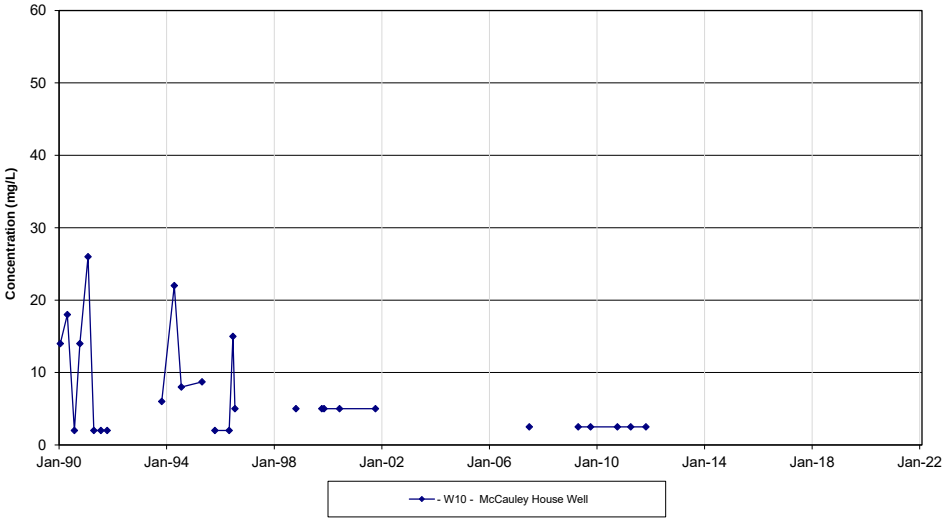
Butler Wells



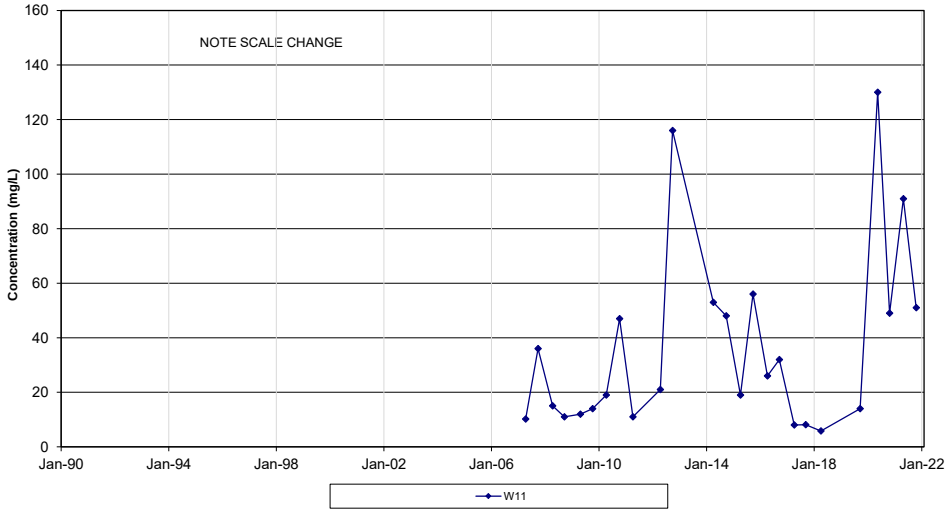
Oxley Wells



McCauley Well



Well W11



APPENDIX

D SURFACE WATER CHEMISTRY

TABLE D-1
SURFACE WATER FIELD CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

LOCATION	DATE	TEMPERATURE (°C)	CONDUCTIVITY (µS/cm)	pH (as units)	TURBIDITY (NTU)	D.O. (mg/L)
SW4	April	8.4	554	7.9	4	8.7
	July	18.9	450	6.1	203	7.7
	October	8.3	283	6.3	9	5.9
	December	1.6	48	7.2	51	8.7
SW6	April	6.3	382	7.9	6	-
	October	10.1	398	7.4	7	14.0
SW7	April	6.7	355	7.7	9	10.6
	October	10.4	310	7.4	5	13.0
SW20	April	3.6	55	8.7	5	12.9
	July	14.6	82.0	7.1	9	7.8
	October	9.8	83	7.3	10	10.5
	December	1.9	50	8.1	1	9.4
SW26	April	11.2	38	7.3	0.7	9.5
	July	23.6	144	5.6	321.0	1.4
	October	12.8	52	7.1	3.7	2.9
	December	2.1	76	7.5	1.6	4.7
SW27	April	11.2	237	7.0	1	10.8
	October	10.3	194	7.6	23	8.2
SW28	April	8.0	375	7.1	143	8.8
	October	9.8	681	6.5	4	4.9
SW30	April	7.9	240	7.1	6	8.8
	July	19.0	321	5.9	290	7.7
	October	11.5	297	7.1	9	7.4
	December	1.5	74	7.4	27	6.7
SW33	April	11.8	58	8.1	1	9.8
	July	20.9	97	6.1	187	4.9
	October	13.9	53	7.0	3	15.0
	December	2.4	52	7.5	1	10.7
SW34	April	10.9	316	8.1	12	5.6
	October	10.7	333	6.8	16	4.7
SP	April	-	-	-	-	-
	October	-	-	-	-	-

NOTES: 1) NT - Indicates parameter not tested.
2) "-" - Surface water location not sampled due to insufficient water.
3) FR - Indicates that the surface water location was frozen.
4) D.O. - Dissolved Oxygen

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SP														
			Oct-99	Mar-00	Apr-00	Apr-01	Oct-01	Nov-01	Apr-02	Jun-02	Apr-03	Oct-03	Nov-03	Apr-04	Jun-04	Sep-04	Nov-04
pH	units	6.5 to 8.5	6.7	7.03	7.3	7.29	7.92	7.73	7.63	7.98	7.72	8.4	8.1	7.9	8.8	8.4	9
Conductivity	µmho/cm		330	310	1110	510	1600	1700	2600	1300	1400	1400	840	550	580	830	470
Chloride	mg/L		23	24.3	67	23	160	160	350	120	330	110	7.9	41	26	120	34
Sulphate	mg/L													51	160	150	120
Alkalinity	mg/L		48	48.8	220	130	410	430	710	330	360	400	290	150	67	74	70
Hardness	mg/L		120	66.24	470	210	420	500	700	360	440	390	290	160	180	320	180
Total Kjeldahl Nitrogen	mg/L		0.85	17.5	2.2	6.7	22	31	38	9.5	17	17	11	4.1	2.4	3.4	0.6
Ammonia: total	mg/L		0.04	1.21	0.95	4	14	27	30	1.1	11	12	8.1	1.4	<0.02	<0.02	<0.02
Ammonia: un-ionized	µg/L	20															
Nitrate	mg/L			0.38												<0.05	<0.05
Nitrite	mg/L														<0.01	<0.01	<0.01
Biochemical Oxygen Demand	mg/L													0.2	0.12	0.057	0.067
Chemical Oxygen Demand	mg/L		46		36	51	410	320	1100	360	350	240	210	100	56	77	19
Dissolved Organic Carbon	mg/L		5.5	18.2	13	9.4	120	260	430	55	180	140	77	21	14	9.4	6.8
Phenols	µg/L	1		<1	<1	13	39	100	210	45	48	41	24	29	2.5	1.2	<1
Arsenic	mg/L	0.005												<0.01	<0.01	<0.01	
Barium	mg/L													0.094	0.077	0.16	0.073
Boron	mg/L	0.200												0.42	0.27	0.22	0.19
Cadmium	mg/L	0.0005 [2]												<0.002	<0.002	<0.002	<0.005
Calcium	mg/L																
Chromium	mg/L	0.01												0.003	<0.002	<0.002	0.006
Copper	mg/L	0.005 [3]												0.005	0.013	0.003	0.012
Iron	mg/L	0.300	2.1	0.64	5.6	1.9	2.5	3.1	6.2	3	1.6	2.5	0.82	2.7	0.9	0.66	1.6
Lead	mg/L	0.005 [4]												<0.01	<0.01	<0.01	<0.02
Magnesium	mg/L																
Manganese	mg/L		0.038	<0.01	2.3	0.48	0.77	1	2.4	0.41	0.73	0.72	0.51	0.38	0.053	0.09	0.23
Mercury	mg/L	0.0002													<0.05	<0.05	
Phosphorus	mg/L	0.030												0.23	0.13	0.1	0.11
Sodium	mg/L																
Zinc	mg/L	0.020												0.015	0.012	0.008	0.024
Total Dissolved Solids	mg/L																
Total Suspended Solids	mg/L																

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SP												
			Apr-05	Sep-05	Apr-06	Apr-07	Apr-08	Apr-09	Oct-09	Apr-10	Apr-11	Apr-12	Apr-16	Apr-17	Apr-19
pH	units	6.5 to 8.5	8	7.14	8	7.11	7.19	8.01	7.79	8.26	7.68	7.59	7.07	7.58	7.7
Conductivity	µmho/cm		388	387	580	203	183	356	269	192	136	274	250	160	176
Chloride	mg/L		24.2	24	32	11.7	18	35.2	35.2	13.7	9.45	16	7	8	13
Sulphate	mg/L		52.7	123	76	25.9	15.3	34.8	40.1	23.4	14.8	46	39	20	13
Alkalinity	mg/L		91.2	9	168	50	41	67	39	46	33	46	62	37	63
Hardness	mg/L		133	168	230	72	54	101	75	59	45	74	96	54	68
Total Kjeldahl Nitrogen	mg/L		1.6	0.8	2.8	0.74	1.61	1.24	0.91	0.63	1.59	0.64	0.5	0.32	0.6
Ammonia: total	mg/L		0.99	<0.05	1.75	0.35	1.13	0.33	<0.02	0.08	<0.02	<0.02	<0.050	<0.050	0.59
Ammonia: un-ionized	µg/L	20									<7	<1	<1	1	2
Nitrate	mg/L				0.5			1.04	0.5	0.96	0.56	3.01	1.62	0.57	1.09
Nitrite	mg/L				0.13			<0.05	<0.05	<0.05	<0.05		1.63	<0.010	<0.10
Biochemical Oxygen Demand	mg/L		<0.1	0.3	0.03			<5	<5		<5	1	<2.0	<2.0	<1
Chemical Oxygen Demand	mg/L		17	13	36	6.2	21	20	24	24	10	13	36	14	10
Dissolved Organic Carbon	mg/L		7.6	3.8	11.5	4.8	8.9	7.3	8.5	6.1	4.6	10	7.3	4.8	4.5
Phenols	µg/L	1	2	<1	<1	<1	3	<1	2	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.2	<0.2	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	<0.0010	<0.0010	<0.001
Barium	mg/L		0.07	0.08	0.1	0.089	0.044	0.051	0.047	0.026	0.018	0.03	0.049	0.027	0.04
Boron	mg/L	0.200	0.22	0.09	0.31	0.099	0.086	0.209	0.207	0.136	0.07	0.14	0.16	0.084	0.14
Cadmium	mg/L	0.0005 [2]	<0.005	<0.005	0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.00010	<0.00010	<0.0001
Calcium	mg/L											23			19
Chromium	mg/L	0.01	<0.01	<0.01	0.005	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	<0.0050	<0.0050	0.001
Copper	mg/L	0.005 [3]	<0.02	0.03	0.007	0.009	0.009	0.009	0.008	0.006	0.003	0.005	0.0092	0.0059	0.005
Iron	mg/L	0.300	1.8	7.07	0.73	1.85	1.03	0.536	0.536	0.206	0.14	0.07	0.7	0.32	0.16
Lead	mg/L	0.005 [4]	<0.05	<0.05	0.001	0.002	0.007	0.002	<0.002	<0.002	<0.002	<0.001	0.0018	0.00053	<0.001
Magnesium	mg/L											4			5
Manganese	mg/L		0.07	0.25	0.29	0.069	0.113	0.017	0.012	0.007	0.006	<0.01	0.011	0.0087	<0.01
Mercury	mg/L	0.0002	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.1	<0.1	<0.0001
Phosphorus	mg/L	0.030	0.059	0.242	<0.05	0.17	0.09	0.09	0.09	0.04	0.05	0.02	0.04	0.023	0.012
Sodium	mg/L														9
Zinc	mg/L	0.020	0.02	0.07	0.026	0.014	0.021	0.011	0.009	<0.005	0.005	<0.01	0.013	0.0058	<0.01
Total Dissolved Solids	mg/L							214	188	138	72	178	124	112	114
Total Suspended Solids	mg/L							37	24	<10	<10	<2	<10	<10	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4														
			May-86	May-86	May-86	Jul-86	May-87	Jun-87	Sep-87	Sep-87	Oct-87	Nov-87	Jan-88	Mar-88	May-88	Jun-88	Jul-88
pH	units	6.5 to 8.5				7.54	7.47	7.09	6.62		7.47	6.68	6.4	7.03	6.78	6.84	7.12
Conductivity	µmho/cm			806	563	825	928	1220	1241	1285	343	180	645	112	412	1135	1380
Chloride	mg/L		94	88.9	66.6	79.6	148	154	165	165	43.9	20.7	79.6	11.7	49.5	133	185
Sulphate	mg/L																
Alkalinity	mg/L					230	282	394	467	451	116	43	223	28	119	368	481
Hardness	mg/L		310	336	235		376	538	545	536	135	66	255	37	153	457	573
Total Kjeldahl Nitrogen	mg/L									0.15	0.05	0.05	0.05	0.05	0.05	0.15	0.15
Ammonia: total	mg/L																
Ammonia: un-ionized	µg/L	20															
Nitrate	mg/L						0.05	0.05	0.05		0.2	0.25	0.15	0.4	0.15	0.25	0.2
Nitrite	mg/L																
Biochemical Oxygen Demand	mg/L																
Chemical Oxygen Demand	mg/L						0.015	0.004	0.0015	0.012				0.1231	0.0546	0.0017	0.0004
Dissolved Organic Carbon	mg/L																
Phenols	µg/L	1	27.8	28	18	12	48	57	76	83	12.4	5.4	34.6	3.4	17.6	109	79.6
Arsenic	mg/L	0.005															
Barium	mg/L																
Boron	mg/L	0.200															
Cadmium	mg/L	0.0005 [2]															
Calcium	mg/L																
Chromium	mg/L	0.01															
Copper	mg/L	0.005 [3]															
Iron	mg/L	0.300	6.2		0.8	6.64	0.12	0.02	0.31	27.3	3.9	1.7	7.84	1.32	7.7	3.49	11.768
Lead	mg/L	0.005 [4]															
Magnesium	mg/L																
Manganese	mg/L																
Mercury	mg/L	0.0002															
Phosphorus	mg/L	0.030															
Sodium	mg/L																
Zinc	mg/L	0.020															
Total Dissolved Solids	mg/L																
Total Suspended Solids	mg/L																

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Aug-88	Sep-88	Oct-88	Nov-88	Dec-88	Jan-89	Apr-89	May-89	Jul-89	Aug-89	Nov-89	Jan-90	Feb-90	Mar-90	Apr-90	May-90	Jul-90
pH	units	6.5 to 8.5	7	6.4	6.8	6	6.9	7	7.4	6.7	6.7	6.7	6.86	7.44	7	6.95	6.9	6.98	7.32
Conductivity	µmho/cm		959	798	324	414	1105	712	143	362	1180	1234	410	239	600	318	182	183	1015
Chloride	mg/L		121	105	39.1	48.9	134	84.2	14.9	45.1	163	165		27.4	77.9	38.6	21.6	20.9	141
Sulphate	mg/L																		
Alkalinity	mg/L		306.9	249.9	89.9	117.5	336	210	34.8		443.8	403.8		49	184.5	93.7	46.1	54.8	
Hardness	mg/L		379	310	122	157	412	258	43	126	422	215		65	215	112	57.2	59	405
Total Kjeldahl Nitrogen	mg/L		0.55	0.5	0.4	0.2	0.3	0.25	0.1	0.35	1.5	0.5		0.45	0.35	0.15	0.2	0.3	0.6
Ammonia: total	mg/L		0.1	0.05	0.05	0.1	0.1	0.05	0.05	0.05	0.75	0.05		0.05	0.05	0.05	0.05	0.05	0.05
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L		0.15	0.15	0.2	0.2	0.15	0.2	0.15	0.05	0.05	0.05		0.4	0.05	0.1	0.1	0.05	0.15
Nitrite	mg/L		0.005	0.005	0.015	0.01	0.02	0.01	0.005	0.005	0.015	0.005		0.01	0.005	0.005	0.005	0.005	0.01
Biochemical Oxygen Demand	mg/L		0.03	0.03	0.04	0.08	0.04	0.07	0.02	0.02	0.02	0.02		0.02	0.02	0.02	0.02	0.02	0.02
Chemical Oxygen Demand	mg/L		0.004	0.0004	0.012	0.0123	0.0115	0.0074	0.0851	0.0095	0.00002	0.0036							
Dissolved Organic Carbon	mg/L		66	72	58	74	176	126	20	30	90	74		30	66	32	14	28	48
Phenols	µg/L	1	48.4	33.2	19.4	28.2	64	90	6	16.4	38.2	30		3	10.6	6	2.6	0.8	9
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	0.19	14.93	8.23	10.65	28	26	1.4	6	26	20.24		2.4	0.17	6.4	1.2	2.6	38
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030	69	62	20.8	29	72	45	7	25	105	99		11.6	43	23.2	11.4	13	88
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Aug-90	Oct-90	Nov-90	Jan-91	Feb-91	Mar-91	Apr-91	May-91	Jul-91	Aug-91	Oct-91	Jan-92	Feb-92	Mar-92	Apr-92	Jul-92	Aug-92
pH	units	6.5 to 8.5	6.82	6.48	6.73	7.37	6.87	6.58	6.68	7.29	6.7	6.8	7.4	6.8	8.44	6.85	6.72	6.5	6.8
Conductivity	µmho/cm		1141	424	163	637	585	321	184	681	539	1001	426	518	597	272	106	868	910
Chloride	mg/L		174	54.7	18.3	85.6	76.8	42.5	24.4	91.1	84.1	128	58.5	65.8	74.2	35	10.7	108	117
Sulphate	mg/L																		
Alkalinity	mg/L		391.4	82	42.3	207.5	179.9	91	46.4	209.3	129.3	336.1	117.4	166	189	73.9	28.4	291.4	302
Hardness	mg/L			102.7	56.2	235.2	189.8	101.1		232.2	145.8	370.7	139	176.6	200.4	83.1	32.5	301.4	290.7
Total Kjeldahl Nitrogen	mg/L		0.35	0.5	0.25	0.35	0.3	0.45	0.2	0.35	0.65	0.4	0.45	0.4	0.45	0.3	0.25	0.5	0.5
Ammonia: total	mg/L		0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.05	0.2	0.15	0.15	0.05	0.05	0.1	0.2
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L		0.05	0.05	0.25	0.05	0.2	0.05	0.1	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05
Nitrite	mg/L		0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.015	0.015	0.005	0.01	0.005	0.005	0.01	0.005	0.005	0.01
Biochemical Oxygen Demand	mg/L			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chemical Oxygen Demand	mg/L																		
Dissolved Organic Carbon	mg/L			40	12	74	38	48	12	20	42	20	26	16	28	18	20	46	68
Phenols	µg/L	1	6.2	2	0.6	3.8	2.8	2	1.2	1.8	1.2	2.6	0.8	0.6	0.6	0.4	0.4	0.6	0.6
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	26	3.6	2.3	16	13	5.9	2.3	14	5.9	23	7.3	11	12	3.7	1.3	14	27
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030		21.2	10	51	41	23.6	12.4	52	32.2	87	30.6	39.8	42	20	6.8	66	55.4
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Sep-92	Dec-92	Jan-93	Mar-93	Apr-93	Jul-93	Aug-93	Oct-93	Feb-94	Apr-94	May-94	Jul-94	Sep-94	Oct-94	Nov-94	Dec-94	Feb-95
pH	units	6.5 to 8.5	6.7	7.26	7.42	7.22	6.97	7.65	7.66	6.84	6.55	6.64	6.64	7.29	7.49	8.04	8.17	8.13	7.09
Conductivity	µmho/cm		589	278	409	201	246	422	797	369	695	90.2	171	601	658	357	303	423	515
Chloride	mg/L		80.4	33.6	52.5	26.6	30.6	50.4	107	47.3	87.7	8.8	19.1	74.7	86.4	47.4	36.8	56.6	67.9
Sulphate	mg/L																		
Alkalinity	mg/L		177.5	80	128.2	50.7	70.6	134.6	258.4	103	218.8	24.3	47.1	187.4	202.9	106	88	118	157
Hardness	mg/L		191.1	91.6	132	55.3	74.9		265.9	115.8	221.5	29.5	61.7	204	125	107	94.2	123	163
Total Kjeldahl Nitrogen	mg/L		0.55	0.35	0.35	0.4	0.8	0.7	0.3	0.55	0.5	0.2	0.3	0.6	0.45	0.7	0.35	0.4	0.35
Ammonia: total	mg/L		0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.1	0.3	0.05	0.2	0.05	0.1	0.25	0.2	0.1	0.15
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L		0.05	0.05	0.05	0.2	0.05	0.1	0.05	0.05	<0.05	0.1	0.1	0.05	<0.05	0.05	0.05	0.05	0.05
Nitrite	mg/L		0.01	0.005	0.005	0.01	0.01	0.01	0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.01	0.01	0.005	0.005
Biochemical Oxygen Demand	mg/L		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.02		<0.02	<0.02	<0.02	0.02	0.02	0.02	0.02
Chemical Oxygen Demand	mg/L																		
Dissolved Organic Carbon	mg/L		46	30	16	10	40		16	26	36	12	22	54	20	52.9	34.8	17	25.5
Phenols	µg/L	1	0.2	0.2	0.4	0.6	0.2	2.6	0.2	0.2	0.2	0.6	0.4	13	1.2	0.4	0.2	0.4	2.4
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	9.6	4.8	7.9	2.7	8.9			5.9	19	1.1	2	5	2.1	7.82	4.96	6.26	6.41
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030	44.2	22.6	32.2	12.8	16.2	32.2	64	32.6	50	3.6	12	44	50	28.4	25.2	39.4	46
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Mar-95	Apr-95	May-95	Jul-95	Sep-95	Oct-95	Nov-95	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Apr-97	Jul-97
pH	units	6.5 to 8.5		7.18	7.03	7	7.74	7.38	7.6	6.9	6.7	6.8	6.7	7.2	7.2	7.1	6.9	6.52	6.65
Conductivity	µmho/cm			216	238	250	396	500	235	254	490	480	610	730	670	520	460	159	804
Chloride	mg/L		4.2	26.5	28.5	29.6	53.6	71.2	28.8	29.53	67	99	87	110	96	73	60	19	123
Sulphate	mg/L																		
Alkalinity	mg/L			57.7	66.7	76.5	107	138	64	60.24	130	210	170	200	170	140	140	36	215
Hardness	mg/L		11	62.3	66.4	76	113	154	71	69.94	150	230	190	240	200	170	130	46	249
Total Kjeldahl Nitrogen	mg/L			0.4	0.55	0.7	0.76	0.25	0.38	0.2	2.3	1	1.1	1.1	0.93	1.3	0.66	0.37	1.28
Ammonia: total	mg/L		0.05	0.05	0.1	0.05	0.03	0.05	0.1	<0.05	0.13	0.27	0.16	0.17	0.25	0.27	0.21	0.04	0.15
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L			0.05	0.05	0.15	0.01	0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Nitrite	mg/L			0.005	0.005	0.005	0.003	0.005	0.005		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Biochemical Oxygen Demand	mg/L		0.02	0.02	0.06	0.02	0.0005	0.02	0.02	<0.01		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Chemical Oxygen Demand	mg/L																		
Dissolved Organic Carbon	mg/L		8.28	8.7	32.8		32	20	28	3	27	64	30	20	27	25	26	9	38
Phenols	µg/L	1	0.2	0.6	0.4	1.6	2.4	0.8	0.4	<2	1	<1	<1	2	<1	7.5	1	<1	<1
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	0.895	3.19	2.47		5.4	2.79	2.64	3.13	8	17	12	11	10	12	11		8.17
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030		15	16.4	21	26.2	37.2	17.4										
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Oct-97	Dec-97	Apr-98	Jul-98	Oct-98	Nov-98	Apr-99	Jul-99	Oct-99	Nov-99	Apr-00	Jun-00	Sep-00	Nov-00	Apr-01	Jul-01	Oct-01
pH	units	6.5 to 8.5	6.78	6.36	7.4	6.8	6.8	6.8	6.4	7.18	7.2	7	6.71	7.49	7.33	6.87	6.83	7.58	7.28
Conductivity	µmho/cm		616	651	270	480	710	700	83	370	360	230	280	640	780	340	73	640	
Chloride	mg/L		97.4	90.6	38	78	120	110	8.1	55	48	26	38	87	110	49	7.6	84	76
Sulphate	mg/L																		
Alkalinity	mg/L		144	170	59	120	170	160	17	110	83	48	60	140	180	59	15	150	160
Hardness	mg/L		193	197	75	140	230	200	24	130	97	64	80	170	210	89	22	150	190
Total Kjeldahl Nitrogen	mg/L		0.45	0.96	0.33	0.56	0.51	0.39	0.3	0.76	0.47	0.36	0.32	0.28	0.42	0.43	0.3	0.78	0.6
Ammonia: total	mg/L		0.14	0.49	<0.03	0.33	0.05	<0.03	<0.03	0.05	0.09	0.06	0.04	<0.02	0.04	0.15	<0.02	0.05	0.17
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L																		
Nitrite	mg/L																		
Biochemical Oxygen Demand	mg/L																		
Chemical Oxygen Demand	mg/L																		
Dissolved Organic Carbon	mg/L		28	34	<10	44	24	26	<10	34	24	<10	<10	20	24	12	19	29	56
Phenols	µg/L	1	<1	3	<1	<1	2	<1	<1	<1	<1	<1	<1	2	<1	5.3	5.3	4	2.6
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	6.02	20.5	1.9	8.1	1.9	1.9	0.93	13	4.2	2.3	2.1	3.4	3.1	2.7	0.95	5.5	11
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L				0.73	1.7	0.25	1.1	0.35	3.3	1.6	1.3	1	3	5.1	1.6	0.33	2.6	5.5
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030																	
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Nov-01	Apr-02	Jun-02	Sep-02	Nov-02	Apr-03	Jul-03	Oct-03	Nov-03	Apr-04	Jun-04	Sep-04	Nov-04	Apr-05	Jun-05	Apr-06	Jun-06
pH	units	6.5 to 8.5	7.18	7	7.82	6.8	6.8	6.6	6.6	6.6	7.1	6.5	7	6.9	6.86	7.24	7.68	7.4	8
Conductivity	µmho/cm		240	280	300	540	380	230	370	270	200	230	360	530	400	451	572	177	543
Chloride	mg/L		29	35	35	87	52	35	55	29	24	26	42	71	62	4.1	73	24	82
Sulphate	mg/L											15	13	18	30	5.7	12.5	11	17
Alkalinity	mg/L		56	69	81	160	72	45	88	60	45	46	87	140	88	15.2	159	42	153
Hardness	mg/L		62	77	90	150	110	59	80	64	51	58	87	120	110	13.4	157	46	140
Total Kjeldahl Nitrogen	mg/L		0.31	0.54	0.62	1.8	0.32	0.3	1	0.25	0.38	0.34	0.56	2.6	0.57	2.7	0.6	<0.10	0.9
Ammonia: total	mg/L		0.08	0.12	<0.02	0.9	0.08	0.09	0.7	0.14	0.11	0.11	0.03	0.54	0.26	<0.05	0.09	0.12	0.14
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L													<0.05	<0.05			<0.1	<0.1
Nitrite	mg/L												<0.01	<0.01	<0.01			<0.01	<0.01
Biochemical Oxygen Demand	mg/L												<0.5	<0.5	<0.5				
Chemical Oxygen Demand	mg/L															10	21	16	31
Dissolved Organic Carbon	mg/L		30	16	38	48	15	12	42	<10	<10	10	24	87	16	3.9	9.6	5	11.8
Phenols	µg/L	1	2.1	12	2.5	1.8	3.9	<10	3	2.3	<1	4.7	1.8	<1	1	1	<1	<1	<1
Arsenic	mg/L	0.005										<0.01	<0.01	<0.01		<0.2	<0.2	<0.001	<0.001
Barium	mg/L											0.015	0.024	0.057	0.024	<0.02	0.06	0.019	0.035
Boron	mg/L	0.200										0.036	0.05	0.063	0.06	<0.02	0.09	0.027	0.08
Cadmium	mg/L	0.0005 [2]										<0.002	<0.002	<0.002	<0.005	<0.005	<0.005	<0.0001	<0.0001
Calcium	mg/L																		
Chromium	mg/L	0.01										<0.002	<0.002	<0.002	<0.004	<0.01	<0.01	<0.005	<0.005
Copper	mg/L	0.005 [3]										<0.002	<0.002	0.003	<0.006	<0.02	<0.02	<0.001	<0.001
Iron	mg/L	0.300	2.7	4.8	5.7	25	2.4	3.6	23	4.9	2.7	1.8	3.5	28	4.5	0.17	12.9	3.4	2.9
Lead	mg/L	0.005 [4]										<0.01	<0.01	<0.01	<0.02	<0.05	<0.05	<0.0005	<0.005
Magnesium	mg/L																		
Manganese	mg/L		0.8	1.6	1.8	3.2	1.5	1.1	2	1	0.78	0.63	1.7	1.8	1.7	<0.01	6.14	0.82	2.8
Mercury	mg/L	0.0002											<0.05	<0.05		<0.0001			
Phosphorus	mg/L	0.030												<5	<5	0.015	0.006	0.004	0.016
Sodium	mg/L																		
Zinc	mg/L	0.020										<0.005	<0.005	0.03	<0.005	<0.01	<0.01	<0.005	0.13
Total Dissolved Solids	mg/L																		349
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Oct-06	Nov-06	Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08	Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10
pH	units	6.5 to 8.5	7.7	7.1	6.71	6.73	6.78	6.93	6.63	7.06	7.72	7.78	7.15	7.73	7.34	7.33	7.11	7.75	7.45
Conductivity	µmho/cm		542	164	223	424	582	308	74	647	351	331	115	338	176	173	237	437	256
Chloride	mg/L		84	21	33.5	62.8	93.6	50	9.27	151	51.9	50.3	15.3	51.7	28.3	23.3	34.2	65.2	39.8
Sulphate	mg/L		22	12	18.3	1.39	21	18.6	7.96	7.14	9.41	25	9.44	8.37	8.71	16.2	22.4	14.1	22.9
Alkalinity	mg/L			37	37	119	130	61	10	103	80	64	17	83	37	34	50	114	52
Hardness	mg/L		150	40	54	106	148	77	19	97	87	86	25	87	46	44	62	114	71
Total Kjeldahl Nitrogen	mg/L		0.8	0.6	<0.10	0.89	0.51	0.34	<0.10	1.27	1.36	0.7	0.35	1.02	0.53	0.56	0.62	2.17	0.35
Ammonia: total	mg/L		0.16	<0.05	0.03	0.03	<0.02	<0.02	<0.02	0.79	0.69	0.19	0.03	0.02	<0.02	<0.02	0.1	<0.02	<0.02
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L										<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite	mg/L										<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Biochemical Oxygen Demand	mg/L										<5	11	<5	<5	<5	<5			
Chemical Oxygen Demand	mg/L		25	23	5.9	35	26	15	11	41	22	10	15	25	16	9	26	24	<5
Dissolved Organic Carbon	mg/L		8.9	7.4	3.5	12.8	8.2	5.8	3.3	15.4	12.6	4.2	4.7	9.2	6.7	3.9	5.9	9.7	7.2
Phenols	µg/L	1	<1	<1	1	8	5	4	<1	3	5	3	<1	2	1	5	<1	<1	<1
Arsenic	mg/L	0.005	<0.2	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003		<0.003		<0.003		<0.003
Barium	mg/L		0.03	<0.02	0.017	0.034	0.041	0.026	0.01	0.007	0.056		0.012		0.015		0.022		0.023
Boron	mg/L	0.200	0.06	0.03	0.035	0.034	0.089	0.041	0.015	0.039	0.044	0.048	0.019	0.053	0.026	0.038	0.037	0.139	0.07
Cadmium	mg/L	0.0005 [2]	<0.005	<0.005	<0.0001	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001		<0.001		<0.001		<0.001		<0.001
Calcium	mg/L																		
Chromium	mg/L	0.01	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003		<0.003		<0.003		<0.003
Copper	mg/L	0.005 [3]	<0.02	<0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005		<0.002		<0.002		<0.002		<0.002
Iron	mg/L	0.300	6.7	1.5	1.49	16.8	5.63	2.94	0.694	24.6	18.5	2.93	1.67	6.59	1.31	1.62	2.74	20.1	2.11
Lead	mg/L	0.005 [4]	<0.05	<0.05	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	0.003		<0.002		<0.002		<0.002		<0.002
Magnesium	mg/L																		
Manganese	mg/L		0.68	0.47	0.62	2.33	2.54	2.44	0.299	1.8	2.41	1.46	0.285	2.54	0.579	0.597	1.94	5.18	0.842
Mercury	mg/L	0.0002			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	0.030	0.022	0.018	0.03	<0.02	0.04	<0.02	<0.02	0.08	0.007	0.05	0.03	0.05	0.02	0.02	0.02	0.11	0.03
Sodium	mg/L																		
Zinc	mg/L	0.020	0.07	0.01	0.004	<0.005	0.006	<0.004	0.006	0.055	0.029		<0.005		<0.005		<0.005		<0.005
Total Dissolved Solids	mg/L												62	188	120	92	174	286	188
Total Suspended Solids	mg/L												14	37	<10	<10	<10	58	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4																
			Dec-10	Apr-11	Jul-11	Sep-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14
pH	units	6.5 to 8.5	7.05	7.02	7.41	7.67	6.93	6.8	7.53	6.81	6.43	6.57	7.36	6.69	7.04	6.49	7.27	7.07	6.93
Conductivity	µmho/cm		103	96	566	508	129	352	643	362	297	161	417	458	250	304	541	326	326
Chloride	mg/L		11.8	12.4	87.4	83.7	14.8	49	88	54	35	23	59	63	34	56	81	50	44
Sulphate	mg/L		12.1	9.22	40.1	56	16	38	26	16	36	14	22	43	27	21	32	22	34
Alkalinity	mg/L		16	15	116	108	17	50	154	70	48	24	88	71	38	37	100	52	53
Hardness	mg/L		25	25	150	142	30	63	154	82	63	37	99	103	54	60	119	75	72
Total Kjeldahl Nitrogen	mg/L		0.38	0.67	0.84	0.73	0.56	0.35	0.45	0.11	0.35	0.33	0.48	0.38	0.39	0.38	0.74	0.41	0.54
Ammonia: total	mg/L		0.04	0.05	0.75	0.24	0.06	0.14	0.04	0.05	0.23	0.09	0.09	0.21	0.19	0.21	0.18	0.16	0.25
Ammonia: un-ionized	µg/L	20		<1	1	<1	1	<1	1	<1	1	<1	<1	<1	<1	<1	<1	1	<1
Nitrate	mg/L		<0.05	0.09	<0.05	<0.05	0.07	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05		<0.10		<0.10	<0.10		<0.10			<0.10		<0.10
Biochemical Oxygen Demand	mg/L			<5	<5	<5	<5	1	<1	1	2	<1	<1	<1	<1	1	3	1	<1
Chemical Oxygen Demand	mg/L		14	<5	25	17	17	<5	34	32	14	8	19	20	13	10	27	9	9
Dissolved Organic Carbon	mg/L		4.1	3.8	10.5	7.8	4.9	5	10.9	9.1	5.2	3.9	9.6	5.4	4.9	3.8	8.3	6.9	4.4
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Arsenic	mg/L	0.005		<0.003		<0.003		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Barium	mg/L			0.01		0.042		0.02		0.03		0.01		0.04		0.02	0.06	0.03	
Boron	mg/L	0.200	0.03	0.025	0.22	0.255	0.072	0.17	0.47	0.2	0.17	0.07	0.23	0.32	0.18	0.14	0.52	0.26	0.28
Cadmium	mg/L	0.0005 [2]		<0.001		<0.001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Calcium	mg/L							17	42	23	17	10	28	28	15	16	33	20	19
Chromium	mg/L	0.01		<0.003		<0.003		0.002		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]		<0.002		<0.002		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Iron	mg/L	0.300	0.452	0.943	11.9	3.36	0.473	2.79	3.55	3.06	3.55	1.26	8.8	7.27	2.14	4.77	16.2	4.47	5.77
Lead	mg/L	0.005 [4]		<0.002		<0.002		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Magnesium	mg/L							5	12	6	5	3	7	8	4	5	9	6	6
Manganese	mg/L		0.277	0.431	3.29	3.18	0.216	1.1	3.27	1.88	1.38	0.49	4.16	2.24	0.96	1.16	3.48	0.78	1.41
Mercury	mg/L	0.0002		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Phosphorus	mg/L	0.030	0.02	<0.02	<0.02	<0.02	<0.02	<0.01	0.02	0.02	<0.01	<0.01	0.01	<0.01	<0.01	0.02	0.07	0.02	0.01
Sodium	mg/L																		
Zinc	mg/L	0.020		<0.005		0.007		<0.01		<0.01		<0.01		<0.01		<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		82	62	354	348	88	229	418	235	193	105	271	298	162	198	352	212	212
Total Suspended Solids	mg/L		<10	<10	30	15	<10	2	12	5	2	<2	<2	6	<2	29	6	11	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4											
			Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16	Apr-17	Jul-17	Sep-17	Dec-17
pH	units	6.5 to 8.5	6.99	7.68	7.32	7.21	6.45	7.32	7.26	7.12	6.93	7.76	7.26	6.94
Conductivity	µmho/cm		239	652	653	298	220	700	570	210	80	560	460	280
Chloride	mg/L		40	103	95	47	32	99	82	35	11	76	69	39
Sulphate	mg/L		16	37	48	24	18	36	32	12	4.3	29	28	22
Alkalinity	mg/L		30	128	115	49	35	150	100	24	9.2	120	83	50
Hardness	mg/L		49	148	136	63	45	160	130	38	13	130	95	58
Total Kjeldahl Nitrogen	mg/L		0.21	0.66	0.58	7.55	0.28	0.61	0.66	0.33	0.17	0.49	0.45	0.33
Ammonia: total	mg/L		0.11	0.15	0.301	1.42	0.098	0.18	0.24	<0.050	<0.050	<0.050	0.19	0.16
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.13	0.11	<0.10	<0.10	<0.10
Nitrite	mg/L			<0.10		<0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Biochemical Oxygen Demand	mg/L		<1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L		10	25	19	11	30	18	32	23	11	28	21	13
Dissolved Organic Carbon	mg/L		4.6	7.4	5.4	4.3	3.6	6.9	6.8	6.8	4.2	9.8	4.9	3.9
Phenols	µg/L	1	<1	2	<1	<1	<1	<1	<1	<1	<1	1.3	3.8	<1
Arsenic	mg/L	0.005	<0.001		<0.001		<0.0010		<0.0010		<0.0010		<0.0010	
Barium	mg/L		0.01		0.04		0.019		0.045		0.0084		0.039	
Boron	mg/L	0.200	0.13	0.65	0.64	0.23	0.15	0.69	0.49	0.11	0.037	0.43	0.36	0.23
Cadmium	mg/L	0.0005 [2]	<0.0001		<0.0001		<0.00010		<0.00010		<0.00010		<0.00010	
Calcium	mg/L		13	41	38	17								
Chromium	mg/L	0.01	<0.001		<0.001		<0.0050		<0.0050		<0.0050		<0.0050	
Copper	mg/L	0.005 [3]	<0.001		<0.001		<0.0010		<0.0010		0.0011		<0.0010	
Iron	mg/L	0.300	2.23	4.23	6.75	4.36	4.3	12	7.7	0.97	0.49	4.5	11	2.9
Lead	mg/L	0.005 [4]	<0.001		<0.001		<0.00050		<0.00050		<0.00050		<0.00050	
Magnesium	mg/L		4	11	10	5								
Manganese	mg/L		0.65	2.6	2.68	1	0.77	4	2.5	0.24	0.11	1.9	2.2	0.93
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.1		<0.1		<0.1		<0.1	
Phosphorus	mg/L	0.030	<0.01	<0.05	<0.05	<0.05	0.011	0.01	0.008	0.014	0.016	0.015	0.006	0.008
Sodium	mg/L													
Zinc	mg/L	0.020	<0.01		<0.01		<0.0050		<0.0050		<0.0050		<0.0050	
Total Dissolved Solids	mg/L		155	424	424	194	150	408	464	106	50	378	304	255
Total Suspended Solids	mg/L		<2	7	<5	7	11	<10	<10	<10	<10	10	26	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW4															
			Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	6.5 to 8.5	7.26	7.66	7.2	7.02	6.78	7.41	7.44	6.87	7.6	7.28	7.19	7.18	6.86	6.93	7.19	6.71
Conductivity	µmho/cm		230	680	420	310	145	679	456	205	388	475	164	322	320	437	164	120
Chloride	mg/L		36	100	63	51	26	123	88	30	58	80	25	49	50	69	25	20
Sulphate	mg/L		17	38	16	28	7	26	15	14	26	18	9	25	18	18	9	8
Alkalinity	mg/L		34	130	89	48	54	148	74	35	66	105	32	62	52	94	32	24
Hardness	mg/L		42	140	93	63	23	141	91	33	77	105	31	70	75	103	31	32
Total Kjeldahl Nitrogen	mg/L		0.19	0.51	0.56	0.29	0.3	1.03	0.2	0.374	0.666	0.548	0.496	0.417	0.379	0.556	0.496	0.263
Ammonia: total	mg/L		0.14	0.28	0.21	0.21	0.05	0.18	0.09	0.081	0.185	0.437	0.034	0.24	0.159	0.126	0.034	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	1	2	<1	<1	<1
Nitrate	mg/L		<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.010	<0.010	<0.050	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1
Biochemical Oxygen Demand	mg/L		<2	3	<2	3	<1	4	1	3	2	2	4	3	<1	3	4	<1
Chemical Oxygen Demand	mg/L		10	16	29	13	<5	23	16	8	12	20	28	8	8	<5	28	18
Dissolved Organic Carbon	mg/L		2.8	5.1	9	3.6	3.3	10.1	8.3	4.7	3.7	8.6	5.5	3.4	5.4	6.7	5.5	5
Phenols	µg/L	1	<1	<1	<1	<1	<1	1	2	<1	<1	8	<1	2	2	1	<1	<1
Arsenic	mg/L	0.005	<0.0010		<0.0010		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Barium	mg/L		0.017		0.035		0.02		0.03		0.03		0.02		0.03	0.04	0.02	
Boron	mg/L	0.200	0.13	0.65	0.27	0.25	0.08	0.57	0.28	0.15	0.31	0.43	0.11	0.3	0.2	0.36	0.11	0.09
Cadmium	mg/L	0.0005 [2]	<0.00010		<0.00010		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Calcium	mg/L						6	40	25	10	21	29	9	20	20	28	9	8
Chromium	mg/L	0.01	<0.0050		<0.0050		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]	<0.0010		<0.0010		0.001		<0.001		<0.001		0.001		<0.001	<0.001	0.001	
Iron	mg/L	0.300	2.6	12	8.5	4.3	0.78	5.38	0.29	2.68	9.92	8.03	2.76	6.28	4.09	8.03	2.76	1.3
Lead	mg/L	0.005 [4]	<0.00050		<0.00050		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Magnesium	mg/L						2	10	7	2	6	8	2	5	6	8	2	3
Manganese	mg/L		0.71	2.6	1.6	0.87	0.22	4.45	0.7	0.74	1.75	1.92	0.41	1.34	0.97	2.19	0.41	0.32
Mercury	mg/L	0.0002	<0.1		<0.1		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.008	0.017	0.01	0.005	0.005	0.037	0.003	0.006	0.005	0.008	0.018	0.009	0.008	0.01	0.018	0.004
Sodium	mg/L						14		52		41		15		38	49	15	
Zinc	mg/L	0.020	<0.0050		<0.0050		<0.01		<0.01		<0.01		<0.01		<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		75	460	330	210	94	441	296	133	252	309	107	209	208	284	107	78
Total Suspended Solids	mg/L		<10	30	<10	<10	<2	9	8	5	11	6	17	19	4	8	17	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW6																
			May-86	Sep-87	Jul-88	Aug-88	Oct-88	Apr-89	Jul-89	Mar-90	May-90	Jul-90	Oct-90	Mar-91	Apr-91	May-91	Aug-91	Mar-92	Apr-92
pH	units	6.5 to 8.5		7.76	7.02	7.9	7.5	7.6	7.3	8.01	7.66	8.14	7.66	6.82	7.74	8.3	7.9	8.37	7.91
Conductivity	µmho/cm		281	720	750	707	582	520	666	668	471	653	588	816	498	584	696	491	471
Chloride	mg/L		40.3	108	98	92.5	87.5	69.4	98.3	113	73.9	122	94.9	141	84.2	104	110	83.7	80
Sulphate	mg/L																		
Alkalinity	mg/L			256	260	221	194	147	189	159	118	179	153	212	117	128	170	111	104
Hardness	mg/L		108	293	317	35	234	178	236	223	156	218	189	220		163	207	138	134
Total Kjeldahl Nitrogen	mg/L				0.6	0.25	0.3	0.05	0.3	0.8	0.15	0.3	0.25	0.55	0.3	0.25	0.45	0.4	0.3
Ammonia: total	mg/L					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.15	0.05	0.2	0.05	0.2	0.05
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L			0.3	0.15	0.15	0.25	0.15	0.05	0.15	0.05	0.1	0.05	0.15	0.15	0.15	0.15	0.05	0.1
Nitrite	mg/L					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	0.005	0.07	0.015	0.005	0.005	0.01	0.005
Biochemical Oxygen Demand	mg/L																		
Chemical Oxygen Demand	mg/L					26	10	20	26	28	24	4	30	30	6	8	22	18	52
Dissolved Organic Carbon	mg/L					5.7	5.3	4.5	5	4	5.8	4.9	5.1	5.1	3.4	3.5	4.2	4.1	3.1
Phenols	µg/L	1	2	1.4	5	1.8	2.8	1.4	2.2	7.6	0.2	0.2	1	2.2	0.2	0.2	0.2	0.2	0.2
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300		0.57	24.62	2.6	2.5	0.76	0.21	39	2.5	4.9	1.3	110	1.8	32	1.5	4.8	1.1
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030				0.02	0.02	0.02	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.12	0.02	0.02
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW6																	
			Aug-92	Dec-92	Mar-93	Jul-93	Oct-93	Apr-94	May-94	Jul-94	Oct-94	Dec-94	Apr-95	Jul-95	Oct-95	Apr-96	Jun-96	Jul-96	Oct-96	Apr-97
pH	units	6.5 to 8.5	7.8	7.95	7.47	7.68	8.05	8	7.87	7.81	7.83	7.66	7.85	6.94	7.95	7.7	7.6	7.6	7.8	7.26
Conductivity	µmho/cm		673	587	337	581	533	453	499	537	560	500	404	470	355	302	350	350	350	257
Chloride	mg/L		119	109	53.4	98.1	95.3	74.6	81.6	85.6	110	76.6	60.9	57.6	52.4	40.85	46	45	45	29.1
Sulphate	mg/L																			
Alkalinity	mg/L		157	129	78	133	112	101	116	123	119	120	92.8	122	83.5	55.34	73	73	72	45
Hardness	mg/L		174	176	84		135	118	129	144	146	123	95.1	119	85	64.1	95	95	93	68
Total Kjeldahl Nitrogen	mg/L		0.35	0.3	0.4	0.45	0.3	0.4	0.25	0.15	0.25	0.25	0.4	0.75	0.15	0.1	3.2	0.44	0.81	0.52
Ammonia: total	mg/L		0.1	0.15	0.15	0.15	0.05	0.05	0.25	<0.05	0.05	0.2	0.1	0.05	0.05	<0.05	0.08	0.03	0.06	0.09
Ammonia: un-ionized	µg/L	20																		
Nitrate	mg/L		0.15	0.2	0.45	0.2	0.2	0.45	0.35	0.25	0.1		0.55	0.1	0.4	<0.05	0.37	0.39	0.37	
Nitrite	mg/L		0.01	0.005	0.035	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.015	0.005	0.005		<0.05	<0.05	<0.05	
Biochemical Oxygen Demand	mg/L				866		4	70	14.1	6.3					2					
Chemical Oxygen Demand	mg/L		18	14	90	4	10	34	12	14	20.6	11.3	2.9		2	2	98	23	<10	24
Dissolved Organic Carbon	mg/L		3.6	3.2	4.8	3.7	3.4	3.3	3.4	3.5	3.6	3.5	2.5	5.2	2.7		4.3	4.2	3.2	10
Phenols	µg/L	1	0.2	0.2	0.4	0.2	0.2	0.4	0.2	0.6	0.2	0.4	0.4	0.2	0.4	<2	<1	<1	2.9	<1
Arsenic	mg/L	0.005																		
Barium	mg/L																			
Boron	mg/L	0.200																		
Cadmium	mg/L	0.0005 [2]																		
Calcium	mg/L																			
Chromium	mg/L	0.01																		
Copper	mg/L	0.005 [3]																		
Iron	mg/L	0.300	1.9	0.69	6.3		0.58	0.63	1.3	7.1	0.639	27.8	0.701		0.222	<0.02	3.6	0.85	2.1	4.49
Lead	mg/L	0.005 [4]																		
Magnesium	mg/L																			
Manganese	mg/L																			
Mercury	mg/L	0.0002																		
Phosphorus	mg/L	0.030	0.02	0.02	0.02	0.02	0.02	<0.02	<0.02	<0.02	0.02	0.02	0.02	0.1	0.02		0.09	<0.06	0.07	
Sodium	mg/L																			
Zinc	mg/L	0.020																		
Total Dissolved Solids	mg/L																			
Total Suspended Solids	mg/L																			

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW6																
			Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Sep-04	Apr-05	Sep-05
pH	units	6.5 to 8.5	7.56	7.6	7	7.2	6.8	7.52	7.4	7.62	7.59	7	7.6	7.6	7.6	7.43	6.7	7.62	7.84
Conductivity	µmho/cm		360	380	520	540	620	540	780	440	500	410	470	350	400	360	450	384	424
Chloride	mg/L		47.4	51	86	88	100	77	110	55	68	55	60	36	42	49	67	54.2	65
Sulphate	mg/L															50	55	51.2	57
Alkalinity	mg/L		63	65	87	83	87	68	180	60	78	55	58	51	56	40	51	48.5	56
Hardness	mg/L		95	110	160	150	170	150	210	120	140	100	110	97	99	97	120	98.1	110
Total Kjeldahl Nitrogen	mg/L		0.28	0.34	0.22	0.72	0.44	0.58	0.42	0.61	0.44	0.74	0.41	0.19	0.16	0.26	<0.16	0.4	0.2
Ammonia: total	mg/L		0.03	0.08	0.05	0.07	<0.03	<0.02	0.04	0.16	0.03	0.18	0.02	0.07	0.09	0.11	0.05	0.11	<0.05
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L																0.18		
Nitrite	mg/L																<0.01		<0.3
Biochemical Oxygen Demand	mg/L																<5		
Chemical Oxygen Demand	mg/L		31	<10	<10	35	<10	<10	24	20	11	<10	<10	<10	<10	10	18	7	4
Dissolved Organic Carbon	mg/L		<1	3.8	3.1	4.5	3	3.2	6.3	3.3	3.2	2.4	2.7	2.5	2.8	2.3	2.4	2.5	2.9
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	2.3	<1	6.1	<1	<1	1.1	<1	<1	<1	<1
Arsenic	mg/L	0.005														<0.01		<0.2	<0.2
Barium	mg/L															0.087	0.025	0.02	<0.02
Boron	mg/L	0.200														0.092	0.11	0.11	0.12
Cadmium	mg/L	0.0005 [2]														<0.002	<0.005	<0.005	<0.005
Calcium	mg/L																		
Chromium	mg/L	0.01														<0.002	<0.004	<0.01	0.41
Copper	mg/L	0.005 [3]														0.004	<0.006	<0.02	<0.02
Iron	mg/L	0.300	1.71	0.79	0.1	0.96	0.45	1.4	3.1	2.5	0.21	1.7	1.2	0.82	1.5	8.8	1.3	5.74	0.61
Lead	mg/L	0.005 [4]														<0.01	<0.02	<0.05	<0.05
Magnesium	mg/L																		
Manganese	mg/L			0.57	0.26	0.58	0.42	0.51	5.1	1.3	0.46	1.1	0.97	0.32	1	4	0.77	0.74	0.33
Mercury	mg/L	0.0002																<0.0001	<0.0001
Phosphorus	mg/L	0.030				0.07			0.07							0.1	<0.06	0.214	0.069
Sodium	mg/L																		
Zinc	mg/L	0.020														0.011	<0.005	<0.01	<0.01
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW6														
			Apr-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13
pH	units	6.5 to 8.5	7.7	6.84	6.65	7.17	8.06	7.64	7.7	7.56	7.83	7.81	7.76	7.02	7.13	6.9	6.9
Conductivity	µmho/cm		381	400	470	295	427	336	352	322	370	373	367	367	391	333	389
Chloride	mg/L		60	62.7	70.3	43.5	67.7	52.4	80.8	58.3	69.6	65.4	67.8	60	62	56	68
Sulphate	mg/L		46	54.9	65.2	47	46.2	42.7	41.5	40.4	40.4	38.7	41.6	37	35	31	26
Alkalinity	mg/L		42	34	50	28	40	31	32	31	42	35	50	44	56	37	45
Hardness	mg/L		110	102	125	85	111	76	91	81	101	89	97	66	95	83	90
Total Kjeldahl Nitrogen	mg/L		0.2	<0.10	0.17	0.55	0.2	0.33	1.98	0.2	0.39	0.62	<0.10	0.24	0.34	0.25	0.26
Ammonia: total	mg/L		<0.05	0.06	<0.02	<0.02	<0.02	0.09	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.06
Ammonia: un-ionized	µg/L	20										<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.2				0.22	0.32	0.24	0.32	0.21	0.3	0.08	0.28	0.16	0.15	0.18
Nitrite	mg/L		<0.01				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Biochemical Oxygen Demand	mg/L						<5	<5	<5			<5	<5	2	1	<1	1
Chemical Oxygen Demand	mg/L		10	12.7	10	11	5	<5	7	14	<5	<5	<5	14	15	6	11
Dissolved Organic Carbon	mg/L		2.6	2.1	3.2	4.2	2.4	2.2	4.1	2.2	3.9	2.8	2.9	<5	3.2	2.6	2.4
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.001	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	<0.001	<0.001	<0.001
Barium	mg/L		0.022	0.024	0.026	0.025	0.021	0.021	0.039	0.021	0.017	0.02	0.014	0.02	0.01	0.02	0.02
Boron	mg/L	0.200	0.11	0.107	0.127	0.081	0.107	0.101	0.083	0.08	0.118	0.117	0.146	0.12	0.16	0.12	0.14
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.0001	<0.002	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L													20	28	25	26
Chromium	mg/L	0.01	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.001	<0.001	0.001	<0.001
Copper	mg/L	0.005 [3]	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.003	<0.003	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001
Iron	mg/L	0.300	0.62	1.04	1.53	4.37	0.49	1.07	4.44	0.968	0.149	0.916	0.173	0.55	0.23	0.74	1.02
Lead	mg/L	0.005 [4]	<0.0005	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L													4	6	5	6
Manganese	mg/L		0.3	0.621	0.507	0.747	0.168	0.604	1.13	0.345	0.195	0.287	0.128	0.18	0.21	0.25	0.36
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	<0.005	<0.02	0.15	0.03	0.03	0.03	0.16	<0.02	0.05	0.05	<0.02	0.01	<0.01	<0.01	0.03
Sodium	mg/L																
Zinc	mg/L	0.020	<0.005	<0.004	<0.004	<0.004	<0.004	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L							188	226	228	206	210	262	239	254	216	253
Total Suspended Solids	mg/L							17	63	<10	23	28	<10	37	5	14	132

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW6															
			Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.5 to 8.5	6.77	7.58	7.58	7.69	6.7	7.54	7.39	7.52	7.41	7.66	7.48	7.64	7.52	7.39	7.29	7.39
Conductivity	µmho/cm		378	390	332	403	310	410	240	410	490	550	421	502	400	396	386	396
Chloride	mg/L		70	75	60	71	56	77	43	91	110	130	94	115	86	98	82	98
Sulphate	mg/L		27	23	21	20	21	19	13	15	21	16	17	18	16	14	14	14
Alkalinity	mg/L		41	38	31	47	38	43	27	26	35	39	61	32	29	29	26	29
Hardness	mg/L		86	90	69	83	62	90	45	89	94	110	83	100	74	74	86	74
Total Kjeldahl Nitrogen	mg/L		0.42	<0.10	3.45	0.14	0.11	0.14	0.15	<0.10	<0.10	0.15	0.2	<0.1	0.279	0.273	<0.100	0.273
Ammonia: total	mg/L		0.07	0.07	<0.02	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.04	0.06	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.29	0.19	0.26	0.15	0.19	0.11	0.16	0.17	0.23	0.13	0.32	0.18	0.22	<0.10	0.2	<0.10
Nitrite	mg/L						<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		3	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	1	4	3	<1	3
Chemical Oxygen Demand	mg/L		13	8	34	20	20	17	24	<4.0	7.2	9.2	<5	<5	23	17	<5	17
Dissolved Organic Carbon	mg/L		2.5	3.2	2.6	1.9	2	2.1	4.8	1.7	1.5	2.2	1.5	1.9	1.8	3	2.1	3
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.02	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L		0.05	0.01	0.04	0.01	0.014	0.064	0.017	0.029	0.025	0.032	0.04	0.03	0.03	0.02	0.02	0.02
Boron	mg/L	0.200	0.2	0.13	0.12	0.13	0.1	0.12	0.079	0.083	0.093	0.095	0.09	0.09	0.06	0.07	0.06	0.07
Cadmium	mg/L	0.0005 [2]	<0.008	<0.0001	0.0001	<0.0001	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L		26	26	21	25							25	30	23	23	26	23
Chromium	mg/L	0.01	<0.05	<0.001	<0.001	<0.001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	<0.01	<0.001	0.003	<0.001	<0.0010	0.0022	0.0011	<0.0010	0.0013	0.0012	0.001	<0.001	0.001	<0.001	<0.001	<0.001
Iron	mg/L	0.300	4.8	0.06	3.58	0.39	0.34	7.8	1.3	1.5	0.31	1.2	0.13	0.45	0.81	0.21	0.24	0.21
Lead	mg/L	0.005 [4]	<0.01	<0.001	0.001	<0.001	<0.00050	0.0012	<0.00050	<0.00050	<0.00050	<0.00050	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L		5	6	4	5							5	6	4	4	5	4
Manganese	mg/L		1.43	0.04	1.05	0.14	0.089	2.6	0.28	0.42	0.13	0.45	0.04	0.16	0.15	0.08	0.07	0.08
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.08	<0.01	0.57	<0.05	0.008	0.026	0.031	0.006	0.008	<0.004	0.007	0.004	0.007	0.004	0.005	0.004
Sodium	mg/L												46	50	42	36	44	36
Zinc	mg/L	0.020	<0.04	<0.01	<0.01	<0.01	<0.0050	0.0072	<0.0050	<0.0050	<0.0050	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L		246	254	216	262	152	214	144	362	205	435	274	326	260	257	251	257
Total Suspended Solids	mg/L		306	9	53	29	<10	120	12	<10	18	<10	5	9	25	15	7	15

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW7												
			May-86	Sep-87	Apr-89	Mar-90	Apr-90	May-90	Jul-90	Oct-90	Mar-91	Apr-91	May-91	Aug-91	Mar-92
pH	units	6.5 to 8.5		7.62	5.9	6.88	7.15	7.3	6.69	6.94	7.58	7.08	8.16	7.2	7.64
Conductivity	µmho/cm		702	818	31.2	670	860	311	694	447	599	531	546	666	661
Chloride	mg/L		86.9	141	0.3	137	129	51.7	102	73.2	105	94.5	89.5	106	113
Sulphate	mg/L														
Alkalinity	mg/L			276	1.7	151.7	167.1	70.3	247.1	110	144.1	119.5	127.9	162.7	154.7
Hardness	mg/L		292	289	8	211	237.4	90	187	125	182.3	137	120.9	181.1	158.7
Total Kjeldahl Nitrogen	mg/L				0.05	0.4	0.5	0.15	1.55	0.35	0.35	0.55	0.85	2.5	0.8
Ammonia: total	mg/L				0.05	0.3	0.25	0.1	0.5	0.15	0.05	0.3	0.6	0.35	0.55
Ammonia: un-ionized	µg/L	20													
Nitrate	mg/L			0.05	0.1	0.05	0.05	0.15	0.05	0.05	0.15	0.05	0.05	0.1	0.05
Nitrite	mg/L				0.005	0.01	0.005	0.005	0.015	0.005	0.01	0.01	0.01	0.005	0.005
Biochemical Oxygen Demand	mg/L														
Chemical Oxygen Demand	mg/L				8	30	22	30	38	32	14	8	2	20	20
Dissolved Organic Carbon	mg/L				4	2.9	3.5	3.8	4.6	3.2	3.6	3	3.1	3.5	3.5
Phenols	µg/L	1	21	0.2	1	2	1.6	0.2	1	1	0.6	0.2	0.2	0.4	0.4
Arsenic	mg/L	0.005													
Barium	mg/L														
Boron	mg/L	0.200													
Cadmium	mg/L	0.0005 [2]													
Calcium	mg/L														
Chromium	mg/L	0.01													
Copper	mg/L	0.005 [3]													
Iron	mg/L	0.300	15	0.34	0.05	100	19	22	190	0.68	3.9	3.7	18	6.1	11
Lead	mg/L	0.005 [4]													
Magnesium	mg/L														
Manganese	mg/L		15												
Mercury	mg/L	0.0002													
Phosphorus	mg/L	0.030			0.02	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.02	2.45	0.02
Sodium	mg/L														
Zinc	mg/L	0.020													
Total Dissolved Solids	mg/L														
Total Suspended Solids	mg/L														

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW7																
			Apr-92	Aug-92	Dec-92	Mar-93	Jul-93	Oct-93	Apr-94	May-94	Jul-94	Oct-94	Dec-94	Feb-95	Apr-95	Jul-95	Oct-95	Apr-96	Jun-96
pH	units	6.5 to 8.5	7.01	7	7.6	7.39	7.98	7.74	7.52	7.8	7.77	8.12	8.02	7.36	7.85	7.92	7.77	6.7	6.8
Conductivity	µmho/cm		586	669	503	453	553	469	196	408	594	373	206	385	310	270	290	556	610
Chloride	mg/L		104	108	85	75	88.8	79.6	27.3	63.7		50.3	51	50.6	37.4	30.8	34.4	67.92	77
Sulphate	mg/L																		
Alkalinity	mg/L		132.6	167	115.4	106.4	133.2	102.8	47.9	95.5	160.5	106	104	108	85.1	77	79.5	149.44	140
Hardness	mg/L		139.7	154	136	104.6		107.6	53.7	99.8	148.1	92.6	86.3	87.8	68.7	61	66.5	124.48	170
Total Kjeldahl Nitrogen	mg/L		0.8	1	0.6	0.4	0.6	0.35	0.2	0.25		0.3	0.2	0.2	0.45	0.5	0.3	13.1	1.6
Ammonia: total	mg/L		0.4	0.75	0.45	0.05	0.2	0.05	0.05	0.2		0.05	0.05	0.2	0.35	0.15	0.25	<0.05	0.89
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L		0.05	0.1	0.15	0.25	0.5	0.45	0.3	0.5		0.55	0.9	0.85	0.4	0.45	0.45	<0.05	<0.05
Nitrite	mg/L		0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.01		0.005	0.005	0.015	0.01	0.005	0.01		<0.05
Biochemical Oxygen Demand	mg/L					866		4	70	14.1	6.3						2		
Chemical Oxygen Demand	mg/L		24	40	6	10	14	10	18	4	30	11.8	19.9	2.84	40.6		2	18	840
Dissolved Organic Carbon	mg/L		3.2	3.6	2.8	3.2	3.4	3.1	2.8	3.5		2.9	2.6	2.3	2.3	2.6	2.5	9.6	11
Phenols	µg/L	1	0.2	0.2	0.2	1.4	0.2	0.2	0.6	0.2		0.8	0.6	0.4	0.4	0.2	0.2	<2	<1
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	4.5	14	11	88		0.37	5.5	1.8	2.9	46.7	17.4	11.1	0.077		0.454	0.42	42
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030	0.02	0.02	0.02	0.02	0.02	0.02	<0.02	<0.02	<0.02	0.02	0.02	0.04	0.02	0.02	0.02		0.6
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW7																
			Jul-96	Oct-96	Apr-97	Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Apr-04	Sep-04	Apr-05	Sep-05
pH	units	6.5 to 8.5	7.4	7	6.97	6.9	6.4	6.1	6.5	6.9	6.49	7.1	7.53	6.19	6.8	6.64	6.6	7.01	7.33
Conductivity	µmho/cm		670	650	331	461	570	600	510	380	850	580	440	330	580	400	540	213	353
Chloride	mg/L		85	83	39	56	69	84	73	49	100	62	41	35	68	40	61	23.8	48
Sulphate	mg/L															48	86	31.1	47
Alkalinity	mg/L		150	140	4	89	110	110	100	69	140	90	82	6	92	52	97	27.8	48
Hardness	mg/L		250	250	91	131	180	190	160	100	260	170	120	91	160	110	350	54	86.7
Total Kjeldahl Nitrogen	mg/L		1.9	2.2	0.76	0.67	1.1	1.4	5.2	1.4	1.8	7.7	1.9	1.3	1.5	0.42	5.6	2.3	0.7
Ammonia: total	mg/L		0.9	0.94	0.44	0.47	0.79	0.84	0.83	0.1	0.94	0.05	0.65	0.26	0.37	0.22	0.26	0.13	0.08
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L		<0.05	<0.05													0.055		
Nitrite	mg/L		<0.05	<0.05													0.019		<0.3
Biochemical Oxygen Demand	mg/L																<5		
Chemical Oxygen Demand	mg/L		380	69	10	19	13	27	160	63	52	140	48	38	32	17	42	52	12
Dissolved Organic Carbon	mg/L		13	15	8	<1	4.3	3.6	10	5.8	15	22	4.6	5	6.5	2.7	6.1	7.8	5.1
Phenols	µg/L	1	<1	1.4	1	<1	<1	1.4	<1	<1	1.8	2.1	1.9	<1	2.6	<1	<1	1	<1
Arsenic	mg/L	0.005														<0.01		<0.2	<0.2
Barium	mg/L															0.072	1.3	<0.02	0.02
Boron	mg/L	0.200														0.12	0.3	0.08	0.12
Cadmium	mg/L	0.0005 [2]														<0.002	<0.025	<0.005	<0.005
Calcium	mg/L																		
Chromium	mg/L	0.01														0.002	<0.02	<0.01	0.19
Copper	mg/L	0.005 [3]														<0.002	<0.03	<0.02	<0.02
Iron	mg/L	0.300	83	120	1.96	0.49	22	35	100	40	150	120	37	25	44	22	78	6.55	11.6
Lead	mg/L	0.005 [4]														<0.01	<0.1	<0.05	<0.05
Magnesium	mg/L																		
Manganese	mg/L						5.4	6.8	6.2	12	9.4	28	6.5	4.9	4.3	7.6		2.87	4.82
Mercury	mg/L	0.0002																<0.0001	<0.0001
Phosphorus	mg/L	0.030	2.5	3.1					0.96			0.79				0.053	<0.3	0.179	0.121
Sodium	mg/L																		
Zinc	mg/L	0.020														0.005	0.18	<0.01	<0.01
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW7															
			Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Sep-11	Apr-12	Sep-12	Apr-13	Sep-13
pH	units	6.5 to 8.5	7.2	7.5	6.63	6.63	7.14	7.97	7.54	7.74	7.64	7.92	7.69	7.84	7.08	7.05	6.92	6.98
Conductivity	µmho/cm		80	413	298	592	173	510	323	397	311	348	296	390	391	384	251	425
Chloride	mg/L		9	68	40.9	79.1	19.4	68.7	44.1	72.8	46.7	58.3	47.9	67.2	59	55	37	66
Sulphate	mg/L		12	50	47.6	109	28.9	71.8	53.3	62.1	44.3	41.8	30	43	42	27	22	33
Alkalinity	mg/L		10		24	59	17	50	30	48	56	57	36	66	52	68	39	68
Hardness	mg/L		21	100	79	167	49	139	84	112	82	102	73	113	73	95	61	101
Total Kjeldahl Nitrogen	mg/L		0.4	0.8	<0.10	0.42	0.42	0.32	0.22	0.32	<0.10	0.15	0.26	0.14	0.3	<0.10	0.31	0.3
Ammonia: total	mg/L		0.06	0.09	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.06	<0.02	<0.02	0.1	<0.02	0.03	0.02	0.03
Ammonia: un-ionized	µg/L	20											<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.1					0.06	0.09	0.09	0.08	0.06	0.11	0.06	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.01					<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05				
Biochemical Oxygen Demand	mg/L							<5	<5	<5	<5	<5	<5	<5	2	3	<1	<1
Chemical Oxygen Demand	mg/L		33	130	9.9	21	12	10	<5	<5	13	<5	<5	17	14	10	8	14
Dissolved Organic Carbon	mg/L		3.3	10.1	3.9	7.8	3.3	2.5	2.6	3.3	2.5	2.9	2.5	3.7	<5	3.2	2.5	2.6
Phenols	µg/L	1	<1	<1	<1	9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.001	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	<0.001	<0.001	<0.001
Barium	mg/L		0.026	0.05	0.023	0.238	0.01	0.013	0.017	0.011	0.012	0.008	0.01	0.053	0.01	<0.01	<0.01	0.01
Boron	mg/L	0.200	0.014	0.1	0.087	0.207	0.053	0.168	0.115	0.143	0.107	0.138	0.1	0.175	0.14	0.18	0.1	0.21
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.005	<0.0001	<0.002	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L														21	28	18	29
Chromium	mg/L	0.01	0.005	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.002	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	0.002	<0.02	<0.002	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001
Iron	mg/L	0.300	7.3	32	9.7	54.4	2.18	0.52	1.95	0.33	0.592	0.278	0.824	3.75	1.39	0.36	0.55	1.81
Lead	mg/L	0.005 [4]	0.0021	<0.05	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L														5	6	4	7
Manganese	mg/L		0.63	3.2	1.47	27.8	0.744	0.839	1.14	0.788	0.59	0.922	0.593	2.92	0.72	1.45	0.41	1.62
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.15	0.2	0.03	0.09	0.02		0.04	0.02	<0.02	0.04	<0.05	0.27	0.02	0.01	0.02	0.04
Sodium	mg/L																	
Zinc	mg/L	0.020	0.007	0.02	<0.004	0.021	<0.004	<0.004	<0.005	0.188	<0.005	<0.005	<0.005	0.013	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L								206	248	218	200	162	280	254	250	163	276
Total Suspended Solids	mg/L								600	63	10	<10	49	226	36	77	27	4

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW7															
			Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.5 to 8.5	6.76	7.62	7.65	7.85	6.66	7.79	7.17	7.68	7.41	7.7	7.36	7.74	7.73	7.59	7.31	7.59
Conductivity	µmho/cm		349	436	334	450	220	430	110	450	380	530	240	517	411	381	340	381
Chloride	mg/L		59	74	54	70	30	65	14	89	85	110	48	111	85	84	64	84
Sulphate	mg/L		27	24	21	21	14	17	7.3	19	18	13	10	16	15	13	13	13
Alkalinity	mg/L		48	61	44	79	33	77	16	51	36	65	63	54	41	49	41	49
Hardness	mg/L		78	104	73	97	44	100	21	92	77	110	47	104	73	66	64	66
Total Kjeldahl Nitrogen	mg/L		0.3	0.15	<0.10	0.15	<0.10	0.13	0.16	0.11	<0.10	0.12	0.2	0.5	0.799	0.355	0.73	0.355
Ammonia: total	mg/L		0.09	0.04	<0.02	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	0.073	0.04	0.07	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L						<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		2	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	1	<1	4	<1	4
Chemical Oxygen Demand	mg/L		11	6	31	10	33	9.9	17	<4.0	5.8	9.6	<5	18	56	18	51	18
Dissolved Organic Carbon	mg/L		2.5	2.7	2.6	2.1	1.9	2.4	4	1.9	1.5	2.7	1	1.7	2.2	2.4	1.9	2.4
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	3	<1	<1	<1
Arsenic	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.01	<0.02	<0.001	<0.001	<0.001
Barium	mg/L		0.01	0.01	<0.01	<0.01	0.011	0.01	0.027	0.014	0.014	0.015	0.02	<0.1	0.34	<0.01	0.02	<0.01
Boron	mg/L	0.200	0.18	0.22	0.16	0.22	0.099	0.2	0.055	0.15	0.098	0.13	0.07	<0.1	0.1	0.1	0.08	0.1
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.001	<0.008	<0.0001	<0.0001	<0.0001
Calcium	mg/L		23	30	21	29							14	30	21	20	19	20
Chromium	mg/L	0.01	<0.001	<0.001	<0.001	<0.001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.001	<0.01	<0.05	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.0076	<0.0010	<0.0010	0.0018	<0.001	<0.01	0.03	<0.001	<0.001	<0.001
Iron	mg/L	0.300	0.61	0.47	0.39	0.32	0.96	1	3	0.75	0.85	1.8	0.29	6.4	85	0.34	2.48	0.34
Lead	mg/L	0.005 [4]	<0.001	<0.001	<0.001	<0.001	<0.00050	<0.00050	0.0015	<0.00050	0.00075	0.00052	<0.001	<0.01	0.04	<0.001	<0.001	<0.001
Magnesium	mg/L		5	7	5	6							3	7	5	4	4	4
Manganese	mg/L		0.67	1.13	0.36	1.03	0.62	1.3	1.7	0.99	0.27	2.2	0.29	3	21.9	0.83	0.94	0.83
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.04	<0.01	0.02	<0.05	0.033	0.01	0.091	0.032	0.075	0.028	0.003	0.03	1.98	0.005	0.025	0.005
Sodium	mg/L												26	54	47	38	44	38
Zinc	mg/L	0.020	<0.01	<0.01	<0.01	0.06	<0.0050	<0.0050	0.013	<0.0050	<0.0050	<0.0050	<0.01	<0.1	0.15	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L		227	283	217	292	132	238	62	320	150	375	156	336	267	248	221	248
Total Suspended Solids	mg/L		160	14	63	6	36	24	40	<10	12	<10	<2	67	58	40	317	40

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW20															
			Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08	Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10
pH	units	6.5 to 8.5	6.53	6.53	6.42	6.68	6.64	7.36	7.69	7.37	6.82	7.3	6.9	7.21	6.97	7.41	7.41	6.87
Conductivity	µmho/cm		67	54	58	76	59	75	89	87	34	63	88	76	61	73	84	58
Chloride	mg/L		3.21	1.19	1.04	5.15	2.78	6.3	8.62	8.87	1.83	5.36	7.75	6.93	4.44	3.8	5.8	3.17
Sulphate	mg/L		11.4	4.95	3.51	10.7	8.44	3.09	3.67	8.75	5.1	2.45	12.2	10.2	8	4.14	3.16	7.37
Alkalinity	mg/L		<10	15	23	10	6	22	27	14	5	16	11	12	11	24	30	10
Hardness	mg/L		22	21	22	24	18	29	31	29	10	24	31	25	20	29	31	18
Total Kjeldahl Nitrogen	mg/L		0.36	0.38	0.42	0.33	<0.10	0.49	0.6	0.48	0.21	0.7	0.63	0.48	0.67	0.58	0.76	0.5
Ammonia: total	mg/L		0.09	<0.02	<0.02	<0.02	<0.02	0.11	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ammonia: un-ionized	µg/L	20																
Nitrate	mg/L								0.15	0.12	0.14	0.22	<0.05	0.1	0.15	0.22	<0.05	0.19
Nitrite	mg/L								<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Biochemical Oxygen Demand	mg/L								<5	13	<5	<5	<5	<5				
Chemical Oxygen Demand	mg/L		12.4	25	27	26	4.9	33	10	7	13	29	33	24	32	24	29	19
Dissolved Organic Carbon	mg/L		5.5	8.4	10.1	12.4	12	14	94	7.9	6.2	12.5	12.8	8	8.5	9.7	11.4	7.1
Phenols	µg/L	1	2	2	7	3	<4	<1	1	2	<1	1	1	3	<1	<1	1	<1
Arsenic	mg/L	0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003		<0.003		<0.003		<0.003	
Barium	mg/L		0.021	0.013	0.015	0.059	0.011	0.025	0.023		0.01		0.021		0.026		0.022	
Boron	mg/L	0.200	0.019	0.011	0.02	0.019	0.0014	0.02	0.02	0.023	0.011	0.019	0.038	<0.010	0.018	0.025	0.026	0.014
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.001	<0.002	0.0002	<0.001	<0.0001	<0.0001		<0.001		<0.001		<0.001		<0.001	
Calcium	mg/L																	
Chromium	mg/L	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003		<0.003		<0.003		<0.003	
Copper	mg/L	0.005 [3]	<0.002	<0.002	<0.002	0.005	<0.002	<0.002	<0.002		<0.002		<0.002		0.002		<0.002	
Iron	mg/L	0.300	0.39	0.516	0.442	2.28	0.131	0.528	0.43	0.23	0.15	0.375	0.286	0.033	0.595	0.527	0.468	0.229
Lead	mg/L	0.005 [4]	<0.001	<0.002	<0.002	0.003	<0.002	<0.002	<0.002		<0.002		<0.002		<0.002		<0.002	
Magnesium	mg/L																	
Manganese	mg/L		0.033	0.047	0.019	0.327	0.024	0.037	0.03	<0.03	0.012	0.043	0.023	0.012	0.06	0.073	0.082	0.034
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Phosphorus	mg/L	0.030	0.15	0.09	0.13	0.03	<0.02	0.06	0.06	0.05	0.05	0.1	0.05	<0.02	0.2	0.18	0.08	0.04
Sodium	mg/L																	
Zinc	mg/L	0.020	0.005	0.006	<0.004	0.019	<0.001	0.132	0.011		<0.005		<0.005		0.007		<0.005	
Total Dissolved Solids	mg/L										34	60	78	<20	78	80	56	36
Total Suspended Solids	mg/L										22	<10	18	<10	124	105	<10	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW20															
			Apr-11	Jul-11	Sep-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14
pH	units	6.5 to 8.5	7.05	7.22	7.22	6.89	6.71	7.04	6.6	6.43	6.66	7.2	6.8	6.86	6.5	7.5	7.15	7.02
Conductivity	µmho/cm		67	67	67	70	71	60	195	71	64	65	88	73	66	78	80	74
Chloride	mg/L		4.4	1.84	1.05	3.92	5	1	10	4	3	3	6	4	3	4	4	3
Sulphate	mg/L		8.46	4.32	6.87	10.8	9	4	52	9	9	3	4	9	7	3	4	9
Alkalinity	mg/L		12	23	23	10	13	26	17	17	15	26	30	21	21	29	26	17
Hardness	mg/L		20	26	27	22	23	21	69	26	26	28	31	26	26	33	33	26
Total Kjeldahl Nitrogen	mg/L		0.82	0.57	0.37	0.39	0.26	0.3	0.52	0.19	0.33	0.42	0.48	0.28	0.28	0.6	0.36	<0.10
Ammonia: total	mg/L		0.03	0.3	0.09	0.02	<0.02	<0.02	<0.02	0.04	0.03	0.03	0.02	0.06	0.09	0.1	0.12	0.04
Ammonia: un-ionized	µg/L	20	<1	3	2	1	<1	<2	<2	1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.38	0.35	<0.05	0.31	0.13	0.14	<0.10	0.11	<0.10	0.19	<0.10	0.19	0.22	0.2	<0.10	0.13
Nitrite	mg/L		<0.05	<0.05	<0.05	<0.05		<0.10		<0.10		<0.10		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L		<5	<5	<5	<5	<1	<1	1	1	<1	1	2	2	<1	<1	<1	<1
Chemical Oxygen Demand	mg/L		7	24	20	26	13	24	38	28	7	34	42	18	8	30	38	11
Dissolved Organic Carbon	mg/L		5.5	10	12.4	7.4	10	8.5	14.3	8.4	6.7	14.1	14.7	7.2	7.1	10.9	16.1	6.4
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.003		<0.003		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Barium	mg/L		0.017		0.021		0.01		0.04		0.01		0.02		0.01	0.02	0.02	
Boron	mg/L	0.200	0.017	0.016	0.038	0.031	0.02	0.01	0.06	0.04	0.02	0.01	0.02	0.02	0.02	0.01	0.03	0.03
Cadmium	mg/L	0.0005 [2]	<0.001		<0.001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Calcium	mg/L						6	5	21	7	7	8	9	7	7	10	10	7
Chromium	mg/L	0.01	<0.003		<0.003		0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]	<0.002		<0.002		<0.001		0.001		<0.001		<0.001		0.001	<0.001	<0.001	
Iron	mg/L	0.300	0.315	0.472	0.436	0.162	0.16	0.48	0.19	0.19	0.27	0.64	0.56	0.42	0.43	0.5	0.48	0.21
Lead	mg/L	0.005 [4]	<0.002		<0.002		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Magnesium	mg/L						2	2	4	2	2	2	2	2	2	2	2	2
Manganese	mg/L		0.047	0.076	0.025	0.019	0.01	0.07	0.08	0.02	0.03	0.05	0.09	0.07	0.04	0.16	0.1	0.03
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Phosphorus	mg/L	0.030	0.06	0.16	0.12	0.03	<0.01	0.06	0.03	0.02	0.03	0.02	0.01	0.05	0.07	0.01	0.06	0.02
Sodium	mg/L																	
Zinc	mg/L	0.020	0.005		<0.005		<0.01		<0.01		<0.01		<0.01		<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		46	80	86	64	46	39	127	46	42	42	57	47	43	51	52	48
Total Suspended Solids	mg/L		31	128	<10	<10	2	<2	<2	<2	141	<2	5	23	49	<2	2	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW20									
			Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Sep-16	Dec-16	Apr-17	Jul-17	Sep-17
pH	units	6.5 to 8.5	7.23	7.69	7.28	6.99	6.31	7.04	7.02	6.7	7.34	7.38
Conductivity	µmho/cm		74	67	63	82	62	140	79	36	67	77
Chloride	mg/L		4	<1	1	4	2.3	2.7	4.2	<1.0	2.1	3.8
Sulphate	mg/L		7	4	3	17	9.7	37	11	4.6	2	2.1
Alkalinity	mg/L		21	29	27	11	12	13	12	6.2	27	30
Hardness	mg/L		28	26	26	31	21	59	28	12	29	33
Total Kjeldahl Nitrogen	mg/L		0.13	0.14	0.24	0.22	0.17	0.46	0.38	0.16	0.25	0.37
Ammonia: total	mg/L		0.07	<0.05	<0.025	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		8	7	7	9	0.2	<0.10	<0.10	0.3	0.13	<0.10
Nitrite	mg/L		4	<1	1	4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Biochemical Oxygen Demand	mg/L		<1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L		15	22	19	22	25	36	45	16	53	36
Dissolved Organic Carbon	mg/L		6.2	7.9	5.9	8.6	5.1	11	15	5.6	13	17
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5.7
Arsenic	mg/L	0.005	<0.001		<0.001		<0.0010	<0.0010		<0.0010		<0.0010
Barium	mg/L		0.01		0.01		0.014	0.036		0.01		0.022
Boron	mg/L	0.200	0.02	0.01	0.01	0.04	0.023	0.053	0.032	0.015	0.019	0.025
Cadmium	mg/L	0.0005 [2]	<0.0001		<0.0001		<0.00010	<0.00010		<0.00010		<0.00010
Calcium	mg/L		8	7	7	9						
Chromium	mg/L	0.01	<0.001		<0.001		<0.0050	<0.0050		<0.0050		<0.0050
Copper	mg/L	0.005 [3]	<0.001		0.001		0.0011	0.0011		0.0011		0.0013
Iron	mg/L	0.300	0.4	0.58	0.83	0.27	0.25	0.21	0.96	0.26	0.61	0.94
Lead	mg/L	0.005 [4]	<0.001		<0.001		<0.00050	<0.00050		<0.00050		<0.00050
Magnesium	mg/L		2	2	2	2						
Manganese	mg/L		0.04	0.11	0.2	0.03	0.014	0.065	0.09	0.02	0.15	0.16
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.1	<0.1		<0.1		<0.1
Phosphorus	mg/L	0.030	0.04	0.09	0.07	<0.05	0.017	0.028	0.052	0.025	0.075	0.064
Sodium	mg/L											
Zinc	mg/L	0.020	<0.01		<0.01		<0.0050	<0.0050		<0.0050		<0.0050
Total Dissolved Solids	mg/L		48	44	41	53	68	78	50	32	94	98
Total Suspended Solids	mg/L		60	5	<3	5	22	<10	<10	<10	<10	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW20															
			Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	6.5 to 8.5	7.11	7.06	7.31	6.94	7.02	7.42	7.21	7.07	7.23	7.36	7.01	7.08	7.04	7.17	7.01	6.56
Conductivity	µmho/cm		63	55	82	57	45	48	161	60	51	74	62	69	58	87	62	38
Chloride	mg/L		2.1	<1.0	1.7	1.2	6	<1	6	3	2	3	13	7	4	6	13	3
Sulphate	mg/L		6.9	3.3	3.2	5	5	3	53	6	4	2	3	5	3	1	3	3
Alkalinity	mg/L		16	21	32	14	14	21	11	17	14	29	14	16	16	33	14	8
Hardness	mg/L		22	22	37	21	17	21	73	15	19	36	22	28	23	38	22	14
Total Kjeldahl Nitrogen	mg/L		0.12	0.24	0.55	0.19	0.4	0.23	0.5	0.335	0.354	1.06	0.545	0.197	0.37	0.598	0.545	0.64
Ammonia: total	mg/L		<0.050	0.055	0.051	<0.050	0.07	0.03	0.08	<0.010	<0.010	0.019	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.38	0.34	<0.50	0.2	0.48	0.22	0.12	0.14	<0.10	0.16	<0.10	0.14	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.010	<0.010	<0.050	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.18	<0.10	0.41
Biochemical Oxygen Demand	mg/L		<2	<2	<2	12	<1	4	2	3	<1	2	4	2	5	2	4	<1
Chemical Oxygen Demand	mg/L		29	17	58	18	14	22	50	15	29	52	43	17	19	<5	43	14
Dissolved Organic Carbon	mg/L		5.4	8.4	21	6.9	4.7	7.3	15.4	7.8	7.6	22.6	12.5	5	7.1	13.4	12.5	6.6
Phenols	µg/L	1	<1		<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.0010		<0.0010		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Barium	mg/L		0.014		0.024		0.03		0.04		0.01		0.01		0.01	0.02	0.01	
Boron	mg/L	0.200	0.016	0.012	0.036	0.011	0.02	<0.01	0.05	0.03	0.02	0.05	0.02	0.03	0.02	0.03	0.02	0.01
Cadmium	mg/L	0.0005 [2]	<0.00010		<0.00010		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Calcium	mg/L						5	5	21	6	6	11	7	8	6	12	7	4
Chromium	mg/L	0.01	<0.0050		<0.0050		0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]	0.0013		0.0021		0.002		0.001		0.001		<0.001		<0.001	0.001	<0.001	
Iron	mg/L	0.300	0.59	1.2	0.8	0.5	0.56	0.36	0.14	0.26	0.26	1.27	0.5	0.29	0.28	0.8	0.5	0.25
Lead	mg/L	0.005 [4]	<0.00050		0.00053		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Magnesium	mg/L						1	2	5	<1	1	2	1	2	2	2	1	1
Manganese	mg/L		0.039	0.059	0.18	0.037	0.07	0.03	0.22	0.02	0.03	0.18	0.06	0.07	0.03	0.33	0.06	0.04
Mercury	mg/L	0.0002	<0.1		<0.1		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.089	0.084	0.072	0.035	0.042	0.043	0.017	0.015	0.022	0.073	0.03	0.022	0.024	0.082	0.03	0.012
Sodium	mg/L						<2		4		2		3		3	5	3	
Zinc	mg/L	0.020	<0.0050		0.005		<0.01		<0.01		<0.01		<0.01		<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		10	10	145	35	29	31	105	39	33	48	40	45	38	57	40	25
Total Suspended Solids	mg/L		73	32	12	13	22	2	51	5	15	51	7	8	14	13	7	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26															
			Mar-88	May-88	Jun-88	Jul-88	Aug-88	Oct-88	Apr-89	Jul-89	Mar-90	May-90	Jul-90	Oct-90	Nov-90	Mar-91	May-91	Jul-91
pH	units	6.5 to 8.5	6.07	6.02	5.74	6.38	6.5	6.8	6.7	6.8	6.13	6.06	6.6	5.73	5.75	6.22	6.17	6.8
Conductivity	µmho/cm		30	33	31	27	74.5	37.8	33.8	32.1	35	27.8	39.5	26	26.7	28	28	30.7
Chloride	mg/L		0.5	0.2	0.8	0.6	0.7	0.9	0.5	0.6	0.5	0.7	0.4	0.8	0.6	0.9	0.5	10.4
Sulphate	mg/L																	
Alkalinity	mg/L		6	5	8	8	12.2	5	2.6	11.8	3.3	7.7	15.9	4.7	10.4	3	8	8.8
Hardness	mg/L		8	9	12	15	24	14	8	12	10	8	15	9.7	9.2	9	10	11
Total Kjeldahl Nitrogen	mg/L																	
Ammonia: total	mg/L						0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05
Ammonia: un-ionized	µg/L	20																
Nitrate	mg/L		0.4	0.15	0.2	0.1	0.15	0.2	0.3	0.05	0.3	0.05	0.05	0.05	0.1	0.1	0.05	0.05
Nitrite	mg/L						0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.01	0.005
Biochemical Oxygen Demand	mg/L																	
Chemical Oxygen Demand	mg/L						40	28	10	40	16	20	28	26	14	10	24	12
Dissolved Organic Carbon	mg/L						11.4	8.2	3.5	12.5	3.7	6.9	8.1	5.7	4.9	4.7	8.7	5.8
Phenols	µg/L	1	0.6	0.6	10	4.6	3.6	3.6	1.4	8.8	4	0.2	0.6	0.6	1.6	0.2	0.2	0.4
Arsenic	mg/L	0.005																
Barium	mg/L																	
Boron	mg/L	0.200																
Cadmium	mg/L	0.0005 [2]																
Calcium	mg/L																	
Chromium	mg/L	0.01																
Copper	mg/L	0.005 [3]																
Iron	mg/L	0.300	0.13	0.41	0.99	0.982	1.6	0.19	0.11	1.5	0.25	0.78	2.5	0.28	0.13	0.18	0.42	0.73
Lead	mg/L	0.005 [4]																
Magnesium	mg/L																	
Manganese	mg/L																	
Mercury	mg/L	0.0002																
Phosphorus	mg/L	0.030					0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.02	0.02
Sodium	mg/L																	
Zinc	mg/L	0.020																
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L																	

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26																
			Aug-91	Mar-93	Jul-93	Oct-93	Apr-94	May-94	Jul-94	Oct-94	Dec-94	Apr-95	Jul-95	Oct-95	Apr-96	Jun-96	Jul-96	Oct-96	Apr-97
pH	units	6.5 to 8.5	7.2	5.96	6.64	6.05	6	6.17	6.16		6.74	6.74	6.34	6.16	5.94	6.23	6.4	7.2	5.91
Conductivity	µmho/cm		31.3	30	46.8	34.4	26	26.3	36.6		36.7	24	35	25	31	26	37	29	21
Chloride	mg/L		0.3	0.7	1.3	1.3	0.5	0.3	0.6	1.3	2.4	0.5	0.8	0.8	<1	0.65	1.2	1.4	2.8
Sulphate	mg/L																		
Alkalinity	mg/L		7.8	5.3	18.6	4.6	5.2	5.1	10		4.74	4.76	12	6.5	4.6	9	12	6.9	2
Hardness	mg/L		7.5	8.9		8.3	9	8	7.7	8.33	13.9	6.67	11.5	7.5	8.81	12	39	11	7
Total Kjeldahl Nitrogen	mg/L				1.1	0.45	0.2	0.25	0.9	0.5	0.3	0.4	0.95	0.35	0.1	1.1	1.3	1.1	0.42
Ammonia: total	mg/L		0.1	0.05	0.2	0.05	0.05	0.1	0.1	0.05	0.3	0.05	0.15	0.05	<0.05	0.03	0.09	<0.03	0.02
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L		0.05	0.25	0.05	0.05	0.25	0.1	<0.05	0.05	0.05	0.1	0.05	0.05	<0.05	0.055	0.1	<0.05	
Nitrite	mg/L		0.01	0.005	0.01	0.005	<0.005	0.005	0.01	0.005	0.005	0.005	0.005	0.005		<0.05	<0.05	<0.05	
Biochemical Oxygen Demand	mg/L																		
Chemical Oxygen Demand	mg/L		16	2	34	20	10	4	46	41.2	14.2	14.5		38	3	64	80	33	7
Dissolved Organic Carbon	mg/L		5.7	3.8	11.8	7.8	3.9	6	15.1	8.5	5.1	4.5	10.8	7.6	0.5	7.5	12	9.3	10
Phenols	µg/L	1	0.6	1	0.4	0.2	0.8	0.6	2	0.2	0.6	0.4	1	0.2	<2	<1	<1	2	<1
Arsenic	mg/L	0.005																	
Barium	mg/L																		
Boron	mg/L	0.200																	
Cadmium	mg/L	0.0005 [2]																	
Calcium	mg/L																		
Chromium	mg/L	0.01																	
Copper	mg/L	0.005 [3]																	
Iron	mg/L	0.300	0.67	0.14		0.14	0.12	0.13	2	0.563	0.211	0.123		0.187	<0.02	1.5	3.5	0.6	0.1
Lead	mg/L	0.005 [4]																	
Magnesium	mg/L																		
Manganese	mg/L																		
Mercury	mg/L	0.0002																	
Phosphorus	mg/L	0.030	0.02	0.02	0.02	0.02	<0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.02		0.03	0.12	<0.06	
Sodium	mg/L																		
Zinc	mg/L	0.020																	
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26																
			Oct-97	Apr-98	Oct-98	Apr-99	Oct-99	Apr-00	Sep-00	Apr-01	Oct-01	Apr-02	Sep-02	Apr-03	Oct-03	Apr-04	Jun-04	Sep-04	Nov-04
pH	units	6.5 to 8.5	6.53	7.4	6.6	5.9	6.4	6.1	6.9	6.15	7.57	6.58	7.1	6.09	6.6	7	7.1	7.6	6.59
Conductivity	µmho/cm		26	21	47	21	33	26	45	17	37	22	40	23	25	23	24	39	30
Chloride	mg/L		2.9	0.73	1.7	1.2	1.4	0.91	1.8	0.48	2.1	1	2.1	1.1	0.99	0.81	0.43	4.2	1
Sulphate	mg/L															3.5	0.81	1.4	6.8
Alkalinity	mg/L		8	3.7	9.4	1.8	5.4	3.2	1.2	1.9		7.1	13	4.8	6.3	2.8	10	8.2	15
Hardness	mg/L		5	7.8	20	6.7	11	9.4	70	11	14	7.2	16	8.5	7.5	7.5	9.1	13	16
Total Kjeldahl Nitrogen	mg/L		0.67	0.39	0.82	0.25	0.73	0.33	0.37	0.24	0.81	0.73	1.1	0.35	0.37	0.3	0.53	1.1	0.43
Ammonia: total	mg/L		0.06	<0.03	0.05	<0.03	<0.03	<0.02	0.04	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L																	<0.05	<0.05
Nitrite	mg/L																<0.01	<0.01	<0.01
Biochemical Oxygen Demand	mg/L															0.004	0.019	0.023	0.008
Chemical Oxygen Demand	mg/L		49	15	36	<10	40	<10	51	<10	50	17	38	22	<10	10	28	46	20
Dissolved Organic Carbon	mg/L		13	4.9	11	3.6	8.1	3.6	13	3.2	12	4.1	12	3.9	4.9	3.4	6.1	9.7	6.1
Phenols	µg/L	1	<1	<1	1.6	<1	<1	<1	<1	4.5	7	8.1	2	7	<1	4.6	2.2	1.1	<1
Arsenic	mg/L	0.005														<0.01	<0.01	<0.01	
Barium	mg/L															0.01	0.01	0.015	0.014
Boron	mg/L	0.200														<0.01	<0.01	<0.01	<0.01
Cadmium	mg/L	0.0005 [2]														<0.002	<0.002	<0.002	<0.005
Calcium	mg/L																		
Chromium	mg/L	0.01														<0.002	<0.002	<0.002	<0.004
Copper	mg/L	0.005 [3]														<0.002	<0.002	<0.002	<0.006
Iron	mg/L	0.300	0.45	0.22	0.42	0.12	0.44	0.13	0.83	0.1	0.75	0.14	0.42	0.22	0.16	0.15	0.43	0.62	0.25
Lead	mg/L	0.005 [4]														<0.01	<0.01	<0.01	<0.02
Magnesium	mg/L																		
Manganese	mg/L			0.023	0.032	0.03	0.056	0.021	0.047	0.007	0.059	0.024	0.022	0.015	0.019	0.017	0.071	0.038	0.023
Mercury	mg/L	0.0002															<0.05	<0.05	
Phosphorus	mg/L	0.030				<0.06			0.084							<0.03	<0.03	0.033	<0.06
Sodium	mg/L																		
Zinc	mg/L	0.020														0.007	<0.005	<0.005	0.013
Total Dissolved Solids	mg/L																		
Total Suspended Solids	mg/L																		

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26																
			Apr-05	Jun-05	Sep-05	Nov-05	Apr-06	Jun-06	Oct-06	Nov-06	Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08	Apr-09
pH	units	6.5 to 8.5	6.01	7.04	6.91	7.31	6.7	6.7	6.9	6.6	6.13	6.18	6.09	6.21	6.21	6.49	6.73	6.81	6.54
Conductivity	µmho/cm		23.1	33.7	39	116	24	26	36	25	23	30	42	26	22	26	28	22	20
Chloride	mg/L		1.1	1.91	3	15	2	1	4	2	0.76	1.58	4.8	1.16	0.93	0.41	1.32	0.58	1.05
Sulphate	mg/L		3.5	1.3	<1	11	3	<1	2	5	3.87	1.24	0.73	3.54	3.42	1.27	1.35	2.98	2.58
Alkalinity	mg/L		2	10.2	11	21	4	9		4	<10	<10	8	<5	<5	8	7	<5	<5
Hardness	mg/L		8.24	14.4	15.1	36.1	8	11	12	8	7	12	15	<10	<10	11	<10	<10	<10
Total Kjeldahl Nitrogen	mg/L		0.4	1	0.7	0.4	0.3	0.9	0.8	0.5	<0.10	0.86	0.61	0.14	<0.10	0.44	0.62	0.57	0.21
Ammonia: total	mg/L		<0.05	0.06	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ammonia: un-ionized	µg/L	20																	
Nitrate	mg/L						<0.1	<0.1									<0.05	0.05	<0.05
Nitrite	mg/L				<0.3		<0.01	<0.01									<0.05	<0.05	<0.05
Biochemical Oxygen Demand	mg/L		<0.1	0.1	<0.1		0.01	0.022	0.017	<0.002							<5	12	<5
Chemical Oxygen Demand	mg/L		16	41	38	25	18	34	29	23	10.5	37	34	11	14	21	20	<5	11
Dissolved Organic Carbon	mg/L		4.4	10.6	11.3	9.9	4.1	11.1	8	5.7	4	11.4	11.2	6.7	3.6	8	9.3	6.2	4.9
Phenols	µg/L	1	2	1	<1	<1	<1	<1	1	<1	1	10	9	2	<1	<1	4	4	<1
Arsenic	mg/L	0.005	<0.2	<0.2	<0.2	<0.001	<0.001	<0.001	<0.2	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003
Barium	mg/L		<0.02	<0.02	<0.02	0.032	0.011	0.008	<0.02	<0.02	0.008	0.009	0.018	0.009	0.008	0.019	0.012		0.007
Boron	mg/L	0.200	<0.02	<0.02	<0.02	0.022	<0.01	<0.01	<0.02	<0.02	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010
Cadmium	mg/L	0.0005 [2]	<0.005	<0.005	<0.005	<0.0001	<0.0001	<0.0001	<0.005	<0.005	<0.0001	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001		<0.001
Calcium	mg/L																		
Chromium	mg/L	0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		<0.003
Copper	mg/L	0.005 [3]	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	<0.02	<0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002
Iron	mg/L	0.300	0.14	2.27	1.29	0.72	0.12	0.75	0.25	0.37	0.1	0.779	0.772	0.178	0.131	0.83	0.57	0.22	0.139
Lead	mg/L	0.005 [4]	<0.05	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.05	<0.05	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002		<0.002
Magnesium	mg/L																		
Manganese	mg/L		<0.01	0.27	0.09	0.076	0.013	0.085	0.01	0.02	0.006	0.034	0.061	0.008	0.013	0.188	0.063	<0.03	0.007
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.0001				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001
Phosphorus	mg/L	0.030	0.005	0.044	0.079	0.034	<0.05	<0.05	<0.1	<0.1	<0.02	<0.02	0.03	<0.02	0.03	0.03	0.05	0.03	0.02
Sodium	mg/L																		
Zinc	mg/L	0.020	<0.01	<0.01	<0.01	0.066	<0.005	0.006	<0.01	<0.01	0.004	<0.005	<0.004	0.009	<0.004	0.211	<0.004		<0.005
Total Dissolved Solids	mg/L							20											<20
Total Suspended Solids	mg/L																		<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26																
			Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10	Apr-11	Jul-11	Oct-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13	Jun-13
pH	units	6.5 to 8.5	6.59	6.43	6.46	6.53	6.45	6.68	6.24	6.25	6.75	6.57	6.04	6.3	6.59	6.14	6.08	6.04	6.51
Conductivity	µmho/cm		27	24	20	25	6	23	17	22	31	37	22	25	34	56	25	22	28
Chloride	mg/L		1.21	0.88	0.88	1.41	2.85	0.93	0.33	1.13	1.14	1.19	0.96	<1	2	3	1	1	2
Sulphate	mg/L		1.62	3.34	2.99	3.16	1.59	1.94	2.58	2.86	0.83	2.17	3.77	<1	<3	12	4	3	<3
Alkalinity	mg/L		7	5	5	<5	6	5	<5	<5	9	12	<5	<5	13	7	<5	<5	11
Hardness	mg/L		11	<10	<10	<10	12	23	<10	<10	13	14	<10	2	9	21	5	5	7
Total Kjeldahl Nitrogen	mg/L		0.67	0.56	0.49	0.25	0.73	0.32	0.44	0.47	0.68	0.52	0.29	0.24	0.7	0.3	0.29	0.94	0.43
Ammonia: total	mg/L		<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.48	0.05	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03
Ammonia: un-ionized	µg/L	20								<1	3	<1	1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.05	<0.05	<0.05	0.1	<0.05	<0.05	0.05	0.09	<0.05	<0.05	0.07	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.10		<0.10		<0.10
Biochemical Oxygen Demand	mg/L		<5	<5	<5					<5	<5	<5	<5	2	5	2	1	<1	1
Chemical Oxygen Demand	mg/L		29	19	15	23	26	<5	16	7	41	18	17	18	43	28	22	8	27
Dissolved Organic Carbon	mg/L		9.2	7	5.7	5.8	9.9	7.6	5.5	4.9	14.7	8.5	5.8	10	12.6	9.6	6.7	4.5	9.8
Phenols	µg/L	1	3	<1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005		<0.003		<0.003		<0.003		<0.003		<0.003		<0.001		<0.001		<0.001	
Barium	mg/L			0.009		0.011		0.007		0.007		0.015		0.01		0.02		<0.01	
Boron	mg/L	0.200	0.01	<0.010	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.01	<0.01	0.01	0.02	<0.01	<0.01
Cadmium	mg/L	0.0005 [2]		<0.001		<0.001		<0.001		<0.001		<0.001		<0.0001		<0.0001		<0.0001	
Calcium	mg/L													1	2	5	2	2	3
Chromium	mg/L	0.01		<0.003		<0.003		<0.003		<0.003		<0.003		<0.001		<0.001		<0.001	
Copper	mg/L	0.005 [3]		<0.002		<0.002		<0.002		<0.002		<0.002		<0.001		<0.001		<0.001	
Iron	mg/L	0.300	1.13	0.257	0.019	0.208	0.704	0.235	0.272	0.121	1.14	0.707	0.185	0.28	1.19	0.38	0.14	0.12	0.6
Lead	mg/L	0.005 [4]		<0.002		<0.002		<0.002		<0.002		<0.002		<0.001		<0.001		<0.001	
Magnesium	mg/L													<1	1	2	<1	<1	<1
Manganese	mg/L		0.092	0.019	0.007	0.017	0.103	0.02	0.013	0.014	0.089	0.086	0.008	0.02	0.07	0.07	<0.01	<0.01	0.04
Mercury	mg/L	0.0002		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
Phosphorus	mg/L	0.030	0.06	0.02	<0.02	<0.02	<0.02	0.03	0.03	<0.05	0.04	0.03	<0.02	0.02	0.05	0.02	0.01	<0.01	<0.01
Sodium	mg/L																		
Zinc	mg/L	0.020		<0.005		<0.005		<0.005		0.005		<0.005		<0.01		<0.01		<0.01	
Total Dissolved Solids	mg/L		26	36	<20	44	44	<20	<20	20	62	44	24	16	22	36	16	14	18
Total Suspended Solids	mg/L		<10	< 10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<2	9	6	<2	3	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26													
			Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14	Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16
pH	units	6.5 to 8.5	6.09	6.16	6.02	6.49	6.3	6.33	6.45	6.89	6.6	6.38	5.92	6.51	6.53	6.2
Conductivity	µmho/cm		30	21	26	38	20	19	22	31	39	22	16	29	28	36
Chloride	mg/L		2	1	2	4	1	<1	1	1	2	1	<1.0	1.3	<1.0	1.9
Sulphate	mg/L		<3	3	3	1	2	2	2	1	<1	3	2.2	<1.0	1.5	4.9
Alkalinity	mg/L		11	5	6	8	5	6	<5	11	12	<5	2.8	9.4	7.4	2.5
Hardness	mg/L		7	2	5	17	5	5	5	7	14	5	5.3	13	12	11
Total Kjeldahl Nitrogen	mg/L		0.66	0.25	0.19	0.66	0.21	0.28	<0.10	0.76	0.78	0.22	0.14	0.74	0.64	0.41
Ammonia: total	mg/L		<0.02	0.03	0.08	0.04	0.07	<0.02	<0.02	<0.05	0.093	<0.025	<0.050	<0.050	<0.050	<0.050
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.10	0.12	0.12	<0.10	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16
Nitrite	mg/L			<0.10		<0.10		<0.10		<0.10		<0.10	<0.010	<0.010	<0.010	<0.010
Biochemical Oxygen Demand	mg/L		1	<1	<1	<1	<1	<1	<1	2	<1	<1	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L		40	11	12	30	22	8	7	39	52	14	19	38	43	31
Dissolved Organic Carbon	mg/L		11.6	5	5.3	11	7.4	5.7	4.7	11.8	14.8	6.5	3.6	12	10	9.8
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.0010		<0.0010	
Barium	mg/L		<0.01		<0.01	0.01	<0.01		<0.01		0.02		0.0062		0.013	
Boron	mg/L	0.200	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	0.015	<0.010	<0.010
Cadmium	mg/L	0.0005 [2]	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001		<0.0001		<0.00010		<0.00010	
Calcium	mg/L		3	1	2	5	2	2	2	3	4	2				
Chromium	mg/L	0.01	<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.0050		<0.0050	
Copper	mg/L	0.005 [3]	<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.0010		<0.0010	
Iron	mg/L	0.300	1.17	0.27	0.22	1.21	0.25	0.24	0.18	1.26	2.48	0.28	<0.10	1.7	0.85	0.24
Lead	mg/L	0.005 [4]	<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.00050		<0.00050	
Magnesium	mg/L		<1	<1	<1	1	<1	<1	<1	<1	1	<1				
Manganese	mg/L		0.12	0.02	0.02	0.11	0.02	<0.01	0.01	0.06	0.15	<0.01	0.004	0.084	0.051	0.02
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.1		<0.1	
Phosphorus	mg/L	0.030	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01	<0.05	<0.05	<0.05	0.005	0.052	0.024	0.012
Sodium	mg/L															
Zinc	mg/L	0.020	<0.01		<0.01	<0.01	<0.01		<0.01		<0.01		<0.0050		<0.0050	
Total Dissolved Solids	mg/L		20	14	17	25	13	12	14	20	25	14	<10	54	22	28
Total Suspended Solids	mg/L		<2	<2	<2	<2	8	<2	<2	7	<4	3	<10	<10	<10	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW26																		
			Apr-17	Jul-17	Sep-17	Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	6.5 to 8.5	6.36	6.7	6.47	6.43	6.16	6.44	6.31	6.99	6.23	6.38	6.25	6.46	6.34	6.41	6.29	6.54	6.19	6.41	5.94
Conductivity	µmho/cm		17	56	24	25	73	58	20	35	17	43	17	18	28	27	19	23	62	27	17
Chloride	mg/L		<1.0	3.8	1.9	1.3	1.9	3.8	<1.0	5	<1	7	<1	1	2	8	1	1	8	8	2
Sulphate	mg/L		2	<1.0	<1.0	1.7	19	1.1	1.6	2	1	4	2	1	2	<1	2	<1	<1	<1	1
Alkalinity	mg/L		2.4	16	5.9	5.5	4.9	13	4.3	29	6	9	<5	<5	5	<5	<5	7	14	<5	<5
Hardness	mg/L		5.2	23	8.6	7.4	26	22	6.7	2	5	17	2	5	7	7	5	5	28	7	5
Total Kjeldahl Nitrogen	mg/L		0.15	0.85	0.29	0.12	0.58	0.84	0.13	0.3	0.35	1.5	0.413	0.266	0.654	0.519	0.259	0.167	0.821	0.519	0.578
Ammonia: total	mg/L		<0.050	0.13	<0.050	<0.050	0.075	0.061	<0.050	0.02	<0.010	0.17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.19	<0.50	<0.10	0.1	<0.10	<0.50	<0.10	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.010	<0.050	<0.010	<0.010	<0.010	<0.050	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		<2.0	<2.0	<2.0	<2	9	2	<2	<1	2	2	3	1	4	4	3	<1	4	4	<1
Chemical Oxygen Demand	mg/L		5.7	54	24	13	24	95	12	<5	11	131	5	<5	38	30	7	7	34	30	13
Dissolved Organic Carbon	mg/L		3.8	17	8.9	4.6	8	27	4.4	3.3	5.4	13.9	4.9	4.9	16	8.7	4.4	5.2	12.2	8.7	5.7
Phenols	µg/L	1	<1	<2	11	<1	<1	1.9	<1	<1	<1	2	<1	<1	11	<1	<1	8	6	<1	<1
Arsenic	mg/L	0.005	<0.0010		<0.0010	<0.0010		<0.0010		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Barium	mg/L		0.0065		0.012	0.007		0.029		0.02		0.03		<0.01		<0.01		<0.01	0.02	<0.01	
Boron	mg/L	0.200	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01
Cadmium	mg/L	0.0005 [2]	<0.00010		<0.00010	<0.00010		<0.00010		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Calcium	mg/L									1	2	5	1	2	3	3	2	2	8	3	2
Chromium	mg/L	0.01	<0.0050		<0.0050	<0.0050		<0.0050		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]	<0.0010		0.0033	<0.0010		0.0013		0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Iron	mg/L	0.300	0.14	4.3	0.63	0.21	1	3	0.26	0.17	0.56	1.22	0.17	0.16	0.76	0.23	0.17	0.14	3.01	0.23	0.24
Lead	mg/L	0.005 [4]	<0.00050		<0.00050	<0.00050		<0.00050		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Magnesium	mg/L									<1	<1	1	<1	<1	<1	<1	<1	<1	2	<1	<1
Manganese	mg/L		0.0048	0.24	0.061	0.02	0.29	0.29	0.017	0.02	0.1	0.18	<0.01	0.02	0.11	0.01	0.01	0.01	0.55	0.01	0.01
Mercury	mg/L	0.0002	<0.1		<0.1	<0.1		<0.1		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.008	0.052	0.013	0.009	0.051	0.045	0.007	0.005	0.011	0.023	0.005	0.005	0.017	0.009	0.007	0.008	0.028	0.009	<0.002
Sodium	mg/L									<2		<2		<2		<2		<2	<2	<2	
Zinc	mg/L	0.020	<0.0050		<0.0050	0.0081		0.0059		<0.01		<0.01		<0.01		<0.01		<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		<10	108	104	25	70	180	<10	23	11	28	11	12	18	18	12	15	40	18	11
Total Suspended Solids	mg/L		20	12	<10	<10	170	10	<10	<2	<2	8	2	3	2	<2	<2	<2	9	<2	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW27															
			Apr-04	Sep-04	Apr-05	Sep-05	Apr-06	Oct-06	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11
pH	units	6.5 to 8.5	7.9	7.4	6.94	4.02	7.5	7.1	6.57	6.28	6.54	7.66	7.11	7.21	6.92	7.15	7.02	7.1
Conductivity	µmho/cm		190	240	261	233	363	95	129	154	87	194	210	212	129	238	130	187
Chloride	mg/L		36	52	64.2	33	98	14	26.7	32.6	19.9	3.89	56.2	66.5	29.5	66	27.8	47.1
Sulphate	mg/L		6.4	5.1	7.5	15	9	7	6.1	3.42	5.72	4.72	5.88	4.65	5.5	5.02	5.62	9.35
Alkalinity	mg/L		16	13	15.4	<1	27		<10	20	5	15	8	11	9	10	8	14
Hardness	mg/L		26	24	25.5	19.2	26	13	12	17	13	16	23	30	16	26	13	31
Total Kjeldahl Nitrogen	mg/L		0.29	0.38	0.9	1	0.4	0.7	<0.10	0.4	0.16	0.56	0.21	0.73	0.29	0.77	0.37	0.14
Ammonia: total	mg/L		0.03	<0.02	<0.05	<0.05	0.14	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06
Ammonia: un-ionized	µg/L	20															<1	<1
Nitrate	mg/L			0.38			0.3					<0.05	0.21	0.44	0.2	0.23	0.3	0.41
Nitrite	mg/L			<0.01		<0.3	0.02					0.29	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Biochemical Oxygen Demand	mg/L			<5								<5	<5	<5			<5	<5
Chemical Oxygen Demand	mg/L		39	45	31	39	18	170	6.8	22	8	11	6	15	17	4.3	<5	12
Dissolved Organic Carbon	mg/L		3.7	3.2	4.5	4.8	5	13	3.1	7.1	3.1	5.4	2.9	4.3	3.4	0.77	3	4.4
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	2	<1	1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.01		<0.2	<0.2	<0.001	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium	mg/L		0.048	0.044	0.05	0.28	0.069	0.19	0.014	0.056	0.019	0.063	0.023	0.034	0.02	0.034	0.02	0.03
Boron	mg/L	0.200	0.01	0.016	0.02	<0.02	<0.01	0.02	<0.010	0.017	<0.010	0.013	<0.010	0.012	<0.010	0.016	<0.010	0.037
Cadmium	mg/L	0.0005 [2]	<0.002	<0.005	<0.005	<0.005	<0.0001	<0.005	<0.0001	<0.002	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L																	
Chromium	mg/L	0.01	0.003	<0.004	<0.01	0.02	<0.005	0.03	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	mg/L	0.005 [3]	0.007	<0.006	<0.02	0.04	0.005	0.03	<0.002	0.007	<0.002	0.006	<0.002	0.002	<0.002	0.003	<0.002	<0.002
Iron	mg/L	0.300	3.6	2.9	3.92	26.6	4.1	27	0.434	3.97	0.606	3.31	0.193	1.19	0.363	0.978	0.558	0.51
Lead	mg/L	0.005 [4]	<0.01	<0.02	<0.05	<0.05	0.0011	<0.05	<0.001	0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Magnesium	mg/L																	
Manganese	mg/L		0.12	0.12	0.17	1.16	0.24	0.81	0.021	0.314	0.042	0.442	0.025	0.071	0.028	0.072	0.034	0.029
Mercury	mg/L	0.0002			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.63	0.058	0.2	4.4	0.07	1.8	0.06	0.57	<0.02	0.14	0.03	0.4	0.04	0.17	0.09	0.07
Sodium	mg/L																	
Zinc	mg/L	0.020	0.014	0.006	0.02	0.05	0.008	0.06	<0.004	0.013	0.005	0.012	<0.005	0.006	<0.005	0.007	<0.005	<0.005
Total Dissolved Solids	mg/L												106	124	96	88	76	126
Total Suspended Solids	mg/L												44	132	<10	75	77	70

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW27																
			Apr-12	Sep-12	Sep-13	Apr-14	Sep-14	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.5 to 8.5	6.42	6.51	6.44	6.35	7.08	6.96	6.05	6.81	6.53	7.04	6.87	7.09	7.37	7.12	7.02	7.04	7.02
Conductivity	µmho/cm		256	207	314	238	274	327	260	290	98	550	450	310	441	339	204	239	204
Chloride	mg/L		64	50	78	58	68	78	63	67	18	150	120	69	114	85	55	53	55
Sulphate	mg/L		7	4	6	6	5	3	6.3	2.4	3.4	6.9	7.7	5.2	4	7	4	6	4
Alkalinity	mg/L		8	14	13	14	12	12	5.2	11	4	10	9.2	21	16	11	14	13	14
Hardness	mg/L		12	22	27	24	24	29	23	31	11	50	37	30	29	22	19	12	19
Total Kjeldahl Nitrogen	mg/L		0.18	0.12	0.24	0.59	0.41	0.28	0.11	0.18	0.17	0.11	0.12	0.3	0.2	0.305	0.825	0.386	0.825
Ammonia: total	mg/L		<0.02	<0.02	<0.02	0.1	0.1	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.05	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1
Nitrate	mg/L		0.24	0.16	0.22	0.36	0.24	0.22	0.26	<0.10	<0.10	0.35	0.32	0.29	0.2	0.24	<0.10	0.16	<0.10
Nitrite	mg/L								<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		1	2	2	1	2	<1	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	3	6	<1	6
Chemical Oxygen Demand	mg/L		<5	14	12	14	28	25	20	19	16	6.7	17	15	17	51	35	13	35
Dissolved Organic Carbon	mg/L		<5	4.3	3	3.2	3.5	2.5	1.9	3.5	3.4	2.6	2.7	4.6	3.5	3.1	8.8	3.9	8.8
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.2	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.02	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L		0.03	0.03	0.04	0.03	0.05	0.11	0.033	0.038	0.025	0.15	0.077	0.11	0.07	0.04	0.03	0.03	0.03
Boron	mg/L	0.200	0.01	0.01	0.01	<0.01	<0.1	0.01	<0.010	<0.010	<0.010	0.042	<0.010	0.051	0.02	<0.01	0.01	<0.01	0.01
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.008	0.0002	<0.00010	<0.00010	<0.00010	0.00022	0.0001	0.00036	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L		5	7	9	8	8	10							10	7	6	5	6
Chromium	mg/L	0.01	<0.001	<0.001	<0.001	<0.001	<0.05	0.002	<0.0050	<0.0050	<0.0050	0.0073	<0.0050	0.011	0.003	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	<0.001	0.001	0.001	0.001	<0.01	0.007	<0.0010	0.001	0.0021	0.013	0.005	0.014	0.002	0.001	0.002	0.002	0.002
Iron	mg/L	0.300	0.2	0.71	0.39	0.38	2.1	5.63	0.4	0.92	1.3	8	3.2	11	0.64	0.64	0.69	0.62	0.69
Lead	mg/L	0.005 [4]	<0.001	<0.001	<0.001	<0.001	<0.01	0.004	<0.00050	<0.00050	0.001	0.0045	0.0023	0.0065	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L		<1	1	1	1	1	1							1	1	1	<1	1
Manganese	mg/L		<0.01	0.04	0.02	0.02	0.12	0.44	0.018	0.046	0.052	0.31	0.089	0.32	0.04	0.05	0.03	0.03	0.03
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.03	0.06	0.06	0.13	0.09	0.39	0.023	0.041	0.08	0.24	0.08	0.29	0.053	0.04	0.056	0.068	0.056
Sodium	mg/L														62	54	26	41	26
Zinc	mg/L	0.020	<0.01	<0.01	<0.01	<0.01	<0.04	0.03	<0.0050	<0.0050	0.011	0.029	0.027	0.039	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L		166	135	204	155	178	213	144	142	78	372	160	235	287	220	133	155	133
Total Suspended Solids	mg/L		10	25	494	213	201	418	23	<10	42	500	150	530	33	312	13	36	13

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW28													
			Apr-08	Sep-08	Oct-09	Apr-10	Oct-10	Oct-11	Apr-12	Sep-12	Apr-13	Sep-13	Apr-14	Sep-14	Apr-15	Sep-15
pH	units	6.5 to 8.5	7.19	7.51	7.16	7.23	7.53	7.97	6.98	6.71	6.86	6.68	6.67	6.88	7	7.26
Conductivity	µmho/cm		352	720	107	597	669	648	754	793	461	786	536	808	559	805
Chloride	mg/L		42.9	100	18.6	83.3	97.1	115	96	103	54	101	66	98	68	101
Sulphate	mg/L		33.2	53.3	4.85	72.4	90.5	122	96	105	56	98	65	95	61	85
Alkalinity	mg/L		75	158	16	121	124	119	127	135	85	130	95	143	108	139
Hardness	mg/L		102	199	24	162	189	212	188	205	129	188	141	208	139	188
Total Kjeldahl Nitrogen	mg/L		0.64	0.46	0.66	0.9	1.14	1.32	1	1.16	0.84	0.86	0.82	1.19	0.6	1.13
Ammonia: total	mg/L		0.12	0.35	<0.02	0.3	0.08	0.74	0.66	0.64	0.4	0.67	0.52	0.73	0.49	0.826
Ammonia: un-ionized	µg/L	20						1	<1	<1	<1	<1	<1	1	<1	<1
Nitrate	mg/L			<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L			<0.05	<0.05	<0.05	<0.05	<0.05								
Biochemical Oxygen Demand	mg/L			<5	<5			<5	2	2	<1	2	1	2	2	<1
Chemical Oxygen Demand	mg/L		18	8	20	20	11	18	16	31	11	24	11	23	13	20
Dissolved Organic Carbon	mg/L		5.1	4.8	7.7	4.5	6.2	6.3	6.9	6.2	4.6	6.2	5.5	6.1	5	4.9
Phenols	µg/L	1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.003	0.005	<0.003	<0.003	<0.003	0.003	<0.01	<0.01	<0.01	<0.01	0.001	0.002	0.001	0.002
Barium	mg/L		0.038	0.082	0.013	0.051	0.067	0.082	0.07	0.1	0.05	0.08	0.06	0.08	0.05	0.07
Boron	mg/L	0.200	0.06	0.114	0.01	0.097	0.252	0.404	0.5	0.65	0.33	0.74	0.46	0.8	0.54	0.87
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L								54	59	35	52	40	57	39	54
Chromium	mg/L	0.01	<0.003	0.004	<0.003	0.003	0.008	0.005	0.005	0.008	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.001	0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001
Iron	mg/L	0.300	9.09	33.4	0.579	15.7	22.6	31	25	69.7	9.51	28.6	15.7	25.4	15.2	20.8
Lead	mg/L	0.005 [4]	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L								13	14	10	14	10	16	10	13
Manganese	mg/L		3.54	6.59	0.041	4.82	6.23	8.01	6.16	6.11	2.82	6.28	3.72	5.95	3.79	5.77
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	<0.02	0.15	0.05	0.03	0.09	<0.02	<0.01	0.14	0.02	0.02	0.03	0.02	0.03	<0.05
Sodium	mg/L															
Zinc	mg/L	0.020	0.0011	<0.004	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L				96			540	490	515	300	511	348	525	363	523
Total Suspended Solids	mg/L				16			<10	44	139	34	60	61	25	21	102

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW28											
			Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.5 to 8.5	7.18	7.18	7.21	7.41	7.16	7.06	6.76	7.1	7.49	6.95	6.84	6.95
Conductivity	µmho/cm		630	810	210	720	460	760	486	778	705	42	441	42
Chloride	mg/L		85	99	19	96	57	100	63	109	99	8	55	8
Sulphate	mg/L		66	83	19	73	42	70	44	73	63	2	33	2
Alkalinity	mg/L		95	140	44	120	90	140	97	143	127	12	91	12
Hardness	mg/L		130	200	48	150	100	170	99	190	159	18	122	18
Total Kjeldahl Nitrogen	mg/L		1.1	1.2	0.58	0.85	0.62	0.97	0.8	0.7	1.12	0.776	3.49	0.776
Ammonia: total	mg/L		0.81	0.85	0.17	0.62	0.48	0.74	0.51	0.78	0.48	<0.010	0.128	<0.010
Ammonia: un-ionized	µg/L	20	<1	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.10	<0.10	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.15	<0.10
Nitrite	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		<2.0	7	<2.0	<2.0	<2	<2	<1	2	3	4	15	4
Chemical Oxygen Demand	mg/L		32	31	27	18	18	14	<5	8	19	44	104	44
Dissolved Organic Carbon	mg/L		4.6	4.6	8.5	4.1	3.8	4.5	3.2	4.6	4.3	10.7	5.7	10.7
Phenols	µg/L	1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	0.002	0.0016	<0.0010	<0.0010	0.0012	0.0015	0.001	0.002	0.001	<0.001	0.045	<0.001
Barium	mg/L		0.076	0.071	0.039	0.05	0.048	0.065	0.06	0.08	0.06	0.02	0.8	0.02
Boron	mg/L	0.200	0.69	0.84	0.18	0.9	0.4	0.71	0.49	0.82	0.67	<0.01	0.36	<0.01
Cadmium	mg/L	0.0005 [2]	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	<0.0001
Calcium	mg/L								28	53	44	4	34	4
Chromium	mg/L	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.002	<0.001	<0.001	0.001	0.041	0.001
Copper	mg/L	0.005 [3]	0.0038	<0.0010	0.0047	<0.0010	0.0021	<0.0010	0.002	<0.001	<0.001	0.002	0.022	0.002
Iron	mg/L	0.300	29	19	6.6	11	16	21	12.3	24.9	20	1.61	836	1.61
Lead	mg/L	0.005 [4]	0.0009	<0.00050	0.0011	<0.00050	0.00053	<0.00050	<0.001	<0.001	<0.001	<0.001	0.011	<0.001
Magnesium	mg/L								7	14	12	2	9	2
Manganese	mg/L		3.7	5.4	1.2	3.9	3	5	3.08	5.38	4.24	0.08	20.4	0.08
Mercury	mg/L	0.0002	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.054	0.013	0.11	0.01	0.065	0.016	0.02	0.02	0.016	0.06	1.12	0.06
Sodium	mg/L								44	78	74	3	46	3
Zinc	mg/L	0.020	0.0063	<0.0050	0.013	<0.0050	0.0053	<0.0050	<0.01	<0.01	<0.01	<0.01	0.12	<0.01
Total Dissolved Solids	mg/L		340	428	190	464	275	470	316	506	458	27	287	27
Total Suspended Solids	mg/L		56	39	12	33	49	31	35	7	87	19	4020	19

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW30															
			Apr-05	Jun-05	Sep-05	Nov-05	Apr-06	Jun-06	Oct-06	Nov-06	Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08
pH	units	6.5 to 8.5	6.85	7.54	7.55	7.32	7.2	7.8	7.3	7.1	6.53	6.47	6.56	6.66	6.59	7.2	7.64	7.33
Conductivity	µmho/cm		114	225	249	227	90	735	251	94	93	188	321	163	72	193	260	161
Chloride	mg/L		18.7	47.7	51	49	15	109	44	13	14.6	34.8	61.4	30.8	15.4	30.7	40.5	27.5
Sulphate	mg/L		6.1	5.4	7	10	5	58	3	7	6.34	2.62	0.64	8.11	4.9	1.6	3.57	7.25
Alkalinity	mg/L		16.2	35.1	31	28	15	176		16	13	33	72	17	5	46	55	21
Hardness	mg/L		24	38.9	56.8	46.2	19	190	61	20	20	38	80	30	14	52	65	31
Total Kjeldahl Nitrogen	mg/L		0.4	0.8	0.6	0.4	0.4	0.9	1	0.6	0.34	0.82	0.65	0.68	<0.10	0.48	0.14	0.45
Ammonia: total	mg/L		0.13	0.1	0.05	<0.05	0.07	0.42	<0.05	<0.05	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ammonia: un-ionized	µg/L	20																
Nitrate	mg/L						<0.1	<0.1									<0.05	<0.05
Nitrite	mg/L						<0.01	<0.01									<0.05	<0.05
Biochemical Oxygen Demand	mg/L																<5	12
Chemical Oxygen Demand	mg/L		11	34	32	18	20	23	52	19	9.9	37	68	29	8	28	6	6
Dissolved Organic Carbon	mg/L		4.7	12.6	12	7.8	5.5	5.5	15.9	7.2	3.8	12	26.3	5.9	4.4	11.8	6.8	4
Phenols	µg/L	1	2	<1	1	<1	<1	<1	1	<1	<1	8	25	7	<1	<1	1	1
Arsenic	mg/L	0.005	<0.2	<0.2	<0.2	<0.001	<0.001	0.002	<0.2	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Barium	mg/L		<0.02	0.02	0.02	0.027	0.013	0.065	0.03	<0.02	0.011	0.013	0.059	0.017	0.01	0.027	0.025	
Boron	mg/L	0.200	<0.02	<0.02	<0.02	0.013	<0.01	0.14	0.05	<0.02	<0.010	<0.010	0.011	<0.010	<0.010	0.012	0.015	0.014
Cadmium	mg/L	0.0005 [2]	<0.005	<0.005	<0.005	<0.0001	<0.0001	<0.0001	<0.005	<0.005	<0.0001	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	
Calcium	mg/L																	
Chromium	mg/L	0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Copper	mg/L	0.005 [3]	<0.02	<0.02	<0.02	<0.001	<0.001	0.001	<0.02	<0.02	<0.002	<0.002	<0.002	0.002	0.002	0.002	0.002	
Iron	mg/L	0.300	0.86	5.02	0.88	0.65	1.1	15	2.9	0.51	0.263	6.39	15.8	0.856	0.327	1.98	0.7	0.23
Lead	mg/L	0.005 [4]	<0.05	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.05	<0.05	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	
Magnesium	mg/L																	
Manganese	mg/L		0.08	0.36	0.04	0.1	0.053	5.9	0.39	0.02	0.017	0.1	1.72	0.025	0.02	0.779	0.08	<0.03
Mercury	mg/L	0.0002	<0.0001				<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.016	0.034	0.035	0.018	0.016	0.032	0.064	0.029	<0.02	<0.02	0.15	0.11	<0.02	0.05	0.03	0.03
Sodium	mg/L																	
Zinc	mg/L	0.020	0.01	<0.01	0.1	0.022	<0.005	0.11	0.27	0.02	0.005	0.006	0.589	0.015	0.007	0.011	0.051	
Total Dissolved Solids	mg/L																	
Total Suspended Solids	mg/L							464										

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW30														
			Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10	Apr-11	Jul-11	Oct-11	Dec-11	Apr-12	Jul-12	Sep-12
pH	units	6.5 to 8.5	7.07	7.25	7.37	7.12	6.63	7	7.36	6.83	6.88	6.86	7.25	6.72	6.52	6.9	6.51
Conductivity	µmho/cm		96	227	199	84	147	267	174	57	84	68	257	65	143	302	229
Chloride	mg/L		16.6	43	48.1	12.8	31.9	57	31.3	6.16	15.2	7.55	59.4	7.41	29	61	48
Sulphate	mg/L		5.27	2.37	4.56	5.55	5.9	0.55	1.36	4.7	4.9	2.13	5.75	6.42	7	<3	8
Alkalinity	mg/L		10	44	28	13	15	46	41	9	11	15	45	8	14	42	24
Hardness	mg/L		17	51	37	19	26	54	43	13	16	22	60	14	21	51	37
Total Kjeldahl Nitrogen	mg/L		0.15	0.89	0.48	0.67	0.36	0.62	0.3	0.35	0.49	0.5	0.29	0.39	0.21	0.5	0.2
Ammonia: total	mg/L		<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.37	0.08	<0.02	<0.02	0.04	<0.02
Ammonia: un-ionized	µg/L	20									<1	2	<1	<1	<1	1	<1
Nitrate	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.05	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.10	
Biochemical Oxygen Demand	mg/L		<5	<5	<5	<5					<5	7	<5	<5	1	1	<1
Chemical Oxygen Demand	mg/L		12	27	12	15	39	27	11	12	<5	28	19	19	9	42	26
Dissolved Organic Carbon	mg/L		4.5	10.7	6.5	5.3	6.5	13.4	7.9	5.2	3.9	9.9	9.9	5.1	7	11.1	8.5
Phenols	µg/L	1	<1	1	1	2	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.003		<0.003		<0.003		<0.003		<0.003		<0.003		<0.001		<0.001
Barium	mg/L		0.01		0.013		0.015		0.018		0.009		0.032		0.01		0.02
Boron	mg/L	0.200	<0.010	0.02	0.015	<0.010	0.011	0.018	0.014	<0.010	<0.010	0.017	0.011	0.012	0.02	0.01	0.02
Cadmium	mg/L	0.0005 [2]	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.0001		<0.0001
Calcium	mg/L														5	14	10
Chromium	mg/L	0.01	<0.003		<0.003		<0.003		<0.003		<0.003		<0.003		0.001		<0.001
Copper	mg/L	0.005 [3]	<0.002		<0.002		<0.002		<0.002		<0.002		0.003		<0.001		<0.001
Iron	mg/L	0.300	0.263	5.23	0.122	0.2	0.498	6.51	0.409	0.301	0.265	0.601	1.25	0.243	0.51	9.06	0.73
Lead	mg/L	0.005 [4]	<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.001		<0.001
Magnesium	mg/L														2	4	3
Manganese	mg/L		0.018	2.08	0.014	0.016	0.062	0.727	0.042	0.014	0.025	0.075	0.318	0.011	0.05	0.63	0.07
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	0.030	0.03	0.05	<0.02	<0.02	0.03	0.06	0.03	0.03	<0.02	0.03	0.02	0.02	0.02	0.04	0.02
Sodium	mg/L																
Zinc	mg/L	0.020	0.121		<0.005		0.006		0.009		0.01		0.008		<0.01		<0.01
Total Dissolved Solids	mg/L		66	130	134	58	116	176	72	38	48	66	188	56	93	196	149
Total Suspended Solids	mg/L		10	15	< 10	<10	<10	10	<10	<10	<10	<10	<10	<10	<2	12	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW30														
			Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Apr-15	Jul-15	Sep-15	Apr-16	Jul-16	Sep-16	Dec-16
pH	units	6.5 to 8.5	6.28	6.5	6.89	6.61	6.71	6.58	7.34	6.98	6.61	7.07	7.23	6.3	6.97	7.24	6.87
Conductivity	µmho/cm		108	137	314	307	153	580	434	267	119	437	534	160	550	530	210
Chloride	mg/L		18	29	71	68	31	96	78	50	24	99	116	35	110	110	43
Sulphate	mg/L		7	5	3	3	7	57	2	3	3	4	3	5.2	<1.0	2.5	5.8
Alkalinity	mg/L		16	15	28	37	17	78	88	41	12	54	61	11	79	72	10
Hardness	mg/L		21	23	54	58	23	110	103	54	17	76	85	22	100	94	25
Total Kjeldahl Nitrogen	mg/L		0.18	0.27	0.31	0.2	0.31	0.62	0.79	0.24	0.11	0.81	0.42	0.16	0.74	0.55	0.32
Ammonia: total	mg/L		0.02	<0.02	0.03	0.03	0.05	0.51	0.08	0.06	0.09	0.07	<0.025	<0.050	0.057	0.062	<0.050
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	0.18
Nitrite	mg/L		<0.10		<0.10		<0.10		<0.10			<0.10		<0.010	0.012	<0.010	<0.010
Biochemical Oxygen Demand	mg/L		<1	<1	<1	7	1	2	<1	1	<1	<1	<1	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L		14	<5	11	18	6	5	33	23	13	42	25	23	62	39	27
Dissolved Organic Carbon	mg/L		5.3	4.3	7.5	6.5	4.6	4.3	14.8	7.3	5.1	13.3	7.7	3.6	17	11	8.6
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005		<0.001		<0.001		0.002	<0.001	<0.001	<0.001		<0.001	<0.0010		<0.0010	
Barium	mg/L			0.01		0.03		0.04	0.05	0.02	0.01		0.05	0.016		0.052	
Boron	mg/L	0.200	0.02	<0.01	0.04	0.03	0.02	0.57	0.03	0.04	<0.01	0.05	0.05	0.019	0.045	0.042	0.028
Cadmium	mg/L	0.0005 [2]		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.00010		<0.00010	
Calcium	mg/L		5	6	15	15	6	31	28	15	5	22	24				
Chromium	mg/L	0.01		<0.001		<0.001		<0.001	<0.001	<0.001	<0.001		<0.001	<0.0050		<0.0050	
Copper	mg/L	0.005 [3]		<0.001		<0.001		<0.001	<0.001	<0.001	0.001		<0.001	<0.0010		<0.0010	
Iron	mg/L	0.300	0.24	0.51	2.54	0.92	0.52	21.4	5.06	0.98	1.24	6.11	3.2	0.66	23	2.6	0.68
Lead	mg/L	0.005 [4]		<0.001		<0.001		<0.001	<0.001	<0.001	<0.001		<0.001	<0.00050		<0.00050	
Magnesium	mg/L		2	2	4	5	2	8	8	4	1	5	6				
Manganese	mg/L		0.02	0.05	0.43	0.12	0.05	3.16	1.45	0.39	0.14	1.04	0.84	0.084	1.9	0.99	0.038
Mercury	mg/L	0.0002		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001		<0.0001	<0.1		<0.1	
Phosphorus	mg/L	0.030	0.02	0.02	0.01	0.01	0.03	<0.01	0.01	<0.01	0.04	<0.05	<0.05	0.014	0.044	0.016	0.032
Sodium	mg/L																
Zinc	mg/L	0.020		<0.01		<0.01		<0.01	<0.01	<0.01	<0.01		<0.01	<0.0050		<0.0050	
Total Dissolved Solids	mg/L		70	89	204	200	99	377	282	174	77	284	347	118	368	436	116
Total Suspended Solids	mg/L		<2	4	<2	<2	<2	44	8	5	4	26	20	<10	37	<10	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW30																
			Apr-17	Jul-17	Sep-17	Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	May-20	Jul-20	Oct-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	6.5 to 8.5	6.71	7.36	7.4	6.86	6.68	7.11	6.65	7.1	7.07	7.09	7.17	7.09	6.84	6.84	6.61	6.84	6.43
Conductivity	µmho/cm		100	510	390	170	530	410	180	150	415	654	193	468	52	377	100	52	40
Chloride	mg/L		19	94	85	38	130	77	36	35	88	155	43	90	11	86	7	11	6
Sulphate	mg/L		3.2	<1.0	1.5	4	2	1.3	5	3	5	1	3	<1	4	7	<1	4	2
Alkalinity	mg/L		6	94	54	11	44	70	15	63	88	62	17	78	10	28	40	10	8
Hardness	mg/L		11	100	65	20	58	70	23	14	89	90	23	78	14	45	41	14	12
Total Kjeldahl Nitrogen	mg/L		0.17	0.48	0.25	0.11	2.7	0.6	0.23	0.3	1.41	0.4	0.351	1.17	0.549	0.488	1.08	0.549	0.698
Ammonia: total	mg/L		<0.050	<0.050	<0.050	0.052	0.56	0.061	<0.050	0.05	0.12	0.05	<0.010	0.01	<0.010	0.206	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Nitrate	mg/L		0.12	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	0.12	<0.10
Nitrite	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		<2.0	<2.0	<2.0	<2	33	<2	5	<1	6	3	2	4	3	1	3	3	<1
Chemical Oxygen Demand	mg/L		12	35	20	6.1	190	45	14	<5	62	27	18	52	28	15	37	28	18
Dissolved Organic Carbon	mg/L		5.4	13	7.9	3.6	8.9	15	4.3	3.6	19.7	8.8	5.4	19.2	5.5	5.5	13.9	5.5	6.1
Phenols	µg/L	1	<1	<1	3.5	<1	<20	<1	<1	<1	1	1	<1	8	<1	<1	5	<1	<1
Arsenic	mg/L	0.005	<0.0010		<0.0010	<0.0010		<0.0010		<0.001		<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	
Barium	mg/L		0.016		0.041	0.015		0.057		0.03		0.08	0.02		0.02	0.04	0.03	0.02	
Boron	mg/L	0.200	<0.010	0.032	0.037	0.015	<0.10	0.031	0.028	0.02	0.12	0.05	0.03	0.05	0.01	0.04	0.01	0.01	<0.01
Cadmium	mg/L	0.0005 [2]	<0.00010		<0.00010	<0.00010		<0.00010		<0.0001		<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	
Calcium	mg/L									4	24	26	6	23	4	13	10	4	3
Chromium	mg/L	0.01	<0.0050		<0.0050	<0.0050		<0.0050		<0.001		<0.001	<0.001		<0.001	0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]	0.0024		<0.0010	<0.0010		0.0012		0.002		<0.001	<0.001		0.003	0.002	0.001	0.003	
Iron	mg/L	0.300	1	4.5	1	0.54	620	9.8	0.5	0.64	3.05	5.69	1.27	16.3	0.95	3.1	9.29	0.95	0.43
Lead	mg/L	0.005 [4]	<0.00050		<0.00050	<0.00050		<0.00050		<0.001		<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	
Magnesium	mg/L									1	7	6	2	5	1	3	4	1	1
Manganese	mg/L		0.03	3.4	0.14	0.09	5.1	2.3	0.082	0.09	1.57	2.25	0.04	2.69	0.15	0.39	1.59	0.15	0.03
Mercury	mg/L	0.0002	<0.1		<0.1	<0.1		<0.1		<0.0001		<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.034	0.035	0.017	0.021	1.6	0.047	0.01	0.012	0.087	0.043	0.023	0.039	0.035	0.028	0.119	0.035	0.016
Sodium	mg/L									17		88	26		4	61	7	4	
Zinc	mg/L	0.020	<0.0050		<0.0050	<0.0050		<0.0050		<0.01		<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		58	310	302	95	225	260	135	98	270	425	125	304	34	245	65	34	26
Total Suspended Solids	mg/L		16	16	<10	<10	2700	19	<10	<2	8	33	5	15	53	30	23	53	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW33															
			Apr-05	Jun-05	Sep-05	Nov-05	Apr-06	Jun-06	Oct-06	Nov-06	Apr-07	Jun-07	Sep-07	Dec-07	Apr-08	Jun-08	Sep-08	Dec-08
pH	units	6.5 to 8.5	7.24	7.06	7.38	7.21	7	7.2	7.2	7.2	6.17	6.48	6.36	6.41	5.82	6.94	7.17	6.94
Conductivity	µmho/cm		45.1	84.7	125	115	36	73	99	76	37	82	102	57	47	71	95	73
Chloride	mg/L		4.1	9.57	15	18	3	9	14	10	2.36	10.7	14.5	4.8	7.76	9.6	11.8	8.63
Sulphate	mg/L		5.7	6.2	8	10	5	2	1	5	5.82	5.16	2.92	4.14	4.39	4.71	2.34	4.72
Alkalinity	mg/L		15.2	11	26	16	5	15		14	<10	19	22	10	<5	12	34	13
Hardness	mg/L		13.4	21.4	41.9	35.1	10	24	33	21	11	25	33	18	13	24	31	23
Total Kjeldahl Nitrogen	mg/L		2.7	0.9	0.8	0.6	0.3	0.9	0.7	0.6	0.14	0.99	0.64	0.32	0.31	0.46	0.62	0.53
Ammonia: total	mg/L		<0.05	0.17	0.09	<0.05	<0.05	0.11	0.06	<0.05	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02
Ammonia: un-ionized	µg/L	20																
Nitrate	mg/L						<0.1	<0.1									<0.05	<0.05
Nitrite	mg/L						<0.01	<0.01									<0.05	<0.05
Biochemical Oxygen Demand	mg/L																<5	13
Chemical Oxygen Demand	mg/L		10	38	30	32	8	41	43	39	7.1	36	37	25	23	26	16	<5
Dissolved Organic Carbon	mg/L		3.9	12.9	9.8	11.1	4	12	12.7	9.7	3.7	10.8	12.2	10.3	7.8	9.7	10.3	7.6
Phenols	µg/L	1	1	<1	<1	<1	<1	<1	<1	<1	2	7	6	5	<1	<1	3	9
Arsenic	mg/L	0.005	<0.2	<0.2	<0.2	<0.001	<0.001	<0.001	<0.2	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Barium	mg/L		<0.02	0.02	0.02	0.021	0.012	0.021	0.02	<0.02	0.01	0.012	0.028	0.022	0.02	0.019	0.019	
Boron	mg/L	0.200	<0.02	0.02	<0.02	0.028	<0.01	0.01	<0.02	<0.02	<0.010	0.015	0.018	<0.010	<0.010	0.019	0.019	0.016
Cadmium	mg/L	0.0005 [2]	<0.005	<0.005	<0.005	<0.0001	<0.0001	0.0003	<0.005	<0.005	<0.0001	<0.001	<0.002	<0.0001	<0.0001	<0.0001	<0.0001	
Calcium	mg/L																	
Chromium	mg/L	0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Copper	mg/L	0.005 [3]	<0.02	<0.02	<0.02	<0.001	<0.001	0.001	<0.02	<0.02	<0.002	<0.002	<0.002	<0.002	0.002	0.002	0.002	
Iron	mg/L	0.300	0.17	0.67	0.49	0.49	0.11	1	0.89	0.34	0.069	0.442	1.04	0.362	0.329	0.397	1.16	0.61
Lead	mg/L	0.005 [4]	<0.05	<0.05	<0.05	<0.0005	<0.0005	<0.0005	<0.05	<0.05	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	
Magnesium	mg/L																	
Manganese	mg/L		<0.01	0.03	0.02	0.023	0.005	0.063	0.04	0.03	0.01	0.023	0.056	0.067	0.024	0.039	0.11	0.1
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.015	0.029	0.06	0.014	0.004	0.054	0.03	0.009	0.02	<0.02	0.03	<0.02	<0.02	0.03	0.03	0.03
Sodium	mg/L																	
Zinc	mg/L	0.020	<0.01	<0.01	<0.01	<0.005	<0.005	0.006	<0.01	<0.01	0.004	0.007	<0.004	0.005	0.009	<0.004	0.037	
Total Dissolved Solids	mg/L							47										
Total Suspended Solids	mg/L																	

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW33																
			Apr-09	Jun-09	Oct-09	Dec-09	Apr-10	Jul-10	Oct-10	Dec-10	Apr-11	Jul-11	Oct-11	Dec-11	Apr-12	Jul-12	Sep-12	Dec-12	Apr-13
pH	units	6.5 to 8.5	6.92	7	7.22	6.87	6.49	6.86	7.01	6.5	6.34	7.2	7.08	6.61	6.45	6.71	6.51	6.14	6.2
Conductivity	µmho/cm		61	88	100	50	58	68	72	39	58	237	101	60	64	78	93	44	46
Chloride	mg/L		7.95	13.4	15.1	5.1	7.81	9.11	7.57	3.29	6.02	42.8	10.2	7.08	9	9	10	4	5
Sulphate	mg/L		6.77	6.26	2.41	4.96	6.06	2.83	1.94	3.34	5.13	0.84	2.1	4.07	5	<3	<3	5	6
Alkalinity	mg/L		7	13	22	9	7	13	20	7	10	52	29	10	9	21	28	10	<5
Hardness	mg/L		25	26	33	16	16	22	25	12	16	56	31	17	14	21	31	14	12
Total Kjeldahl Nitrogen	mg/L		0.25	0.79	0.77	0.52	0.31	0.61	0.72	0.4	0.63	0.78	0.46	0.46	0.24	0.47	0.78	1.01	0.45
Ammonia: total	mg/L		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	0.33	0.04	0.04	<0.02	<0.02	0.05	0.22	0.27
Ammonia: un-ionized	µg/L	20									<1	1	<1	1	<1	<2	<1	4	<1
Nitrate	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	0.06	<0.10	<0.10	<0.10	<0.10	0.12
Nitrite	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.10		<0.10	
Biochemical Oxygen Demand	mg/L		<5	<5	<5	<5					<5	<5	<5	<5	2	2	2	2	<1
Chemical Oxygen Demand	mg/L		9	22	25	16	19	24	22	16	10	39	28	23	8	31	28	30	<5
Dissolved Organic Carbon	mg/L		3.9	8.7	9	5.4	3.8	9.1	10.3	5	4.9	18	9.9	6	5	8.7	10.2	6.6	3.8
Phenols	µg/L	1	<1	11	2	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.003		<0.003		<0.003		<0.003		<0.003		<0.003		<0.001		<0.001		<0.001
Barium	mg/L		0.009		0.019		0.011		0.015		0.019		0.022		0.01		0.02		0.01
Boron	mg/L	0.200	0.014	0.022	0.021	<0.010	0.011	0.02	0.016	<0.010	<0.010	<0.010	0.018	0.011	0.01	0.02	0.03	0.02	<0.01
Cadmium	mg/L	0.0005 [2]	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.0001		<0.0001		<0.0001
Calcium	mg/L														4	5	9	4	3
Chromium	mg/L	0.01	<0.003		<0.003		<0.003		<0.003		<0.003		<0.003		<0.001		<0.001		<0.001
Copper	mg/L	0.005 [3]	<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.001		<0.001		<0.001
Iron	mg/L	0.300	0.101	0.463	0.566	0.101	0.137	0.614	0.775	0.161	0.594	5.92	1.02	0.157	0.16	0.93	1.61	0.46	0.11
Lead	mg/L	0.005 [4]	<0.002		<0.002		<0.002		<0.002		<0.002		<0.002		<0.001		<0.001		<0.001
Magnesium	mg/L														1	2	2	1	1
Manganese	mg/L		0.022	0.054	0.066	0.031	0.029	0.069	0.086	0.027	0.09	0.581	0.088	0.018	0.01	0.11	0.12	0.06	0.02
Mercury	mg/L	0.0002	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Phosphorus	mg/L	0.030	0.02	0.04	0.03	<0.02	<0.02	<0.02	0.02	0.02	<0.05	<0.02	0.02	<0.02	<0.01	0.02	0.02	0.04	<0.01
Sodium	mg/L																		
Zinc	mg/L	0.020	<0.005		<0.005		<0.005		<0.005		<0.005		<0.005		<0.01		<0.01		<0.01
Total Dissolved Solids	mg/L		38	58	86	20	50	50	24	28	36	178	72	50	42	51	60	29	30
Total Suspended Solids	mg/L		<10	<10	< 10	<10	<10	<10	<10	<10	<10	10	<10	<10	<2	3	4	10	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW33														
			Jun-13	Sep-13	Dec-13	Apr-14	Jul-14	Sep-14	Dec-14	Apr-15	Jul-15	Sep-15	Dec-15	Apr-16	Jul-16	Sep-16	Dec-16
pH	units	6.5 to 8.5	6.77	6.45	6.45	6.19	7.21	6.62	6.63	6.64	7.68	7.25	6.86	5.99	7.28	6.96	6.44
Conductivity	µmho/cm		81	83	72	63	93	49	57	56	160	130	52	37	150	110	77
Chloride	mg/L		11	11	11	8	15	6	7	7	20	18	6	3.3	16	11	8.6
Sulphate	mg/L		4	6	7	6	2	3	5	4	6	5	7	4.5	4.4	10	9.3
Alkalinity	mg/L		14	16	8	10	14	8	8	<5	43	29	7	4.6	43	15	3.9
Hardness	mg/L		23	26	17	17	26	17	21	14	65	44	14	11	60	40	22
Total Kjeldahl Nitrogen	mg/L		0.72	0.3	0.34	0.29	0.66	0.28	0.29	0.13	0.62	0.39	0.2	0.16	0.47	0.43	0.39
Ammonia: total	mg/L		0.22	0.02	0.12	0.14	0.06	0.06	0.03	0.04	<0.05	<0.025	<0.025	<0.050	<0.050	<0.050	<0.050
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		<0.10	<0.10	0.2	0.37	<0.10	<0.10	<0.10	0.27	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.14
Nitrite	mg/L		<0.10		<0.10		<0.10		<0.10		<0.10		<0.10	<0.010	<0.010	<0.010	<0.010
Biochemical Oxygen Demand	mg/L		1	<1	1	<1	<1	<1	1	<1	1	<1	<1	<2.0	<2.0	<2.0	<2.0
Chemical Oxygen Demand	mg/L		31	31	16	<5	28	28	7	13	28	26	13	20	23	44	35
Dissolved Organic Carbon	mg/L		11.7	9.5	5.2	4.4	12	9	5.1	4.4	10.5	9.1	6	4.3	9.7	12	12
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005		<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.0010		<0.0010	
Barium	mg/L			0.02		0.01	0.02	0.01		0.01		0.02		0.0099		0.03	
Boron	mg/L	0.200	0.03	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.02	<0.01	0.011	0.02	0.021	0.021
Cadmium	mg/L	0.0005 [2]		<0.0001		<0.0001	<0.0001	<0.0001		<0.0001		<0.0001		<0.00010		<0.00010	
Calcium	mg/L		6	7	5	5	7	5	5	4	16	11	4				
Chromium	mg/L	0.01		<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.0050		<0.0050	
Copper	mg/L	0.005 [3]		<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.0010		<0.0010	
Iron	mg/L	0.300	0.64	0.29	0.12	0.11	0.33	0.17	0.11	0.12	0.34	0.16	0.11	<0.10	0.41	0.3	0.15
Lead	mg/L	0.005 [4]		<0.001		<0.001	<0.001	<0.001		<0.001		<0.001		<0.00050		<0.00050	
Magnesium	mg/L		2	2	1	1	2	1	2	1	6	4	1				
Manganese	mg/L		0.05	0.03	0.02	0.01	0.01	<0.01	0.01	0.01	0.02	<0.01	<0.01	0.0047	0.022	0.015	0.012
Mercury	mg/L	0.0002		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001		<0.1		<0.1	
Phosphorus	mg/L	0.030	0.02	0.02	0.02	<0.01	0.02	0.01	<0.01	<0.01	<0.05	<0.05	<0.05	0.005	0.021	0.015	0.011
Sodium	mg/L																
Zinc	mg/L	0.020		<0.01		<0.01	<0.01	<0.01		<0.01		<0.01		<0.0050		0.0081	
Total Dissolved Solids	mg/L		53	54	47	41	60	32	37	36	104	84	34	16	140	82	52
Total Suspended Solids	mg/L		<2	<2	<2	4	<2	4	7	<2	4	12	2	<10	<10	<10	<10

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW33																			
			Apr-17	Jul-17	Sep-17	Dec-17	Apr-18	Jul-18	Sep-18	Dec-18	Apr-19	Jul-19	Sep-19	Dec-19	May-20	Jul-20	Oct-20	Dec-20	Apr-21	Jul-21	Oct-21	Dec-21
pH	units	6.5 to 8.5	6.17	6.98	6.91	6.67	6.56	6.78	6.63	6.39	6.3	6.69	7.14	6.59	6.75	7.05	6.86	6.79	6.8	6.6	6.86	6.26
Conductivity	µmho/cm		33	96	71	39	60	150	74	44	39	75	130	46	62	116	60	44	58	86	60	32
Chloride	mg/L		3.1	13	11	4.5	7.6	24	9.3	5.2	8	14	27	6	10	22	16	7	9	15	16	5
Sulphate	mg/L		3	<1.0	<1.0	2.7	4.1	<1.0	<1.0	2.7	3	<1	1	3	3	<1	2	3	2	<1	2	2
Alkalinity	mg/L		2.1	16	11	4.8	4.8	32	12	5.8	5	15	17	7	7	16	9	7	9	14	9	<5
Hardness	mg/L		8.1	29	21	11	15	45	24	12	12	23	35	7	14	28	10	10	14	26	10	7
Total Kjeldahl Nitrogen	mg/L		0.22	0.39	0.27	0.2	0.12	1.7	0.71	0.26	0.2	1.02	0.5	0.292	0.521	0.899	0.926	0.354	0.266	0.764	0.926	0.624
Ammonia: total	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050	0.71	<0.050	0.08	0.04	<0.010	0.02	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.34	<0.10	<0.10	0.11	0.72	<0.10	<0.50	0.23	1.26	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.050	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.15
Biochemical Oxygen Demand	mg/L		<2.0	<2.0	<2.0	<2.0	<2	7	<2	<2	<1	4	1	3	8	4	5	3	<1	2	5	<1
Chemical Oxygen Demand	mg/L		13	37	25	9.5	9.3	82	64	11	5	40	17	5	21	35	26	16	14	10	26	18
Dissolved Organic Carbon	mg/L		5.7	14	11	4.8	3.7	26	19	4.8	2.7	15.2	12.3	4.9	6.4	14.5	8.5	4.3	5.2	10.5	8.5	4.7
Phenols	µg/L	1	<1	<2	6.1	<1	<1	1.3	<1	<1	<1	<1	1	<1	3	6	<1	2	3	3	<1	<1
Arsenic	mg/L	0.005	<0.0010		<0.0010		<0.0010		<0.0010		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Barium	mg/L		0.0086		0.017		0.013		0.021		0.03		0.03		0.01		0.01		0.01	0.02	0.01	
Boron	mg/L	0.200	<0.010	0.014	0.015	0.012	<0.010	0.019	0.012	<0.010	<0.01	0.01	0.01	<0.01	0.02	0.02	<0.01	0.01	<0.01	0.02	<0.01	<0.01
Cadmium	mg/L	0.0005 [2]	<0.00010		<0.00010		<0.00010		<0.00010		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Calcium	mg/L										3	6	9	3	4	8	4	4	4	7	4	3
Chromium	mg/L	0.01	<0.0050		<0.0050		<0.0050		<0.0050		0.002		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Copper	mg/L	0.005 [3]	<0.0010		<0.0010		<0.0010		0.0012		0.002		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Iron	mg/L	0.300	<0.10	0.4	0.23	0.12	<0.10	5.1	0.79	0.24	0.15	0.9	0.54	0.24	0.14	0.69	0.24	0.16	0.2	1.09	0.24	0.2
Lead	mg/L	0.005 [4]	<0.00050		<0.00050		<0.00050		<0.00050		<0.001		<0.001		<0.001		<0.001		<0.001	<0.001	<0.001	
Magnesium	mg/L										1	2	3	<1	1	2	<1	<1	1	2	<1	<1
Manganese	mg/L		0.0059	0.012	0.0075	0.0056	0.0074	0.22	0.11	0.024	<0.01	0.03	0.04	0.03	<0.01	0.05	0.01	0.01	<0.01	0.11	0.01	0.02
Mercury	mg/L	0.0002	<0.1		<0.1		<0.1		<0.1		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	<0.0001	<0.0001	
Phosphorus	mg/L	0.030	0.009	0.015	0.005	0.005	0.006	0.29	0.025	0.006	0.004	0.027	0.014	0.004	0.008	0.019	0.008	0.007	0.01	0.033	0.008	<0.002
Sodium	mg/L										3		10		5		4		5	8	4	
Zinc	mg/L	0.020	0.006		0.0071		0.0052		0.011		<0.01		<0.01		<0.01		<0.01		<0.01	<0.01	<0.01	
Total Dissolved Solids	mg/L		44	104	108	80	50	80	100	10	25	49	84	30	40	75	39	29	38	56	39	21
Total Suspended Solids	mg/L		<10	<10	<10	<10	<10	45	<10	<10	<2	6	8	2	<2	2	2	5	<2	11	2	<2

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

PARAMETER	UNITS	PWQO [1]	SW34															
			Apr-05	Sep-05	Apr-07	Sep-07	Apr-08	Sep-08	Apr-09	Oct-09	Apr-10	Oct-10	Apr-11	Oct-11	Apr-12	Sep-12	Apr-13	Sep-13
pH	units	6.5 to 8.5	6.96	8.02	6.62	6.79	6.59	7.89	7.4	7.57	7.53	7.64	7.02	7.74	6.99	6.86	6.71	6.75
Conductivity	µmho/cm		105	301	82	267	30	163	76	120	174	131	80	229	189	175	128	148
Chloride	mg/L		8.3	35	8.94	33.3	1.06	16.6	5.44	14.3	17.5	13	7.87	28	14	15	18	18
Sulphate	mg/L		7.8	8	6.25	7.12	4.63	5.08	5.61	5.62	9.63	2.63	4.58	10.5	11	10	7	4
Alkalinity	mg/L		27.9	106	15	72	5	50	21	30	52	44	17	75	66	52	27	39
Hardness	mg/L		35.3	93.6	22	78	11	50	25	37	54	46	24	77	60	56	32	41
Total Kjeldahl Nitrogen	mg/L		0.5	0.8	<0.10	0.63	0.32	0.45	0.24	1.03	0.4	0.95	0.31	0.32	0.3	0.51	0.22	0.46
Ammonia: total	mg/L		0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.06	<0.02	<0.02	0.03	0.02
Ammonia: un-ionized	µg/L	20											<1	<1	<1	<1	<1	<1
Nitrate	mg/L							<0.05	<0.05	<0.05	<0.05	<0.05	0.2	0.32	0.44	<0.10	<0.10	<0.10
Nitrite	mg/L							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Biochemical Oxygen Demand	mg/L							<5	<5	<5			<5	<5	1	2	<1	1
Chemical Oxygen Demand	mg/L		19	28	9.6	31	14	9	12	35	24	23	7	23	23	29	9	31
Dissolved Organic Carbon	mg/L		5.2	9.7	4.4	11.8	4.7	9.2	5.7	10.2	5.6	12.2	4.3	9.9	8.2	11.6	5.3	9.1
Phenols	µg/L	1	2	<1	1	3	<1	3	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.2	<0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.001	<0.001	<0.001	<0.001
Barium	mg/L		<0.02	0.03	0.011	0.025	0.009	0.017	0.01	0.01	0.017	0.019	0.015	0.021	0.02	0.02	0.01	0.02
Boron	mg/L	0.200	<0.02	0.05	0.013	0.029	<0.010	0.024	0.013	0.017	0.027	0.017	<0.010	0.034	0.03	0.03	0.01	0.02
Cadmium	mg/L	0.0005 [2]	<0.005	<0.005	<0.0001	<0.002	<0.0001	<0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	mg/L														14	14	8	10
Chromium	mg/L	0.01	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.001	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	<0.02	<0.02	<0.002	<0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.001	0.001	<0.001	0.001
Iron	mg/L	0.300	0.68	1.26	0.362	0.457	0.188	0.6	0.363	0.579	0.366	1.17	0.793	0.15	0.4	1.15	0.45	1.98
Lead	mg/L	0.005 [4]	<0.05	<0.05	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001
Magnesium	mg/L														6	5	3	4
Manganese	mg/L		0.16		0.086	0.26	0.054	0.064	0.055	0.065	0.083	0.421	0.154	0.021	0.22	0.17	0.13	0.28
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.015	0.089	<0.02	0.05	<0.02	0.03	0.03	0.12	0.03	0.03	<0.05	0.02	0.03	0.03	0.01	0.03
Sodium	mg/L																	
Zinc	mg/L	0.020	0.01	<0.01	0.005	0.022	0.018	<0.004	<0.005	<0.005	<0.005	0.009	0.006	0.044	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L								50	102	116	58	52	158	123	114	83	96
Total Suspended Solids	mg/L								<10	< 10	<10	<10	<10	<10	3	2	<2	6

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

TABLE D-2
SURFACE WATER GENERAL CHEMICAL RESULTS
McDOUGALL LANDFILL SITE - 2021 MONITORING PROGRAM

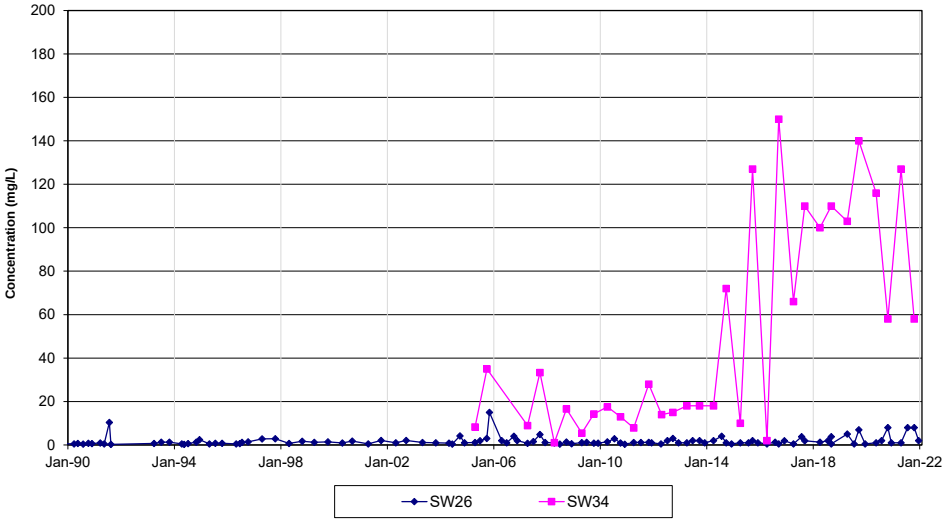
PARAMETER	UNITS	PWQO [1]	SW34															
			Apr-14	Sep-14	Apr-15	Sep-15	Apr-16	Sep-16	Apr-17	Sep-17	Apr-18	Sep-18	Apr-19	Sep-19	May-20	Oct-20	Apr-21	Oct-21
pH	units	6.5 to 8.5	6.57	6.79	7.24	6.73	6.26	6.75	6.61	6.82	6.67	6.73	7.01	6.77	6.9	7.29	6.5	7.29
Conductivity	µmho/cm		147	310	108	484	47		270	420	380	480	397	512	454	239	426	239
Chloride	mg/L		18	72	10	127	2	150	66	110	100	110	103	140	116	58	127	58
Sulphate	mg/L		8	1	6	<1	4.5	<1.0	3.8	<1.0	3.8	<1.0	4	<1	3	2	3	2
Alkalinity	mg/L		37	27	28	26	12	26	5.5	17	10	47	56	20	12	32	12	32
Hardness	mg/L		41	40	30	64	16	76	21	51	35	61	28	50	37	12	46	12
Total Kjeldahl Nitrogen	mg/L		0.36	0.32	0.28	0.26	0.17	0.47	0.15	0.2	0.1	0.89	0.2	0.1	3.61	0.561	0.264	0.561
Ammonia: total	mg/L		0.22	0.07	0.29	<0.025	<0.050	<0.050	<0.050	<0.050	<0.050	0.1	0.01	0.04	<0.010	<0.010	<0.010	<0.010
Ammonia: un-ionized	µg/L	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate	mg/L		0.23	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite	mg/L						<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Biochemical Oxygen Demand	mg/L		2	2	<1	2	<2.0	<2.0	<2.0	<2.0	<2	<2	<1	1	12	3	1	3
Chemical Oxygen Demand	mg/L		7	23	14	18	24	45	9.7	14	7.9	120	<5	15	100	40	12	40
Dissolved Organic Carbon	mg/L		5.7	8.5	5	3.3	4.1	11	4.7	4.3	3	27	3.1	7.4	5.1	7.6	5.6	7.6
Phenols	µg/L	1	<1	<1	<1	<1	<1	<1	<2	3.8	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Barium	mg/L		0.02	0.03	0.01	0.04	0.0092	0.06	0.019	0.047	0.027	0.062	0.04	0.05	0.06	0.02	0.03	0.02
Boron	mg/L	0.200	0.02	<0.01	0.02	<0.01	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Cadmium	mg/L	0.0005 [2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001
Calcium	mg/L		10	11	7	19							8	15	10	5	12	5
Chromium	mg/L	0.01	<0.001	<0.001	<0.001	<0.001	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Copper	mg/L	0.005 [3]	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0047	0.003	0.002	<0.005	0.002	<0.001	0.002
Iron	mg/L	0.300	1.27	1.99	0.53	5.47	0.34	3.5	0.23	5.7	0.34	24	0.19	2.05	23.3	5.11	1.02	5.11
Lead	mg/L	0.005 [4]	<0.001	<0.001	<0.001	<0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Magnesium	mg/L		4	3	3	4							2	3	3	<1	4	<1
Manganese	mg/L		0.33	0.25	0.15	0.61	0.059	0.42	0.021	0.6	0.032	1.3	0.02	0.2	1.54	0.14	0.03	0.14
Mercury	mg/L	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001
Phosphorus	mg/L	0.030	0.02	<0.01	0.02	<0.05	0.015	0.019	0.008	0.012	0.005	0.15	0.004	0.01	0.14	0.015	0.011	0.015
Sodium	mg/L												56	72	69	33	67	33
Zinc	mg/L	0.020	<0.01	<0.01	<0.01	<0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L		96	202	70	315	50	292	150	298	145	360	258	333	295	155	277	155
Total Suspended Solids	mg/L		8	113	<2	432	<10	<10	<10	<10	<10	410	<2	16	278	4	11	4

NOTES: 1) PWQO - Provincial Water Quality Objectives (1999)
2) PWQO value based on hardness >100 mg/L.
3) PWQO value based on hardness >20 mg/L.
4) PWQO value based on hardness >80 mg/L.
5) Blank indicates parameter not analysed.

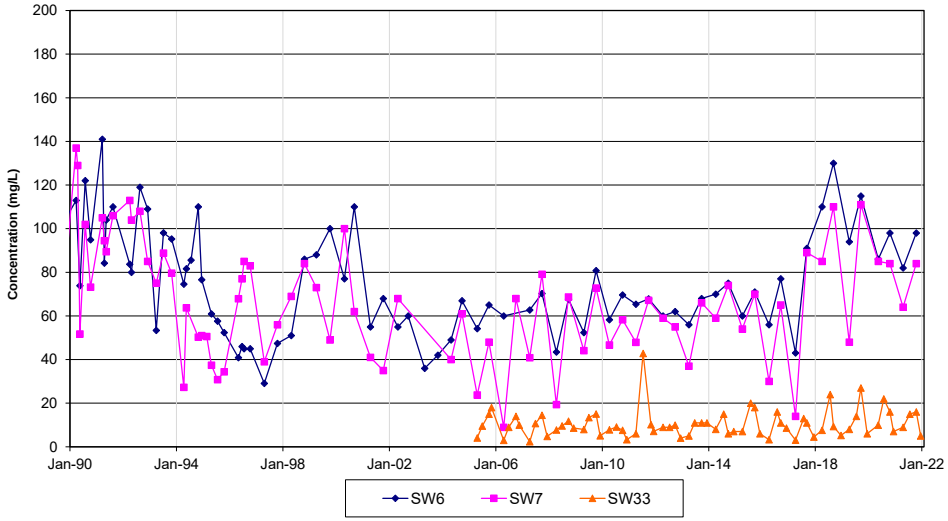
FIGURE D-1

SURFACE WATER TIME CONCENTRATION GRAPHS - CHLORIDE

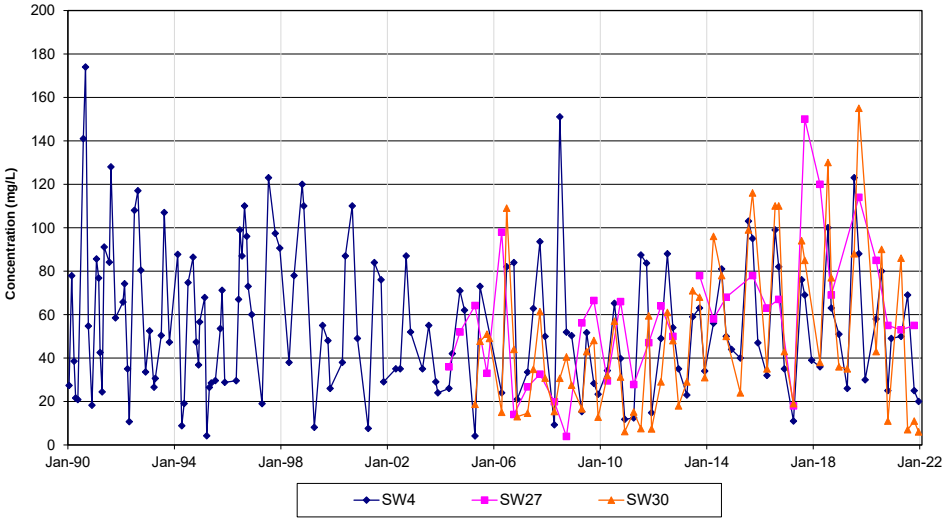
Stations SW26 and SW34



Little Cramadog Lake: SW6, SW7, SW33



Oxley Wetland: SW4, SW27, SW30



Seguin Lake: Sedimentation Pond, SW20

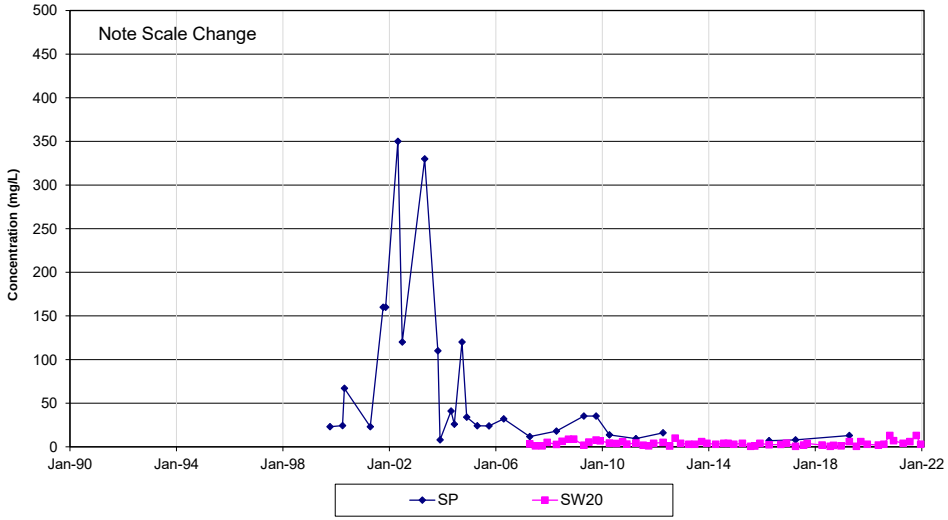
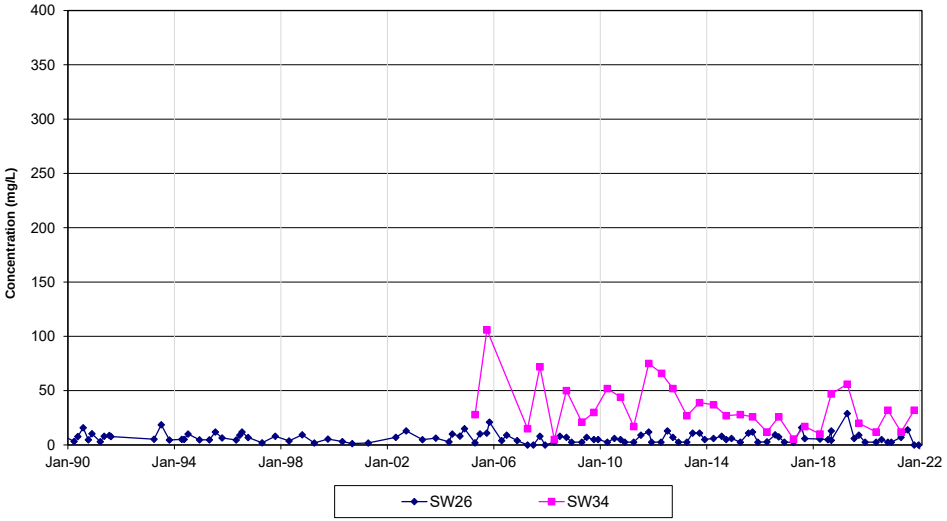
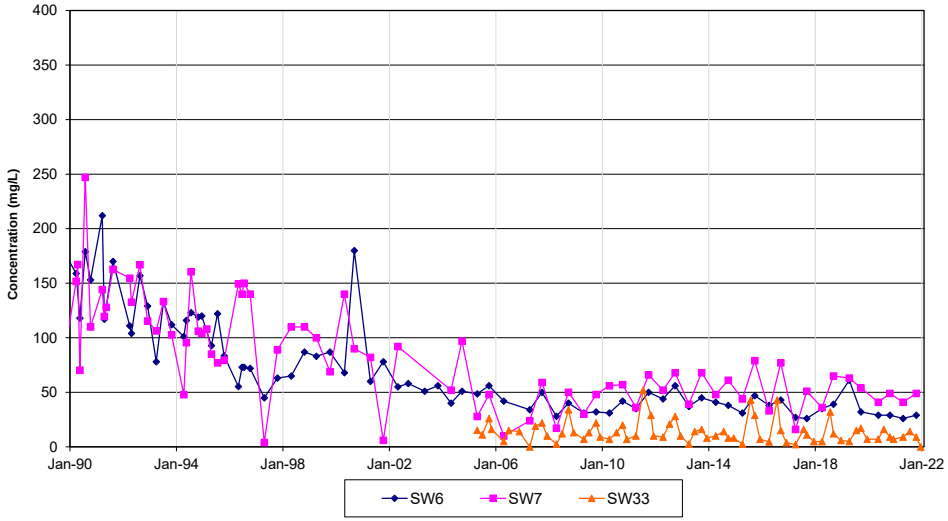


FIGURE D-2
SURFACE WATER TIME CONCENTRATION GRAPHS - ALKALINITY

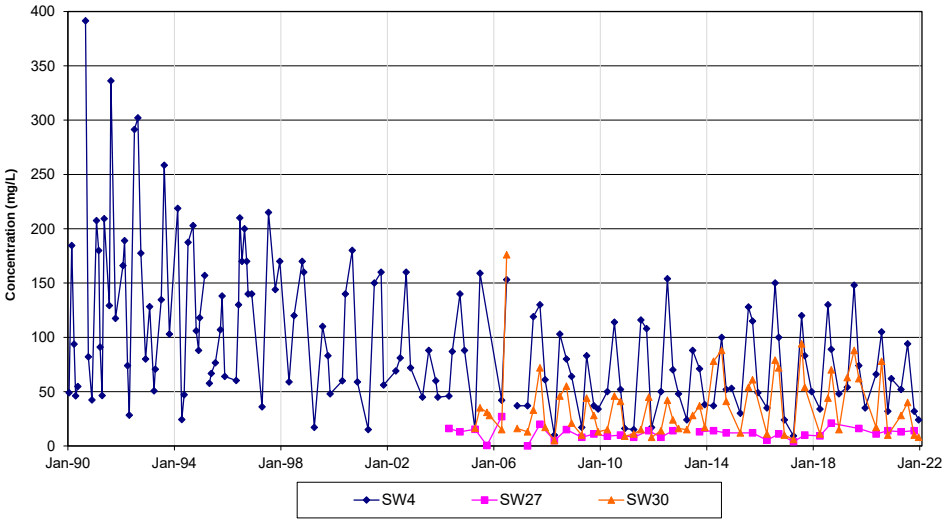
Stations SW26 and SW34



Little Cramadog Lake: SW6, SW7, SW33



Oxley Wetland: SW4, SW27, SW30



Seguin Lake: Sedimentation Pond, SW20

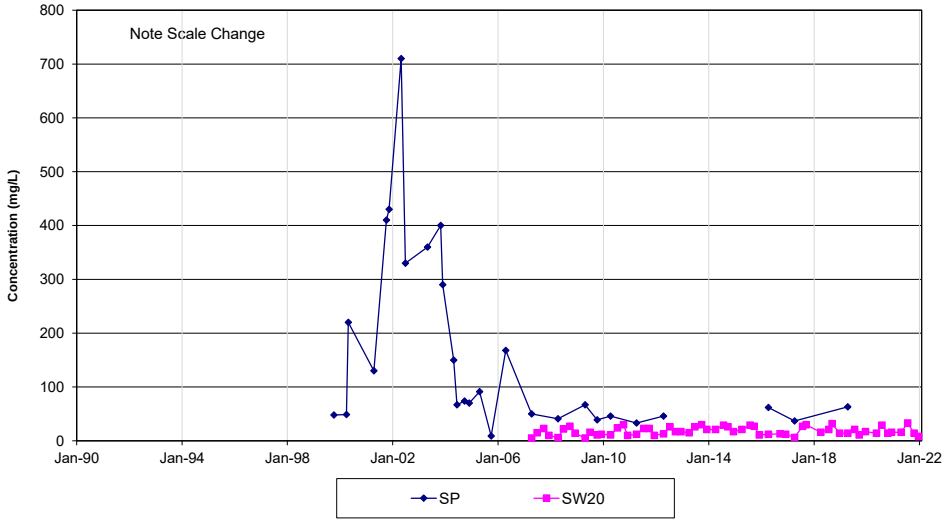
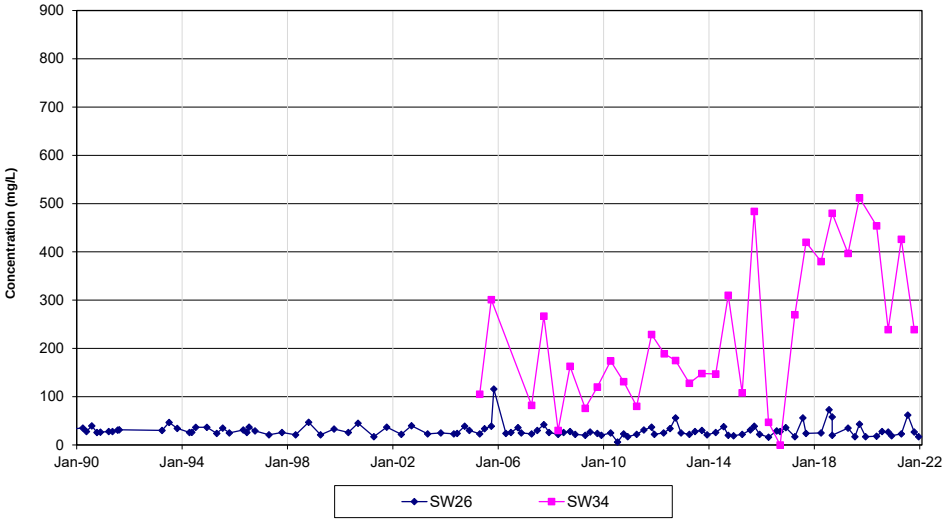


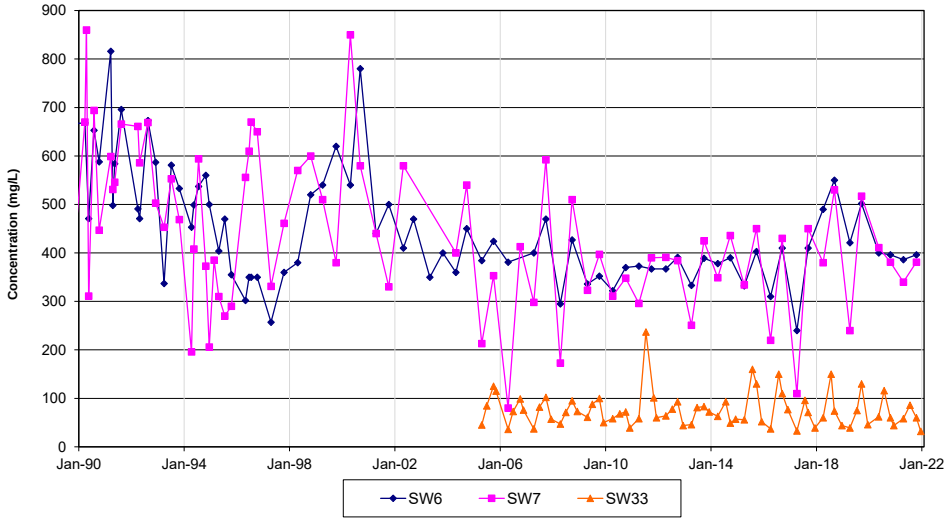
FIGURE D-3

SURFACE WATER TIME CONCENTRATION GRAPHS - CONDUCTIVITY

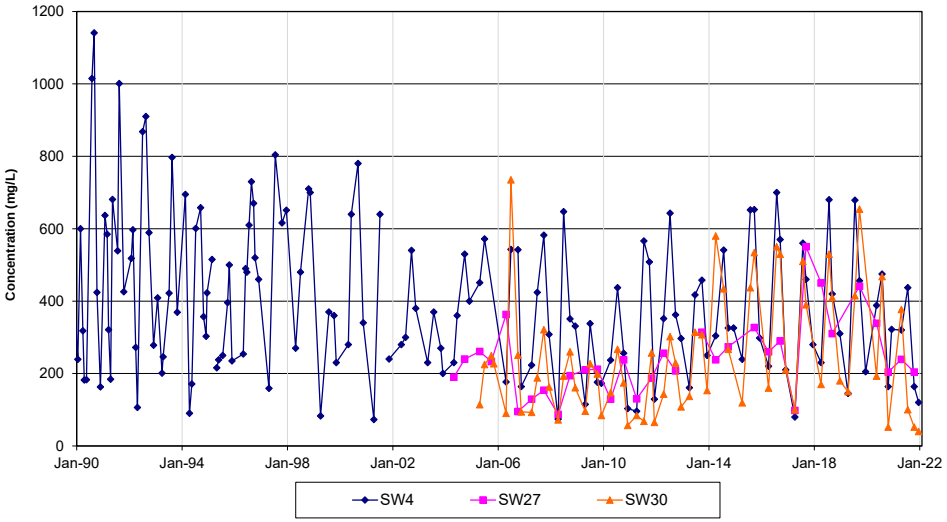
Stations SW26 and SW34



Little Cramadog Lake: SW6, SW7, SW33



Oxley Wetland: SW4, SW27, SW30



Seguin Lake: Sedimentation Pond, SW20

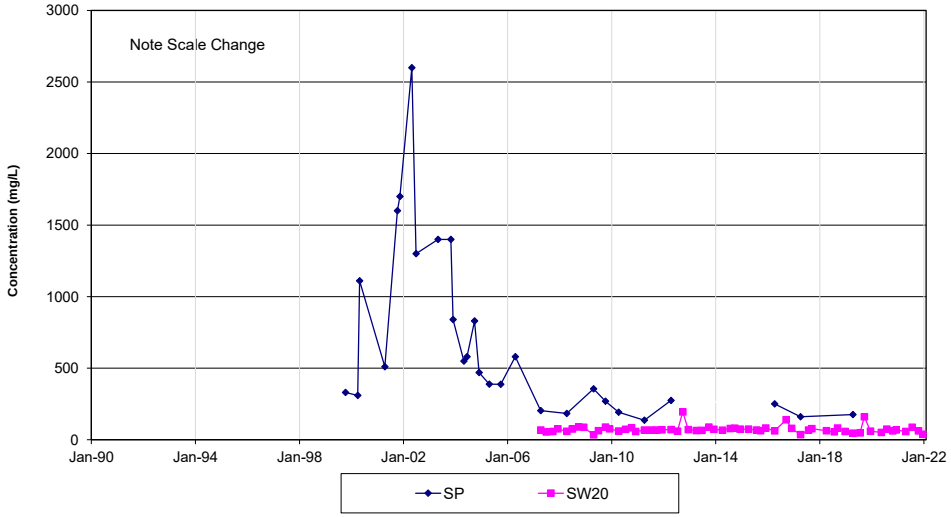
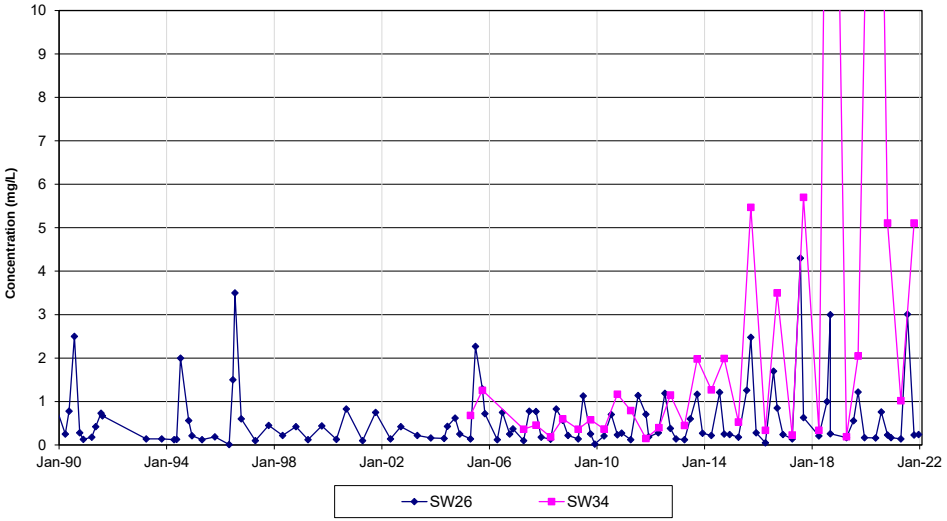


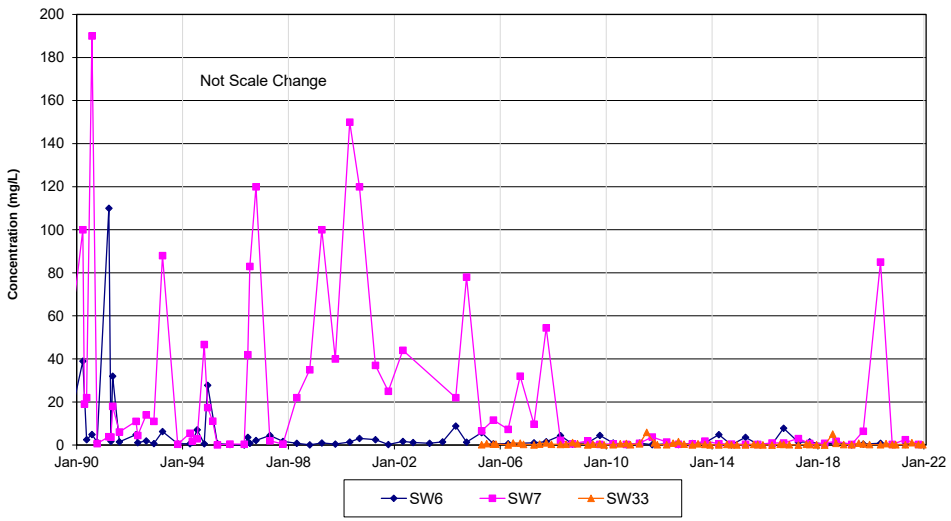
FIGURE D-4

SURFACE WATER TIME CONCENTRATION GRAPHS - IRON

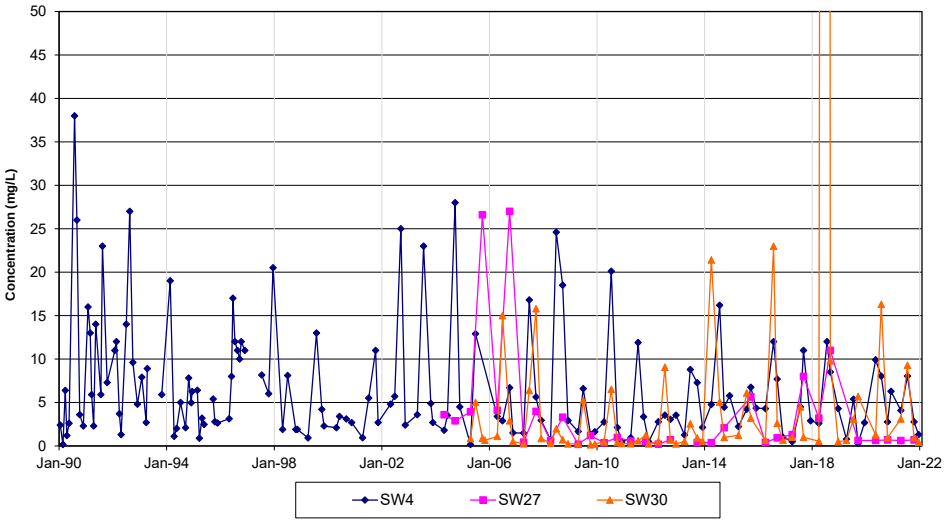
Stations SW26 and SW34



Little Cramadog Lake: SW6, SW7, SW33



Oxley Wetland: SW4, SW27, SW30



Seguin Lake: Sedimentation Pond, SW20

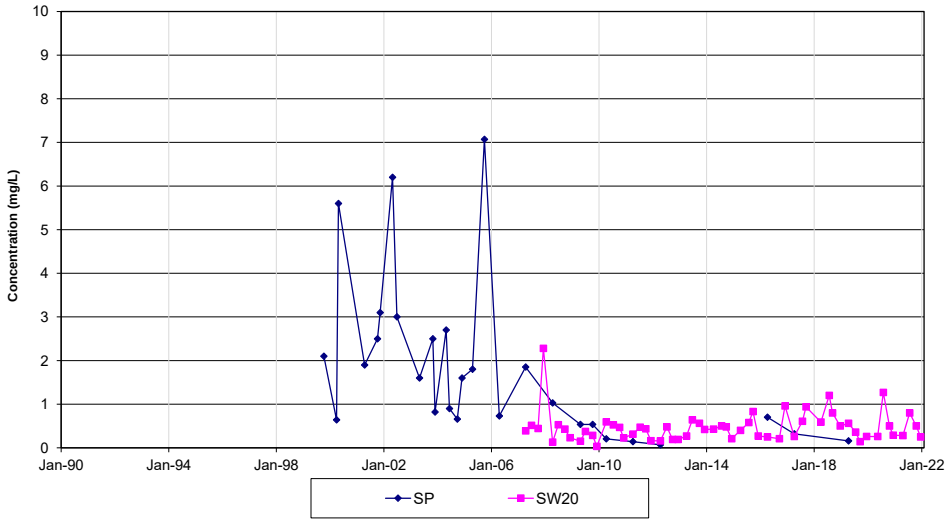
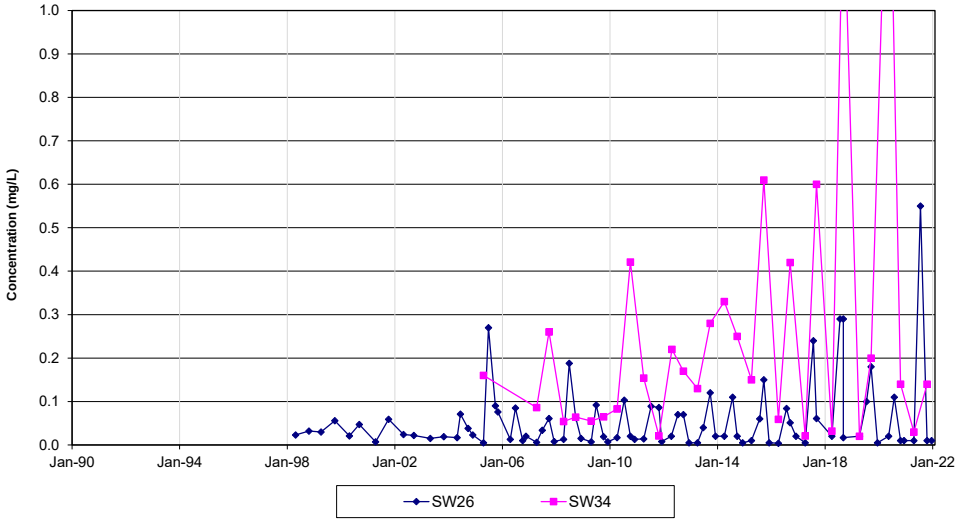


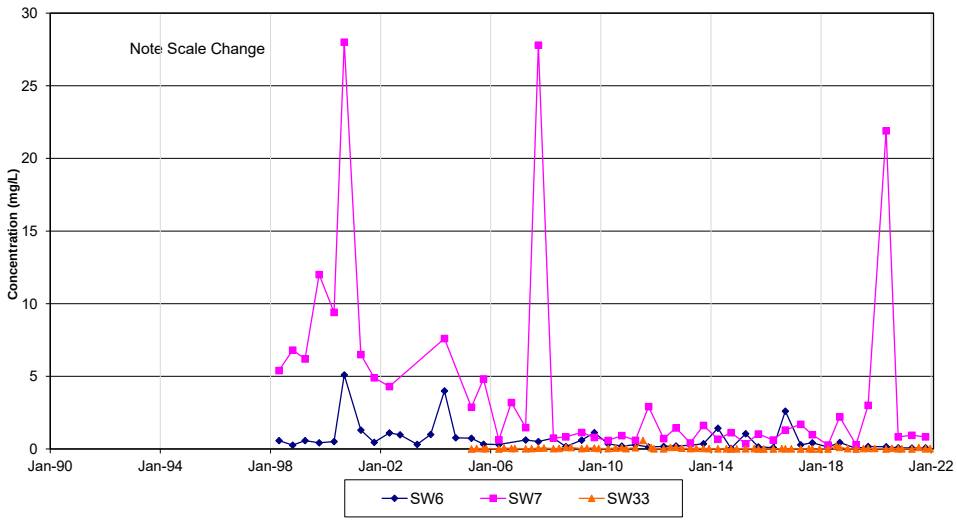
FIGURE D-5

SURFACE WATER TIME CONCENTRATION GRAPHS - MANGANESE

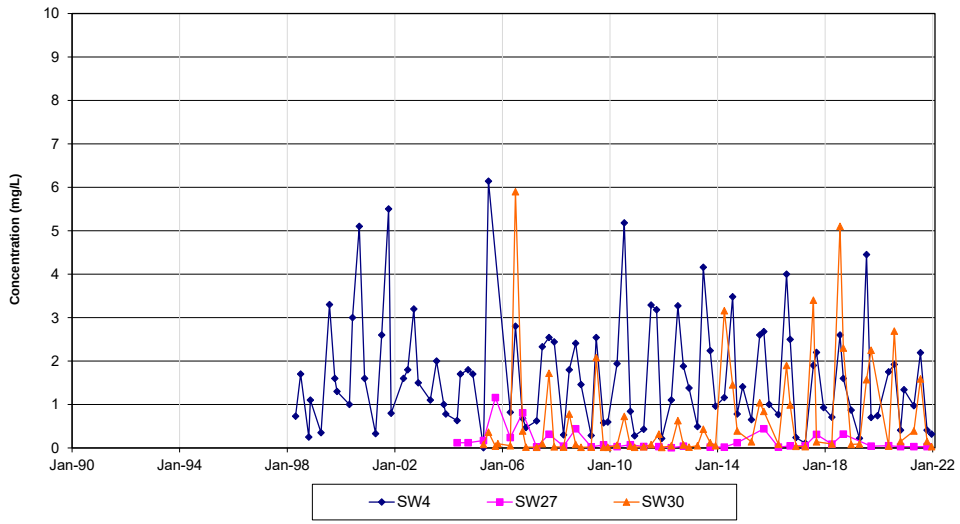
Stations SW26 and SW34



Little Cramadog Lake: SW6, SW7, SW33



Oxley Wetland: SW4, SW27, SW30



Seguin Lake: Sedimentation Pond, SW20

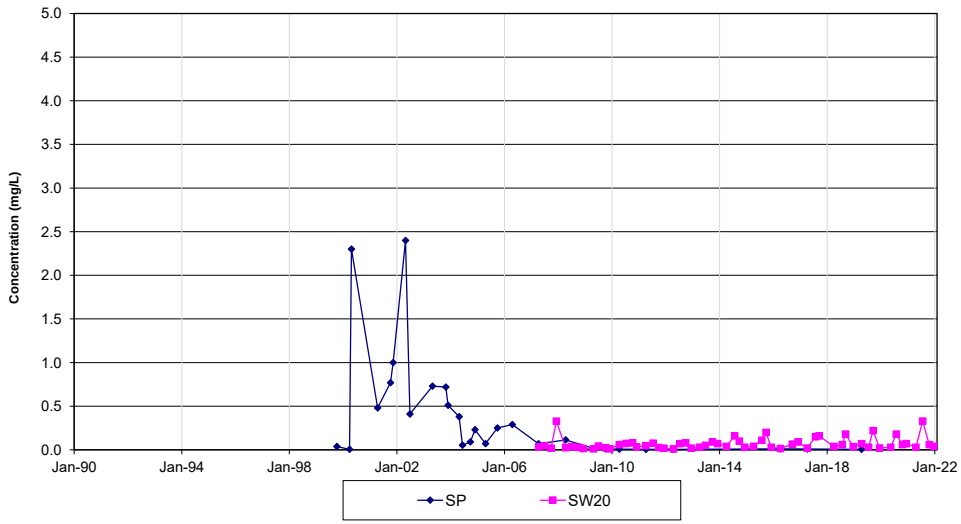
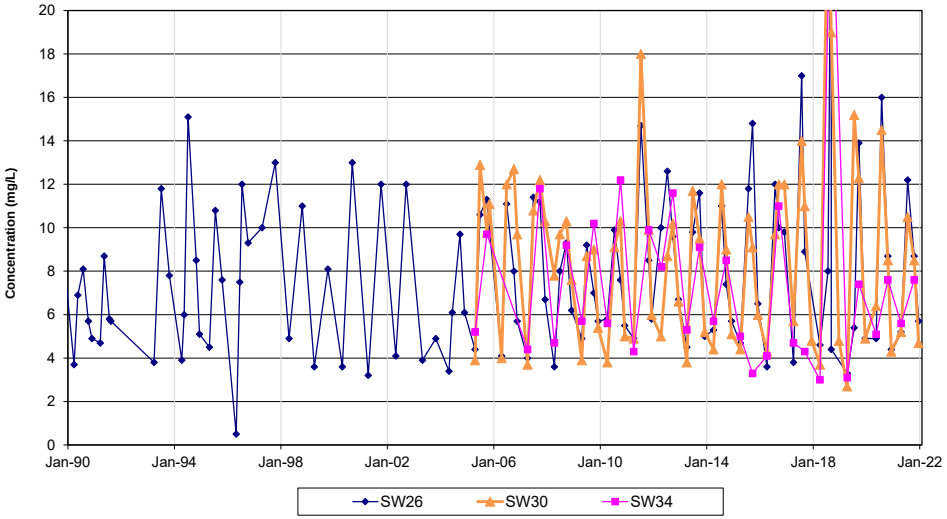


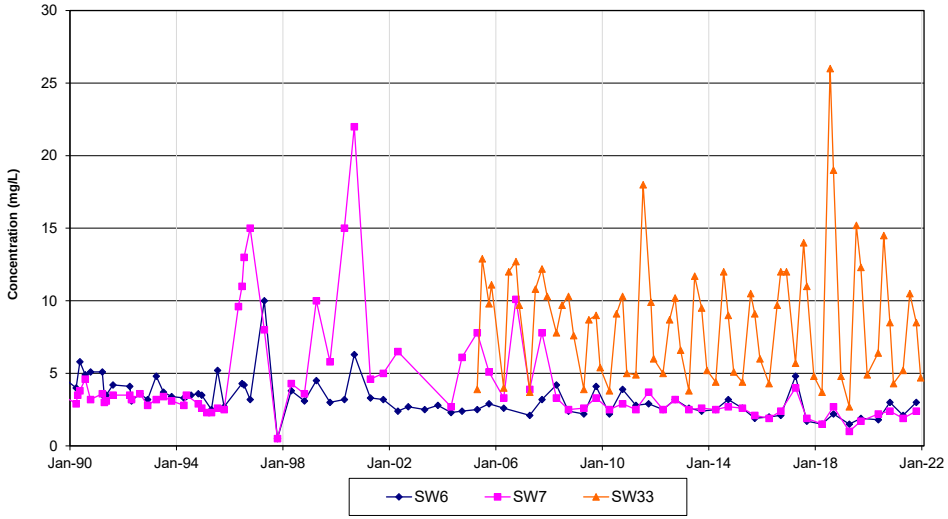
FIGURE D-6

SURFACE WATER TIME CONCENTRATION GRAPHS - DISSOLVED ORGANIC CARBON

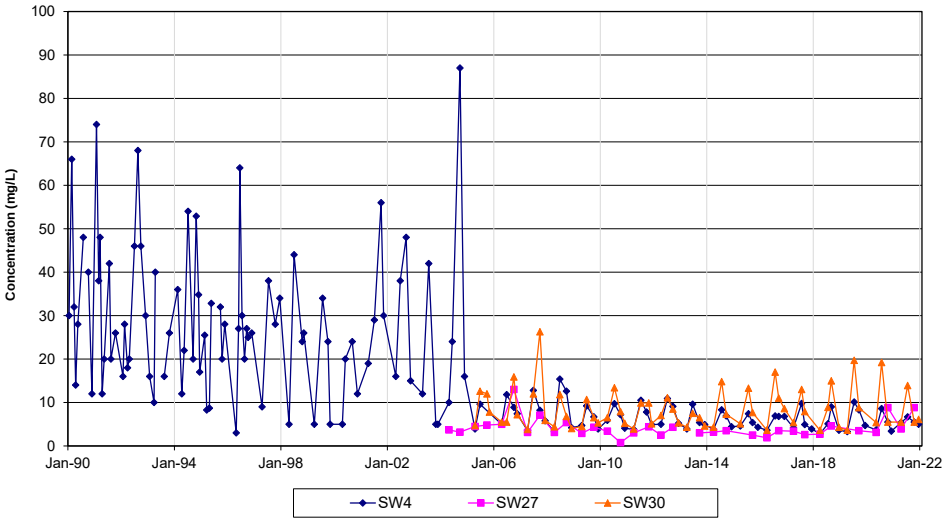
Stations SW26 and SW34



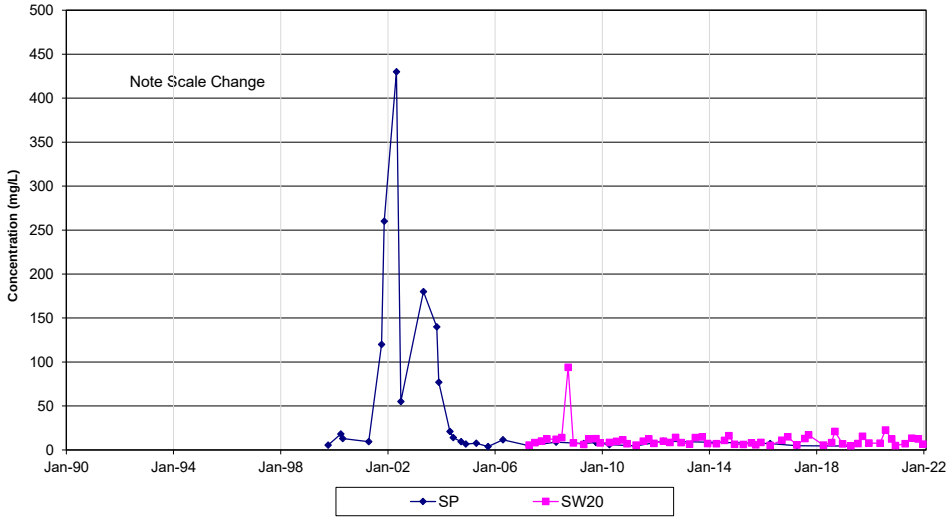
Little Cramadog Lake: SW6, SW7, SW33



Oxley Wetland: SW4, SW27, SW30



Seguin Lake: Sedimentation Pond, SW20



APPENDIX

E PROVISIONAL CERTIFICATES OF APPROVAL AND CORRESPONDENCE

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A522101
Notice No. 1
Issue Date: November 19, 2008

The Corporation of the Municipality of McDougall
5 Barager Blvd R.R. #3
McDougall, Ontario
P2A 2W9

Site Location: McDougall Landfill Site
214 McDougall Rd
McDougall Municipality, District of Parry Sound
P2A 2W7

You are hereby notified that I have amended Provisional Certificate of Approval No. A522101 issued on March 28, 2008 for the use and operation of a 7.0 hectare landfill within a total site area of 77.56 hectares , as follows:

Conditions 68, 69 and 70 are added to the Certificate of Approval:

68. Approval of Leachate Collection System and Liner for Cells 1 and 2

Approval is hereby granted to construct the Expansion Cell at the McDougall Landfill Site in accordance with the documentation listed as Items 28 to 49 inclusive on Schedule "A".

69. Approval of Waste Deposit in Cells 1 and 2

As per condition 20 and the submission of item 50 on Schedule "A", approval is hereby given to deposit waste in Cells 1 and 2.

70. Approval of Groundwater Management System

Approval is hereby granted to construct the Groundwater Management System at the McDougall Landfill Site in accordance with the documentation listed as Items 28 to 51 inclusive on Schedule "A".

The following items are added to Schedule "A":

SCHEDULE "A"

28. Drawing C-03 entitled "Proposed Final Conditions" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

29. Drawing C-04 entitled "Site Preparation, Erosion and Sediment Control Plan" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

30. Drawing C-05 entitled "Proposed Cut/Fill Contours (Existing Grades to Final Grades)" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

31. Drawing C-06 entitled "Proposed Expansion Cell Base Excavation Grades" dated July 10, 2008 prepared by Conestoga-Rovers and Associates.

32. Drawing C-07 entitled "Cell 1/Cell 2 Composite Liner Grades and Leachate Collection System" dated October 10, 2008 prepared by Conestoga-Rovers and Associates.

33. Drawing C-08 entitled "Proposed Drainage Layer Grades (Base Grades for Waste Disposal)" dated July 10, 2008 prepared by Conestoga-Rovers and Associates.

34. Drawing C-09 entitled "Proposed Final Grades for Ponds, Roads and Ditches" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

35. Drawing C-10 entitled "Proposed Leachate Treatment System Effluent Sewer – Plan and Profile" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

36. Drawing C-11 entitled "Cross Sections A-A', B-B', and C-C' Through Expansion Cell" dated July 10, 2008 prepared by Conestoga-Rovers and Associates.

37. Drawing C-12 entitled "Cross Sections D-D' and E-E' Through Polishing Pond" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

38. Drawing C-13 entitled "Cross Sections F-F' and G-G' Through Sludge and Infiltration Ponds" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

39. Drawing C-14 entitled "Leachate Collection System Details – Detail Sheet 1" dated July 10, 2008 prepared by Conestoga-Rovers and Associates.

40. Drawing C-15 entitled "Leachate Collection System Details – Detail Sheet 2" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

41. Drawing C-16 entitled "Leachate Collection System Details – Detail Sheet 3" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

42. Drawing C-17 entitled "Leachate Collection System Details – Detail Sheet 4 " dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

43. Drawing C-18 entitled "Polishing Pond/Infiltration Pond 1 Details – Detail Sheet 5" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

44. Drawing C-19 entitled "Polishing Pond/Infiltration Pond 1 Details – Detail Sheet 6" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

45. Drawing C-20 entitled "Infiltration Pond 1 Details – Detail Sheet 7" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

46. Drawing C-21 entitled "Miscellaneous Details – Detail Sheet 8" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

47. Drawing C-22 entitled "Miscellaneous Details – Detail Sheet 9" dated August 1, 2007 prepared by Conestoga-Rovers and Associates.

48. Letter dated July 14, 2008 from Gregory D. Ferraro, Conestoga-Rovers and Associates to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

49. E-mail dated August 26, 2008 from Alice Maliakkal, Conestoga-Rovers and Associates to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

50. Letter dated August 26, 2008 and supporting attachments, figures 1 to 3 inclusive from Gregory D. Ferraro, Conestoga-Rovers and Associates to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

51. Letter dated October 21, 2008 from Gregory D. Ferraro, Conestoga-Rovers and Associates to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

52. Memorandum and Attachment A dated October 31, 2008 from Alice Maliakkal to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

Schedule "B" created on March 28, 2008 is hereby revised as follows:

SCHEDULE "B": GROUNDWATER MONITORING

Groundwater sampling is to be completed as per the following schedule and the following parameters:

LOCATION	SPRING	SUMMER	FALL	WINTER
RESIDENTIAL WELLS: W7, W11	B		B	

W10	-		B	
W12	B		B	
W14	B		A	
Residential duplicate	B		A	
GROUNDWATER WELLS: OW11-08, BHH, OW12-08, BHK, BHL, BHM, BHO, BHP, BHQ,	B		B	
OW1A-08, OW1B-08, OW2-08, OW3A-08, OW3B-08, OW4A-08, OW4B-08, OW5-08, OW8-08, OW9-08, OW10-08	B		A	
BHB, BHC, BHE-2, PW1	B	B	A	B
Groundwater duplicate	B	B	A	

FIELD BLANKS

SPRING	SUMMER	FALL	WINTER
B, C	B, D	B, C	B

List A:

pH (field), Conductivity(field), temperature(field), pH, Conductivity, hardness, alkalinity, boron, chloride, calcium, sulphate, potassium, sodium, TKN, ammonia, arsenic, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, zinc, phenols, Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Organic Carbon, nitrate, nitrite, total phosphorus, phosphates, benzene, chlorobenzene, chloroethane, ethylbenzene, methylene chloride, toluene, xylenes, 1,2-dichlorobenzene, 1,4-dichlorobenzene, vinyl chloride, Total Dissolved Solids (TDS), Total Suspended Solids (LHT)

List B

pH (field), Conductivity(field), temperature(field), pH, Conductivity, hardness, alkalinity, barium, boron, chloride, TKN, ammonia, iron, manganese, phenols, Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Organic Carbon, nitrate, sulphate, total Phosphorus, Total Dissolved Solids, Total Suspended Solids (LHT), calcium, magnesium, sodium.

Detection limits shall be low enough in order to allow for comparison with the Ministry's Ontario Drinking Water Standards.

Conductivity, pH and temperature readings are to be taken from samples collected from each well during each sampling event.

The reasons for this amendment to the Certificate of Approval are as follows:

1. *Condition 68 has been added to ensure that Cells 1 and 2 are constructed in accordance with the approved documents and plans submitted and not in a fashion that the Director has not been asked to consider.*

2. *The reason for Condition 69 is to fulfil condition 20 to ensure that the preparation report has been completed and reviewed by the Director.*

3. *Condition 70 has been added to ensure that Groundwater Management System is constructed in accordance with the approved documents and plans submitted and not in a fashion that the Director has not been asked to consider.*

4. *Schedule "B" has been revised to reflect the change in the monitoring wells that are part of the new monitoring network as a result of well installations completed in January-February, 2008.*

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A522101 dated March 28, 2008.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 19th day of November, 2008

Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

GW/

c: District Manager, MOE North Bay
Doug Walsh, MOE, North Bay
Garfield Eaton, The Corporation of the Municipality of McDougall
Alice Maliakkal, Conestoga-Rovers and Associates
Gregory D. Ferraro, Conestoga-Rovers and Associates

31807

Rec'd. CRA
APR 0 9 2008

Ministry of the Environment
Environmental Assessment and
Approvals Branch
Floor 12A
2 St Clair Ave W
Toronto ON M4V 1L5
Fax: (416)314-8452
Telephone: (416) 314-5138

Ministère de l'Environnement
Direction des évaluations et des
autorisations environnementales
Étage 12A
2 av St Clair O
Toronto ON M4V 1L5
Télécopieur : (416)314-8452
Téléphone : (416) 314-5138

Ontario

April 3, 2008

Mr. Garfield Eaton, Chief Administrative Officer/Clerk-Treasurer
The Corporation of the Municipality of McDougall
5 Fire Route 113
Rural Route, No. 3
Parry Sound, Ontario
P2A 2W9

Dear Mr. Eaton:

Re: Application for Approval of Expansion of capacity
McDougall Landfill Site, Certificate of Approval A
McDougall Municipality, District of Parry Sound
MOE Reference Number 5225-6UVTBP

Please find attached the Certificate of Approval for the McDougall Landfill site dated March 28, 2008. The amendment approves the expansion of capacity at the site.

If you have any questions regarding the above, please contact me at the above phone number.

Yours truly,

Greg Washuta

Greg Washuta, P. Eng., M. Eng.
Senior Waste Engineer, Waste Unit

c: District Manager, MOE North Bay
Gregory D. Ferraro, P.Eng., Conestoga-Rovers & Associates Limited
Kip Hawley, MOE, Technical Support, Northern Region
Bob Smith, MOE, North Bay District
Rod Sein, MOE, Technical Support, Northern Region

Ministry of the Environment | Ministère de l'Environnement

Ontario

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A522101
Issue Date: March 28, 2008

The Corporation of the Municipality of McDougall
5 Barager Boulevard
Rural Route, No. 3
Parry Sound, Ontario
P2A 2W9

Site Location: McDougall Landfill Site
214 McDougall Rd
Part Lots 11 and 12, Concession 4
Township of McDougall, District of Parry Sound
P2A 2W7

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:

a 7.0 hectare landfill footprint within a total site area of 77.56 hectares.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Crown* " means Her Majesty the Queen in the Right of Ontario;

"*Certificate* " means this entire provisional Certificate of Approval document, issued in accordance with section 39 of the *EPA* , and includes any schedules to it, the application and the supporting documentation listed in schedule "A;

"*Director* " means any *Ministry* employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part V of the EPA;

"*District Manager* " means the District Manager of the local district office of the Ministry in which the Site is geographically located;

"*EPA* " means *Environmental Protection Act* , R.S.O. 1990, c. E. 19, as amended;

"*Ministry* " means the Ontario Ministry of the Environment;

"*Operator* " has the same meaning as "operator" as defined in s.25 of the *EPA* ;

"*Owner* " means The Corporation of the Municipality of McDougall and its successors and assigns;

"*PA* " means the *Pesticides Act* , R.S.O. 1990, c. P-11, as amended from time to time;

"*Provincial Officer* " means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the *OWRA* or section 5 of the *EPA* or section 17 of *PA* .

"*Regional Director* " means the Regional Director of the local Regional Office of the Ministry in which the Site is located.

"*Regulation 232* " or "*Reg. 232* " means Ontario Regulation 232/98 (New Landfill Standards) made under the *EPA* , as amended from time to time;

"*Regulation 347* " or "*Reg. 347* " means Regulation 347, R.R.O. 1990, made under the *EPA* , as amended from time to time;

"*Site* " means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone located at Part Lots 11 and 12, Concession 4 in t he Township of McDougall, District of Parry Sound, approved by this *Certificate* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

GENERAL

1. Compliance

a. The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Site* is notified of the *Certificate* and the conditions herein and shall take all reasonable measures to ensure the person complies with the same.

b. Any person authorized to carry out work on or operate any aspect of the *Site* shall comply with the conditions of this *Certificate* .

2. In Accordance

Except as otherwise provided for in this *Certificate* , the *Site* shall be designed, developed, built, operated and maintained in accordance with the application for this *Certificate* , dated October 23, 2006, and the supporting documentation listed in Schedule "A".

3. Other Legal Obligations

The issuance of, and compliance with, this *Certificate* does not:

- relieve any person of any obligation to comply with any provision of the *EPA* or any other applicable statute, regulation or other legal requirement; or

- limit in any way the authority of the *Ministry* to require certain steps be taken or to request that any further information related to compliance with this *Certificate* be provided to the *Ministry* ;

unless a provision of this *Certificate* specifically refers to the other requirement or authority and clearly states that the other requirement or authority is to be replaced or limited by the this *Certificate* .

4. Adverse Effect

a. The *Owner* and *Operator* shall take all reasonable steps to minimize and ameliorate any adverse effect or impairment of water quality resulting from the operation of the *Site* , including such accelerated or additional monitoring as may be necessary to determine the nature of the effect or impairment.

b. The *Owner* or *Operator* remain responsible for any contravention of any other condition of this *Certificate* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect or impairment of water quality.

6. Furnish Information

a. Any information requested by the *Director* or a *Provincial Officer* concerning the *Site* and its operation under this *Certificate* , including but not limited to any records required to be kept by this *Certificate* shall be provided in a timely manner.

b. The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Certificate* or under any statute, regulation or subordinate legal instrument, in relation to the information, shall not be construed as:

i. an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any condition of this *Certificate* or any statute, regulation or other subordinate legal requirement; or
ii. acceptance by the *Ministry* of the information's completeness or accuracy.

7. Freedom of Information and Protection of Privacy Act

Any information related to this Certificate and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, RSO 1990, CF-31.

8. Interpretation

a. Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate* , and the conditions of this *Certificate,* the conditions in this *Certificate* shall take precedence.

b. Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the *Ministry* approved the amendment.

c. Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.

d. The conditions of this *Certificate* are severable. If any condition of this *Certificate* , or the application of any condition of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

e. This Certificate of Approval revokes and replaces the previous Certificate of Approval and any subsequent amendments.

9. Certificate of Prohibition

Pursuant to Section 197 of the *EPA* , no person having an interest in the *Site* shall deal with the *Site* in any way without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

10. No Transfer or Encumbrance

No portion of this *Site* shall be transferred or encumbered prior to or after closing of the *Site* unless the *Director* is notified in advance and is satisfied with the arrangements made to ensure that all conditions of this *Certificate* will be carried out and that sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out.

11. Change of Owner

a. The *Owner* shall notify the *Director* , in writing, and forward a copy of the notification to the *District Manager* , within 30 days of the occurrence of any changes in the following information:
   i. the ownership of the *Site* ;
   ii. the Operator of the *Site* ;
   iii. the address of the *Owner* or *Operator* ;
   iv. the partners, where the *Owner* or *Operator* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act* , R. S. O. 1990, c. B.17, shall be included in the notification;
   v. the name of the corporation where the *Owner* or *Operator* is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the *Corporations Information Act* , R. S. O. 1990, c. C.39, shall be included in the notification.

b. In the event of any change in the ownership of the works, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this

Certificate , and a copy of such notice shall be forward to the *Director* and *District Manager* .

12. Inspections

No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA* , the *EPA* , or the *PA* , of any place to which this *Certificate* relates, and without limiting the foregoing:

a. to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Certificate* are kept;
b. to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate* ;
c. to inspect the *Site,* related equipment and appurtenances;
d. to inspect the practices, procedures, or operations required by the conditions of this *Certificate* ; and
e. to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *EPA* , the *OWRA* or the *PA* .

CONSTRUCTION, INSTALLATION and PLANNING

13. Major Works

For the purposes of this *Certificate* the following are *Major Works* :

- leachate collection system;
- gas collection and/or treatment system;
- groundwater management system; and
- liner.

14. A final detailed design shall be prepared for each *Major Work* to be constructed at the *Site* consistent with the conceptual design of the *Site* as presented in the Supporting Documentation in Schedule "A".

15. The final detailed design of each *Major Work* shall include the following:

a. design drawings and specifications;
b. a detailed quality assurance / quality control (QA/QC) program for construction of the major work, including necessary precautions to avoid disturbance to the underlying soils; and
c. details on the monitoring, maintenance, repair and replacement of the engineered components of the major work, if any.

16. Any design optimization or modification that is inconsistent with the conceptual design shall be clearly identified, along with an explanation of the reasons for the change.

17. The final detailed design of each *Major Work* shall be submitted to the *Director* , copied to the District Manager.

18. No construction of a Major Work shall commence prior the Director approving, in writing, the

final detailed design of that Major Work. Each major work shall be constructed in accordance with the approved final detailed design and the QA/QC procedures shall be implemented as approved by the Director.

19. As-built drawings for all *Major Works* shall be retained on site and made available to *Ministry* staff for inspection.

Subsequent Stages

20. No person shall deposit any waste at the subsequent stage until a written *Preparation Report* has been submitted to the *Director* and *District Manager* documenting that:
    - all construction;
    - *QA/QC* activities;
    - *Site* conditions; and,
    - all details of the construction of the stage;

are in accordance with the approved design plans and specifications.

21. Approval to proceed with landfilling or construction of each subsequent stage shall be dependent on monitoring results acceptable to the *Director* . If monitoring results are not acceptable to the Director then remedial action must be undertaken before landfilling may proceed in the subsequent stage.

22. Geotechnical Engineer

A qualified professional geotechnical engineer shall inspect the excavation and construction activities at the *Site* and provide a report addressing whether the construction proceeded in accordance with approved detailed design plans, specifications and QA/QC procedures. The report shall be included in the *Preparation Reports* for each stage of the landfill.

23. Signage

a. A sign shall be installed and maintained at the main entrance/exit to the *Site* on which is legibly displayed the following information:
    - the name of the *Site* and *Owner* ;
    - the number of the Certificate;
    - the name of the *Operator;*
    - the normal hours of operation;
    - the allowable and prohibited waste types;
    - a warning against unauthorized access;
    - the telephone number to which complaints may be directed;
    - a twenty-four (24) hour emergency telephone number (if different from above); and
    - a warning against dumping outside the *Site* .

b. The Owner shall install and maintain signs to direct vehicles to working face and recycling areas.

c. The Owner shall provide signs at recycling depot informing users what materials are acceptable and directing users to appropriate storage area.

24. Closure Plan

At least 2 years prior or when 90% of the site capacity is reached, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed site closure plan pertaining to the termination of landfilling operations at this *Site* , post-closure inspection, maintenance and monitoring, and end use. The plan shall include the following:

a. a plan showing *Site* appearance after closure;
b. a description of the proposed end use of the *Site* ;
c. a descriptions of the procedures for closure of the *Site,* including:
   i. advance notification of the public of the landfill closure;
   ii. posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
   iii. completion, inspection and maintenance of the final cover and landscaping;
   iv. site security;
   v. removal of unnecessary landfill-related structures, buildings and facilities; and
   vi. final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
   vii. a schedule indicating the time-period for implementing sub-conditions i) to vi) above.
d. descriptions of the procedures for post-closure care of the Site, including:
   i. operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
   ii. record keeping and reporting; and
   iii. complaint contact and response procedures;
e. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and,
f. an updated estimate of the contaminating life span of the *Site* , based on the results of the monitoring programs to date.

25. The *Site* shall be closed in accordance with the closure plan as approved by the *Director.*

26. Site Closure

a. Upon closure of the site, the following features will be visually inspected (walkthrough inspection), recorded and maintained on a quarterly basis:

- evidence of settlement;
- cover soil integrity;
- vegetative cover;
- surface water drainage works;
- erosion and sediment in surface water drainage system; and
- groundwater monitoring wells.

b. A vegetative cover consisting of vegetation that is suited to local conditions and that is capable with minimal care of providing vigorous, plentiful cover no later than its 3rd growing season shall be established over all completed areas to control erosion and minimize evaportranspiration. Complete planting as soon as possible after reaching final contours.

c. If weather conditions do not allow timely placement of final and vegetative cover, silt curtains shall be employed to minimize silt loadings to surface water bodies.

Operation

Proper Operation

27. The *Site* shall be properly operated and maintained at all times. All waste shall be managed and disposed of in accordance with the *EPA* , *Regulation 347* , *Regulation 232/98* , and the requirements of this *Certificate.* At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

28. All loads of waste must be properly inspected by trained site personnel prior to acceptance at the site and waste vehicles must be diverted to appropriate areas for waste disposal.

29. The Owner shall deposit waste in a manner that minimizes exposure area at the landfill working face and all waste shall be compacted before cover is applied.

30. Vermin, etc.

The *Site* shall be operated and maintained such that the vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.

31. Scavenging

No scavenging is to occur at the Site.

32. Dust

The Owner shall control fugitive dust emissions from on site sources including but not limited to on-site roads, stockpiled cover material and, closed landfill area prior to seeding especially during times of dry weather conditions. If necessary, major sources of dust shall be treated with water and/or dust suppression materials to minimize the overall dust emissions from the site.

33. Noise

The Owner shall comply with noise criteria in MOE Guideline entitled "Noise Guidelines for Landfill Sites".

34. Burning Waste Prohibited

Burning of waste at the *Site* is prohibited.

35. Landfill Gas

a. All buildings are to be free of any landfill gas accumulation. The Owner shall provide adequate ventilation systems to relieve landfill gas accumulations in buildings if necessary.

b. Contingency measures shall be implemented if gas readings are 1.0% methane or higher in the buildings.

Surface Water

36. The Owner shall take all appropriate measures to minimize surface water from coming in contact with waste. Temporary berms and ditches shall be constructed around active waste disposal areas to prevent extraneous surface water from coming in contact with the active working face.

37. The owner shall not discharge surface water to receiving water bodies without an approval under Section 53 of the OWRA.

38. Litter Control

The Owner shall take all practical steps to prevent escape of litter from the site. The Owner shall inspect and collect litter from the site weekly or as required during the spring, summer and fall months. During winter months, litter collection shall be completed when accumulated snow depths permit. All loose, windblown litter shall be collected and disposed of at the landfill working face.

39. Waste Type

a. Only the following types of waste shall be accepted at the *Site* :
- non-hazardous solid domestic waste;
- non-hazardous solid commercial and industrial waste.

b. No hazardous waste or liquid industrial waste as defined under O. Reg 347 as amended shall be accepted at the site.

c. Any waste type not listed in the previous condition shall not be accepted at the *Site* .

40. Capacity

a. The *Owner* shall only accept and deposit waste at the site as long as there is available capacity as defined by the final contours for the *Site* approved by this *Certificate* as shown in Drawing C-03 in Schedule "A".

b. The amount of waste deposited at the existing and expanded site shall not exceed the site capacity of 1,008,338 cubic metres including daily cover material and excluding final cover material.

41. Daily Waste Limit

No more than 500 tonnes of waste per day may be accepted at the *Site* .

42. Service Area

Only waste that is generated in the following municipalities, town and townships shall be accepted at the Site:

- Municipality of McDougall;
- Township of the Archipelago;
- Township of Carling;
- Township of Seguin;
- Township of McKellar; and,
- Town of Parry Sound.

43. Cover

a. A thickness of at least three (3) metres of compacted waste and cover material shall be maintained between any landfilled sludge (solid non-hazardous as per Reg. 347) and the granular leachate collection layer.

b. The following materials, in the corresponding thickness, may be used as an alternative to soil as a daily and intermediate cover:
   - shingles;
   - tire chips;
   - saw dust;
   - wood chips;
   - landfill fines; and
   - tarps.

c. The use of any other alternative materials as daily or intermediate cover material is subject to approval by the Director.

d. Cover material shall be applied as follows:
   - Daily Cover - At the end of each working day, the entire working face shall be covered with a minimum thickness of 150 mm of soil cover or an approved thickness of alternative cover material;
   - Intermediate Cover - In areas where landfilling has been temporarily discontinued for six (6) months or more, a minimum thickness of 300 mm of soil cover or an approved thickness of alternative cover material shall be placed; and
   - Final Cover - In areas where landfilling has been completed to final contours, a minimum 0.6

metre thick layer of final cover soil shall be placed followed by 0.15 m of topsoil.

e. The Owner shall fill areas in accordance with the Design and Operations Plan.

44. Waste Limits

a. No waste, including daily cover, intermediate cover or final cover layer, shall be landfilled outside the limits of the base contours and the final contours shown in Drawings C-03 and C-04 attached to this *Certificate* .

b. Landfilling operations shall be conducted in accordance with the Design and Operations Plan in Schedule "A" attached to this *Certificate* .

45. Hours of Operation

a. Waste shall only be accepted at the Site during the following time periods:
7:00 am to 7:00 pm - Monday to Saturday

b. On-site equipment used for daily site preparation and closing activities shall only be used during the following time periods:
7:00 am to 7:00 pm - Monday to Saturday

c. With the prior written approval of the *District Manager* , the time periods may be extended to accommodate seasonal or unusual quantities of waste.

d. The Owner may provide limited hours of operation provided that the hours are posted at the landfill gate and that suitable notice is provided to the public of any change in operating hours.

e. Upon reasonable notice to the Director, contingency actions may take place outside normal hours of operation. Emergency response may occur at any time as required.

46. Site Security

During non-operating hours, the *Site* entrance and exit gates shall be locked and the *Site* shall be secured against access by unauthorized persons

47. Site Access

Access roads and on-site roads shall be provided and maintained in a manner that vehicles hauling waste to and on the site may travel readily and safely on any operating day. During winter months, when the site is in operation, roads must be maintained to ensure safe access to the landfill working face. Access roads must be clear of mud, ice and debris which may create hazardous conditions.

48. Ditches

The Owner shall hydroseed all ditches after construction and straw bale barriers shall be installed along the newly seeded ditches to control sediment.

49. Cleaning Leachate Collection System

The leachate collection system piping for each stage of the landfill shall be inspected at least annually for the first five (5) years after waste placement overtop of each pipe and then as often as future inspections indicate to be necessary. Leachate collection pipes must be cleaned whenever an inspection indicates that cleaning is necessary.

50. Stone for the Leachate Collection System

The gradation of stone for the gravel layer in the leachate collection system shall be in accordance with O. Reg. 232/98.

51. Inspections:

When the site is in operation, the owner shall inspect the site monthly for:

- Presence of leachate seeps;
- Condition of surface water drainage works;
- Erosion and sedimentation in surface water drainage system;
- Presence of any ponded water;
- Adequacy of cover material;
- Evidence of vegetative stress;
- Condition of groundwater monitoring wells;
- Presence of insects, vermin, rodents and scavenging animals;
- Condition of fence surrounding the site; and,
- General site appearance.

52. Landfill Mining

The Owner shall restrict stockpiling of landfill fines to sections of the landfill footprint that have composite liner and leachate collection system. If landfill fines cannot be stockpiled on areas that have a composite liner and leachate collection system, the Owner shall take the appropriate test to determine leachate quality complies with Schedule IV of O. Reg. 347 as amended from time to time. The results shall be submitted to the District Manager upon receipt.

53. Employees and Training

A training plan for all employees that operate any aspect of the site shall be developed and implemented by the *Operator* . Only trained employees shall operate any aspect of the *Site* or carry out any activity required under this *Certificate* . For the purpose of this *Certificate* "trained" means knowledgeable either through instruction or practice in:

a. the relevant waste management legislation *including EPA, O. Reg. 347 and 558* , regulations and

guidelines;

b. major environmental *and occupational health and safety* concerns pertaining to the waste to be handled;

c. the proper handling of wastes;

d. the management procedures including the use and operation of equipment for the processes and wastes to be handled;

e. the emergency response procedures;

f. the specific written procedures for the control of nuisance conditions;

g. the *terms, conditions and operating* requirements of this *Certificate;* and,

h. proper inspection, receiving and recording procedures and the activities to be undertaken during and after a load rejection.

MONITORING, RECORDING NOTIFICATION

54. Daily Inspections and Log Book

a. An inspection of the entire *Site* and all equipment on the *Site* shall be conducted each day the *Site* is in operation to ensure that the site is being operated in compliance with this *Certificate* . Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the *Site* if needed.

b. A record of the inspections shall kept in a daily log book *or a dedicated electronic file* that includes:

   i. the name and signature of person that conducted the inspection;

   ii. the date and time of the inspection;

   iii. the list of any deficiencies discovered;

   iv. the recommendations for remedial action; and

   v. the date, time and description of actions taken.

c. A record shall be kept in the daily log book of all refusal of waste shipments, the reason(s) for refusal, and the origin of the waste, if known.

55. Groundwater Monitors

a. The Owner shall ensure all groundwater monitoring wells are properly capped, locked and protected from damage.

b. In areas where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and they shall be properly re-secured.

c. Any groundwater monitoring wells included in the monitoring program shall be assessed, repaired, replaced or decommissioned as required.

d. The Owner shall repair or replace any monitoring well which is destroyed or in any way made inoperable for sampling such that no more than one sampling event is missed.

e. All monitoring wells that are no longer required as part of the groundwater monitoring program and have been approved by the Director for abandonment, shall be decommissioned in accordance with good standard practice that will prevent contamination through the abandoned well and in accordance with Ontario Regulation 903. A report on the decommissioning shall be provided in the annual monitoring report for the period during which the well was decommissioned.

56. Monitoring Program

a. Monitoring programs shall be carried out for groundwater, surface water and leachate in accordance with Schedules "B" and "C" attached to this *Certificate* .

b. No alterations to the groundwater or surface water monitoring programs shall be implemented prior to receiving written agreement from the District Manager or written approval from the Director.

57a. Trigger Mechanisms for Groundwater

In the event one or more trigger parameter results from a monitoring test carried out under a monitoring program exceeds the trigger mechanism, *the Owner* shall:

- Notify the District Manager upon receipt of the results;
- Collect a duplicate sample at location(s) where the exceedance(s) was(were) observed within six weeks of receipt of the results; and
- If consecutive trigger exceedances become known, the implementation of contingency measures shall be undertaken based on discussions held with the MOE at that time.

57b. Trigger Mechanisms for Surface Water

In the event a trigger parameter result from a monitoring test carried out under a monitoring program exceeds the trigger mechanism, *the* Owner shall:

- Notify the District Manager upon receipt of the results;
- Collect a duplicate sample at the location(s) where the exceedances were observed within six (6) weeks of receipt of the results; and
- If consecutive trigger exceedances become known, the implementation of contingency measures shall be undertaken based on discussions held with the MOE at that time.

58. Contingency Plans for Groundwater and Surface Water

Upon approval by the Director, the Owner shall:

- submit detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures, and a schedule as to when these measures will be implemented, to the

Director and notify *District Manager* ; and

- implement the required contingency measures.

59. Complaints Procedure

a. If at any time, the *Owner* receives complaints regarding the operation of the *Site* , the *Owner* shall respond to these complaints according to the following procedure:

i. The *Owner* shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;

ii. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine all possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and

iii. The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

b. The Owner shall designate a person to receive any complaints and to respond with a written notice of action as soon as possible. The Owner shall post site complaints procedure at site entrance. All complaints and the Owner's actions taken to remedy the complaints must be summarized in the Annual Report.

c. The Owner shall ensure that the records regarding complaints are maintained to facilitate compliance with the Municipal Freedom of Information and Protection of Privacy Act, and subject to that Act, make it available for inspection upon request of the Public Liaison Committee (if applicable), the public or the MOE.

60. Daily Records

a. Daily waste and monthly *Site* inspection records shall be prepared in accordance with the Design and Operations Plan in Schedule "A" attached to this *Certificate* .

b. *Monthly site inspection records in the form of a written log or a dedicate electronic file* shall include...

i. the type, date and time of arrival, hauler, and quantity (tonnes) of all waste received at the site;

ii. the area of the Site in which waste disposal operations are taking place;

iii. a calculation of the total quantity (tonnes) of waste received at the Site during each operating day and each operating week;

iv. the amount of any leachate removed, or treated and discharged from the Site;

v. a record of litter collection activities and the application of any dust suppressants;

vi. a record of the daily inspections;
vii. a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service;
viii. type and amount of daily, intermediate and final cover used;
ix. maintenance and repairs performed on equipment employed at the site;
x. emergency situations and actions taken to resolve them; and
xi. any other information required by the District Manager.

61. Record Retention

a. Except as authorized in writing by the Director, all records required by this Certificate shall be retained at the Site or at the Municipal Office for a minimum of two (2) years from their date of creation.

b. The Owner shall retain all documentation listed in Schedule "A" for as long as this Certificate is valid.

c. All monthly summary reports are to be kept at the site until they are included in the Annual Report.

d. The Owner shall retain employee training records as long as the employee is working at the site.

e. The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

Emergency Situations:

62. In the event of a fire or discharge of a contaminant to the environment, site staff shall contact the MOE Spills Action Centre (1-800-268-6060) and the District Office of the MOE.

63. The Owner shall submit to the District Manager a written report within 3 days of the spill or incident, outlining the nature of the incident, remedial measures taken and measures taken to prevent future occurrences at the Site.

64. The Owner shall ensure that adequate fire fighting and contingency spill clean up equipment is available and that emergency response personnel are familiar with its use and location.

65. Public Liaison Committee

The Owner shall review the need for establishing a Public Liaison Committee. If there is no interest from the public in establishing and participating in such a Committee (once sufficient notice has been given), the need for such a Committee should be reviewed yearly. If established, the Committee shall serve as a focal point for the dissemination, review and exchange of information and monitoring results relevant to the operation of the landfill.

Annual Report

66. A written report on the development, operation and monitoring of the *Site* , shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the *Regional* Director and the *District Manager* , by March 31st of each year, and shall cover the 12 month period preceding each anniversary date.

67. The Annual Report shall include the following:

a. the results and an interpretive analysis of the results of all leachate, groundwater, surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
b. an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the *Site* , and the adequacy of and need to implement the contingency plans;
c. site plans showing the existing contours of the *Site;*
d. areas of landfilling operation during the reporting period;
e. areas of intended operation during the next reporting period;
f. areas of excavation during the reporting period;
g. the progress of final cover, vegetative cover, and any intermediate cover application;
h. previously existing site facilities;
i. facilities installed during the reporting period;
j. site preparations and facilities planned for installation during the next reporting period;
k. calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the *Site* during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
l. a calculation of the remaining capacity of the site, an estimate of the remaining site life *and a comparison of actual capacity used to approved site capacity* ;
m. a summary of the quantity of any leachate or pre-treated leachate removed from the *Site* or leachate treated and discharged from the Site during each operating week;
n. a summary of the weekly, maximum daily and total annual quantity (tonnes) of waste received at the Site;
o. a summary of any complaints received and the responses made;
p. a discussion of any operational problems encountered at the *Site* and corrective action taken;
q. a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903;
r. any other information with respect to the site which the *District Manager* or Regional Director may require from time to time;
s. a statement of compliance with all conditions of this Certificate of Approval and other relevant Ministry groundwater and surface water requirements;
t. summary of inspections undertaken at the site;
u. any changes in operations, equipment or procedures employed at the site; and,
v. recommendations regarding any proposed changes in operations of the site.

SCHEDULE "A"

1. Order in Council 523/2006 dated March 1, 2006, and Environmental Assessment Act Section 9, Notice of Approval to Proceed with the Undertaking, Re: An Environmental Assessment for One or More Waste Disposal Solutions for the Municipality of McDougall and Other Area Municipalities, EA File No. EA 02-08 dated February 13, 2006.

2. Application for a Provisional Certificate of Approval for a Waste Disposal Site for the McDougall landfill site dated October 23, 2006.

3. Letter dated October 23, 2006 from Gregory D. Ferraro, P. Eng., Conestoga-Rovers Associates and Attachments "A" to "E" including Reference Plans to James O'Mara, Director, Environmental Assessment and Approvals Branch, MOE.

4. Report entitled "Expansion Cell Incremental Impact Assessment McDougall Landfill" prepared by Conestoga-Rovers and Associates Limited, dated October 2006.

5. Report entitled "Design and Operations Plan McDougall Landfill Site" prepared by Conestoga-Rovers and Associates Limited, dated October 2006.

6. Letter dated November 28, 2006 and attachments from Gregory D. Ferraro, P. Eng., Conestoga-Rovers and Associates to Matthew Chisholm, Application Processor, MOE.

7. Letter dated May 10, 2007 from Greg Washuta, Senior Waste Engineer, Ministry of the Environment to Garfield Eaton, CAO/Clerk-Treasurer, The Corporation of the Municipality of McDougall.

8. Letter and attachments dated June 5, 2007 from Gregory D. Ferraro, P. Eng., Conestoga-Rovers & Associates to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

9. Letter and Attachments "B" and "C" dated June 21, 2007 from Gregory D. Ferraro, P. Eng., Conestoga-Rovers & Associates to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

10. Report entitled "Geotechnical Assessment Report Proposed Landfill Expansion McDougall Landfill Site" dated June 22, 2007, prepared by Inspec-Sol Inc.

11. Letter dated July 13, 2007 from Greg Washuta, Senior Waste Engineer, Ministry of the Environment to Garfield Eaton, CAO/Clerk-Treasurer, The Corporation of the Municipality of McDougall.

12. Drawing number C-01 entitled "Existing Conditions- November 2004", dated October 2006, prepared by Conestoga-Rovers and Associates.

13. Drawing number C-02 entitled "Limits of Site and Contaminant Attenuation Zone", dated October 2006, prepared by Conestoga-Rovers and Associates.

14. Drawing number C-03 entitled "Proposed Final Contours", dated October 2006, prepared by

Conestoga-Rovers and Associates.

15. Drawing number C-04 entitled "Proposed Base Contours", dated October 2006, prepared by Conestoga-Rovers and Associates.

16. Drawing number C-05 entitled "Proposed Leachate Collection System", dated October 2006, prepared by Conestoga-Rovers and Associates.

17. Drawing number C-06 entitled "Proposed Landfill Sequencing", dated October 2006, prepared by Conestoga-Rovers and Associates.

18. Drawing number C-07 entitled "Proposed Surface Water Management Plan", dated October 2006, prepared by Conestoga-Rovers and Associates.

19. Drawing number C-08 entitled "Leachate Collection System Details 1", dated February 2008, prepared by Conestoga-Rovers and Associates.

20. Drawing number C-09 entitled "Leachate Collection System Details 2", dated February 2008, prepared by Conestoga-Rovers and Associates.

21. Drawing number C-10 entitled "Typical Sections", dated February 2008, prepared by Conestoga-Rovers and Associates.

22. Drawing number C-11 entitled "Miscellaneous Details", dated October 2006, prepared by Conestoga-Rovers and Associates.

23. Letter and Attachments A and B dated August 13, 2007 from Greg D. Ferraro, P. Eng., Conestoga-Rovers & Associates to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

24. Letter dated October 4, 2007 from Greg D. Ferraro, P. Eng., Conestoga-Rovers & Associates to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

25. Letter dated November 30, 2007 from Greg D. Ferraro, P. Eng., Conestoga-Rovers & Associates to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

26. E-mail dated January 23, 2008 from Greg Washuta, Senior Waste Engineer, EAAB, MOE to Greg D. Ferraro, P. Eng., Conestoga-Rovers & Associates.

27. Letter dated February 22, 2008 from Greg D. Ferraro, P. Eng., Conestoga-Rovers & Associates to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

SCHEDULE "B": GROUNDWATER MONITORING

Groundwater sampling is to be completed as per the following schedule and the following parameters:

LOCATION	SPRING	SUMMER	FALL	WINTER
RESIDENTIAL WELLS:				
W7, W11	B		B	
W10	-		B	
W12	B		B	
W14	B		A	
Residential duplicate	B		A	
GROUNDWATER WELLS: BHD-2, BHH, BHI, BHK, BHL, BHM, BHO, BHP, BHQ,	B		B	
OW1A-07, OW1B-07, OW2-07, OW3A-07, OW3B-07, OW4A-07, OW4B-07, OW4C-07, OW5-07, OW6-07, OW7-07, OW8-07, OW9-07, OW10-07	B		A	
BHB, BHC, BHE-2	B	B	A	B
Groundwater duplicate	B	B	A	

LEACHATE SAMPLING

LOCATION	SPRING	SUMMER	FALL	WINTER
PW1	B	B	A	B
Leachate holding tank	A		A, PCBs	
Treatment System Effluent	B	B	A	B

FIELD BLANKS

SPRING	SUMMER	FALL	WINTER
B, C	B, D	B, C	B

List A:

pH (field), Conductivity(field), temperature(field), pH, Conductivity, hardness, alkalinity, boron, chloride, calcium, sulphate, potassium, sodium, TKN, ammonia, arsenic, barium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, zinc, phenols, Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Organic Carbon, nitrate, nitrite, total phosphorus, phosphates, benzene, chlorobenzene, chloroethane, ethylbenzene, methylene chloride, toluene, xylenes, 1,2-dichlorobenzene, 1,4-dichlorobenzene, vinyl chloride, Total Dissolved Solids (TDS), Total Suspended Solids (LHT)

List B
pH (field), Conductivity(field), temperature(field), pH, Conductivity, hardness, alkalinity, barium, boron, chloride, TKN, ammonia, iron, manganese, phenols, Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Organic Carbon, nitrate, sulphate, total Phosphorus, Total Dissolved Solids, Total Suspended Solids (LHT), calcium, magnesium, sodium.

Detection limits shall be low enough in order to allow for comparison with the Ministry's Ontario Drinking Water Standards.

Conductivity, pH and temperature readings are to be taken from samples collected from each well during each sampling event.

SCHEDULE "C": SURFACE WATER MONITORING:

LOCATION	SPRING	SUMMER	FALL	WINTER
SW4, SW20, SW26, SW30, SW33	C	D	C	D
SW6, SW7, SW27, SW34 (MC culvert), SP, SW28	C		C	
Surface water duplicate	C	D	C	D

List C
pH (field), Conductivity(field), temperature(field), pH, Conductivity, hardness, alkalinity, chloride, TKN, ammonia, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, zinc, iron, manganese, phenols, Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Organic Carbon, nitrate, nitrite, sulphate, total phosphorus, Total Dissolved Solids, Total Suspended Solids. Dissolved Oxygen *(Field)* .

List D
pH (field), Conductivity(field), temperature(field), pH, Conductivity, hardness, alkalinity, chloride, TKN, ammonia, boron, iron, manganese, phenols, Chemical Oxygen Demand, Biochemical Oxygen Demand, Dissolved Organic Carbon, nitrate, nitrite, sulphate, total phosphorus, Total Dissolved Solids, Total Suspended Solids, Dissolved Oxygen *(field)* .

Velocity, depth and cross sectional area measurements shall be taken at each surface water station during each sampling event.

Surface water samples are to be collected from the downstream surface water station first then subsequent stations while traversing upstream.

Weather conditions during and 48 hours prior to the sampling event are to be observed and recorded.

Detection limits shall be low enough in order to provide comparisons with the Ministry's Provincial

Water Quality Objectives.

The reasons for the imposition of these terms and conditions are as follows:

1. *The reason for the inclusion of the definitions is to define the specific meaning of terms and simplify the wording of conditions in this Certificate of Approval.*

2. *The reason for Condition 1 is to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.*

3. *The reason for Conditions 2, 3, 4 and 8 is to clarify the legal rights and responsibilities of the Owner under this Certificate of Approval.*

4. *Condition 6 are included to ensure that the appropriate Ministry staff have ready access to information and the operations of the Site, which are approved under this Certificate.*

5. *Condition 7 has been included in order to clarify what information may be the subject to the Freedom of Information Act.*

6. *Condition 9 is included, pursuant to subsection 197(1) of the EPA, to provide that any persons having an interest in the Site are aware that the land has been approved and used for the purposes of waste disposal.*

7. *The reasons for Condition 10 are to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Certificate of Approval.*

8. *The reasons for Condition 11 are to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.*

9. *The reason for Condition 12 is to ensure that appropriate Ministry staff have ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Certificate of Approval. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the EPA and OWRA.*

10. *The reason for Conditions 13 to 18 inclusive and 20 to 21 inclusive is to ensure that the Site is designed, constructed and operated in an environmentally acceptable manner, based on the conceptual design and operations for the Site. Condition 21 has been specifically included to allow for optimization of design for subsequent stages based on operating experience and monitoring results and to ensure that any necessary remedial action is undertaken before landfilling may proceed in the next stage.*

11. *The reason for Condition 19 is to ensure the availability of as-built drawings for inspection and*

information purposes.

12. *Condition 22 has been included in order to ensure that the site has been constructed in accordance with the approved design plans, specifications and QA/QC procedures and to ensure that there is not an adverse impact on the environment.*

13. *The reason for Condition 23 is to ensure that users of the Site are fully aware of important information and restrictions related to Site operations under this Certificate of Approval.*

14. *The reasons for Conditions 24 through 26 inclusive are to ensure that final closure of the Site is completed in an aesthetically pleasing manner and to ensure the long-term protection of the natural environment.*

15. *The reasons for Conditions 27, 28, 29, 30, 32, 35, 36, 37, 38 and 47 to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.*

16. *The reasons for Condition 31 are for the protection of public health and safety and minimization of the potential for damage to environmental control, monitoring and other works at the landfill Site. Scavenging is the uncontrolled removal of material from waste at a landfill site.*

17. *The reason for Condition 33 is to ensure that noise from or related to the operation of the landfill is kept to within Ministry limits and does not result in a hazard or nuisance to any person.*

18. *The reason for Condition 34 is that open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard.*

19. *The reason for Condition 37 is to specify other approvals required for works and activities related to the operation of this Site as a landfill.*

20. *The reason for Conditions 39 and 42 is to specify the approved areas from which waste may be accepted at the Site and the types and amounts of waste that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.*

21. *The reason for Conditions 40 and 44 is to specify restrictions on the extent of landfilling at this Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site. Approval to landfill beyond these limits would require an application with supporting documentation submitted to the Director.*

22. *Condition 41 is necessary in order to specify a daily limit of waste received at the site in accordance with the Design and Operations Report.*

23. *The reasons for Condition 43a are to minimize the potential for clogging of the drainage layer and to minimize temperature effects on the leachate collection system. Failure to maintain the specified minimum thickness of waste and cover material may result in a decrease in the service life of the*

drainage layer.

24. *The reason for Conditions 43b and 43c is to specify the approval requirements for use of alternative cover material at the Site.*

25. *The reason for Condition 43d and 43e is to ensure that landfilling operations are conducted in an environmentally acceptable manner. Daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.*

26. *The reasons for Condition 45 are to specify the normal hours of operation for the landfill Site and a mechanism for amendment of the hours of operation.*

27. *The reasons for Condition 46 are to specify site access to/from the Site and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.*

28. *Condition 48 has been included so that sediment is not deposited in drainage ditch and an adverse impact on the environment is not observed.*

29. *The reasons for Condition 49 are to minimize the potential for clogging of leachate collection pipes and to ensure effective operation of the leachate collection system components for as long as they are required. Failure to clean out these components on a regular basis may result in a decrease in their service lives. Regular cleaning of the leachate collection pipes is especially important during stages of landfilling when the level of both organic and inorganic constituents in the leachate is high and, consequently, the potential for clogging due to encrustation is greatest. As the landfill reaches the more stable methane producing stage, pipe cleaning may be required less frequently.*

30. *The reason for Condition 50 is to ensure that the site leachate collection system stone is in accordance with Ontario Regulation 232/98.*

31. *Condition 51 is necessary to identify possible impacts on the environment during routine inspections.*

32. *Condition 52 is needed so that runoff from any landfill fines does not create an adverse impact on the environment.*

33. *The reason for Condition 53 is to ensure that the Site is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.*

34. *The reasons for Condition 55 are to ensure protection of the natural environment and the integrity of the groundwater monitoring network.*

35. *The reason for Condition 56 is to demonstrate that the landfill site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.*

36. *The reason for Conditions 57 and 58 is to ensure that the Owner follows a plan with an organized set of procedures for identifying and responding to unexpected but possible problems at the Site. A remedial action / contingency plan is necessary to ensure protection of the natural environment. A leachate contingency plan is a specific requirement of Reg. 232.*

37. *The reason for Condition 59 is to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and environmental protection.*

38. *The reasons for Conditions 60 and 61 are to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this Certificate of Approval, the EPA and its regulations.*

39. *The reasons for Conditions 62 and 63 are to ensure that the Ministry is informed of any spills or fires at the Site and to provide public health and safety and environmental protection.*

40. *Condition 64 is contained in the Certificate to guarantee that appropriate measures are taken by the County to prevent future occurrences of spills or fires at the site and to protect public health and safety and the environment.*

41. *The reason for condition 65 is to ensure that there is an opportunity to establish a Public Liaison Committee for the site in accordance with the EA approval.*

42. *The reasons for Condition 66 are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.*

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A522101 issued on November 29, 1991 and all subsequent amendments.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;

2. The grounds on which you intend to rely at the hearing in relation to eachportion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 28th day of March, 2008

THIS CERTIFICATE WAS MAILED
ON April 03, 2008
N.P
(Signed)

Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

GW/
c: District Manager, MOE North Bay
Gregory D. Ferraro, P.Eng., Conestoga-Rovers & Associates Limited
Garfield Eaton, CAO, Municipality of McDougall
Kip Hawley, MOE, Technical Support, Northern Region
Bob Smith, MOE, North Bay District
Rod Sein, MOE, Technical Support, Northern Region

RECEIVED DEC 0 1 2008

Ministry of the Environment
Environmental Assessment and
Approvals Branch
Floor 12A
2 St Clair Ave W
Toronto ON M4V 1L5
Fax: (416)314-8452
Telephone: (416) 314-5138

Ministère de l'Environnement
Direction des évaluations et des
autorisations environnementales
Étage 12A
2 av St Clair O
Toronto ON M4V 1L5
Télécopieur : (416)314-8452
Téléphone : (416) 314-5138

Ontario

November 20, 2008

Mr. Garfield Eaton, Chief Administrative Officer/Clerk-Treasurer
The Corporation of the Municipality of McDougall
5 Barager Blvd R.R. #3
McDougall, Ontario
P2A 2W9

Dear Mr. Eaton:

Re: Application for Approval of Detailed Design of Liner & Leachate Collection System
McDougall Landfill Site, Certificate of Approval A522101
McDougall Municipality, District of Parry Sound
MOE Reference Number 5281-7JLSMA

Please find attached an amendment dated November 19, 2008 to the Certificate of Approval for the McDougall Landfill site. The amendment approves the detailed design of the leachate collection system and liner for Cells 1 and 2. In addition, approval is granted to place waste in Cells 1 and 2.

If you have any questions regarding the above, please contact me at the above phone number.

Yours truly,

Greg Washuta, M. Eng., P.Eng.
Senior Waste Engineer, Waste Unit

c: District Manager, MOE North Bay
Alice Maliakkal, Conestoga Rovers and Associates
Greg Ferraro, Conestoga Rovers & Associates
Doug Walsh, MOE, North Bay

APPENDIX

F MECP CHECKLIST

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	McDougall Landfill Site
Location (e.g. street address, lot, concession)	Part Lots 11 and 12, Concession 4
GPS Location (taken within the property boundary at front gate/ front entry)	581545, 5026160 Zone 17, NAD 83
Municipality	Township of McDougall
Client and/or Site Owner	Municipality of McDougall
Monitoring Period (Year)	2021
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	A522101
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	◉ **Annual** ○ **Other**	
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		N/A
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:		
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)	○ Yes ◉ No	

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	◉ **Yes** ○ **No**	If no, list exceptions (Type Here):
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	◉ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Some or all groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.	◯ **Yes** ◉ **No** ◯ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◯ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ◯ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	◉ **Yes** ○ **No**		
6) The site meets compliance and assessment criteria.	◉ **Yes** ○ **No**		
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	◉ **Yes** ○ **No**	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ **Yes** ○ **No**	**Note which practice(s):**	☒ **(a)** ☐ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ○ **No** ◉ **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

31-Mar-2022

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

○ **No changes to the monitoring program are recommended**	
◉ **The following change(s) to the monitoring program is/are recommended:**	Sampling should occur only twice per year (Spring and Fall) as opposed to the current frequency of 4 times per year (April, July, September, and December).
◉ **No Changes to site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/ are recommended:**	Type Here

Name:	Paul Smolkin, P.Eng.		
Seal:	Add Image 		
Signature:		**Date:**	March 22, 2022
CEP Contact Information:	Type Here		
Company:	Golder Associates Ltd. (Member of WSP Canada Inc.)		
Address:	1931 Robertson Road, Ottawa, Ontario, Canada, K2H 5B7		
Telephone No.:	(613) 592-9600	Fax No. :	
E-mail Address:	paul_smolkin@golder.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	Tributaries of Little Cramadog Lake, Cramadog Lake, Seguin Lake, Oxley Wetland
Distance(s)	400-500 metres

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	◉ Yes ○ No	If no, identify issues (Type Here):
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	◉ Yes ○ No ○ **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	◯ **Yes** ◉ **No** ◯ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	◯ **Yes** ◯ **No** ◯ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/ outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ◯ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	○ **Yes** ◉ **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Outlined in Section 3.6 of report.	Outlined in Section 3.6 of report.	Outlined in Section 3.6 of report.
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	○ **Yes** ◉ **No**	Outlined in Sections 3.6 and 5.4 of report. Several exceedances are related to road salt and other off-site or naturally occurring concentrations.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	◉ **Yes** ○ **No**	If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range (Type Here)
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	◉ Yes ○ No ○ Not Known ○ Not Applicable	Outlined in Sections 3.4 and 5.2 of report.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ○ **No** ◉ **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

31-Mar-2022

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

○ **No Changes to the monitoring program are recommended** ◉ **The following change(s) to the monitoring program is/are recommended:**	Sampling should occur twice per year (April and September) as opposed to the current 4 times per year (April, July, September, and December).
◉ **No changes to the site design and operation are recommended** ○ **The following change(s) to the site design and operation is/are recommended:**	Type Here

CEP Signature	
Relevant Discipline	Engineer
Date:	22-March-2022
CEP Contact Information:	Paul Smolkin, P.Eng.
Company:	Golder Associates Ltd. (Member of WSP Canada Inc.)
Address:	1931 Robertson Road, Ottawa, Ontario, Canada, K2H 5B7
Telephone No.:	(613) 592-9600
Fax No. :	
E-mail Address:	paul_smolkin@golder.com

Save As **Print Form**