Monitored Natural Attenuation Feasibility Assessment, Former Springhill Farms Industrial Wastewater Treatment Facility, Neepawa, Manitoba

FINAL REPORT

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Prepared for:

HyLife Foods
523 Main Street East
Neepawa, MB R0J 1H0

Prepared by:

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB R2B 3B9

111474534

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Executive Summary

HyLife Foods (HyLife) retained Stantec Consulting Ltd. (Stantec) to conduct a Monitored Natural Attenuation Feasibility Assessment at the former Springhill Farms Industrial Wastewater Treatment Facility (SH IWWTF) located immediately north of the HyLife facility in Neepawa, Manitoba (hereinafter referred to as “the Site”). The objective of the Monitored Natural Attenuation (MNA) Feasibility Assessment was to assess the natural attenuation potential of the historically identified nitrate impacts to groundwater as part of the approved remediation plan for the Site.

Historical environmental investigations have identified exceedances of nitrate, chloride, and sulfate in groundwater. Based on mobility, toxicity, and the guideline exceedances, nitrate has been considered as the contaminant of potential concern (COPC) in groundwater at the Site.

Elevated nitrate concentrations are positively associated with elevated sulfate and total dissolved solids (TDS) concentrations and their positive relationship can be further defined as linear. Simultaneously elevated concentrations of nitrate, sulfate, and TDS suggest an anthropogenic nitrate source. Considering the Site operations, the nitrate contamination source is likely wastewater seepage from the holding cells. The comparison of the elevations of nitrate-impacted groundwater to the construction of the holding cells further suggested that the nitrate contamination source was the seepage from the bottom of the holding cells.

The positive linear relationship between nitrate and sulfate and/or TDS determined that the source of the identified nitrate impacts at monitoring wells MW18 and MW20 could be either agricultural fertilizer application or accidental fertilizer spill, but not from the seepage of the holding cells.

Multiple lines of evidence were used to evaluate the MNA potential at the Site, which include primary line of evidence (concentration changes with time and the plume status), secondary line of evidence (geochemical indicators), and optional line of evidence (microbiological study).

A Mann-Kendall analysis was conducted for the monitoring wells including MW2, MW3, MW4, MW5, and MW7. The results indicated: 1) No trend can be found in the nitrate concentrations in monitoring well MW7; 2) Nitrate concentrations at MW2 and MW4 have decreased with time; 3) A stable trend of the nitrate concentrations has been observed at monitoring wells MW3 and MW5.

Changes in groundwater levels can influence the nitrate concentrations in groundwater. However, the Mann-Kendall analysis cannot evaluate the influence of the groundwater level changes. After excluding the influence from the groundwater levels by only comparing nitrate concentrations obtained at similar groundwater levels, a stable trend in nitrate concentrations was observed in selected monitoring wells MW2, MW3, MW4, MW5, and MW7.

Analytical results of geochemical indicators including organic carbon source, ammonia (the final product of dissimilatory nitrate reduction), and nitrite (the intermediate product of the denitrification) suggested the nitrate biodegradation potential could be low.

Populations of denitrifying bacteria (DNB) at the nitrate-impacted monitoring wells (MW2, MW3, MW4, MW5, and MW7) were consistent with the non-impacted monitoring wells (MW6 and MW14) and further confirmed the nitrate biodegradation potential could be low.

The conclusions of the MNA feasibility assessment are summarized below.

- Based on mobility, toxicity, and the guideline exceedances, nitrate has been considered as the COPC in groundwater at the Site.
- The wastewater seepage occurring at the bottom of the holding cells could be the source of the identified nitrate impacts at monitoring wells MW2, MW3, MW4, MW5, and MW7 which are located in vicinity of the former SH IWWTF.
- Based on the positive linear relationship between nitrate and sulfate and/or TDS concentrations, the source for the identified nitrate impacts at monitoring wells MW18 and MW20 could be either agricultural fertilizer application or accidental fertilizer spill, but not from the holding cells.
- The nitrate plume identified surrounding the holding cells is generally stable, based on the nitrate concentration changes with time without the influence from groundwater levels.
- The current MNA potential is considered low or limited, based on multiple lines of evidence (primary, secondary, and optional lines of evidence).

Historical analytical results obtained from groundwater monitoring and sampling events conducted over a period from 2019 until 2022 further confirmed that the nitrate-impacted groundwater was confined within the footprint of the developed/elevated area (see elevation cross section in **Figure A4** in **Appendix A**) of the Site (i.e., at monitoring wells MW2, MW3, MW4, MW5, and MW7) as shown in **Figure A3** in **Appendix A**. Another line of evidence for the fact that the nitrate plume is confined within the developed/elevated area is that sulfate concentrations at monitoring well MW17 have been consistent with the background concentrations since 2007 (**Table B1**). Based on the positive linear relationship between nitrate and sulfate suggested in Sections 2.2 and 2.3, the sulfate concentrations at MW17 indicate that the nitrate plume has not arrived at MW17.

Since the nitrate-impacted groundwater due to the holding cells is confined within the footprint of the developed/elevated area of the Site, risks posed by the nitrate-impacted groundwater to off-site human and ecological receptors are considered negligible.

Considering negligible risks posed by the nitrate-impacted groundwater to off-site human and ecological receptors and the stable nitrate plume, although the MNA potential could be low, no immediate actions are required. Therefore, annual groundwater monitoring and sampling should continue until Cells #2A, #2B, and #3 are completely decommissioned by removing wastewater and sludge; however, the frequency of groundwater sampling should be reduced to biennially following decommissioning.

The statements made in this Executive Summary are subject to the same limitations included in Section 5.0 and are to be read in conjunction with the remainder of this report.

Abbreviations

AO	-	Aesthetic Objective
CCME	-	Canadian Council of Ministers of the Environment
CF	-	Confidence Factor
COPC	-	Contaminant of potential concern
CoV	-	Coefficient of Variance
CSRA	-	Manitoba Contaminated Sites Remediation Act
DNB	-	Denitrifying bacteria
DTW	-	Depth to groundwater
HPC	-	Heterotrophic plate count
IRB	-	Iron reducing bacteria
MAC	-	Maximum acceptable concentration
mAD		Metres above datum
m AMSL		Metres above mean sea level
mBTOC		Metres below top of casing
MCC	-	Manitoba Conservation and Climate

MECP	-	Manitoba Environment, Climate and Parks
MNA	-	Monitored natural attenuation
MPN	-	Most probable number
NO_3-N	-	Nitrate as nitrogen
S	-	Mann-Kendall Statistic
SH IWWTF	-	Springhill Farms Industrial Wastewater Treatment Facility
SRB	-	Sulfate reducing bacteria
TOC	-	Total organic carbon
TDS	-	Total dissolved solids

1.0 INTRODUCTION

HyLife Foods (HyLife) retained Stantec Consulting Ltd. (Stantec) to conduct a Monitored Natural Attenuation Feasibility Assessment at the former Springhill Farms Industrial Wastewater Treatment Facility (SH IWWTF) located immediately north of the HyLife facility in Neepawa, Manitoba (hereinafter referred to as "the Site"). A Site Location Map is presented on **Figure A1** of **Appendix A** and a Site Plan is presented on **Figure A2** of **Appendix A**.

1.1 OBJECTIVE

The objective of the Monitored Natural Attenuation Feasibility Assessment was to assess the natural attenuation potential of the historically identified nitrate impacts to groundwater as part of the approved remediation plan for the Site (MCC, 2019).

1.2 BACKGROUND

A groundwater sampling program was completed by Earth Tech in 2007 for 11 monitoring wells present at the Site (MW1 through MW11) (Earth Tech, 2007). The Earth Tech (2007) report indicated that groundwater impacts were present on the SH IWWTF and to the north and east of the SH IWWTF but appeared to remain within the facility limits. The apparent direction of groundwater flow was generally towards the north. Nitrate (as N) concentrations in groundwater exceeded the referenced Health Canada drinking water guideline at the time; however, the nitrate+nitrite (as N) concentrations were below the Canadian Council of Ministers of the Environment (CCME) guideline for livestock watering. In some groundwater samples, the dissolved sulfate concentrations exceeded the Health Canada aesthetic objective (AO). The Earth Tech (2007) report recommended the installation of additional groundwater wells north of the SH IWWTF to further delineate the impacts and confirm that the impacts were contained to the SH IWWTF.

Additional groundwater data collected since 2007 by HyLife (annual data collected from 2014 through 2018 from the 11 monitoring wells) identified groundwater impacts in monitoring well MW8 near the property's northern boundary; however, analyte concentrations were not consistent.

The 2019 groundwater delineation program completed by Stantec included the advancement of seven additional boreholes, each completed with a monitoring well (Stantec, 2019a). Based on the results of the groundwater delineation program undertaken, and to the extent that the samples analyzed were representative of the areas investigated, Stantec (2019a) concluded that:

- The concentrations of dissolved nitrite (NO_2), dissolved nitrite (as N), and nitrate+nitrite (as N) in the groundwater samples submitted for laboratory analysis were less than the applied regulatory guidelines.

- The concentrations of dissolved nitrate (NO_3) and dissolved nitrate (as N) exceeded the Health Canada maximum acceptable concentration (MAC), in monitoring wells MW2, MW3, MW5, and MW7 (see **Figure A3** in **Appendix A**).
- The concentrations of dissolved chloride in groundwater samples MW3 (and its field duplicate QC2), MW4, MW5, MW6 and MW12 exceeded the CCME guideline.
- The concentrations of dissolved sulfate in groundwater samples MW2, MW3 (and its field duplicate QC2), MW5, MW8, and QC3 (MW13 is the parent sample) exceeded the Health Canada AO. The concentrations in MW3 and its field duplicate QC2 also exceeded the CCME guideline for livestock water.

The lateral delineation of the groundwater impacts, specifically dissolved nitrate (NO_3), was attained to the north, east, and west; however, the area to the south/southeast of the SH IWWTF was not fully delineated. The dissolved nitrate impacted groundwater appeared to be limited to the area in the vicinity of the SH IWWTF cells.

As the groundwater concentrations exceeded the mandatory requirements under The Manitoba Contaminated Sites Remediation Act (CSRA), a remediation plan for the nitrate groundwater impacts identified at the Site was submitted to, and approved by, Manitoba Environment, Climate and Parks (MECP) on December 30, 2019 (Stantec, 2019b and MCC, 2019). The remediation plan proposed a feasibility study to confirm the potential effectiveness of MNA. The proposed feasibility study included one groundwater monitoring and sampling event to be undertaken in 2020 (to provide baseline groundwater analytical data prior to SH IWWTF cell remediation) with two annual groundwater monitoring and sampling events to be undertaken in the following years, post-SH IWWTF cell remediation.

A groundwater monitoring program was completed for the 18 monitoring wells located at the Site in 2020, based on the remediation plan approved by MECP (Stantec, 2020a).

Based on the results of the groundwater monitoring program undertaken, and to the extent that the samples analyzed were representative of the areas investigated, Stantec concluded that:

- The concentrations of dissolved nitrite (NO_2), dissolved nitrite (as N), and nitrate+nitrite (as N) in the groundwater samples submitted for laboratory analysis were less than the referenced target guidelines.
- The concentrations of dissolved nitrate (NO_3) exceeded the 45 mg/L Health Canada MAC in monitoring wells MW2, MW3, MW5, MW7, and MW18 (see **Figure A3** in **Appendix A**).
- The concentrations of dissolved nitrate (as N) exceeded the 10 mg/L Health Canada MAC in monitoring wells MW2, MW3, MW5, and MW7.
- The concentrations of dissolved chloride in groundwater samples collected from MW3, MW4, MW5, MW6, MW7, and MW8 exceeded the 100 mg/L CCME guideline for irrigation water.

- The concentrations of dissolved sulfate in groundwater samples MW3, MW5, and MW8 exceeded the 500 mg/L Health Canada AO. The concentration in MW3 also exceeded the 1000 mg/L CCME guideline for livestock water.

Based on the analytical results for the 2020 Groundwater Monitoring and Sampling Program, Stantec recommended the installation of three additional monitoring wells to the southeast of the SH IWWTF.

Stantec supervised the installation of three monitoring wells (MW19, MW20, and MW21) at the Site southeast of the SH IWWTF on April 20, 2021 (Stantec, 2021a).

Based on the remediation plan approved by MECP in 2019 and the work completed up to April 2021 which included the relining of the former SH IWWTF anaerobic cell (Cell #1), discontinued use of Cells #2A and #2B and limited use (as needed basis) of Cell #3, two further groundwater monitoring programs, one each in 2021 and 2022 (post cell remediation), were required for the monitored natural attenuation feasibility assessment outlined in the remediation plan.

The 2021 groundwater monitoring program was completed in July 2021. Based on the results of the 2021 groundwater monitoring program (Stantec, 2021b), Stantec concluded that:

- The concentrations of dissolved nitrite (NO_2), dissolved nitrite (as N), and nitrate+nitrite (as N) in the groundwater samples submitted for laboratory analysis were less than the referenced guidelines.
- In monitoring wells MW2, MW4, MW5, MW7, MW18, and MW20, the concentrations of dissolved nitrate (NO_3) and dissolved nitrate (as N) exceeded the Health Canada MAC of 45 mg/L and 10 mg/L, respectively (see **Figure A3** in **Appendix A**).
- In monitoring wells MW3, MW4, MW5, MW6, MW7, MW8, MW12, MW13, and MW20, the concentrations of dissolved chloride exceeded the lowest CCME guideline of 100 mg/L for irrigation water. In MW4, the concentration also exceeded the 250 mg/L Health Canada AO.
- In monitoring wells MW3, MW5, and MW8, the concentrations of dissolved sulfate in groundwater samples exceeded the 500 mg/L Health Canada AO. In monitoring well MW3, the concentration also exceeded the 1000 mg/L CCME guideline for livestock watering.

The 2022 groundwater monitoring program was completed in June 2022, providing the second year of sampling following the partial completion of the cell remediation (re-lining of Cell #1). Based on the results of the 2022 groundwater monitoring program (Stantec, 2022), Stantec concluded that:

- The concentrations of dissolved nitrite (NO_2), dissolved nitrite (as N), and nitrate+nitrite (as N) in the groundwater samples submitted for laboratory analysis were less than the referenced guidelines.
- In monitoring wells MW3, MW5, MW7, and MW20, the concentrations of dissolved nitrate (NO_3) and dissolved nitrate (as N) exceeded the Health Canada MAC of 45 mg/L and 10 mg/L, respectively (see **Figure A3** in **Appendix A**).
- In monitoring wells MW6, MW8, and MW20, the concentrations of dissolved chloride exceeded the lowest CCME guideline of 100 mg/L for irrigation water.

- In monitoring well MW8, the concentration of dissolved sulphate exceeded the 500 mg/L Health Canada AO.

The following report discusses the findings of the Monitored Natural Attenuation Feasibility Assessment based on the completed groundwater sampling programs.

2.0 NITRATE CONTAMINATION SOURCE

2.1 CONTAMINANTS OF POTENTIAL CONCERN

As summarized in Section 1.2 Background, historical environmental investigations have identified exceedances of nitrate, chloride, and sulfate in groundwater. Nitrate concentrations in groundwater exceeded the referenced Health Canada MAC. Chloride concentrations in groundwater slightly exceeded the CCME guideline for irrigation water. Sulfate concentrations in groundwater exceeded the Health Canada AO. Based on mobility, toxicity, and the guideline exceedances, nitrate has been considered as the contaminant of potential concern (COPC) in groundwater at the Site.

2.2 POSITIVE RELATIONSHIP BETWEEN NITRATE AND SULFATE AND TDS

Elevated nitrate concentrations in groundwater were positively related to concentrations of sulfate and total dissolved solids (TDS). MW1 is a good example to illustrate the positive relationship between nitrate and sulfate and TDS because the multiple years of groundwater monitoring at this location detected the occurrence of nitrate contamination. In 2014, the concentration of nitrate in MW1 was 0.064 mg/L and by 2017, the concentration had significantly increased to 55.7 mg/L, as shown on the below Figure 1.

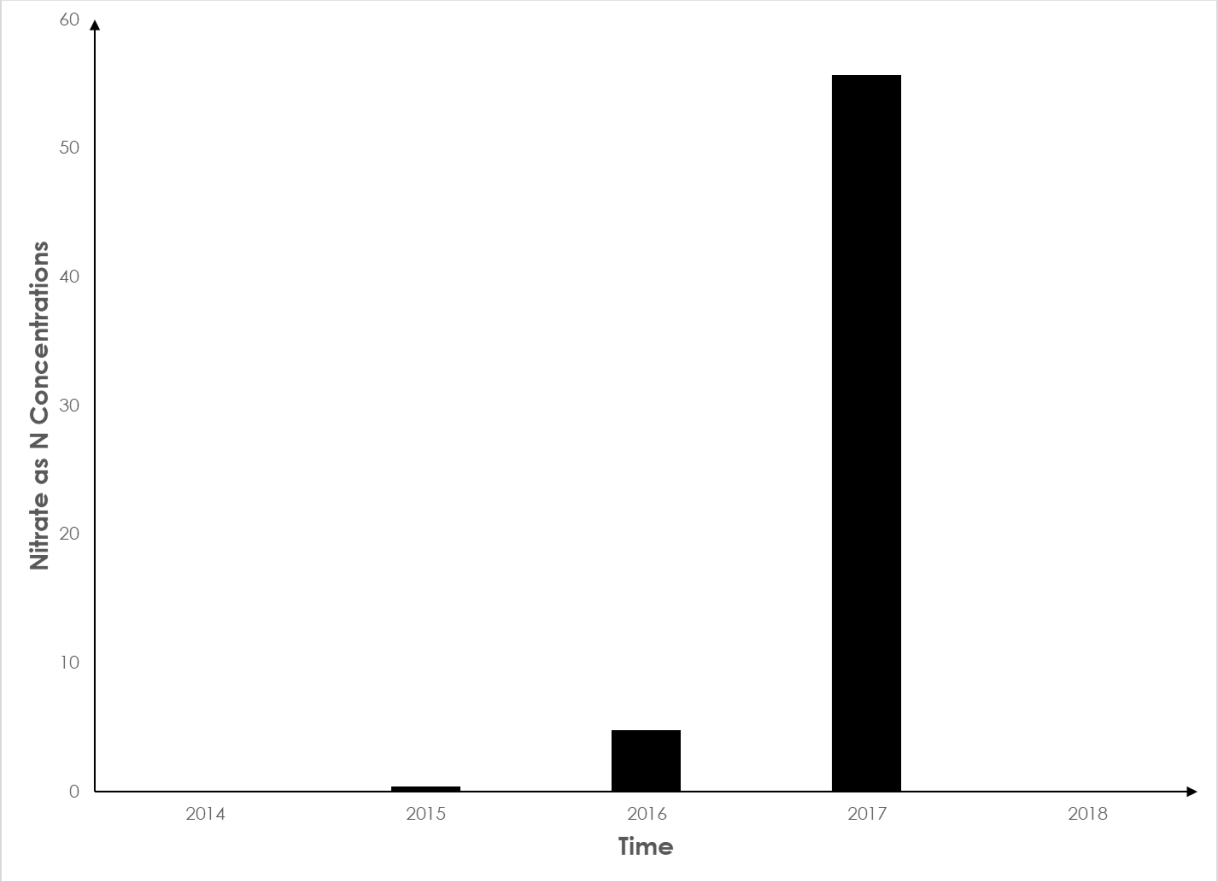


Figure 1 Nitrate Concentration Changes at Monitoring Well MW1 between 2014 and 2018

When the nitrate contamination occurred in 2017, elevated sulfate and TDS concentrations were also observed in MW1. Thus, it is postulated that there is positive relationship between nitrate and sulfate and TDS, which is illustrated by using MW1 as an example (shown on Figure 2).

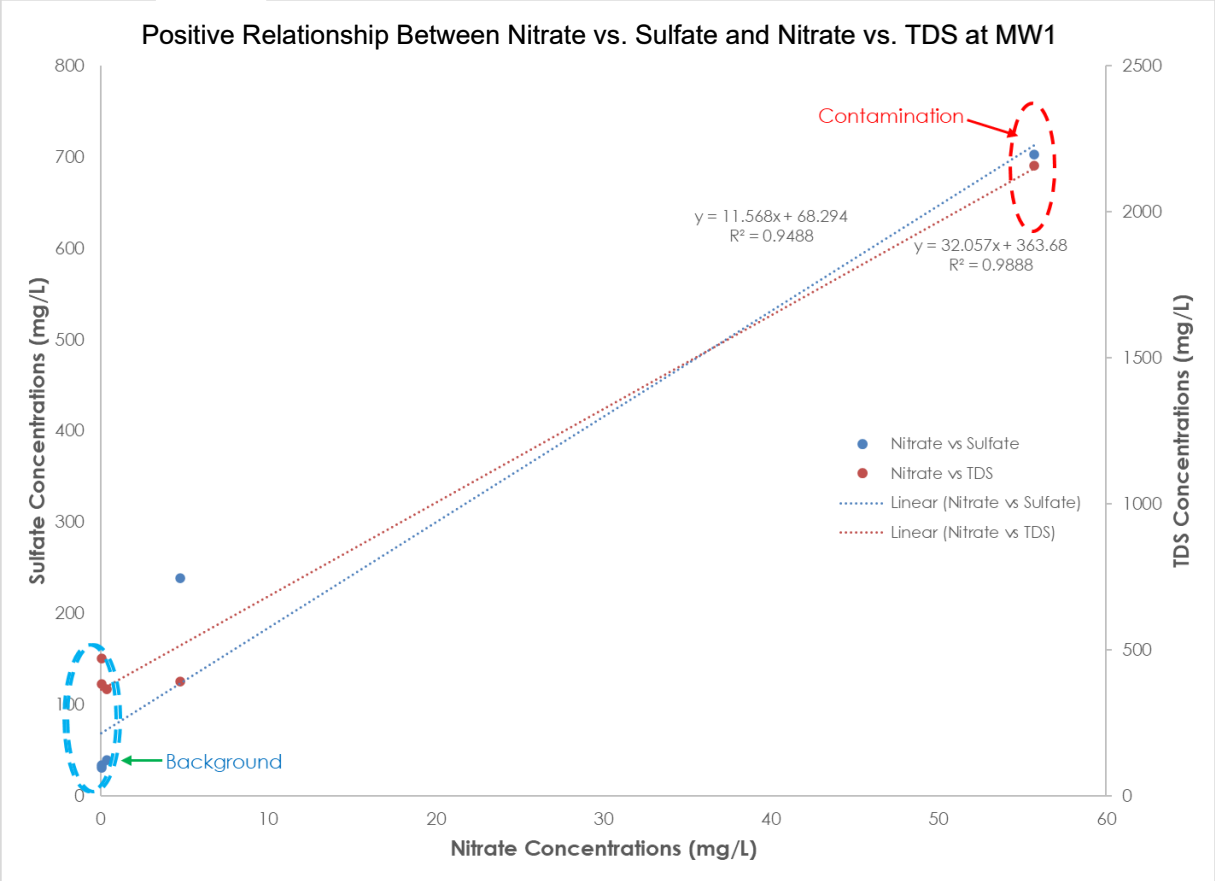


Figure 2 Relationship between Nitrate and Sulfate and TDS at Monitoring Well MW1

As shown on Figure 2, the background concentrations of nitrate ranged from 0.042 mg/L to 0.364 mg/L, which were close to the left Y axis of the Figure 2. The corresponding background sulfate concentrations ranged from 30.8 mg/L to 39.8 mg/L, and the corresponding background TDS concentrations ranged from 366 mg/L to 472 mg/L, which are included in the highlighted “background” circle. When the nitrate as N concentration was measured in 2017 to be 55.7 mg/L, the sulfate and TDS concentrations were reported to be 703 mg/L and 2,160 mg/L, respectively, which are shown on the highlighted “contamination” circle on Figure 2.

Figure 2 suggests that elevated nitrate concentrations are positively associated with elevated sulfate and TDS concentrations and their positive relationship can be further defined as linear ([Sulfate]=11.6[Nitrate]+68.3 with R^2=0.95, and [TDS]=32.1[Nitrate]+363.7 with R^2=0.99).

2.3 NITRATE CONTAMINATION SOURCE

Potential nitrate sources in groundwater consist of natural sources and anthropogenic sources. Natural nitrate sources in groundwater could be from geogenic sources (including desert-derived nitrate, lake evaporate deposits) and soil organic nitrogen (including proteinaceous materials and heterocyclics). Sources of anthropogenic nitrate contamination to groundwater are septic systems, sanitary sewage effluent releases, domestic animal wastes, and home and farm usage of nitrogen fertilizer including nitrate fertilizer, ammonium fertilizer, and urea.

Natural nitrate sources including geogenic sources and soil organic nitrogen usually cannot cause elevated sulfate and TDS concentrations.

Simultaneously elevated concentrations of nitrate, sulfate, and TDS suggest an anthropogenic nitrate source. Among the possible anthropogenic nitrate sources, the usage of nitrogen fertilizers cannot cause the simultaneously elevated concentrations of nitrate, sulfate, and TDS. Therefore, considering the Site operations, the nitrate contamination source is likely the wastewater and sludge of the SH IWWTF holding cells. Therefore, the nitrate contamination together with elevated sulfate and TDS concentrations in groundwater is likely caused by seepage from the holding cells.

2.3.1 Seepage from Bottom of Holding Cells as Nitrate Contamination Source

The Cells #2A, #2B, and #3 were constructed from surface up by using a 6 m tall dyke (from 62.75 m above datum (mAD) to 68.75 mAD), as shown on Figure 3 (MWSB, 1986). It should be noted that the datum of the elevations of the dyke were not provided in MWSB (1986).

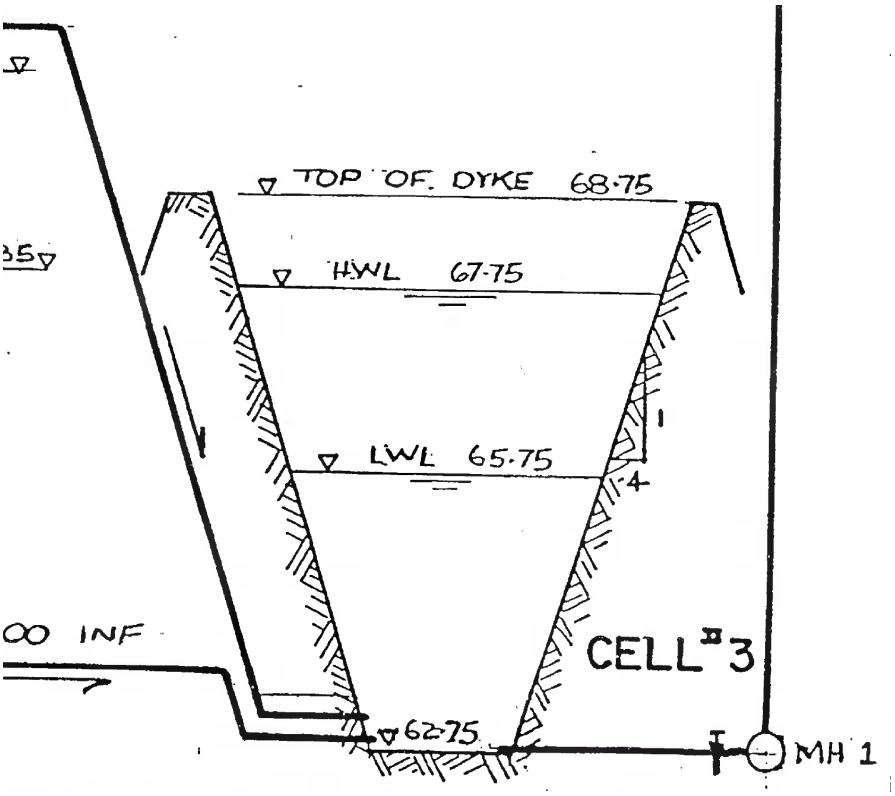


Figure 3 Construction of Holding Cell #3

The top of monitoring well MW2 (without the stickup) was approximately 4 m lower than the top of the Cell #3; thus, the bottom of the Cell #3 is about 2 to 3 m lower than the top of MW2 (without the stickup). When the depth to groundwater was about 3 m below ground surface (m BGS) (i.e., 3.09 m BGS in 2019 and 3.14 m BGS in 2021 as shown in **Table B3** in **Appendix B**), the groundwater level at MW2 was consistent with the bottom of the Cell #3. Thus, groundwater is anticipated to be in contact with the seepage from the bottom of the Cell #3, resulting in 16 mg/L of nitrate in MW2 in both 2019 and 2021. When the depth to groundwater at monitoring well MW2 raised to 2.62 m BGS in 2020 and 2.24 m BGS in 2022, groundwater was diluted by the clean groundwater, resulting in 12 mg/L of nitrate in 2020 and 3.4 mg/L in 2022. Therefore, the changes of the nitrate concentrations at monitoring well MW2 with the groundwater level suggested that seepage occurs at the bottom of Cell #3, and the bottom of the holding cell acted as the nitrate contamination source.

Sludge samples were collected from Cells #1, #2A, and #2B on February 13, 2020 (prior to remediation – relining of Cell #1), for laboratory analysis (Stantec, 2020b). Total Kjeldahl nitrogen (TKN) concentrations were reported to be 13,900 mg/kg for Cell #1, 3,170 mg/kg for Cell #2A, and 7,600 mg/kg for Cell #2B. It should be noted that the TKN can be transferred to nitrate via the microbial-induced nitrification process under appropriate environmental conditions. In addition, sulfate as sulfur concentrations in the sludge leachates ranged from 897 mg/L to 7,030 mg/L. The analytical results of the sludge samples collected

from Cells #1, #2A, and #2B further support the theory that the nitrate contamination source could be the seepage from the bottom of the holding cells.

2.4 APPLICATION OF SIMULTANEOUS POSITIVE RELATIONSHIP

It is recommended that the positive linear relationship between nitrate and sulfate and/or TDS be used to distinguish the contamination from the holding cells from agricultural fertilizer application or accidental fertilizer spills.

Although nitrate as N concentrations at monitoring well MW20 were reported to be 14 mg/L in 2021 and 15 mg/L in 2022, since sulfate concentrations were 62 mg/L and 38 mg/L and were consistent with the background concentrations, the identified nitrate impacts at MW20 may not be caused by the seepage from the holding cells, but rather potentially agricultural fertilizer application or accidental fertilizer spill.

A similar situation occurred at monitoring well MW18 (nitrate as N concentrations were 10 mg/L in 2020 and 14 mg/L in 2021; but sulfate concentrations were 16 mg/L and 53 mg/L, respectively). Thus, the source of the identified nitrate impacts at monitoring well MW18 could be either agricultural fertilizer application or accidental fertilizer spill, but not from the seepage of the holding cells.

3.0 MONITORED NATURAL ATTENUATION POTENTIAL

Demonstration of MNA feasibility may include primary, secondary, and optional lines of evidence (ASTM, 1998):

1. Primary line of evidence includes documented loss of contaminants, used to define the plume as shrinking, stable or expanding.
2. Secondary lines of evidence include geochemical indicators of naturally occurring biodegradation and estimates of the attenuation rate.
3. Optional lines of evidence include modelling, estimates of assimilative capacity, microbiological studies, and stable isotope analysis.

Laboratory analytical results used as multiple lines of evidence for the MNA Feasibility Assessment are presented in **Appendix B**.

3.1 MONITORING WELLS WHERE MNA POTENTIAL MAY BE PRESENT

As indicated in Section 2.3, simultaneously elevated concentrations of nitrate, sulfate, and/or TDS are a characteristic of the seepage from bottom of the holding cells. Thus, it was recommended in Section 2.4 that the positive linear relationship between nitrate and sulfate and/or TDS be used to distinguish the contamination from the holding cells from agricultural fertilizer application or accidental fertilizer spills.

As shown on **Table B1** of **Appendix B**, nitrate exceedances and corresponding elevated nitrate and sulfate (after 2018, TDS was analyzed in select monitoring wells only) concentrations were identified at monitoring wells MW2, MW3, MW4, MW5, and MW7. It should be noted that these monitoring wells were located within the footprint of the developed/elevated area of the Site, and they are referred to as MNA monitoring wells in this report.

Since Section 2.4 indicated that nitrate exceedances identified at monitoring wells MW18 and MW20 may not be associated with the holding cells, these two monitoring wells are not included in the MNA feasibility assessment.

Remaining monitoring wells including MW1, MW6, MW8, MW9 through MW17, MW19, and MW21 have not exhibited the nitrate contamination since 2018; thus, they are not included in the MNA feasibility assessment further.

3.2 PRIMARY LINE OF EVIDENCE FOR MNA POTENTIAL EVALUATION

3.2.1 Nitrate Concentration Trend at MNA Monitoring Wells

Analysis of the trend of the contaminant of potential concern (COPC) concentrations in the impacted groundwater plumes has many applications in groundwater plume management and remediation. The demonstration of groundwater plume status is often required to confirm protective conditions. Formal evaluation of the plume status can be accomplished using a variety of statistical methods, of which the Mann-Kendall protocol is one of the most commonly used and widely applicable tools.

3.2.1.1 Mann-Kendall Trend Analysis

The Mann-Kendall analysis is a non-parametric statistical procedure that is used for analyzing trends in the analytical data over time (Gilbert, 1987). Nonparametric methods require no assumptions regarding the underlying statistical distribution of the data. Accordingly, the Mann-Kendall test does not require a specific statistical distribution of the data and is not test sensitive to the sampling interval over which the monitoring data are collected. The Mann-Kendall procedure can be used for data sets that include irregular sampling intervals, data below the detection limit and trace or missing data. Therefore, the Mann-Kendall method is recommended to be applied to track data trends for purpose of groundwater compliance monitoring, site assessment and monitoring of the performance of groundwater corrective actions (USEPA, 2009).

The Mann-Kendall test for trend analysis, as coded in the GSI Mann-Kendall Toolkit, relies on three statistical metrics (Aziz et al. 2003), as follows:

- The Mann-Kendall Statistic (S): The S value indicates whether concentration trend vs. time is generally decreasing (negative S value) or increasing (positive S value).
- The Confidence Factor (CF): The CF value modifies the S value statistic calculation to indicate the degree of confidence in the trend result, as in “Decreasing” vs. “Probably Decreasing” or “Increasing” vs. “Probably Increasing”. Additionally, if the confidence factor is quite low, due either to considerable variability in concentrations vs. time or little change in concentrations vs. time, the CF is used to apply a preliminary “No Trend” classification, pending consideration of the coefficient of variation (CoV).
- The Coefficient of Variation (CoV): The CoV is used to distinguish between a “No Trend” result (significant scatter in concentration trend vs. time) and a “Stable” result (limited variability in concentration vs. time) for datasets with no significant increasing or decreasing trend (e.g., low CF).

Categories of statistical metrics used in the Mann-Kendall analysis are summarized in the below Table 1.

Table 1 Statistical Metrics Used in Mann-Kendall Analysis

S Statistic	Confidence in Trend	Trend
S>0	CF>95%	Increasing
S>0	95%≥CF≥90%	Probably Increasing
S>0	CF<90%	No Trend
S≤0	CF<90% and CoV≥1	No Trend
S≤0	CF<90% and CoV<1	Stable
S<0	95%≥CF≥90%	Decreasing
S<0	CF>95%	Probably Decreasing
ND	Dataset where all values are non-detectable	
NA	Sites with less than four sample results	

Note: Adapted from Aziz et al. (2003).

3.2.1.2 Results of Mann-Kendall Analysis

The Mann-Kendall analytical results of nitrate concentrations at the MNA Monitoring wells are shown in Table 2 below.

Table 2 Mann-Kendall Analytical Results of Nitrate Concentrations at MNA Monitoring Wells

Mann-Kendall Parameters	MW2	MW3	MW4	MW5	MW7
Coefficient of Variation (CoV)	0.82	1.00	0.66	0.61	0.49
Mann-Kendall Statistic (S)	-34	-13	-29	-4	12
Confidence Factor	99.0%	82.1%	98.7%	59.0%	79.9%
Trend	Decreasing	Stable	Decreasing	Stable	No Trend

No trend was found in the nitrate concentrations in monitoring well MW7. Nitrate concentrations at MW2 and MW4 have decreased with time. A stable trend of the nitrate concentrations has been observed at monitoring wells MW3 and MW5.

Results of the Mann-Kendall Analysis are presented in **Appendix C**.

3.2.2 Influence of Groundwater Level on Nitrate Concentrations

The Mann-Kendall analysis only evaluates the change in nitrate concentrations with time. Influences of other parameters on the nitrate concentrations are not evaluated by the Mann-Kendall analysis, as it is the non-parametric test. For example, one of the Mann-Kendall limitations is non-seasonal effects (i.e., groundwater elevations and contaminant concentrations change seasonally).

As indicated in Section 2.3.1, the seepage occurred from the bottom of the holding cells. This means that when the groundwater level was consistent with the bottom of the holding cells, nitrate concentrations are anticipated to increase due to contamination by the seepage. And, when the groundwater level is higher than the bottom of the holding cells and proximate to the cell, the nitrate concentrations are anticipated to decrease due to the dilution by clean background groundwater. Therefore, it is postulated that groundwater levels can influence the nitrate concentrations in groundwater.

Depths to groundwater (DTW) and nitrate concentrations at representative monitoring wells are shown in the Table 3 below.

Table 3 Depth to Groundwater (DTW) Versus Nitrate as N Concentrations at MNA Monitoring Wells

Year	MW2		MW3		MW4		MW5		MW7	
	DTW (m BGS)	NO_3-N (mg/L)	DTW (m BGS)	NO_3-N (mg/L)	DTW ((m BGS)	NO_3-N (mg/L)	DTW (m BGS)	NO_3-N (mg/L)	DTW (m BGS)	NO_3-N (mg/L)
2019	3.09	16	4.50	20	3.80	8.4	3.78	40	3.93	55
2020	2.62	12	4.15	21	3.33	5	3.49	48	3.55	49
2021	3.14	16	4.58	0.72	4.09	15	3.80	39	3.99	60
2022	2.24	3.4	3.56	14	2.89	0.4	2.88	17	2.91	29

NOTE: m BGS – metres below ground surface
NO_3-N – nitrate as N concentrations

As shown in Table 3, when the water table was rising (decreasing DTWs), the nitrate concentrations were decreasing. When the water table was dropping (increasing DTWs), the nitrate concentrations were increasing. More specifically, at monitoring well MW2, when the DTW decreased from 3.09 m BGS to 2.62 m BGS, nitrate concentrations decreased from 16 mg/L to 12 mg/L; and when the DTW decreased from 3.14 m BGS to 2.24 m BGS, nitrate concentrations decreased from 16 mg/L to 3.4 mg/L. For another example, at MW4, when the DTW decreased from 4.09 m BGS to 2.89 m BGS, nitrate concentrations decreased from 15 mg/L to 0.4 mg/L. At monitoring well MW5, when the DTW decreased from 3.8 m BGS to 2.88 m BGS, nitrate concentrations decreased from 39 mg/L to 17 mg/L. At monitoring well MW7, when the DTW decreased from 3.99 m BGS to 2.91 m BGS, nitrate concentrations decreased from 60 mg/L to 29 mg/L.

The nitrate as N concentrations at monitoring well MW3 ranged from 10 mg/L to 94.2 mg/L over the period from 2007 until present, except in 2018. 0.72 mg/L of nitrate as N was reported in 2018. Based on the nitrate concentration distribution, the 0.72 mg/L of nitrate as N obtained in 2018 is considered as an outlier. The outlier could be caused by various factors including field sampling problems and laboratory measurement errors.

3.2.3 Nitrate Concentration Changes Without Influence from Groundwater Levels

As described above, the groundwater level fluctuations resulted in the changes in nitrate concentrations. This means that the Mann-Kendall analytical results may be influenced by the groundwater level fluctuations. The possible reason for the influence of the groundwater level fluctuations on the nitrate concentrations is that wastewater seepage occurred from the bottom of the holding cells, but not from the dikes of the holding cells.

In order to evaluate the nitrate concentration changes caused by the wastewater seepage more accurately, the nitrate concentrations obtained at similar groundwater levels were compared (see groundwater levels in **Table B3** in **Appendix B**). The comparison results are summarized below:

- At monitoring well MW2, when the DTWs were similar (i.e., 3.09 m BGS and 3.14 m BGS), the nitrate concentrations were 16 mg/L in 2019 and 16 mg/L in 2021, respectively.
- At monitoring well MW3, when the DTWs were similar (i.e., 4.5 m BGS and 4.15 m BGS), the nitrate concentrations were 20 mg/L in 2019 and 21 mg/L in 2020, respectively.
- At monitoring well MW4, when the DTWs were 3.8 m BGS and 4.09 m BGS, the nitrate concentrations were 8.4 mg/L in 2019 and 15 mg/L in 2021, respectively.
- At monitoring well MW5, when the DTWs were 3.78 m BGS and 3.8 m BGS, the nitrate concentrations were 40 mg/L in 2019 and 39 mg/L in 2021, respectively.
- At monitoring well MW7, when the DTWs were 3.93 m BGS and 3.99 m BGS, the nitrate concentrations were 55 mg/L in 2019 and 60 mg/L in 2021, respectively.

As shown above, when the DTWs were similar, the nitrate concentrations at different times were relatively consistent. Therefore, a stable trend classification in nitrate concentrations is more appropriate, excluding the influence from groundwater level fluctuation.

Historical groundwater analytical results are presented in **Table B1** of **Appendix B**.

3.3 SECONDARY LINE OF EVIDENCE FOR MNA POTENTIAL EVALUATION

A secondary line of evidence for natural attenuation of elevated nitrate concentrations is based on geochemical analytical results. Among natural attenuation mechanisms (sorption, diffusion, dispersion, volatilization, and biodegradation), biodegradation is the most important process (ASTM, 1998) because nitrate is not ready for sorption and is non-volatile. Major nitrate biodegradation processes include dissimilatory nitrate reduction and/or denitrification.

Dissimilatory nitrate reduction transforms nitrate back to ammonium, which is described as:

$2CH_2O + NO_3^- + 2H^+ \rightarrow NH_4^+ + 2CO_2 + H_2O.$

Denitrification is the anaerobic respiratory process whereby heterotrophic bacteria reduce nitrate to harmless nitrogen (N_2) by the oxidation of a carbon source (Calderer et al., 2010), which is described as: $NO_3^- \rightarrow NO_2^- \rightarrow NO \rightarrow N_2O \rightarrow N_2$.

3.3.1 Organic Carbons

In the nitrate biodegradation processes, organic carbon plays a double role. First, it serves as an electron donor in both the dissimilatory nitrate reduction process and the denitrification process. Secondly, it serves as carbon source for cell synthesis through an assimilatory process into biomass (Calderer et al., 2010). Therefore, the lack of an organic carbon source inhibits both dissimilatory nitrate reduction and denitrification in groundwater.

Total organic carbon (TOC) was analyzed for select MNA monitoring wells (MW2, MW3, MW5, and MW7) and non-impacted monitoring wells (MW6 and MW14). TOC concentrations at the non-impacted monitoring wells can be considered as background TOC concentrations. TOC concentrations ranged from <0.5 mg/L to 1.1 mg/L at MW6 and from 1.5 mg/L to 2.5 mg/L at MW14 over the period from 2020 to 2022; thus, the background TOC concentrations can be considered ranging from <0.5 mg/L to 2.5 mg/L. The TOC concentrations at the MNA monitoring wells were either consistent with the background concentrations (i.e., 2.4 to 2.6 mg/L at MW2 and 1.4 to 2.7 mg/L at MW5) or slightly higher than the background concentrations (i.e., 2.9 to 3.5 mg/L at MW3 and 0.71 to 3.5 mg/L at MW7). Therefore, based on the reported TOC concentrations at the MNA monitoring wells, the nitrate biodegradation potential is considered low.

3.3.2 Ammonia

As shown on the reaction equation of the dissimilatory nitrate reduction, ammonia is the final product of the dissimilatory nitrate reduction. Ammonia as nitrogen and un-ionized ammonia were analyzed for select MNA monitoring wells (MW2, MW3, MW5, and MW7) and non-impacted monitoring wells (MW6 and MW14) on June 14, 2022. Concentrations of un-ionized ammonia at the analyzed monitoring wells were lower than the detection limits. Ammonia as nitrogen concentrations at the non-impacted monitoring wells can be considered background concentrations. Ammonia as nitrogen concentrations were lower than the reportable detection limit (0.015 mg/L) at both non-impacted monitoring wells (MW6 and MW14); thus, the background ammonia as nitrogen concentrations were non-detectable. The ammonia as nitrogen concentrations at the MNA monitoring wells were reported to be 0.015 mg/L at MW2, <0.015 mg/L at MW3, 0.22 mg/L at MW5, and 0.037 mg/L at MW7 on June 14, 2022. The presence of ammonia at monitoring wells MW2, MW5, and MW7, compared to the non-detectable background ammonia concentrations suggests that the dissimilatory nitrate reduction occurred at these wells. However, based on the absence of un-ionized ammonia, the non-detectable ammonia at MW3, and the relatively low ammonia concentrations at the remaining monitoring wells, the dissimilatory nitrate reduction potential is considered low.

3.3.3 Nitrite

As shown on the denitrification reaction equation , nitrite (NO_2^-) is the intermediate product of the denitrification. Nitrite as nitrogen was analyzed for select MNA monitoring wells (MW2, MW3, MW5, and MW7) and non-impacted monitoring wells (MW6 and MW14) over the period from 2020 to 2022. Nitrite as nitrogen concentrations at the non-impacted monitoring wells can be considered as background concentrations. Nitrite as nitrogen concentrations were lower than the detection limit (0.01 mg/L) at both non-impacted monitoring wells (MW6 and MW14); thus, the background nitrite concentrations were non-detectable.

The nitrite concentrations at the MNA monitoring wells were reported to be:

- <0.01 mg/L at MW2 on July 7, 2020, July 27, 2021, and June 14, 2022
- 0.11 mg/L at MW3 on July 7, 2020; <0.01 mg/L on July 27, 2021, and June 14, 2022
- 0.08 mg/L at MW5 on July 7, 2020; 0.082 mg/L on July 27, 2021; and 0.012 mg/L on June 14, 2022
- 0.039 mg/L at MW7 on July 7, 2020; 0.034 mg/L on July 27, 2021; and <0.01 mg/L on June 14, 2022

The presence of nitrite at monitoring wells MW3, MW5, and MW7 suggested the occurrence of denitrification at these monitoring wells in 2020 and/or 2021. Non-detectable nitrite concentrations were identified at monitoring wells MW2, MW3, and MW7 on June 14, 2022, and the nitrite concentration at MW5 on June 14, 2022 was only slightly higher than the detection limit (0.01 mg/L), suggesting the denitrification potential at these monitoring wells in 2022 could be limited.

3.4 OPTIONAL LINE OF EVIDENCE FOR MNA POTENTIAL EVALUATION

Microbial analysis including enumeration of heterotrophic plate count (HPC), denitrifying bacteria (DNB), iron reducing bacteria (IRB), and sulfate reducing bacteria (SRB) was conducted at the select MNA monitoring wells (MW2, MW3, MW5, and MW7) and the non-impacted monitoring wells (MW6 and MW14) over the period from 2020 to 2022.

The HPC represents the population of aerobic bacteria; however, both the dissimilatory nitrate reduction and the denitrification occur under anaerobic conditions. Therefore, the HPC cannot be used for the MNA potential evaluation.

Compared to the IRB and SRB, the DNB is more directly involved in the dissimilatory nitrate reduction and the denitrification. The DNB population range at the non-impacted monitoring wells can be considered as background DNB population. The DNB population was enumerated to be 2.3 most probable number (MPN)/mL to 9,300 MPN at MW6 and 930 MPN/mL to 15,000 MPN/mL at MW14. The DNB populations at the MNA monitoring wells were reported to be 9.3 MPN/mL to 930 MPN/mL at MW2, 21 MPN/mL to 930 MPN/mL at MW3, 75 MPN/mL to 2,300 MPN/mL at MW5, and 2 MPN/mL to 150 MPN/mL at MW7. The DNB populations at the MNA monitoring wells were consistent with the background DNB populations, suggesting that the dissimilatory nitrate reduction and the denitrification induced by the DNB could be limited.

Microbial analytical results used as optional line of evidence for MNA potential evaluation are presented in **Table B2** of **Appendix B**.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

The conclusions of the MNA feasibility assessment are summarized below.

- Based on mobility, toxicity, and the guideline exceedances, nitrate has been considered as the COPC in groundwater at the Site.
- The likely source of nitrate impacts to the groundwater is wastewater seepage occurring at the bottom of the holding cells. This may be the source of the identified nitrate impacts at monitoring wells MW2, MW3, MW4, MW5, and MW7 which are located in vicinity of the former SH IWWTF.
- Based on positive linear relationship between nitrate and sulfate and/or TDS concentrations, the source for the identified nitrate impacts at monitoring wells MW18 and MW20 could be either agricultural fertilizer application or accidental fertilizer spill, but it is not expected to originate from the SH IWWTF cells.
- The nitrate plume identified surrounding the holding cells is generally stable, based on the nitrate concentration changes with time without the influence from groundwater levels.
- Both dissimilatory nitrate reduction and denitrification occurred at the MNA monitoring wells prior to 2022; however, the current MNA potential is considered low or limited, based on multiple lines of evidence (primary, secondary, and optional lines of evidence).

4.2 RECOMMENDATIONS

Historical analytical results obtained from groundwater monitoring and sampling events conducted over a period from 2019 until 2022 further confirmed that the nitrate-impacted groundwater was confined within the footprint of the developed/elevated area of the Site (i.e., at monitoring wells MW2, MW3, MW4, MW5, and MW7) as shown in **Figure A3** in **Appendix A**.

Another line of evidence for the fact that the nitrate plume is confined within the developed/elevated area is that sulfate concentrations at monitoring well MW17 have been consistent with the background concentrations since 2007 (**Table B1** in **Appendix B**). Based on the positive linear relationship between nitrate and sulfate suggested in Sections 2.2 and 2.3, the sulfate concentrations at MW17 indicate that the nitrate plume has not arrived at MW17.

Since the nitrate-impacted groundwater due to the holding cells is confined within the footprint of the developed/elevated area of the Site, risks posed by the nitrate-impacted groundwater to off-site human and ecological receptors are considered negligible.

Considering negligible risks posed by the nitrate-impacted groundwater to off-site human and ecological receptors and the stable nitrate plume, although the MNA potential could be low, no immediate actions are required. Therefore, annual groundwater monitoring and sampling should continue until Cells #2A, #2B, and #3 are completely decommissioned by removing wastewater and sludge; however, the frequency of groundwater sampling should be reduced to biennially following decommissioning.

5.0 LIMITATIONS

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected environmental conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Stantec cannot comment on other areas of the property that were not assessed.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report, and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities, or claims, howsoever arising, from third party use of this report.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and Stantec assumes no liability for damage to them.

The conclusions are based on the site conditions encountered by Stantec at the time the work was performed at the specific testing and/or sampling locations, and conditions may vary among sampling locations. Factors such as areas of potential concern identified in previous studies, site conditions (e.g., utilities) and cost may have constrained the sampling locations used in this assessment. In addition, analysis has been carried out for only a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, Stantec does not warrant against undiscovered environmental liabilities nor that the sampling results are indicative of the condition of the entire site. As the purpose of this report is to identify

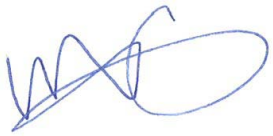
site conditions which may pose an environmental risk; the identification of non-environmental risks to structures or people on the site is beyond the scope of this assessment.

Should additional information become available which differs significantly from our understanding of conditions presented in this report, Stantec specifically disclaims any responsibility to update the conclusions in this report.

6.0 STANTEC QUALITY MANAGEMENT PROGRAM

This report, entitled **Monitored Natural Attenuation Feasibility Assessment, Former Springhill Farms Industrial Wastewater Treatment Facility, Neepawa, Manitoba**, dated December 5, 2022**,** was produced by Stantec Consulting Ltd.

This report was written by the following individual:

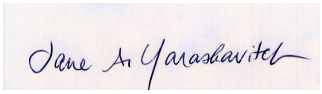


Digitally signed by Xiong, Wenhui
Date: 2022.12.05 15:42:10 -06'00'

Signature
Wenhui Xiong, Ph.D., P.Eng.,
Principal, Environmental Engineer

This report was reviewed by the following individuals:

Jane Yaraskavitch, M.Eng., P.Eng. (ON & YK)
Senior Associate – Environmental Services



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Jill Peters-Dechman, B.Eng., P.Eng.
Principal – Environmental Services

Digitally signed by Peters-Dechman, Jill
Date: 2022.12.05 17:06:21 -05'00'

Signature

7.0 REFERENCES

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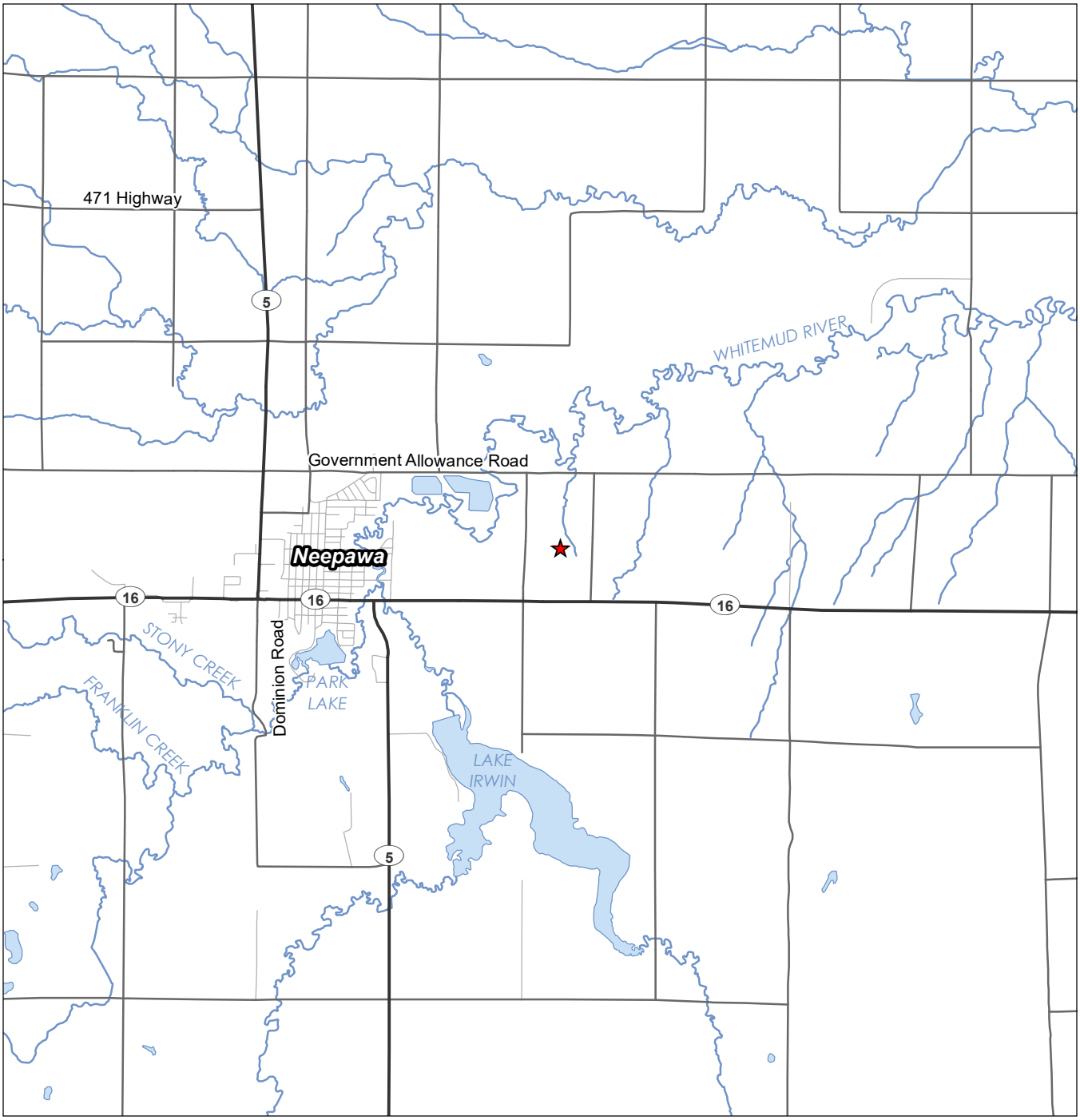
Appendix A FIGURES

G:_GIS_Project_Folder\111484501\ArcMaps\Figure1_SiteLocation_2022GroundwaterMonitoring_20220915.mxd Revised: 2022-09-15 By: acampigotto



Legend

- Site Location
- Major Road
- Minor Road
- Local Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres

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1:75,000

N

Stantec

Project Location
Neepawa,
Manitoba

Prepared by ACampigotto on 2022-09-15
Reviewed by SCoughtrey on 2022-09-15

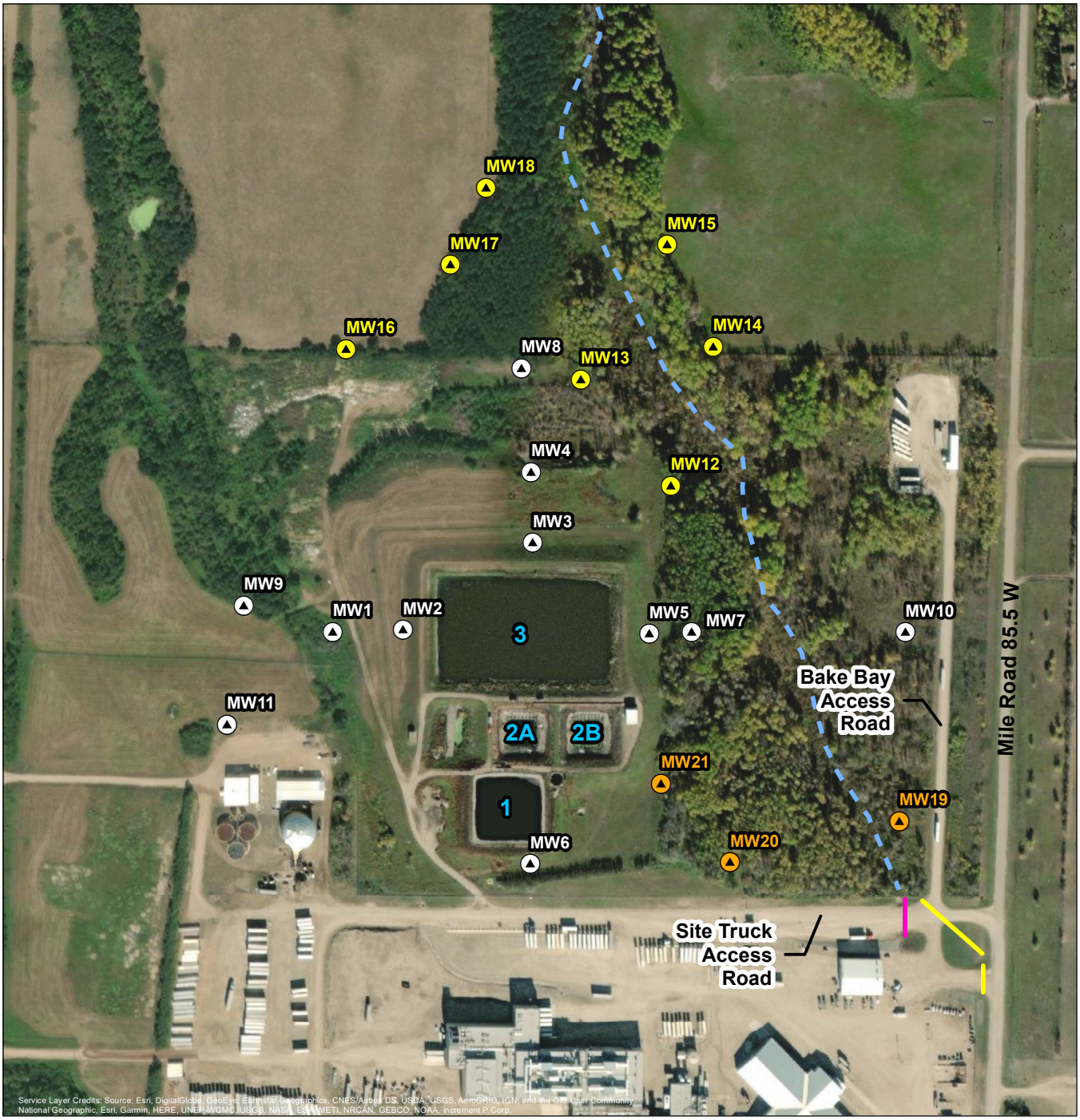
Client/Project 111474534

HyLife Foods
Monitored Natural Attenuation Feasibility Assessment
Former Industrial Wastewater Treatment Facility at the
Hylife Foods Neepawa Facility, Neepawa, Manitoba

Figure No.
A1

Title
Site Location

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba



Legend

- Monitoring Well (Previously Installed)
- Monitoring Well (Stantec, 2019)
- Monitoring Well (Stantec, 2021)
- Approximate Location of Galvanized Steel Culvert
- Approximate Location of PVC Culvert
- Approximate Centre Line of Coulee
- 1 Cell Location

0 50 100 Metres

(At original document size of 8.5x11)
1:5,000

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba
3. Aerial imagery source indicated on image, non-authoritative data.

Stantec

Project Location
Neepawa, Manitoba

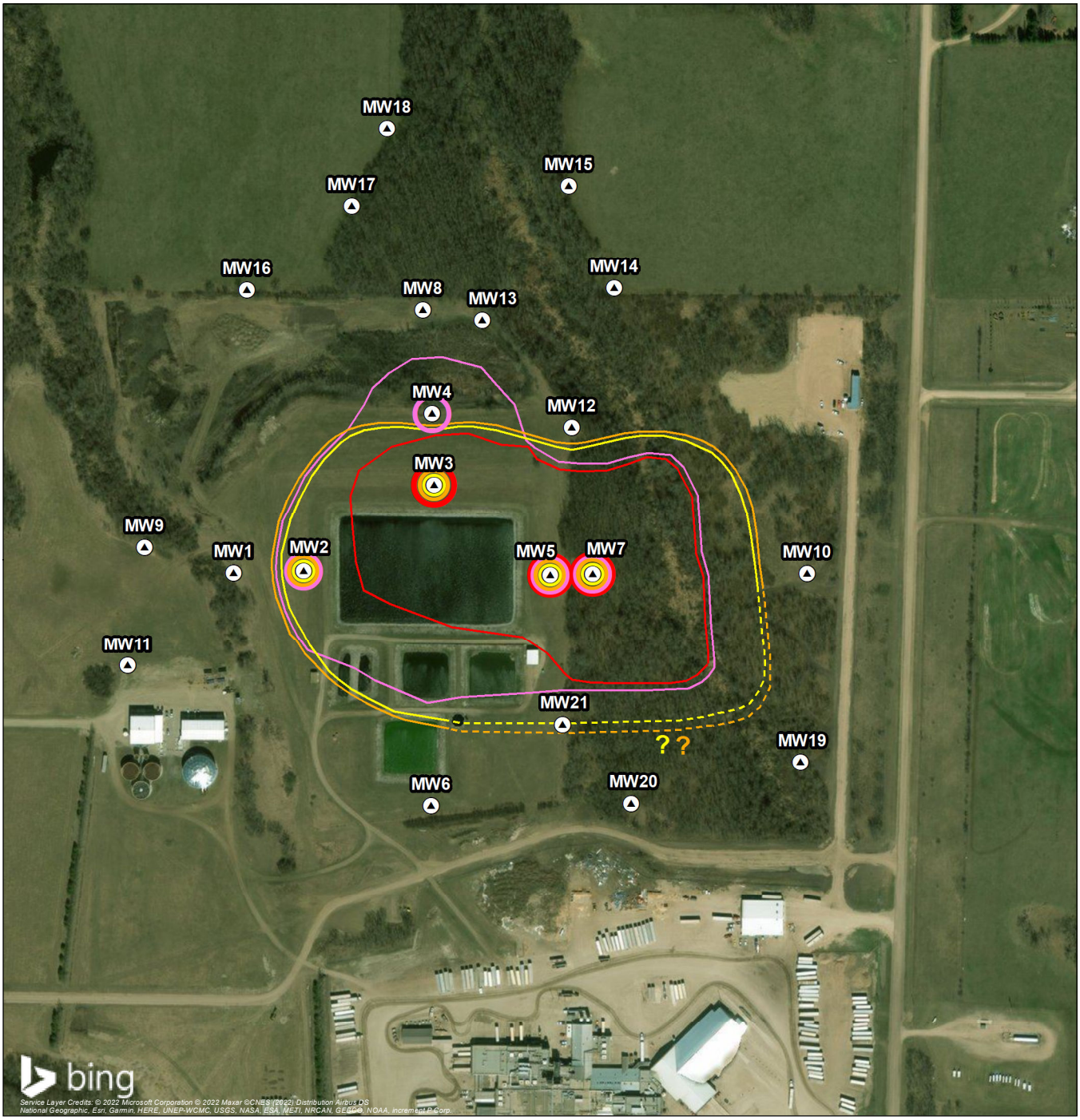
Prepared by ACampigotto on 2022-09-29
Reviewed by SCoughtrey on 2022-09-29

Client/Project 111474534
HyLife Foods
Monitored Natural Attenuation Feasibility Assessment
Former Industrial Wastewater Treatment Facility at the Hylife Foods Neepawa Facility, Neepawa, Manitoba

Figure No.
A2

Title
Monitoring Well Location Plan

G:_GIS_Project_Folder\111484501\ArcMaps\Figure2_MW_Plan_2022GroundwaterMonitoring_20220915.mxd Revised: 2022-09-29 By: acampigotto



Legend

- Monitoring Well
- Exceeded Health Canada Maximum Acceptable Concentration for Nitrate (NO3) in 2022
- Exceeded Health Canada Maximum Acceptable Concentration for Nitrate (NO3) in 2021
- Exceeded Health Canada Maximum Acceptable Concentration for Nitrate (NO3) in 2020
- Exceeded Health Canada Maximum Acceptable Concentration for Nitrate (NO3) in 2019
- Approximate Extent of Nitrate (NO3) Groundwater Impacts (2022)
- Approximate Extent of Nitrate (NO3) Groundwater Impacts (2021)
- Approximate Extent of Nitrate (NO3) Groundwater Impacts (2020)
- Approximate Extent of Nitrate (NO3) Groundwater Impacts (2019)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba
3. Microsoft product screen shot reprinted with permission from Microsoft Corporation.

0 50 100 Metres

(At original document size of 8.5x11)
1:5,000

N

Stantec

Project Location
Neepawa, Manitoba

Prepared by ACampigotto on 2022-12-05
Reviewed by SCoughtrey on 2022-12-05

Client/Project 111474534
HyLife Foods
2022 Groundwater Monitoring and Sampling Program
Former Industrial Wastewater Treatment Facility at the Hylife Foods Neepawa Facility, Neepawa, Manitoba

Figure No.
A3

Title
Nitrate (NO3) Groundwater Analytical Results (2019 - 2022)

G:_GIS_Project_Folder\111484501\ArcMaps\Figure3_NitrateAnalyticalResults_2019-2022_20221204.mxd Revised: 2022-12-05 By: ACampigotto

Appendix B SUMMARY TABLES

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1		MW1
Sample Date				31-May-07	11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19	16-Jul-19	9-Jul-20	27-Jul-21	27-Jul-21	27-Jul-21		27-Jul-21
Sample ID				MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW1 Lab-Dup	MW1	MW1	MW1 Lab-Dup	QC-02		QC-02 Lab-Dup
Sampling Company				Earth Tech	Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC		STANTEC
Laboratory				Maxxam	Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV	BV	BV	BV	BV		BV
Laboratory Work Order				A754992/A770318	A772710	n/a	n/a	n/a	n/a	n/a	B958618	B958618	C047949	C154612	C154612	C154612		C154612
Laboratory Sample ID				S66874/T36278	T46279	n/a	n/a	n/a	n/a	n/a	WD1276	WD1276	YB4362	ACV011	ACV011	ACV033		ACV033
Sample Type	Units	Health Canada	CCME									Lab Replicate				Field Duplicate	RPD (%)	Lab Replicate
General Chemistry																		
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	-	-	-	-	-	-	-	0.16	-	0.061	0.13	-	0.11	17%	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	0.7	<0.1	<0.071	0.389	5.26	55.7	<0.070	0.035	-	<0.014	0.030	-	0.026	nc	0.023
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	-	-	-	-	-	-	-	<0.033	-	<0.033	<0.033	-	<0.033	nc	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	0.7	<0.1	0.064	0.364	4.77	**55.7[B]**	0.042	0.035	-	0.014	0.030	-	0.026	nc	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.01	<0.01	<0.050	0.024	0.489	<0.050	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	nc	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	0.042	-	<0.030	<0.030	<0.030	<0.050	<0.050	0.0062	-	0.0035	0.0042	-	0.0040	nc	-
Phosphorus, Total	mg/L	n/v	n/v	0.046	0.037	-	-	-	-	-	0.0068	0.0063	0.0031	0.0060	-	0.081 SD	nc	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	6	9	5.09	5.82	**123[C]**	93.7	38.8	46	-	47	40	-	39	3%	-
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	45	38	33.8	39.8	239	**703[A]**	30.8	33	-	24	26	-	26	0%	-
Total Ammonia	mg/L	nv	n/v	-	-	-	-	-	-	-	-	-	0.057	0.026	0.026	<0.015	nc	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	383	366	391	**2160[AC]**	472	-	-	-	-	-	-	-	-

See notes on last page

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW1 (Continued)									MW2							
Sample Date	Units	Health Canada	CCME	14-Jun-22	14-Jun-22	14-Jun-22	RPD (%)	14-Jun-22	31-May-07	31-May-07	RPD (%)	11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19	16-Jul-19
Sample ID				MW1	MW1 Lab-Dup	QC-01		QC-01 Lab-Dup	MW2	MW2D		MW2	MW2	MW2	MW2	MW2	MW2	MW2	MW2 Lab-Dup
Sampling Company				STANTEC	STANTEC	STANTEC		STANTEC	Earth Tech	Earth Tech		Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC
Laboratory				BV	BV	BV		BV	Maxxam	Maxxam		Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV
Laboratory Work Order				C242046	C242046	C242046		C242046	A754992/A770318	A754992/A770318		A772710	n/a	n/a	n/a	n/a	n/a	B958618	B958618
Laboratory Sample ID				AVE487	AVE487	AVE501		AVE501	S66875/T36279	S66881/T36285		T46280	n/a	n/a	n/a	n/a	n/a	WD1277	WD1277
Sample Type					Lab Replicate	Field Duplicate		Lab Replicate		Field Duplicate									Lab Replicate
General Chemistry																			
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	<0.044	-	<0.044	nc	-	-	-	-	-	-	-	-	-	-	**73[B]**	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	<0.010	-	<0.010	nc	-	49	48	1%	53	22.7	21.1	26.1	1.09	8.29	16	-
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	-	<0.033	nc	-	-	-		-	-	-	-	-	-	<0.033	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	<0.010	-	<0.010	nc	-	**49[B]**	**47[B]**	4%	**53[B]**	**22.7[B]**	**21.1[B]**	**23.7[B]**	1.09	8.29	**16[B] CD**	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	-	<0.010	nc	-	<0.5	0.6	nc	**1.8[B]**	<0.25	<0.020	**2.37[B]**	<0.010	<0.10	<0.010	-
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	0.0048	<0.0030	nc	-	0.019	0.013	nc	-	0.307	<0.030	<0.030	<0.050	<0.050	0.0050	0.0049
Phosphorus, Total	mg/L	n/v	n/v	<0.0030	-	0.0053	nc	-	0.019	0.01	nc	0.005	-	-	-	-	-	0.0088	0.0058
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	31	-	31	0%	-	85	82	1%	68	25.9	55.4	**609[AC]**	42.5	**158[C]**	39	-
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	24	-	24	0%	-	**794[A]**	**784[A]**	1%	**729[A]**	**796[A]**	**540[A]**	**1180[AD]**	8.01	**583[A]**	**550[A] CD**	-
Total Ammonia	mg/L	nv	n/v	0.044	-	0.042	nc	0.043	-	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	-	-	-	**1780[AC]**	**1220[AC]**	**1260[AC]**	398	**1590[AC]**	-	-

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Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW2 (Continued)															
Sample Date				8-Jul-20	8-Jul-20		27-Jul-21	14-Jun-22	31-May-07	11-Jul-07	2014	2015	MW3 2016	2017	2018	16-Jul-19	16-Jul-19	
Sample ID				MW2	QC-01		MW2	MW2	MW3	MW3	MW3	MW3	MW3	MW3	MW3	MW3	QC2	
Sampling Company				STANTEC	STANTEC		STANTEC	STANTEC	Earth Tech	Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	
Laboratory				BV	BV		BV	BV	Maxxam	Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV	
Laboratory Work Order				C047949	C047949		C154612	C241389	A754992/A770318	A772710	n/a	n/a	n/a	n/a	n/a	B958618	B958618	
Laboratory Sample ID				YB4363	YB4380		ACV012	AVB074	S66876/T36280	T46281	n/a	n/a	n/a	n/a	n/a	WD1278	WD1297	
Sample Type	Units	Health Canada	CCME		Field Duplicate	RPD (%)											Field Duplicate	RPD (%)
General Chemistry																		
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	**51[B]**	**51[B]**	0%	**70[B]**	15	-	-	-	-	-	-	-	**90[B]**	**57[B]**	**45%**
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	12	12	0%	16	3.4	10	25	22.5	23	**104[D]**	30.2	10.5	20	13	**42%**
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	<0.033	nc	<0.033	<0.033	-	-	-	-	-	-	-	0.055	0.057	nc
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	**12[B] CD**	**12[B] CD**	0%	**16[B]**	3.4	10	**25[B]**	**22.5[B]**	**22.9[B]**	**94.2[B]**	**30.2[B]**	**10.3[B]**	**20[B] CD**	**13[B] CD**	**42%**
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	<0.010	nc	<0.010	<0.010	<0.01	<0.01	<0.25	0.058	**9.68[B]**	<0.10	0.21	0.017	0.017	nc
Phosphorus, Dissolved	mg/L	n/v	n/v	0.015	0.019	nc	<0.0030	<0.0030	0.009	-	<0.030	<0.030	<0.030	<0.050	1.109	<0.0030	<0.0030	nc
Phosphorus, Total	mg/L	n/v	n/v	0.025	0.019	27%	0.0042	0.0030	0.011	0.014	-	-	-	-	-	0.16	0.13	21%
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	9.4	9.8	4%	26	8.0	**120[C]**	**130[C]**	**118[C]**	**324[AC]**	**2420[AC]**	**112[C]**	**149[C]**	**190[C] CD**	**190[C]**	0%
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	360 CD	370 CD	3%	600	130	**1270[AD]**	**1170[AD]**	491	**1010[AD]**	**4710[AD]**	**950[A]**	**1360[AD]**	**1200[AD] CD**	**1300[AD] CD**	8%
Total Ammonia	mg/L	nv	n/v	0.054	<0.015	nc	<0.015	<0.015	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	-	**1530[AC]**	**2510[AC]**	**3050[AC]**	**2580[AC]**	**2930[AC]**	-	-	-

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Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW3 (Continued)					MW4											
Sample Date				8-Jul-20	27-Jul-21	14-Jun-22	31-May-07	11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19	9-Jul-20	27-Jul-21	27-Jul-21		27-Jul-21
Sample ID				MW3	MW3	MW3	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW4	QC-01		QC-01 Lab-Dup
Sampling Company				STANTEC	STANTEC	STANTEC	Earth Tech	Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC	STANTEC		STANTEC
Laboratory				BV	BV	BV	Maxxam	Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV	BV	BV		BV
Laboratory Work Order				C047949	C154612	C241389	A754992/A770318	A772710	n/a	n/a	n/a	n/a	n/a	B958618	C047949	C154612	C154612		C154612
Laboratory Sample ID				YB4364	ACV013	AVB075	S66877/T36281	T46282	n/a	n/a	n/a	n/a	n/a	WD1279	YB4365	ACV014	ACV032		ACV032
Sample Type	Units	Health Canada	CCME														Field Duplicate	RPD (%)	Lab Replicate
General Chemistry																			
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	**95[B]**	3.2	**62[B]**	-	-	-	-	-	-	-	37	22	**67[B]**	**63[B]**	6%	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	22	0.73	14	24	48	51.6	38.3	53.2	31.7	40.6	8.4	5.0	15	14	7%	-
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	0.28	0.043	<0.033	-	-	-	-	-	-	-	<0.033	<0.033	<0.033	<0.033	nc	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	**21[B] CD**	0.72	**14[B]**	**24[B]**	**48[B]**	**51.6[B]**	**38.3[B]**	**48.3[B]**	**31.7[B]**	**40.6[B]**	8.4	5.0	**15[B]**	**14[B]**	7%	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	0.084	0.013	<0.010	<0.5	<0.01	<0.25	<0.020	**4.93[B]**	<0.10	<0.20	<0.010	<0.010	<0.010	<0.010	nc	-
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0031	<0.0030	0.0076	0.011	-	<0.030	<0.030	<0.030	<0.050	<0.050	0.0054	0.0049	0.0043	<0.0030	nc	-
Phosphorus, Total	mg/L	n/v	n/v	0.0045	0.0051	0.11	0.008	0.01	-	-	-	-	-	0.043	0.0060	0.012	0.0063	nc	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	**180[C]**	**210[C]**	1.4	62	**210[C]**	**114[C]**	**106[C]**	**1240[AC]**	**186[C]**	**184[C]**	**150[C]**	**220[C] CD**	**580[AC]**	**580[AC]**	0%	**600[AC]**
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	**1100[AD] CD**	**1300[AD]**	13	241	134	**883[A]**	**689[A]**	**2410[AD]**	**676[A]**	**1150[AD]**	130	32	270	260	4%	250
Total Ammonia	mg/L	nv	n/v	0.86	2.3	<0.015	-	-	-	-	-	-	-	-	0.027	<0.015	0.018	nc	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	**2510[AC]**	**1890[AC]**	**1930[AC]**	**2070[AC]**	**2990[AC]**	-	-	-	-	-	-

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Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW4 (Continued)				MW5									
Sample Date				14-Jun-22	14-Jun-22	14-Jun-22		31-May-07	11-Jul-07	11-Jul-07		2014	2015	2016	2017	2018	16-Jul-19
Sample ID				MW4	MW4 Lab-Dup	QC-02		MW5	MW5	MW55		MW5	MW5	MW5	MW5	MW5	MW5
Sampling Company				STANTEC	STANTEC	STANTEC		Earth Tech	Earth Tech	Earth Tech		R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC
Laboratory				BV	BV	BV		Maxxam	Maxxam	Maxxam		n/a	n/a	n/a	n/a	n/a	BV
Laboratory Work Order				C242046	C242046	C242046		A754992/A770318	A772710	A772710		n/a	n/a	n/a	n/a	n/a	B958618
Laboratory Sample ID				AVE488	AVE488	AVE502		S66878/T36282	T46283	T46289		n/a	n/a	n/a	n/a	n/a	WD1280
Sample Type	Units	Health Canada	CCME		Lab Replicate	Field Duplicate	RPD (%)			Field Duplicate	RPD (%)						
General Chemistry																	
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	1.8	-	1.7	6%	-	-	-	-	-	-	-	-	-	**180[B]**
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	0.40	-	0.38	nc	40	49	40	20%	34.6	17.3	<0.22	<0.070	35.7	40
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	-	<0.033	nc	-	-	-	-	-	-	-	-	-	0.058
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	0.40	-	0.38	5%	**40[B]**	**49[B]**	**40[B]**	20%	**34.6[B]**	**17.3[B]**	<0.020	0.036	**35.7[B]**	**40[B] CD**
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	-	<0.010	nc	<0.5	<0.01	<0.01	nc	<0.25	<0.020	<0.10	<0.010	<0.20	0.018
Phosphorus, Dissolved	mg/L	n/v	n/v	0.011	-	0.0089	nc	0.014	-	-	-	<0.030	<0.030	<0.030	<0.050	<0.050	0.0070
Phosphorus, Total	mg/L	n/v	n/v	0.011	0.0088	0.0090	nc	0.017	0.039	0.009	nc	-	-	-	-	-	0.020
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	17	-	15	16%	88	96	100	4%	82.2	**275[AC]**	<5.0	3.56	**157[C]**	**120[C]**
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	13	-	13	0%	**1110[AD]**	**1100[AD]**	**1080[AD]**	2%	**809[A]**	**865[A]**	<3.0	11.5	**704[A]**	**670[A] CD**
Total Ammonia	mg/L	nv	n/v	<0.015	-	<0.015	nc	-	-	-	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	-	-	**2200[AC]**	**2180[AC]**	**1860[AC]**	336	**2080[AC]**	-

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Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW5 (Continued)				MW6									
Sample Date				8-Jul-20	8-Jul-20	27-Jul-21	14-Jun-22	31-May-07	11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19	8-Jul-20	8-Jul-20
Sample ID				MW5	MW5 Lab-Dup	MW5	MW5	MW6	MW6	MW6	MW6	MW6	MW6	MW6	MW6	MW6	MW6 Lab-Dup
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	Earth Tech	Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	Maxxam	Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV	BV
Laboratory Work Order				C047949	C047949	C154612	C241389	A754992/A770318	A772710	n/a	n/a	n/a	n/a	n/a	B958618	C047949	C047949
Laboratory Sample ID				YB4366	YB4366	ACV015	AVB076	S66879/T36283	T46284	n/a	n/a	n/a	n/a	n/a	WD1281	YB4367	YB4367
Sample Type	Units	Health Canada	CCME		Lab Replicate												Lab Replicate
General Chemistry																	
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	**210[B]**	-	**170[B]**	**76[B]**	-	-	-	-	-	-	-	2.2	1.8	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	48	-	40	17	3.5	2.6	1.85	1.27	<0.070	<0.070	0.972	0.50	0.41	-
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	0.077	-	0.38	<0.033	-	-	-	-	-	-	-	<0.033	<0.033	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	**48[B] CD**	-	**39[B]**	**17[B]**	3.5	2.6	1.85	1.27	<0.020	<0.020	0.972	0.50	0.41	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	0.023	-	0.12	<0.010	<0.01	<0.01	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-
Phosphorus, Dissolved	mg/L	n/v	n/v	0.014	0.013	0.0031	0.0060	0.009	-	<0.030	<0.030	<0.030	<0.030	<0.050	<0.0030	<0.0030	-
Phosphorus, Total	mg/L	n/v	n/v	0.021	-	0.0053	0.0066	0.023	0.008	-	-	-	-	-	0.014	0.0070	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	**120[C]**	-	**200[C]**	52	9	10	54.5	30.6	<0.50	<0.50	**105[C]**	**150[C]**	**190[C]**	-
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	**550[A] CD**	-	**680[A]**	210	13	14	15.6	6.47	<0.30	<0.30	8.78	13	25	-
Total Ammonia	mg/L	nv	n/v	0.10	-	0.65	0.21	-	-	-	-	-	-	-	-	0.023	0.022
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	369	330	365	365	**582[AC]**	-	-	-

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Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW6 (Continued)			MW7											
Sample Date				27-Jul-21	27-Jul-21	14-Jun-22	31-May-07	11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19	8-Jul-20	27-Jul-21	27-Jul-21	14-Jun-22
Sample ID				MW6	MW6 Lab-Dup	MW6	MW7	MW7	MW7	MW7	MW7	MW7	MW7	MW7	MW7	MW7	MW7 Lab-Dup	MW7
Sampling Company				STANTEC	STANTEC	STANTEC	Earth Tech	Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	Maxxam	Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV	BV	BV	BV
Laboratory Work Order				C154612	C154612	C241389	A754992/A770318	A772710	n/a	n/a	n/a	n/a	n/a	B958618	C047949	C154612	C154612	C241389
Laboratory Sample ID				ACV016	ACV016	AVB077	S66880/T36284	T46285	n/a	n/a	n/a	n/a	n/a	WD1282	YB4368	ACV017	ACV017	AVB078
Sample Type	Units	Health Canada	CCME		Lab Replicate												Lab Replicate	
General Chemistry																		
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	1.6	-	0.83	-	-	-	-	-	-	-	**240[B]**	**220[B]**	**260[B]**	-	**130[B]**
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	0.35	0.37	0.19	44	29	36.5	24.9	<0.22	21.1	53.6	55	49	60 SD	-	29
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	-	<0.033	-	-	-	-	-	-	-	<0.033	0.15	0.10	-	<0.033
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	0.35	-	0.19	**44[B]**	**29[B]**	**36.5[B]**	**24.9[B]**	<0.20	**21.1[B]**	**53.6[B]**	**55[B] CD**	**49[B] CD**	**60[B]**	-	**29[B]**
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	<0.010	<0.010	<0.5	<0.1	<0.25	<0.020	<0.10	<0.10	<0.10	<0.010	0.045	0.030 SD	-	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	-	0.0032	0.006	-	<0.030	<0.030	<0.030	<0.050	<0.050	0.0055	0.0045	<0.0030	-	0.0075
Phosphorus, Total	mg/L	n/v	n/v	0.056	-	0.041	0.013	0.005	-	-	-	-	-	0.059	0.0056	0.0058	0.0052	0.018
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	**180[C]**	-	**150[C]**	69	35	73.2	66.7	<5.0	**154[C]**	67.8	58	**120[C]**	**160[C]**	-	92
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	17	-	20	**697[A]**	309	**638[A]**	443	<3.0	**1300[AD]**	459	360 CD	390 CD	340	-	180
Total Ammonia	mg/L	nv	n/v	<0.015	-	<0.015	-	-	-	-	-	-	-	-	0.14	0.071	0.074	0.041
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	**1710[AC]**	**1290[AC]**	**1920[AC]**	**3110[AC]**	**1630[AC]**	-	-	-	-	-

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Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW8												MW9		
Sample Date				11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19	16-Jul-19	8-Jul-20	28-Jul-21	15-Jun-22	11-Jul-07	2014	2015
Sample ID				MW8	MW8	MW8	MW8	MW8	MW8	MW8	MW8 Lab-Dup	MW8	MW8	MW8	MW9	MW9	MW9
Sampling Company				Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	Earth Tech	R3 Innovattions	R3 Innovattions
Laboratory				Maxxam	n/a	n/a	n/a	n/a	n/a	BV	BV	BV	BV	BV	Maxxam	n/a	n/a
Laboratory Work Order				A772710	n/a	n/a	n/a	n/a	n/a	B958618	B958618	C047949	C154612	C242046	A772710	n/a	n/a
Laboratory Sample ID				T46286	n/a	n/a	n/a	n/a	n/a	WD1283	WD1283	YB4369	ACV018	AVE489	T46287	n/a	n/a
Sample Type	Units	Health Canada	CCME								Lab Replicate						
General Chemistry																	
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	-	-	-	-	-	-	37	-	33	39	29	-	-	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	2.2	5.2	0.444	<0.45	<0.070	31	8.4	-	7.5	8.9	6.5	<0.1	<0.071	0.154
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	-	-	-	-	-	-	<0.033	-	<0.033	<0.033	0.050	-	-	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	2.2	5.2	0.444	<0.40	0.035	**31[B]**	8.4	8.4	7.5	8.9	6.5	<0.1	<0.050	0.154
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	0.01	<0.25	<0.020	<0.20	<0.010	<0.20	<0.010	0.012	<0.010	<0.010	0.015	<0.01	<0.050	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	-	<0.030	<0.030	<0.030	<0.050	<0.050	0.0057	-	<0.0030	0.0049	0.0031	-	0.04	0.043
Phosphorus, Total	mg/L	n/v	n/v	0.26	-	-	-	-	-	0.12	-	1.4 SD	47	1.3 SD	0.054	-	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	78	84.2	58.6	<10	5.12	**116[C]**	100	-	**130[C]**	**130[C]**	**180[C]**	1	2.58	4.71
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	**625[A]**	**785[A]**	**539[A]**	<6.0	36.8	**970[A]**	**950[A] CD**	-	**1000[A] CD**	**1000[A]**	**1000[A]**	36	28.9	34.8
Total Ammonia	mg/L	nv	n/v	-	-	-	-	-	-	-	-	<0.015	0.024	<0.015	-	-	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	**1900[AC]**	**1590[AC]**	**2190[AC]**	388	**2710[AC]**	-	-	-	-	-	-	282	372

See notes on last page

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW9 (Continued)										MW10				
Sample Date				2016	2017	2018	16-Jul-19	9-Jul-20	27-Jul-21	14-Jun-22	11-Jul-07	2014	2015	2016	2017	2018	16-Jul-19
Sample ID				MW9	MW9	MW9	MW9	MW9	MW9	MW9	MW10	MW10	MW10	MW10	MW10	MW10	MW10
Sampling Company				R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC	STANTEC	Earth Tech	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC
Laboratory				n/a	n/a	n/a	BV	BV	BV	BV	Maxxam	n/a	n/a	n/a	n/a	n/a	BV
Laboratory Work Order				n/a	n/a	n/a	B958618	C047949	C154612	C242046	A772710	n/a	n/a	n/a	n/a	n/a	B958618
Laboratory Sample ID				n/a	n/a	n/a	WD1284	YB4370	ACV019	AVE490	T46288	n/a	n/a	n/a	n/a	n/a	WD1285
Sample Type	Units	Health Canada	CCME														
General Chemistry																	
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	-	-	-	1.5	2.4	2.8	1.2	-	-	-	-	-	-	0.096
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	<0.070	<0.070	0.922	0.34	0.58	0.65	0.26	0.7	<0.071	<0.070	<0.070	15.7	<0.070	0.022
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	-	-	-	<0.033	0.084	0.075	<0.033	-	-	-	-	-	-	<0.033
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	<0.020	<0.020	0.906	0.34	0.55	0.63	0.26	0.7	<0.050	0.041	<0.020	**15.7[B]**	<0.020	0.022
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	<0.010	0.017	<0.010	0.026	0.023	<0.010	<0.01	<0.050	<0.010	<0.010	<0.050	<0.010	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.030	<0.030	0.703	<0.0030	<0.0030	0.0050	0.0040	-	<0.030	<0.030	<0.030	<0.050	0.077	0.0057
Phosphorus, Total	mg/L	n/v	n/v	-	-	-	0.80 CD	1.3 SD	1.1	0.032	0.22	-	-	-	-	-	0.23
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	<0.50	<0.50	13.5	10	17	22	17	3	3.29	3.12	<0.50	57.8	4.17	9.9
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	<0.30	<0.30	45.3	40	43	46	41	17	19.6	14.7	<0.30	**689[A]**	12.7	15
Total Ammonia	mg/L	nv	n/v	-	-	-	-	0.11	0.075	0.065	-	-	-	-	-	-	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	291	291	393	-	-	-	-	-	245	336	329	**1600[AC]**	372	-

See notes on last page

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW10 (Continued)			MW11									
Sample Date				9-Jul-20	28-Jul-21	15-Jun-22	2014	2015	2016	2017	2018	16-Jul-19	9-Jul-20	27-Jul-21	15-Jun-22	15-Jun-22
Sample ID				MW10	MW10	MW10	MW11	MW11	MW11	MW11	MW11	MW11	MW11	MW11	MW11	MW11 Lab-Dup
Sampling Company				STANTEC	STANTEC	STANTEC	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	R3 Innovattions	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	n/a	n/a	n/a	n/a	n/a	BV	BV	BV	BV	BV
Laboratory Work Order				C047949	C154612	C242046	n/a	n/a	n/a	n/a	n/a	B958618	C047949	C154612	C242046	C242046
Laboratory Sample ID				YB4371	ACV020	AVE491	n/a	n/a	n/a	n/a	n/a	WD1286	YB4372	ACV021	AVE492	AVE492
Sample Type	Units	Health Canada	CCME													Lab Replicate
General Chemistry																
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	0.28	0.93	0.21	-	-	-	-	-	0.21	0.41	0.050	0.17	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	0.064	0.21	0.048	<0.071	0.112	<0.070	0.074	<0.070	0.048	0.093	0.011	0.039	0.041
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	<0.033	<0.033	-	-	-	-	-	<0.033	<0.033	<0.033	<0.033	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	0.064	0.21	0.048	<0.050	0.112	0.033	0.074	<0.020	0.048	0.093	0.011	0.039	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0037	0.0038	0.0032	0.076	<0.030	<0.030	<0.050	0.439	<0.0030	0.0051	<0.0030	0.0039	-
Phosphorus, Total	mg/L	n/v	n/v	0.47 SD	5.7	0.54	-	-	-	-	-	0.44	1.0 SD	0.20	1.2 SD	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	15	28	2.1	0.63	2.96	5.29	21	4.8	5.4	6.7	8.4	8.2	-
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	22	32	2.7	2.82	20.1	44.7	38.1	42.1	49	54	41	31	-
Total Ammonia	mg/L	nv	n/v	<0.015	<0.015	<0.015	-	-	-	-	-	-	0.11	0.023	0.020	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	302	278	297	443	378	-	-	-	-	-

See notes on last page

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW12							MW13						MW14		
Sample Date				16-Jul-19	9-Jul-20	28-Jul-21	14-Jun-22	16-Jul-19	16-Jul-19		9-Jul-20	28-Jul-21	15-Jun-22	16-Jul-19	8-Jul-20	8-Jul-20	8-Jul-20	
Sample ID				MW12	MW12	MW12	MW12	MW13	QC3		MW13	MW13	MW13	MW14	MW14	MW14 Lab-Dup	QC-02	
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC		STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	
Laboratory				BV	BV	BV	BV	BV	BV		BV	BV	BV	BV	BV	BV	BV	
Laboratory Work Order				B958618	C047949	C154612	C242046	B958618	B958618		C047949	C154612	C242046	B958618	C047949	C047949	C047949	
Laboratory Sample ID				WD1287	YB4373	ACV022	AVE493	WD1288	WD1298		YB4374	ACV023	AVE494	WD1289	YB4375	YB4375	YB4381	
Sample Type	Units	Health Canada	CCME						Field Duplicate	RPD (%)						Lab Replicate	Field Duplicate	RPD (%)
General Chemistry																		
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	23	10	12	25	10	24	**82%**	24	1.5	1.8	0.25	0.33	-	0.46	
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	5.2	2.2	2.7	5.7	2.3	5.5	**82%**	5.5	0.33	0.40	0.057	0.076	-	0.10	27%
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	0.049	<0.033	<0.033	<0.033	0.13	0.20	**42%**	0.069	<0.033	<0.033	<0.033	<0.033	-	<0.033	nc
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	5.2	2.2	2.7	5.7	2.3	5.5	**82%**	5.5	0.33	0.40	0.057	0.076	-	0.10	27%
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	0.015	<0.010	<0.010	<0.010	0.039	0.059	**41%**	0.021	<0.010	<0.010	<0.010	<0.010	-	<0.010	nc
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0096	0.0038	0.0032	0.013	0.0036	0.0033	nc	0.0033	<0.0030	<0.0030	<0.0030	0.0035	-	0.011	nc
Phosphorus, Total	mg/L	n/v	n/v	0.46	0.14	3.4	1.4	0.20	0.31	**43%**	0.60 SD	4.2	0.69 SD	0.82 CD	0.074	-	0.031	**82%**
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	**120[C]**	4.5	**190[C]**	31	77	96	22%	83	**110[C]**	46	1.5	2.5	-	2.5	0%
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	170	<1.0	110	17	490 CD	**570[A] CD**	15%	300 CD	240	190	5.1	5.8	-	5.9	2%
Total Ammonia	mg/L	nv	n/v	-	0.044	<0.015	<0.015	-	-	-	0.020	<0.015	<0.015	-	<0.015	<0.015	<0.015	nc
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

See notes on last page

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW14 (Continued)			MW15						MW16				
Sample Date				27-Jul-21	14-Jun-22	14-Jun-22	16-Jul-19	9-Jul-20	27-Jul-21	14-Jun-22	14-Jun-22	16-Jul-19	16-Jul-19	9-Jul-20	28-Jul-21	15-Jun-22	15-Jun-22
Sample ID				MW14	MW14	MW14 Lab-Dup	MW15	MW15	MW15	MW15	MW15 Lab-Dup	MW16	MW16 Lab-Dup	MW16	MW16	MW16	MW16
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C154612	C241389	C241389	B958618	C047949	C154612	C241389	C241389	B958618	B958618	C047949	C154612	C242046	C242046
Laboratory Sample ID				ACV024	AVB079	AVB079	WD1290	YB4376	ACV025	AVB080	AVB080	WD1291	WD1291	YB4377	ACV026	AVE495	AVE495
Sample Type	Units	Health Canada	CCME			Lab Replicate					Lab Replicate		Lab Replicate				
General Chemistry																	
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	0.079	0.14	-	20	26	20	15	-	<0.044	-	0.11	0.13	44	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	0.018	0.030	0.031	4.6	5.8	4.5	3.5	-	<0.014	-	0.025	0.029	10	-
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	<0.033	-	0.14	<0.033	0.070	<0.033	-	<0.033	-	<0.033	<0.033	0.048	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	0.018	0.030	-	4.6	5.8	4.4	3.5	-	<0.010	<0.010	0.025	0.029	10	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	<0.010	<0.010	0.044	<0.010	0.021	<0.010	-	<0.010	<0.010	<0.010	<0.010	0.015	-
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	0.0030	-	0.0060	<0.0030	<0.0030	0.0033	0.0031	<0.0030	-	0.0035	<0.0030	0.0061	0.0057
Phosphorus, Total	mg/L	n/v	n/v	11	1.6	-	0.95 CD	3.0 CD	5.0	2.0	-	0.70 CD	-	0.35	1.3	1.8	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	2.4	1.6	-	6.1	4.3	5.3	2.2	-	22	-	25	24	82	-
Dissolved Sulphate	mg/L	≤500[A]	1000[D]	7.8	5.8	-	28	13	27	9.0	-	55	-	74	78	64	-
Total Ammonia	mg/L	nv	n/v	<0.015	<0.015	-	-	0.075	<0.015	<0.015	-	-	-	<0.015	<0.015	<0.015	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	-	-	-	-	-	-	-	-

See notes on last page

Table B1
Summary of Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location				MW17						MW18						MW19		MW20				MW21		
Sample Date				16-Jul-19	16-Jul-19	9-Jul-20	9-Jul-20	28-Jul-21	15-Jun-22	16-Jul-19	9-Jul-20	28-Jul-21	15-Jun-22	28-Jul-21	15-Jun-22	28-Jul-21	28-Jul-21	14-Jun-22	28-Jul-21	14-Jun-22	14-Jun-22
Sample ID				MW17	MW17 Lab-Dup	MW17	MW17 Lab-Dup	MW17	MW17	MW18	MW18	MW18	MW18	MW19	MW19	MW20	MW20 Lab-Dup	MW20	MW21	MW21	MW21 Lab-Dup
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				B958618	B958618	B958618	B958618	C154612	C242046	B958618	C047949	C154612	C242046	C154612	C242046	C154612	C154612	C242046	C154612	C242046	C242046
Laboratory Sample ID				WD1294	WD1294	YB4378	YB4378	ACV027	AVE496	WD1295	YB4379	ACV028	AVE497	ACV029	AVE498	ACV030	ACV030	AVE499	ACV031	AVE500	AVE500
Sample Type	Units	Health Canada	CCME		Lab Replicate		Lab Replicate										Lab Replicate				Lab Replicate
General Chemistry																					
Dissolved Nitrate (NO3)	mg/L	45[B]	n/v	9.5	-	6.9	-	17	9.0	40	**46[B]**	**64[B]**	20	<0.044	0.046	**60[B]**	-	**68[B]**	23	7.4	-
Nitrate + Nitrite (as N)	mg/L	n/v	100[D]	2.1	-	1.6	-	3.8	2.0	9.1	10	15	4.5	<0.010	0.010	14	-	15	5.2	1.7	-
Dissolved Nitrite (NO2)	mg/L	3[B]	32.8[D]	<0.033	-	<0.033	-	<0.033	<0.033	0.076	<0.033	0.34	<0.033	<0.033	<0.033	0.65	-	0.059	<0.033	<0.033	-
Dissolved Nitrate (as N)	mg/L	10[B]	n/v	2.1	-	1.6	1.6	3.8	2.0	9.1	10 CD	**14[B]**	4.5	<0.010	0.010	**14[B]**	-	**15[B]**	5.2	1.7	-
Dissolved Nitrite (as N)	mg/L	1[B]	10[D]	<0.010	-	<0.010	<0.010	<0.010	<0.010	0.023	<0.010	0.10	<0.010	<0.010	<0.010	0.20	-	0.018	<0.010	<0.010	-
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0041	0.0040	0.010	-	0.0049	0.021	0.0043	0.0048	0.0060	0.037	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	-
Phosphorus, Total	mg/L	n/v	n/v	6.8 CD	-	3.4 CD	-	1.3	0.11 SD	0.95 CD	1.5 SD	7.2	1.1 SD	0.64	0.24 SD	0.59	-	0.12	76	0.80 SD	-
Dissolved Chloride	mg/L	≤250[A]	100-700[C]	6.5	-	8.2	8.2	14	6.9	5.9	4.9	14	2.7	96	100	**170[C]**	-	**150[C]**	22	11	11
Dissolved Sulphate	mg/L	≤500[j,A]	1000[D]	35	-	39	39	62	20	21	16	53	12	88	81	62	-	38	21	8.5	7.7
Total Ammonia	mg/L	nv	n/v	-	-	0.058	-	<0.015	<0.015	-	0.019	<0.015	<0.015	0.051	0.051	<0.015	-	<0.015	0.038	<0.015	-
Total Dissolved Solids	mg/L	≤500[A]	500-3500[C] 3000[D]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Health Canada	Health Canada (2022). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, ON.
[A]	Aesthetic Objectives/ Operational Guidelines
[B]	Maximum Acceptable Concentration
CCME	Canadian Council of Ministers of the Environment
[C]	Canadian Environmental Quality Guidelines for the Protection of Agriculture - Irrigation Water
[D]	Canadian Environmental Quality Guidelines for the Protection of Agriculture - Livestock Water
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
[j]	High levels (above 500 mg/L) can cause physiological effects such as diarrhoea or dehyrdration.
CD	Detection limits raised due to dilution to bring analyte within the calibrated range.
MI	Detection limits raised due to matrix interference.
SD	Due to the sample matrix, the sample required dilution. The detection limit was adjusted accordingly.
HI	Sample was originally processed within hold time. Data quality required investigation. Re-analysis was completed past recommended hold time.
RPD	Relative Percent Difference.
61%	RPD exceeds data quality objective of 40% (source: BV Labs QA/QC Interpretation Guide Reference COR-FCD-0097 released 2019.)
nc	RPD is not calculated if one or more values is non detect or if one or more values is less than five times the reportable detection limit.

Table B2
Summary of Geochemical Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility
at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location			MW2							MW3						MW5						
Sample Date			7-Jul-20	7-Jul-20	27-Jul-21	27-Jul-21	27-Jul-21	14-Jun-22	14-Jun-22	7-Jul-20	7-Jul-20	7-Jul-20	27-Jul-21	27-Jul-21	14-Jun-22	7-Jul-20	7-Jul-20	27-Jul-21	27-Jul-21	27-Jul-21	14-Jun-22	14-Jun-22
Sample ID			MW2	MW2	MW2	MW2 Lab-Dup	MW2	MW2	MW2	MW3	MW3 Lab-Dup	MW3	MW3	MW3	MW3	MW5	MW5	MW5	MW5 Lab-Dup	MW5	MW5	MW5 Lab-Dup
Sampling Company			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory			BV	Bio-Chem	BV	BV	Bio-Chem	BV	BV	BV	BV	Bio-Chem	BV	Bio-Chem	BV	BV	Bio-Chem	BV	BV	Bio-Chem	BV	BV
Laboratory Work Order			C047629	BC37641A	C154495	C154495	BC39088A	C241178	C241178	C047629	C047629	BC37641A	C154495	BC39088A	C241178	C047629	BC37641A	C154495	C154495	BC39088A	C241178	C241178
Laboratory Sample ID			YB2484		ACU043	ACU043		AUZ691	AUZ691	YB2485	YB2485		ACU044		AUZ692	YB2486		ACU045	ACU045		AUZ693	AUZ693
Sample Type	Units	GCDWQ				Lab Replicate			Lab Replicate		Lab Replicate								Lab Replicate			Lab Replicate
General Chemistry																						
Alkalinity (P as CaCO3)	mg/L	n/v	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	<1.0	-	<1.0	-	-	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	310	-	450	460	-	340	-	650	650	-	900	-	380	430	-	480	-	-	440	440
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	<1.0	-	<1.0	-	-	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	<1.0	-	<1.0	-	-	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	260	-	370	380	-	270	-	530	530	-	740	-	310	530	-	580	-	-	360	360
Ammonia (as N)	mg/L	n/v	-	-	-	-	-	0.015	-	-	-	-	-	-	<0.015	-	-	-	-	-	0.22	-
Ammonia (Un-Ionized)	mg/L	n/v	-	-	-	-	-	<0.00050	-	-	-	-	-	-	<0.00050	-	-	-	-	-	<0.00050	-
Anion Sum	meq/L	n/v	15	-	-	-	-	-	-	40	-	-	-	-	-	28	-	-	-	-	-	-
Bromide	mg/L	n/v	-	-	-	-	-	0.039	0.033	-	-	-	-	-	<0.10 CD	-	-	-	-	-	<0.10 CD	-
Cation Sum	meq/L	n/v	15	-	-	-	-	-	-	41	-	-	-	-	-	27	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	n/v	10	-	<10	-	-	<10	-	24	-	-	25	-	<10	19	-	21	26	-	<10	-
Chloride	mg/L	≤250[A]	14	-	27	-	-	7.9	-	180	180	-	190	-	1.5	120	-	190	-	-	74	-
Electrical Conductivity, Lab	µS/cm	n/v	1300	-	1600	1600	-	760	-	3000	3000	-	3500	-	680	2300	-	2600	-	-	1500	1500
Hardness (as CaCO3)	mg/L	n/v	720	-	810	-	-	390	-	1900	-	-	2100	-	370	1200	-	1300	-	-	610	-
Ion Balance % Difference	%	n/v	1.0	-	5.6	-	-	0.20	-	1.1	-	-	1.5	-	1.3	0.42	-	2.6	-	-	12	-
Nitrate	mg/L	45[B]	**54[B]**	-	**77[B]**	-	-	16	-	**74[B]**	-	-	2.2	-	**60[B]**	**200[B]**	-	**180[B]**	-	-	**100[B]**	-
Nitrate (as N)	mg/L	10[B]	**12[B] CD**	-	**17[B]**	-	-	3.5	-	**17[B] CD**	-	-	0.51	-	**14[B]**	**46[B] CD**	-	**41[B]**	-	-	**23[B]**	-
Nitrate + Nitrite (as N)	mg/L	n/v	12	-	17	-	-	3.5	-	17	-	-	0.51	-	14	46	-	41	-	-	23	-
Nitrite	mg/L	3[B]	<0.033	-	<0.033	-	-	<0.033	-	0.36	-	-	<0.033	-	<0.033	0.26	-	0.27	-	-	0.038	-
Nitrite (as N)	mg/L	1[B]	<0.010	-	<0.010	-	-	<0.010	-	0.11	-	-	<0.010	-	<0.010	0.080	-	0.082	-	-	0.012	-
Orthophosphate (as P)	mg/L	n/v	0.011	-	0.0047	-	-	0.0038	-	0.0045	-	-	0.0041	-	0.0075	0.010	-	0.0049	-	-	0.0072	-
pH, lab	S.U.	7.0-10.5[A]	7.59	-	7.80	7.84	-	7.60	-	7.41	7.43	-	7.60	-	7.63	7.30	-	7.48	-	-	7.24	7.23
Phosphorus, Total	mg/L	n/v	-	-	-	-	-	<0.0030	-	-	-	-	-	-	0.016	-	-	-	-	-	0.0070	-
Sulfate	mg/L	≤500[A]	410 CD	-	**510[A]**	-	-	120	-	**1100[A] CD**	**1100[A]**	-	**1300[A]**	-	14	**590[A] CD**	-	**660[A]**	-	-	310	-
Sulfide	mg/L	n/v	<0.0018 YE	-	<0.0018 YE	-	-	<0.0018	-	<0.0018 YE	-	-	<0.0018 YE	-	<0.0018	<0.0018 YE	-	<0.0018 YE	-	-	<0.0018	-
Sulfide (as H2S)	mg/L	≤0.05[A]	<0.0020	-	<0.0020	-	-	<0.0020	-	<0.0020	-	-	<0.0020	-	<0.0020	<0.0020	-	<0.0020	-	-	<0.0020	-
Total Dissolved Solids	mg/L	≤500[A]	**910[A]**	-	**1200[A]**	-	-	470	-	**2400[A]**	-	-	**2700[A]**	-	400	**1700[A]**	-	**1900[A]**	-	-	**950[A]**	-
Total Organic Carbon	mg/L	n/v	2.4	-	2.6	-	-	2.4	-	3.5	-	-	2.9	-	3.2	2.7	-	1.4	-	-	2.2	-
Metals, Dissolved																						
Calcium	mg/L	n/v	210	-	230	-	-	110	-	530 CD	-	-	540	-	110	340	-	380	-	-	170	-
Iron	mg/L	≤0.3[A]	<0.060	-	<0.060	-	-	<0.060	-	<0.060	-	-	<0.060	-	<0.060	<0.060	-	<0.060	-	-	<0.060	-
Magnesium	mg/L	n/v	48	-	57	-	-	28	-	140	-	-	190	-	25	81	-	89	-	-	45	-
Manganese	mg/L	≤0.02[A] 0.12[B]	**0.022[A]**	-	0.012	-	-	**0.060[A]**	-	**0.35[AB]**	-	-	**0.49[AB]**	-	<0.0040	**0.037[A]**	-	**0.062[A]**	-	-	0.010	-
Potassium	mg/L	n/v	2.0	-	3.1	-	-	1.5	-	7.1	-	-	7.8	-	2.0	4.6	-	5.8	-	-	2.0	
Sodium	mg/L	≤200[A]	20	-	37	-	-	15	-	68	-	-	75	-	3.4	82	-	87	-	-	31	-
Metals, Total																						
Iron	mg/L	≤0.3[A]	-	-	-	-	-	<0.060	-	-	-	-	-	-	**0.49[A]**	-	-	-	-	-	0.079	-
Manganese	mg/L	≤0.02[A] 0.12[B]	-	-	-	-	-	**0.099[A]**	-	-	-	-	-	-	**0.027[A]**	-	-	-	-	-	**0.044[A]**	-
Microbiological																						
Denitrifying Bacteria	MPN/mL	n/v	-	93	-	-	930	9.3	-	-	-	21	-	430	930	-	75	-	-	930	2300	-
Heterotrophic Plate Count	CFU/mL	n/v	-	1100	-	-	2200	120 HO	-	-	-	240	-	9600	73 HO	-	500	-	-	560,000	340 HO	-
Iron Bacteria	CFU/mL	n/v	-	-	-	-	-	9000 HO	-	-	-	-	-	-	35000 HO	-	-	-	-	-	9000 HO	-
Sulphate Reducing Bacteria	CFU/mL	n/v	-	-	-	-	-	330 HO	-	-	-	-	-	-	<75 HO	-	-	-	-	-	<75 HO	-
Sulphate Reducing Bacteria	MPN/mL	n/v	-	<0.3	-	-	0.4	-	-	-	-	0.4	-	0.7	-	-	<0.3	-	-	<0.3	-	-

See notes on last page.

Table B2
Summary of Geochemical Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility
at the HyLife Foods Neepawa Facility
HyLife Foods

Sample Location			MW6						MW7						MW14					
Sample Date			7-Jul-20	7-Jul-20	27-Jul-21	27-Jul-21	27-Jul-21	14-Jun-22	7-Jul-20	7-Jul-20	27-Jul-21	27-Jul-21	14-Jun-22	14-Jun-22	7-Jul-20	7-Jul-20	7-Jul-20	27-Jul-21	27-Jul-21	14-Jun-22
Sample ID			MW6	MW6	MW6	MW6 Lab-Dup	MW6	MW6	MW7	MW7	MW7	MW7	MW7	MW7 Lab-Dup	MW14	MW14 Lab-Dup	MW14	MW14	MW14	MW14
Sampling Company			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory			BV	Bio-Chem	BV	BV	Bio-Chem	BV	BV	Bio-Chem	BV	Bio-Chem	BV	BV	BV	BV	Bio-Chem	BV	Bio-Chem	BV
Laboratory Work Order			C047629	BC37641A	C154495	C154495	BC39088A	C241178	C047629	BC37641A	C154495	BC39088A	C241178	C241178	C047629	C047629	BC37641A	C154495	BC39088A	C241178
Laboratory Sample ID			YB2487		ACU046	ACU046		AUZ694	YB2488		ACU047		AUZ695	AUZ695	YB2489	YB2489		ACU048		AUZ696
Sample Type	Units	GCDWQ				Lab Replicate								Lab Replicate		Lab Replicate				
General Chemistry																				
Alkalinity (P as CaCO3)	mg/L	n/v	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	-	<1.0	-	-	<1.0	-	<1.0
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	210	-	240	240	-	230	440	-	510	-	390	-	280	-	-	320	-	290
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	-	<1.0	-	-	<1.0	-	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	-	<1.0	-	<1.0	-	-	<1.0	-	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	180	-	200	200	-	190	360	-	410	-	320	-	230	-	-	260	-	230
Ammonia (as N)	mg/L	n/v	-	-	-	-	-	<0.015	-	-	-	-	0.037	-	-	-	-	-	-	<0.015
Ammonia (Un-Ionized)	mg/L	n/v	-	-	-	-	-	<0.00050	-	-	-	-	<0.00050	-	-	-	-	-	-	<0.00050
Anion Sum	meq/L	n/v	9.5	-	-	-	-	-	22	-	-	-	-	-	4.8	-	-	-	-	-
Bromide	mg/L	n/v	-	-	-	-	-	0.88	-	-	-	-	<0.10 CD	-	-	-	-	-	-	<0.010
Cation Sum	meq/L	n/v	9.3	-	-	-	-	-	22	-	-	-	-	-	5.0	-	-	-	-	-
Chemical Oxygen Demand	mg/L	n/v	30	-	18	-	-	10	15	-	14	-	<10	-	14	-	-	120	-	37
Chloride	mg/L	≤250[A]	190	-	180	-	-	150	110	-	170	-	97	-	2.2	-	-	1.9	-	1.9
Electrical Conductivity, Lab	µS/cm	n/v	1000	-	940	930	-	870	1900	-	2100	-	1400	-	450	-	-	470	-	470
Hardness (as CaCO3)	mg/L	n/v	450	-	390	-	-	410	960	-	1000	-	690	-	250	-	-	250	-	260
Ion Balance % Difference	%	n/v	1.1	-	5.7	-	-	1.6	0.54	-	4.6	-	1.3	-	2.6	-	-	3.4	-	3.8
Nitrate	mg/L	45[B]	1.7	-	2.0	-	-	0.18	**200[B]**	-	**260[B]**	-	**130[B]**	-	0.30	-	-	<0.044	-	0.086
Nitrate (as N)	mg/L	10[B]	0.39	-	0.46	-	-	0.040	**45[B] CD**	-	**60[B]**	-	**30[B]**	-	0.067	-	-	<0.010	-	0.019
Nitrate + Nitrite (as N)	mg/L	n/v	0.39	-	0.46	-	-	0.040	45	-	60	-	30	-	0.067	-	-	<0.010	-	0.019
Nitrite	mg/L	3[B]	<0.033	-	<0.033	-	-	<0.033	0.13	-	0.11	-	<0.033	-	<0.033	-	-	<0.033	-	<0.033
Nitrite (as N)	mg/L	1[B]	<0.010	-	<0.010	-	-	<0.010	0.039	-	0.034	-	<0.010	-	<0.010	-	-	<0.010	-	<0.010
Orthophosphate (as P)	mg/L	n/v	0.0033	-	0.0039	-	-	0.0046	0.0059	-	0.0041	-	0.0051	-	<0.0030	-	-	0.0035	-	0.0048
pH, lab	S.U.	7.0-10.5[A]	7.85	-	7.93	7.97	-	7.75	7.43	-	7.95	-	7.59	-	7.83	-	-	8.16	-	7.74
Phosphorus, Total	mg/L	n/v	-	-	-	-	-	0.027	-	-	-	-	0.011	0.0095	-	-	-	-	-	1.7
Sulfate	mg/L	≤500[A]	25	-	19	-	-	20	400 CD	-	350	-	200	-	6.1	-	-	8.0	-	5.8
Sulfide	mg/L	n/v	0.0086 YE	-	0.0091	-	-	0.0044	0.0023 YE	-	<0.0018 YE	-	<0.0018	-	0.0099 YE	-	-	0.83 CD	-	0.058 CD
Sulfide (as H2S)	mg/L	≤0.05[A]	0.0091	-	0.0097	-	-	0.0047	0.0024	-	<0.0020	-	<0.0020	-	0.011	-	-	**0.89**	-	**0.062**
Total Dissolved Solids	mg/L	≤500[A]	**500[A]**	-	470	-	-	440	**1300[A]**	-	**1400[A]**	-	**890[A]**	-	230	-	-	260	-	240
Total Organic Carbon	mg/L	n/v	0.82	-	<0.50	-	-	1.1	2.1	-	0.71	-	3.5	-	1.5	1.6	-	2.5	-	2.1
Metals, Dissolved																				
Calcium	mg/L	n/v	130	-	110	-	-	120	280	-	290	-	200	-	69	-	-	70	-	70
Iron	mg/L	≤0.3[A]	<0.060	-	<0.060	-	-	<0.060	<0.060	-	<0.060	-	<0.060	-	<0.060	-	-	<0.060	-	<0.060
Magnesium	mg/L	n/v	29	-	26	-	-	29	61	-	64	-	47	-	18	-	-	19	-	20
Manganese	mg/L	≤0.02[A] 0.12[B]	0.0071	-	0.019	-	-	**0.031[A]**	**0.046[A]**	-	0.011	-	<0.0040	-	**0.020[A]**	-	-	**0.17[AB]**	-	0.012
Potassium	mg/L	n/v	1.9	-	2.2	-	-	1.7	2.7	-	2.4	-	1.6	-	0.52	-	-	0.66	-	0.67
Sodium	mg/L	≤200[A]	7.8	-	12	-	-	8.5	57	-	53	-	25	-	1.9	-	-	1.8	-	2.7
Metals, Total																				
Iron	mg/L	≤0.3[A]	-	-	-	-	-	**2.3[A]**	-	-	-	-	<0.060	-	-	-	-	-	-	**14[A]**
Manganese	mg/L	≤0.02[A] 0.12[B]	-	-	-	-	-	**0.23[AB]**	-	-	-	-	0.015	-	-	-	-	-	-	**0.52[AB]**
Microbiological																				
Denitrifying Bacteria	MPN/mL	n/v	-	7500	-	-	9300	2.3	-	150	-	93	2.0	-	-	-	930	-	15,000	930
Heterotrophic Plate Count	CFU/mL	n/v	-	8300	-	-	13000	4700 HO	-	140	-	690	510 HO	-	-	-	3800	-	55,000	4400 HO
Iron Bacteria	CFU/mL	n/v	-	-	-	-	-	9000 HO	-	-	-	-	9000 HO	-	-	-	-	-	-	9000
Sulphate Reducing Bacteria	CFU/mL	n/v	-	-	-	-	-	<75 HO	-	-	-	-	<75 HO	-	-	-	-	-	-	<75
Sulphate Reducing Bacteria	MPN/mL	n/v	-	0.4	-	-	<0.3	-	-	0.4	-	0.3	-	-	-	-	<0.3	-	<0.3	-

See notes on last page.

Table B2
Summary of Geochemical Groundwater Analytical Results
Former Industrial Wastewater Treatment Facility
at the HyLife Foods Neepawa Facility
HyLife Foods

Notes:

GCDWQ	Health Canada (June 2022). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
A	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
B	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
j	High levels (above 500 mg/L) can cause physiological effects such as diarrhea or dehydration.
CD	Detection limits raised due to dilution to bring analyte within the calibrated range.
HO	Sample analyzed past recommended hold time.
MI	Detection limit was raised due to matrix interferences.
MIS	Matrix spike outside acceptance limits due to matrix interference. Unable to reanalyze due to insufficient sample.
YE	Sample pH <9, preservation incomplete. Due to volatility of analyte, a low bias in the results is likely. Detection limit raised due to interferent

Table B3
Groundwater Monitoring Data Summary Table
Former Industrial Wastewater Treatment Facility at the Hylife Foods Neepawa Facility
Hylife Foods

Well Identification	Monitoring Date (DD-MMM-YY)	Northing (m)	Easting (m)	Top of Pipe (TOP) Elevation (m AMSL)	Ground Surface Elevation Elevation (m AMSL)	Height of Well Above Grade (m)	Depth to Water (m) TOP	Depth to Water (m BGS)	Depth to Bottom of Well (m) TOP	Groundwater Elevation (m AMSL)	Temperature (°C)	Conductivity (µS/cm)	pH (Std. Units)	Oxidation/ Reduction Potential [ORP] (mV)	Dissolved Oxygen [DO] (mg/L)	Total Disolved Solids (mg/L)	Turbidity (NTU)
MW1	16-Jul-19	5564459.59	469507.03	363.63	362.63	1.00	2.36	1.36	7.38	361.27	8.10	504	7.47	125	2.20	425.2	-
	7-Jul-20						1.79	0.80	7.39	361.84	5.33	766	7.33	39	4.03	488.0	-
	27-Jul-21						2.54	1.54	7.31	361.09	14.01	652	7.58	150	28.26	-	18.2
	13-Jun-22						1.63	0.63	7.31	362.00	5.46	719	7.20	86	2.50	-	222
MW2	16-Jul-19	5564461.25	469565.03	365.37	364.37	1.00	4.09	3.09	8.99	361.28	7.80	1059	7.30	114	12.96	1027.0	-
	7-Jul-20						3.63	2.62	8.89	361.74	7.62	1730	7.30	192	2.30	627.0	-
	27-Jul-21						4.15	3.14	8.81	361.22	11.30	1550	7.15	132	10.13	-	40.7
	13-Jun-22						3.24	2.24	8.81	362.13	7.39	1100	7.17	142	6.88	-	577.0
MW3	16-Jul-19	5564533.10	469672.69	366.07	365.06	1.01	5.51	4.50	8.97	360.56	8.50	2377	6.79	123	3.96	2255.5	-
	6-Jul-20						5.16	4.15	8.95	360.91	6.77	3020	7.09	77	2.95	1920.0	-
	27-Jul-21						5.59	4.58	8.86	360.49	9.49	3270	6.84	147	13.04	-	33.8
	13-Jun-22						4.58	3.56	8.86	361.50	8.09	1530	7.02	142	7.16	-	286
MW4	16-Jul-19	5564591.66	469671.35	364.82	363.75	1.07	4.88	3.80	9.14	359.95	7.50	760	7.60	97	18.62	734.5	-
	7-Jul-20						4.40	3.33	9.16	360.42	5.92	1830	7.15	172	6.20	1170.0	-
	27-Jul-21						5.17	4.09	9.08	359.66	11.24	2760	7.16	189	11.51	-	33.9
	13-Jun-22						3.97	2.89	9.08	360.86	7.09	864	7.30	130	13.41	-	139
MW5	16-Jul-19	5564458.49	469769.11	365.59	364.50	1.09	4.87	3.78	9.15	360.71	8.70	1521	6.87	76	8.60	1436.5	-
	6-Jul-20						4.58	3.49	9.15	361.01	7.18	2590	6.92	149	3.34	1640.0	-
	27-Jul-21						4.89	3.80	9.07	360.70	9.74	2550	6.81	162	6.93	-	19.5
	13-Jun-22						3.97	2.88	9.07	361.62	7.62	2060	6.82	171	4.71	-	105
MW6	16-Jul-19	5564267.19	469670.87	367.06	366.31	0.75	4.17	3.42	6.20	362.89	13.60	680	7.84	44	7.86	565.5	-
	6-Jul-20						3.98	3.23	6.20	363.08	12.73	981	7.54	178	6.48	628.0	-
	27-Jul-21						4.24	3.49	6.12	362.82	12.70	950	7.55	159	6.24	-	218
	13-Jun-22						3.78	3.03	6.12	363.28	10.27	832	7.75	149	11.75	-	408
MW7	16-Jul-19	5564458.96	469804.69	365.23	364.22	1.01	4.94	3.93	9.23	360.29	6.80	1205	7.07	93	5.11	1189.5	-
	6-Jul-20						4.56	3.55	9.23	360.67	6.00	1990	7.15	174	8.14	1260.0	-
	27-Jul-21						4.99	3.99	9.17	360.24	8.91	2010	6.95	175	7.38	-	18.8
	13-Jun-22						3.92	2.91	9.17	361.31	7.13	1760	6.94	172	1.14	-	133
MW8	16-Jul-19	5564677.45	469663.41	363.45	362.42	1.03	4.45	3.42	5.96	359.00	7.40	1846	6.99	178	4.01	1774.5	-
	7-Jul-20						3.70	2.66	5.84	359.76	8.74	2670	7.13	208	5.38	1730.0	-
	28-Jul-21						4.79	3.76	5.72	358.66	16.02	2290	7.00	200	12.36	-	OVER
	14-Jun-22						2.91	1.88	5.72	360.54	7.74	2700	6.96	167	11.35	-	237
MW9	16-Jul-19	5564481.07	469433.46	363.27	362.26	1.01	2.48	1.48	6.90	360.79	10.10	426	7.80	126	3.63	382.2	-
	7-Jul-20						1.73	0.73	6.43	361.54	6.68	584	7.60	119	5.14	374.0	-
	27-Jul-21						2.33	1.33	6.21	360.94	12.72	581	7.75	174	5.41	-	OVER
	13-Jun-22						1.76	0.75	6.21	361.51	7.53	540	7.67	120	6.20	-	OVER
MW10	16-Jul-19	5564459.49	469981.76	365.67	364.61	1.06	5.59	4.53	7.50	360.08	8.40	428	7.61	137	4.89	395.2	-
	8-Jul-20						5.11	4.05	7.25	360.55	6.97	649	7.54	169	6.33	-	-
	28-Jul-21						5.62	4.56	7.37	360.05	14.36	592	7.59	104	11.14	-	OVER
	14-Jun-22						4.33	3.27	7.37	361.34	8.57	377	7.85	140	15.44	-	OVER
MW11	16-Jul-19	5564382.89	469419.46	364.71	363.78	0.93	2.77	1.84	6.11	361.93	11.80	4707	7.63	132	4.16	405.6	-
	8-Jul-20						1.94	1.02	5.96	362.76	7.87	668	7.51	176	5.89	428.0	-
	27-Jul-21						2.63	1.70	6.10	362.08	12.10	610	7.74	192	5.16	-	544
	13-Jun-22						1.77	0.84	6.10	362.94	7.83	572	7.59	173	7.37	-	OVER
MW12	16-Jul-19	5564580.55	469786.83	362.56	361.79	0.77	3.20	2.43	6.89	359.36	9.20	835	7.45	96	10.24	767.0	-
	7-Jul-20						2.64	1.87	6.79	359.92	8.77	753	7.27	188	7.65	486.0	-
	28-Jul-21						3.29	2.52	6.34	359.26	12.70	1740	7.12	103	12.58	-	OVER
	13-Jun-22						2.42	1.65	6.34	360.14	7.51	900	7.44	144	12.97	-	641

See notes on last page

Table B3
Groundwater Monitoring Data Summary Table
Former Industrial Wastewater Treatment Facility at the Hylife Foods Neepawa Facility
Hylife Foods

Well Identification	Monitoring Date (DD-MMM-YY)	Northing (m)	Easting (m)	Top of Pipe (TOP) Elevation (m AMSL)	Ground Surface Elevation Elevation (m AMSL)	Height of Well Above Grade (m)	Depth to Water (m) TOP	Depth to Water (m BGS)	Depth to Bottom of Well (m) TOP	Groundwater Elevation (m AMSL)	Temperature (°C)	Conductivity (µS/cm)	pH (Std. Units)	Oxidation/ Reduction Potential [ORP] (mV)	Dissolved Oxygen [DO] (mg/L)	Total Disolved Solids (mg/L)	Turbidity (NTU)
MW13	16-Jul-19	5564668.67	469712.47	361.52	360.59	0.93	2.48	1.55	6.63	359.04	10.20	1314	6.91	87	4.73	1085.5	-
	7-Jul-20						1.83	0.90	4.97	359.69	9.40	2100	7.16	211	4.57	1340.0	-
	28-Jul-21						2.91	1.98	4.61	358.61	12.66	1560	7.11	201	4.91	-	570
	14-Jun-22						0.99	0.06	4.61	360.53	8.07	1210	7.09	172	4.81	-	OVER
MW14	16-Jul-19	5564695.64	469821.97	362.21	361.21	0.99	4.10	3.10	6.22	358.11	8.80	316	7.83	-48	4.19	286.7	-
	6-Jul-20						3.52	2.53	5.47	358.68	7.69	453	7.47	145	8.82	296.0	-
	27-Jul-21						4.16	3.16	5.15	358.05	14.92	420	7.84	176	11.54	-	OVER
	13-Jun-22						2.84	1.85	5.15	359.36	6.50	435	7.41	164	0.28	-	156
MW15	16-Jul-19	5564780.05	469784.14	360.59	359.73	0.86	3.71	2.85	5.90	356.88	8.50	331	7.77	-21	4.70	307.5	-
	8-Jul-20						2.82	1.96	6.03	357.77	7.45	488	7.75	167	6.11	319.0	-
	27-Jul-21						3.87	3.00	6.15	356.72	9.95	462	7.74	190	15.07	-	OVER
	13-Jun-22						2.28	1.41	6.15	358.31	6.39	432	7.58	168	0.28	-	OVER
MW16	16-Jul-19	5564693.65	469518.14	363.84	363.11	0.73	4.45	3.72	6.46	359.38	8.30	455	7.64	-38	10.17	427.1	-
	8-Jul-20						3.94	3.21	6.90	359.90	8.17	750	7.61	94	5.02	480.0	-
	28-Jul-21						4.53	3.80	6.19	359.31	9.85	735	7.52	181	12.10	-	OVER
	14-Jun-22						2.90	2.17	6.19	360.94	8.38	1002	7.60	151	12.53	-	OVER
MW17	16-Jul-19	5564763.52	469604.58	361.36	360.46	0.90	3.50	2.59	4.22	357.86	8.60	33	7.68	97	10.86	319.8	-
	8-Jul-20						2.56	1.65	4.15	358.80	8.35	407	7.67	138	7.74	266.0	-
	28-Jul-21						3.42	2.52	4.04	357.94	14.41	556	7.30	187	11.36	-	OVER
	14-Jun-22						2.00	1.10	4.04	359.36	7.49	392	7.69	131	8.63	-	OVER
MW18	16-Jul-19	5564827.52	469634.02	360.84	359.91	0.93	4.13	3.20	6.88	356.70	9.40	396	7.75	140	9.01	341.9	-
	8-Jul-20						3.46	2.53	6.23	357.38	8.43	495	7.74	157	8.17	323.0	-
	28-Jul-21						4.23	3.30	6.11	356.60	14.35	230	7.81	230	12.52	-	OVER
	14-Jun-22						2.98	2.05	6.11	357.85	6.58	392	7.54	160	9.38	-	OVER
MW19	16-Jul-19	5564298.36	469975.58	363.84	362.99	0.86	2.64	1.79	4.91	361.20	12.90	722	7.84	-30	7.19	-	OVER
	14-Jun-22						1.35	0.49	4.91	362.49	7.51	781	7.68	-3	3.46	-	OVER
MW20	16-Jul-19	5564262.31	469838.45	366.25	365.23	1.02	3.97	2.95	6.74	362.28	10.61	1230	7.55	224	8.97	-	OVER
	13-Jun-22						2.88	1.86	6.74	363.37	7.96	1090	7.34	173	8.11	-	OVER
MW21	8-Jul-20	5564333.70	469781.54	366.09	364.92	1.17	4.27	3.10	4.81	361.82	16.08	800	8.03	190	8.86	-	OVER
	13-Jun-22						3.13	1.96	4.81	362.96	10.48	471	7.69	168	-	-	OVER

Notes

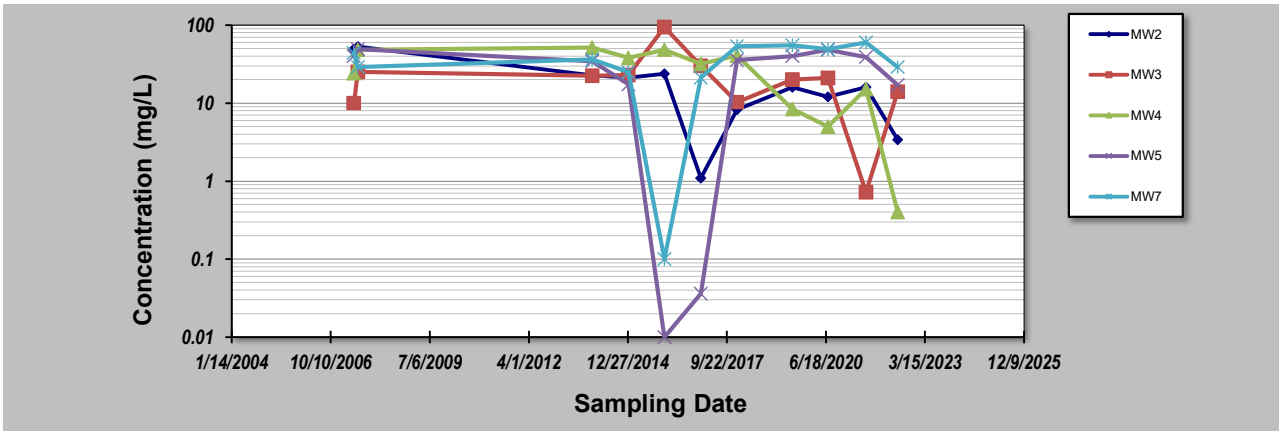
m AMSL	Metres Above Mean Sea Level
m BGS	Metres Below Ground Surface
-	Data not available/no measurement available
TOP	Measured from top of pipe
OVER	Over instrument range

Appendix C MANN-KENDALL ANALYSIS RESULTS

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	3-Sep-22	Job ID:	111474534
Facility Name:	Stantec Consulting Ltd.	Constituent:	Nitrate
Conducted By:	Wenhui Xiong	Concentration Units:	mg/L

Sampling Point ID:	MW2	MW3	MW4	MW5	MW7		
Sampling Event	Sampling Date	NITRATE CONCENTRATION (mg/L)						
1	5/31/2007	49	10	24	40	44		
2	7/11/2007	53	25	48	49	29		
3	1/1/2014	22.7	22.5	51.6	34.6	36.5		
4	1/1/2015	21.1	22.9	38.3	17.3	24.9		
5	1/1/2016	23.7	94.2	48.3	0.01	0.1		
6	1/1/2017	1.09	30.2	31.7	0.036	21.1		
7	1/1/2018	8.29	10.3	40.6	35.7	53.6		
8	7/16/2019	16	20	8.4	40	55		
9	7/8/2020	12	21	5	48	49		
10	7/27/2021	16	0.72	15	39	60		
11	6/14/2022	3.4	14	0.4	17	29		
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.82	1.00	0.66	0.61	0.49		
Mann-Kendall Statistic (S):		-34	-13	-29	-4	12		
Confidence Factor:		99.0%	82.1%	98.7%	59.0%	79.9%		
Concentration Trend:		Decreasing	Stable	Decreasing	Stable	No Trend		



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.