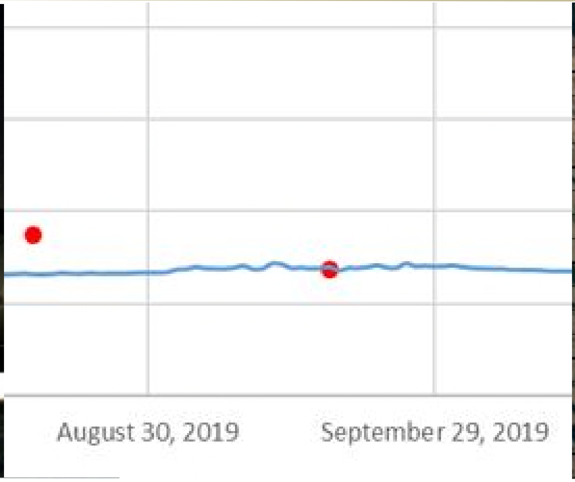
# Meliadine Lake
# Updated 3-D Modelling of the Discharge Assessment

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**Agnico Eagle Mines Limited**

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### APPENDICES

## LIMITATIONS OF REPORT

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# 1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was engaged by Agnico Eagle Mines Limited (Agnico Eagle) to conduct 3-D circulation modelling in Meliadine Lake, NU, to assess the dilutions resulting from discharge through the Meliadine Lake diffuser with updated discharge parameters for the Life of Mine.

The objectives of the studies are to assess dilutions in the lake based on different scenarios (base case and wet year conditions) by conducting a multi-year simulation with updated discharge parameters (provided by Golder, August 2020) to support the permitting requirement for the Meliadine Lake diffuser. To achieve these, the following tasks were undertaken:

- Dilutions and Total Dissolved Solids (TDS) concentrations were determined at the edge of the mixing zone for two scenarios:
  - Scenario 1: base case conditions; and
  - Scenario 2: wet year conditions, taking into account potential wet years.

  Both scenarios focus on the discharge that occurred between 2018 and 2020 as well as the forecast discharge occurring between 2021 and 2028. Comparisons with observed dilutions and observed TDS concentration provided by Agnico Eagle and Golder were also conducted.
- For both scenarios, the following output was determined:
  - Number of exceedances of the 1,000 mg/L TDS concentration at the edge of the mixing zone over the multi-year discharge.

# 2.0 BACKGROUND INFORMATION

In order to the assess the discharge of the effluent in Meliadine Lake and its potential accumulation over the multi-year discharge duration, a 3-D hydrodynamic model coupled with a plume model was used.

This modelling framework is the same as the one developed during the detailed design of the Meliadine Lake diffuser (Tetra Tech, 2017), at the exception of some updates to bathymetry and to the effluent discharge schedule (described in Section 3). The model domain encompasses the entire south sub-basin of Meliadine Lake (where the discharge occurs), with limited connectivity to the main lake through one open boundary located on the northwest side of the sub-basin (92.2 W, 63.04 N), where water can be exchanged with the rest of the Meliadine Lake system.

Meteorological data and wind data provided by the observed station at Rankin Inlet airport for year 2014 (identified as a representative year from a meteorological perspective) was used and repeated over the multi-year discharge duration. Conditions at the end of year 1 are used as initial conditions for the beginning of year 2; therefore, allowing to account for the accumulation of effluent over time.

# 3.0 UPDATES TO THE MODELLING FRAMEWORK

## 3.1 Bathymetry Updates

The southern area of the model domain was updated. Since the existing model bathymetry was based on a survey conducted in year 2014 in the vicinity of the diffuser location, the extrapolation of the bathymetric contour lines was conducted at that time to obtain the bathymetry map used in previous modelling. Early 2020, a scanned bathymetry map (R. L. & L. Environmental Services, 1997) was available for this domain, with coarse information on the lake bathymetry.

Thereby, the model bathymetry was updated by keeping the existing bathymetry in the north portion of the lake (in the vicinity of the diffuser location where past bathymetry data was available), and by updating the southern portion of the lake. This updated bathymetry is presented in Figure 3.1 and actually shows little differences with the original bathymetry. Model domain encompassing the south basin represents about 33% of the entire Meliadine Lake by area (AEM, 2014). Table 3.1 presents the volume of water in various depth intervals between the original bathymetry and the updated bathymetry. The total volume of water in the domain with updated bathymetry is approximately 54 Mm$^3$ compared to about 57 Mm$^3$ with the previous bathymetry, representing a slight reduction in lake water volume.

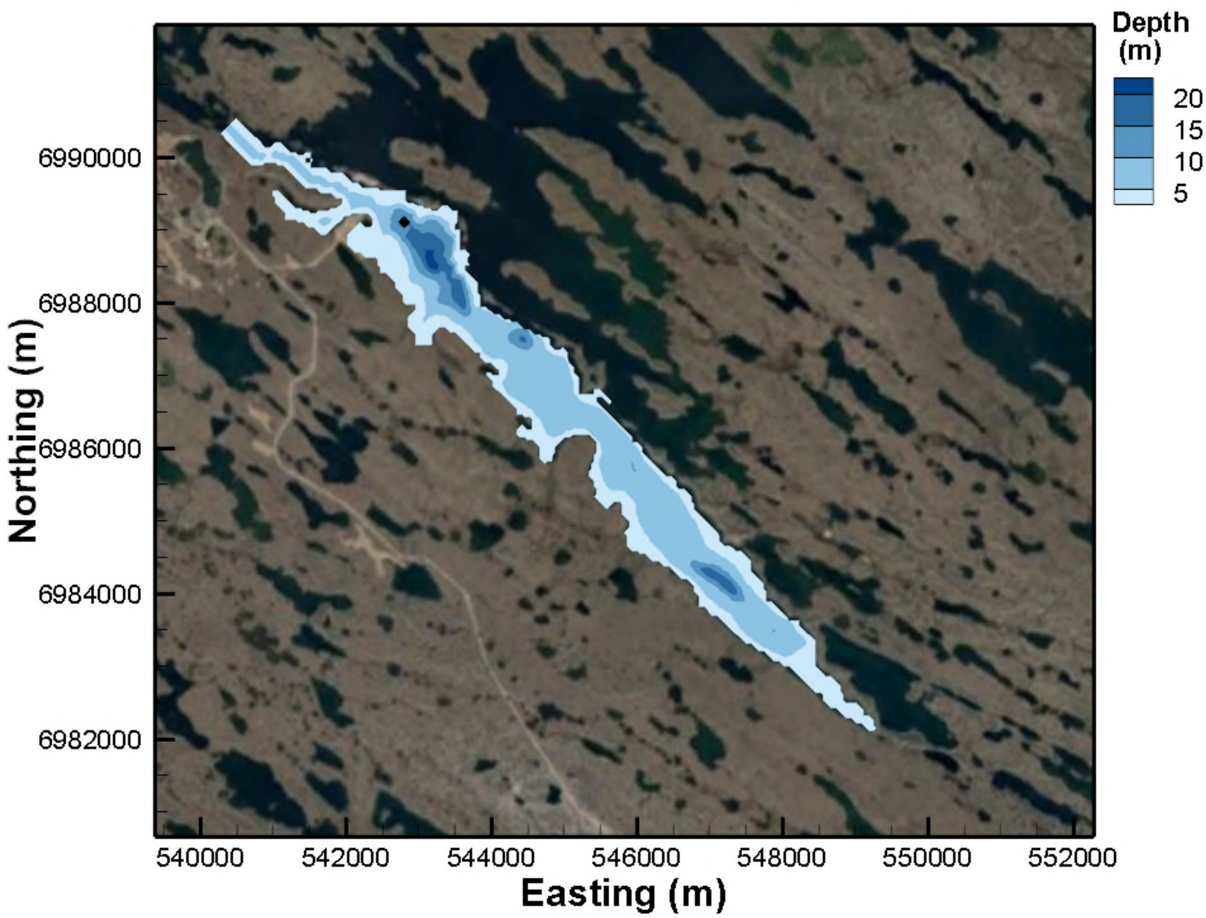


**Figure 3.1: Model Extent and Updated Bathymetry in the Meliadine Lake 3-D Hydrodynamic Model. Black Circle Represents the Location of Diffuser.**

**Table 3.1: Volume of Water in the Lake for Each Depth Interval**

| Depth Intervals (m) | Original Bathymetry (Mm$^3$) | Updated Bathymetry (Mm$^3$) |
|---|---|---|
| 0-5 | 10.8 | 9.7 |
| 5-10 | 27.5 | 30.3 |
| 10-15 | 12.6 | 7.1 |
| 15-20 | 5.4 | 6.0 |
| 20 plus | 0.8 | 0.8 |

## 3.2 Effluent Discharge Updates

### 3.2.1 Scenario 1: Base Case Conditions

Mean precipitation years were considered. Observed monthly discharge from June 2018 to October 2020 and predictions from year 2021 to year 2028 provided by Golder (August 2020) were used as model inputs and are shown in Figure 3.2. Table 3.2 presents the corresponding annual discharge from year 2018 to year 2028. As one can observe, the discharge is the highest during the first two months of the open-water season, i.e. during June and July. A significant discharge in June/July 2020 can be observed, corresponding to the 2020 emergency discharge.

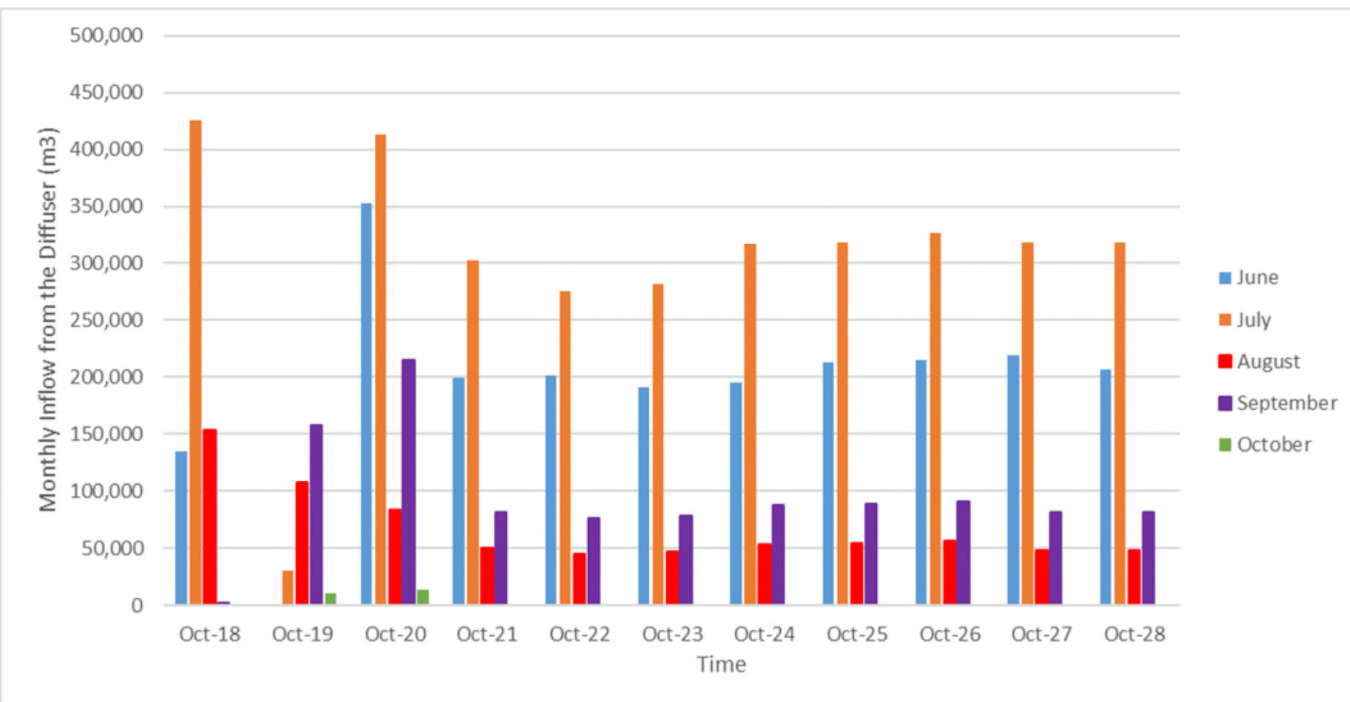


**Figure 3.2: Updated Monthly Inflow from the Diffuser Spanning from Year 2018 to Year 2028 for Base Case**

### Table 3.2: Updated Annual Discharge Inputs during Base Case

| Year | Annual Discharge ($m^3$/year) |
|---|---|
| 2018 | 715,532 |
| 2019 | 306,773 |
| 2020 | 1,078,095 |
| 2021 | 634,507 |
| 2022 | 598,209 |
| 2023 | 599,536 |
| 2024 | 653,135 |
| 2025 | 674,411 |
| 2026 | 689,621 |
| 2027 | 666,985 |
| 2028 | 654,486 |

### 3.2.2 Scenario 2: Wet Year Conditions

The wet year scenario corresponds to wet conditions applied to years 2021, 2025 and 2026, with year 2025 corresponding to a 100-year return period precipitation (Golder, August 2020). Other years present an average trend in terms of precipitation. Similar to Scenario 1, the observed monthly discharge from June 2018 to October 2020 and the predictions from year 2021 to year 2028 (provided by Golder, August 2020) for the wet year scenario were used as model inputs and are shown in Figure 3.3. Table 3.3 presents the corresponding annual discharge from year 2018 to year 2028. The discharge schedule is actually the same as Scenario 1 except for Years 2021, 2025, and 2026.

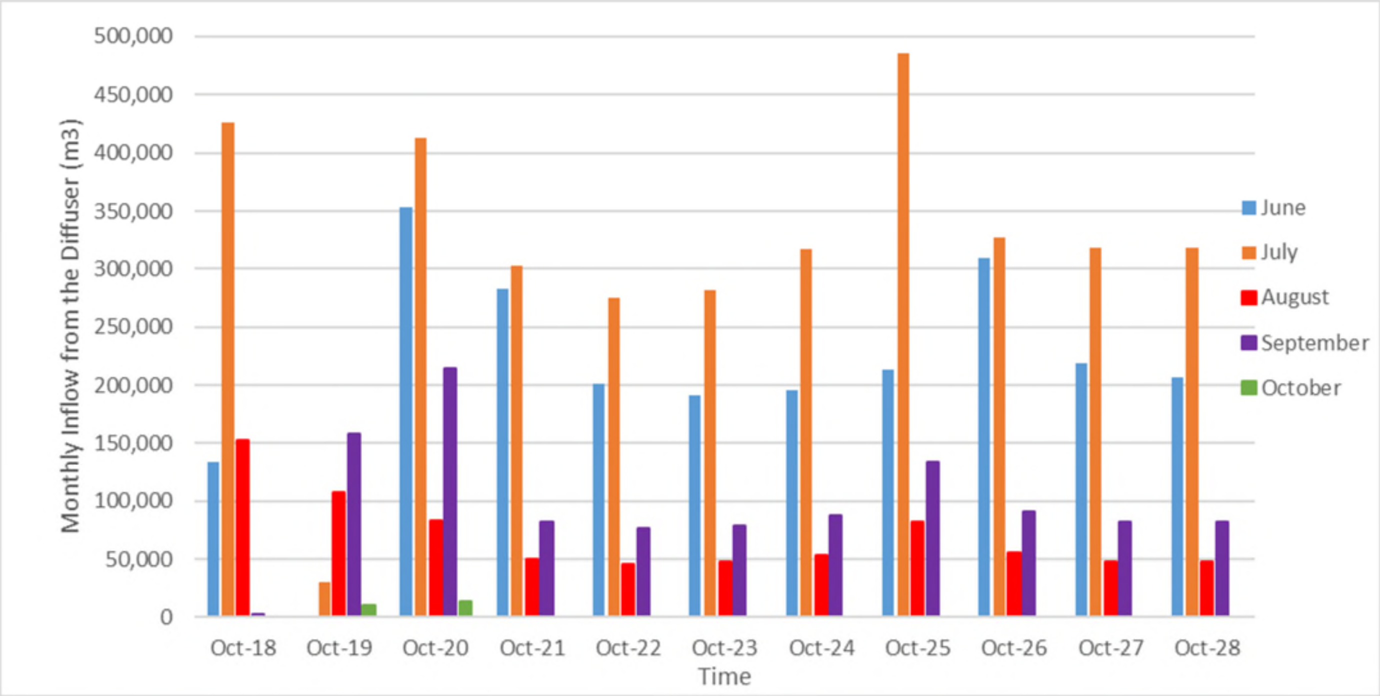


**Figure 3.3: Updated Monthly Inflow from the Diffuser Spanning from Year 2018 to Year 2028 for Wet Year Case**

## Table 3.3: Updated Annual Discharge Inputs during Wet Year Case

| Year | Annual Discharge ($m^3$/year) |
|---|---|
| 2018 | 715,532 |
| 2019 | 306,773 |
| 2020 | 1,078,095 |
| 2021 | 717,659 |
| 2022 | 598,209 |
| 2023 | 599,536 |
| 2024 | 653,135 |
| 2025 | 914,662 |
| 2026 | 783,168 |
| 2027 | 666,985 |
| 2028 | 654,486 |

# 4.0 RESULT

## 4.1 Scenario 1: Base Case Conditions

Effluent discharge was conducted from June to October (open-water season) spanning from year 2018 to year 2020 with continuous discharge as presented in Section 3.2.1. No ice was including in this modelling. TDS concentrations of the discharged effluent varied from year to year and are presented in Table 4.1.

- Measured TDS concentrations provided by AEM were used as input concentrations in the model for the discharged effluent from year 2018 to year 2020. Specifically, the effluent TDS concentration inputs to the model were determined as the averaged measured TDS concentration at site MEL-14.
- A conservative assumption was used with discharged TDS concentration value of 3,500 mg/L (the discharge criteria requested by Agnico Eagle) for the prediction years from 2021 to 2028.

### Table 4.1: Discharged TDS Concentration Inputs

| Year | Discharged Effluent TDS Concentration Inputs to the Model (mg/L) |
|---|---|
| 2018 | 1,097 |
| 2019 | 1,119 |
| 2020 | 1,748 |
| From 2021 to 2028 | 3,500 |

In the model, a passive tracer was released with the effluent, allowing to quantify dilutions obtained within and at the edge of the mixing zone.

Figure 4.1 to Figure 4.11 present the minimum dilution obtained within the mixing zone (i.e., within 100-m) and at the 100-m mark characterizing the edge of the mixing zone from year 2018 to year 2028. Dilution at 100-m (yellow line) ranges between 100:1 and 30:1 most of the time. The trend shows a decrease in dilution (i.e. an increase of effluent concentration), which reflects the accumulation of effluent over time and from year to year. Predicted minimum dilution (corresponding to maximum concentration) achieved at the edge of the mixing zone for each year was summarized in Table 4.2.

Observations were undertaken to quantify dilutions in 2020 (Golder, October 2020). During the peak of the discharge, observed dilutions varied between 43:1 and 57:1 at the edge and within the mixing zone. In comparison, the modelled minimum dilution obtained in year 2020 was 34:1 with values ranging between 34:1 and 50:1 depending on the month. Comparison between averaged observed dilution and modelled dilution is presented in Table 4.3. The modelled results are well aligned with observations and tend to be slightly on the conservative side, since representing slightly lower dilutions (i.e. model presenting slightly higher concentrations).

Moreover, the modelled minimum dilution reached over the multi-year discharge (i.e. 26:1) is in agreement with the past work Tetra Tech conducted for the detailed design, where a minimum dilution of 23:1 was obtained (Tetra Tech 2017).

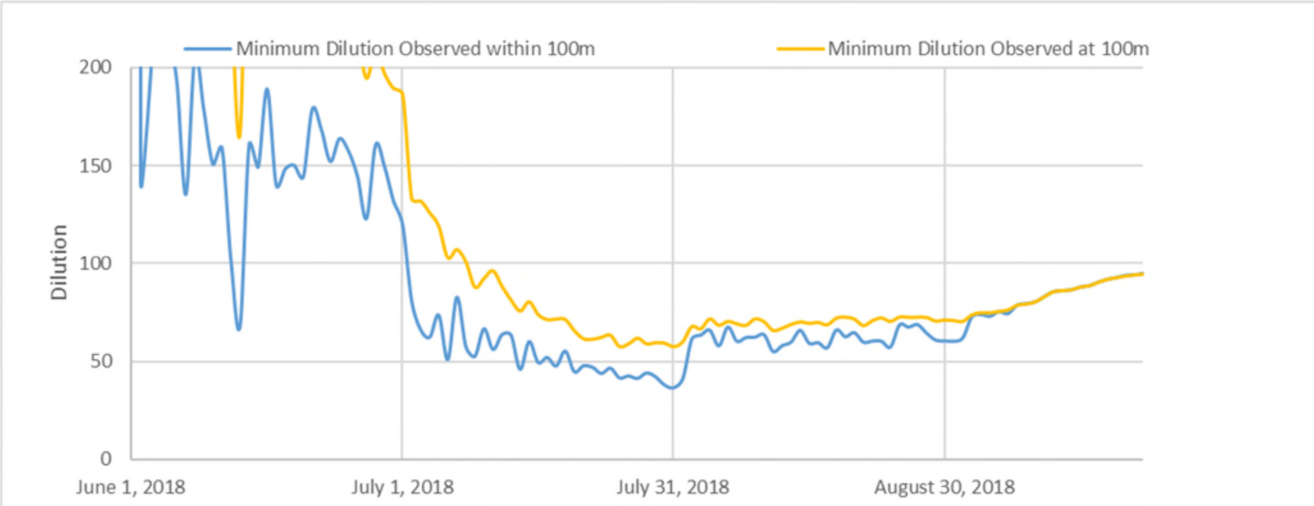


**Figure 4.1: Minimum Dilutions of Year 2018 for Base Case**

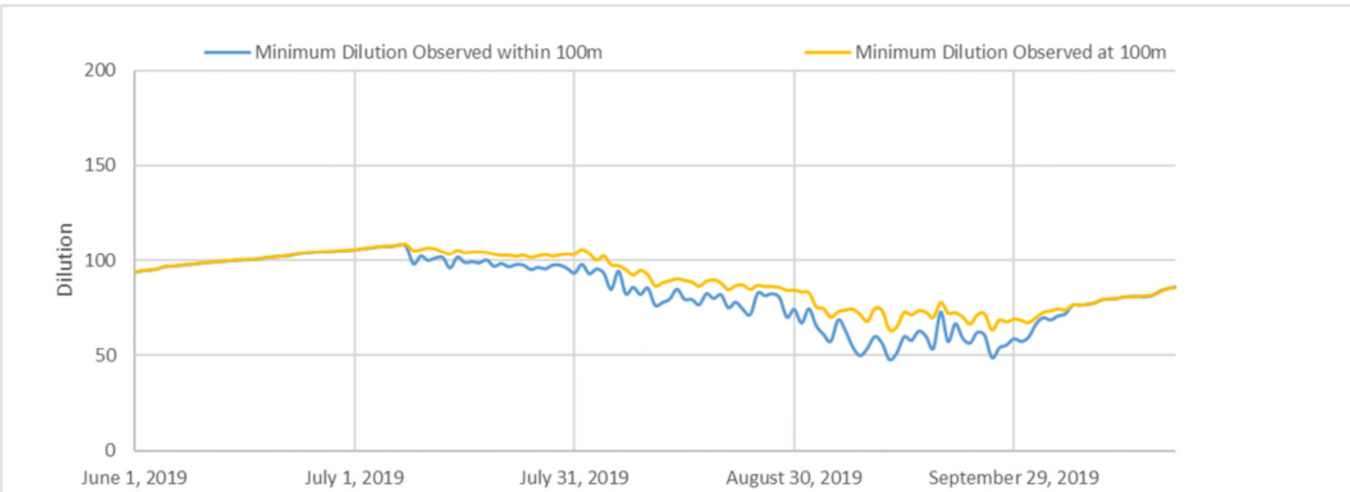


**Figure 4.2: Minimum Dilutions of Year 2019 for Base Case**

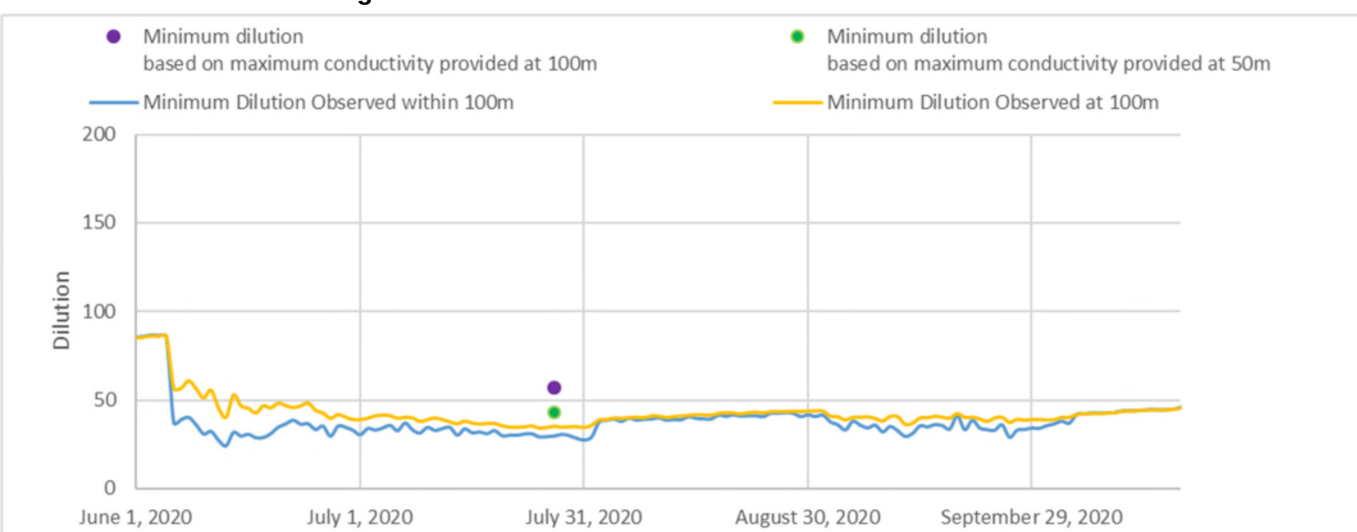


**Figure 4.3: Minimum Dilutions of Year 2020 for Base Case and Comparison with Observed Dilutions**

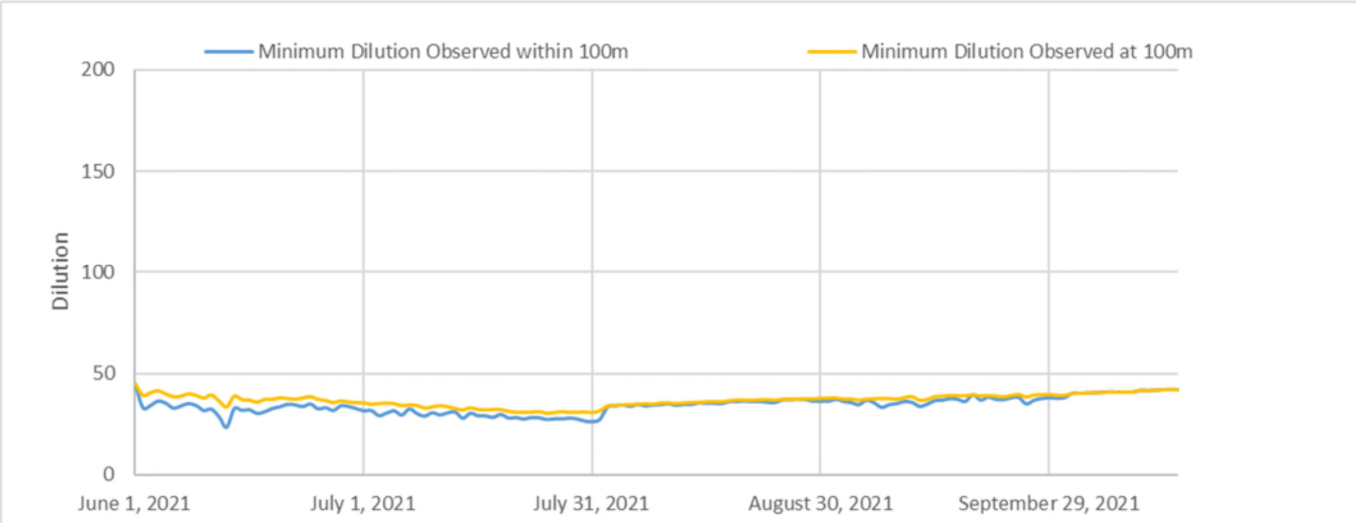


**Figure 4.4: Minimum Dilutions of Year 2021 for Base Case**

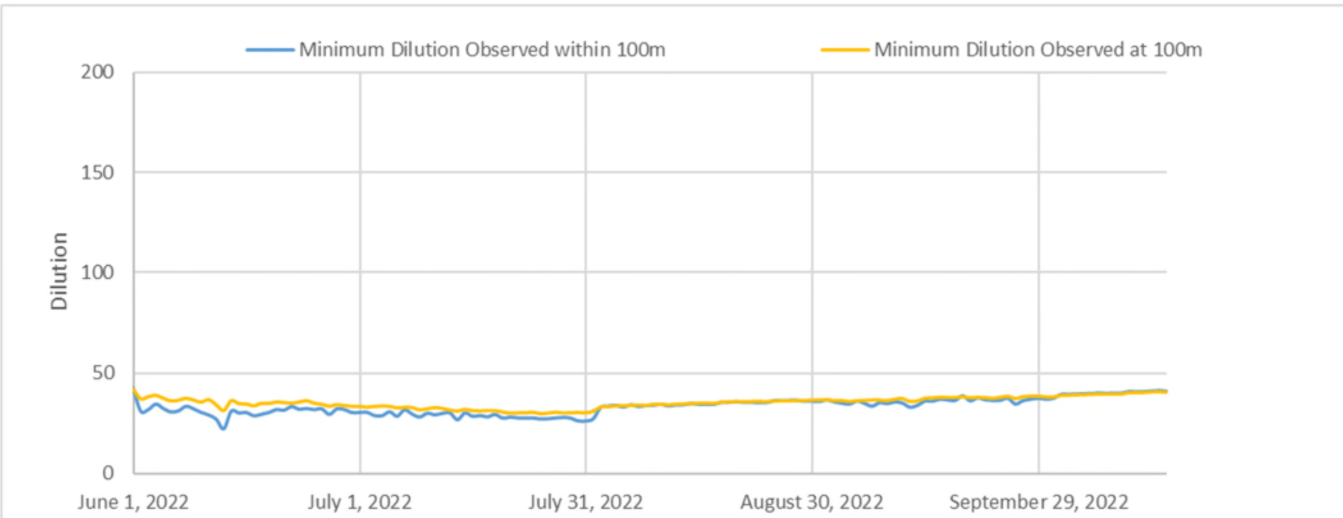


**Figure 4.5: Minimum Dilutions of Year 2022 for Base Case**

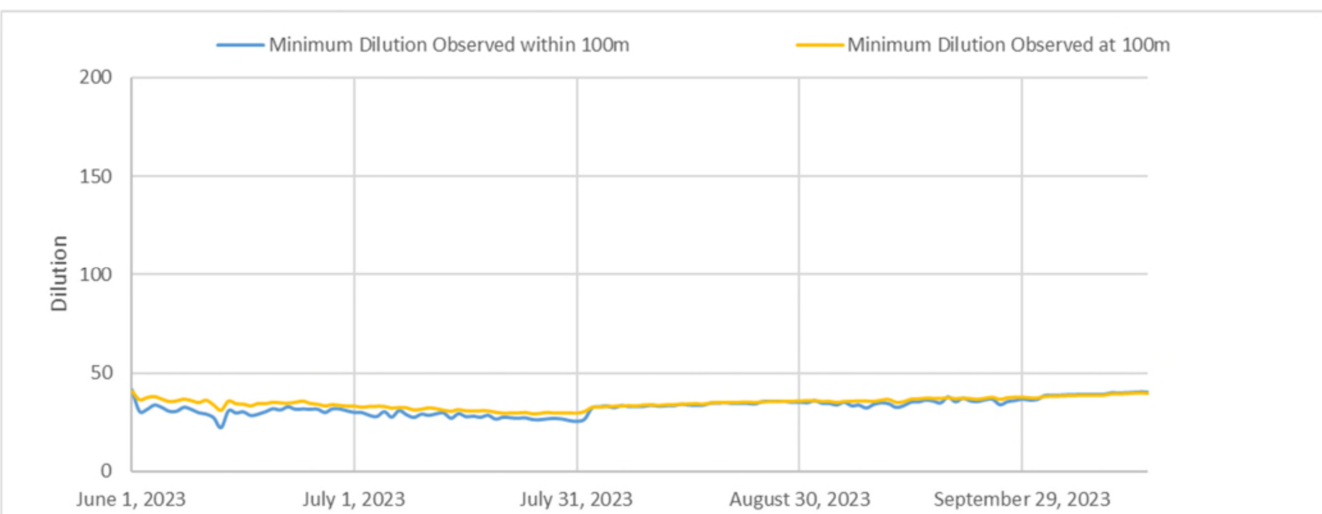


**Figure 4.6: Minimum Dilutions of Year 2023 for Base Case**

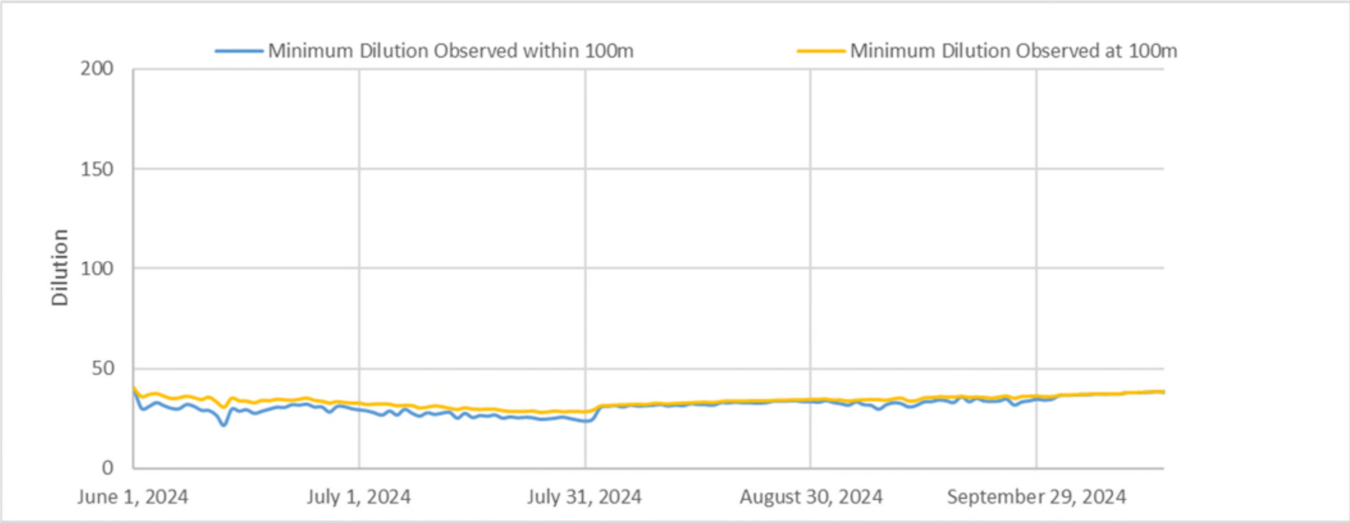


**Figure 4.7: Minimum Dilutions of Year 2024 for Base Case**

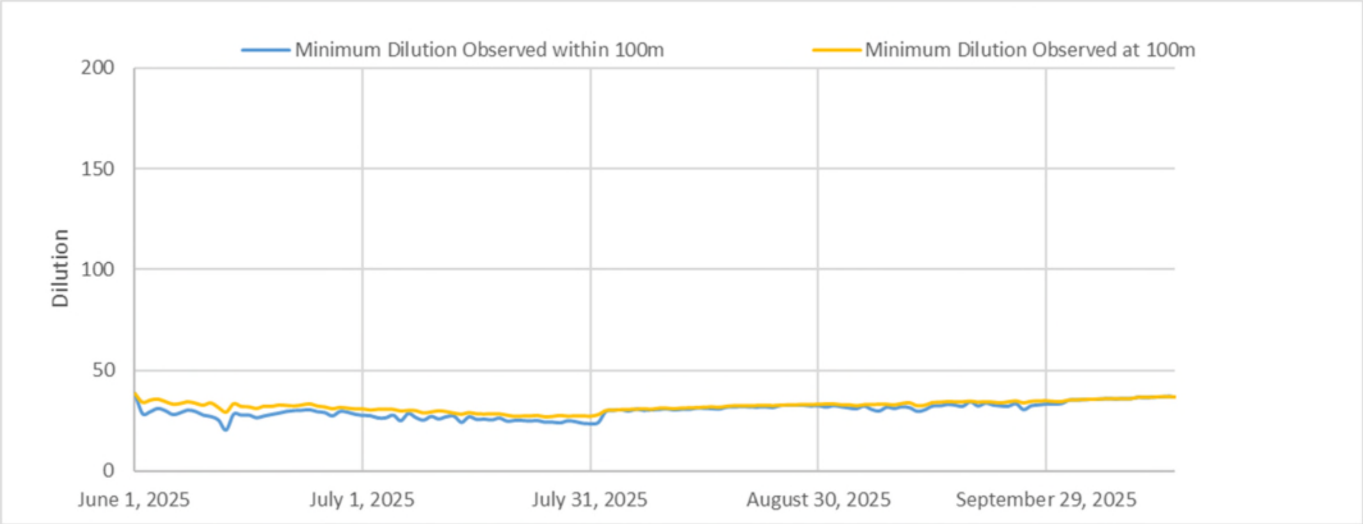


**Figure 4.8: Minimum Dilutions of Year 2025 for Base Case**

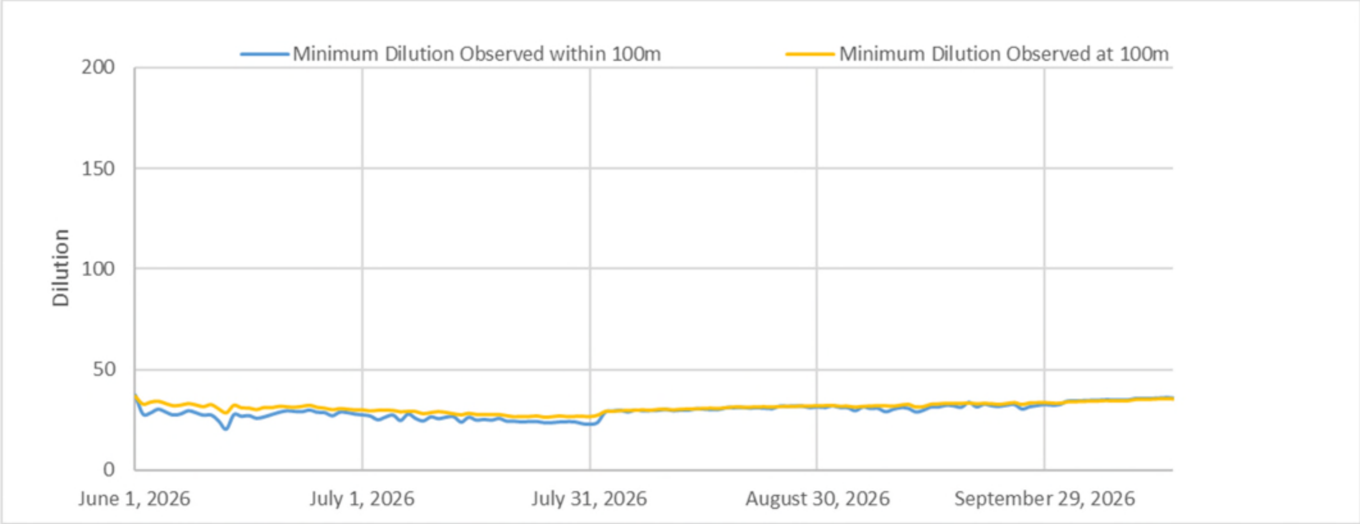


**Figure 4.9: Minimum Dilutions of Year 2026 for Base Case**

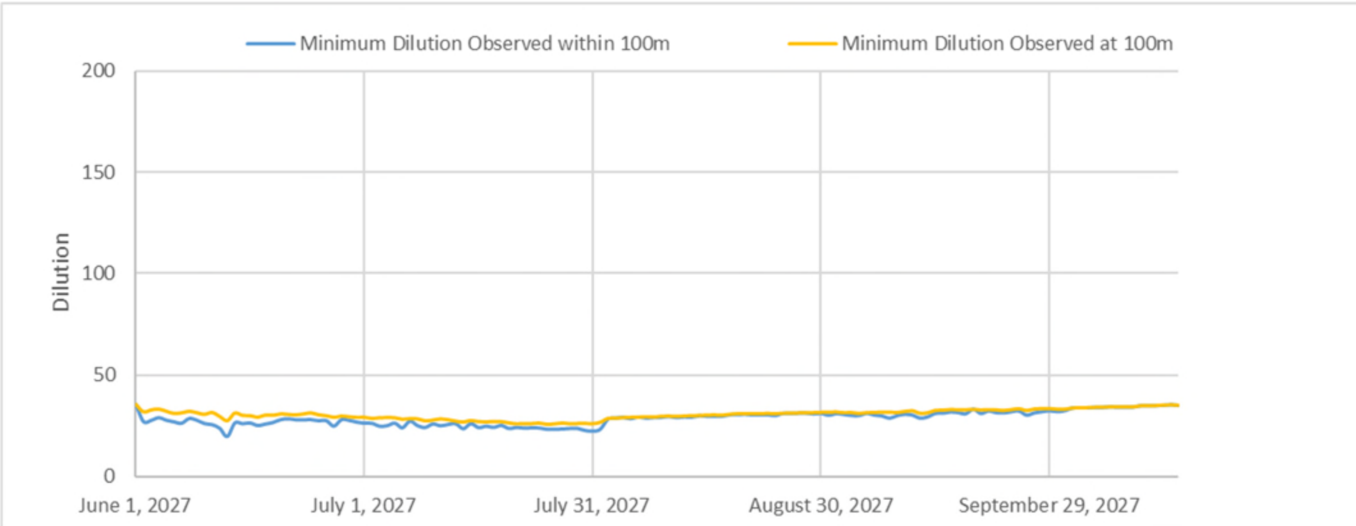


**Figure 4.10: Minimum Dilutions of Year 2027 for Base Case**

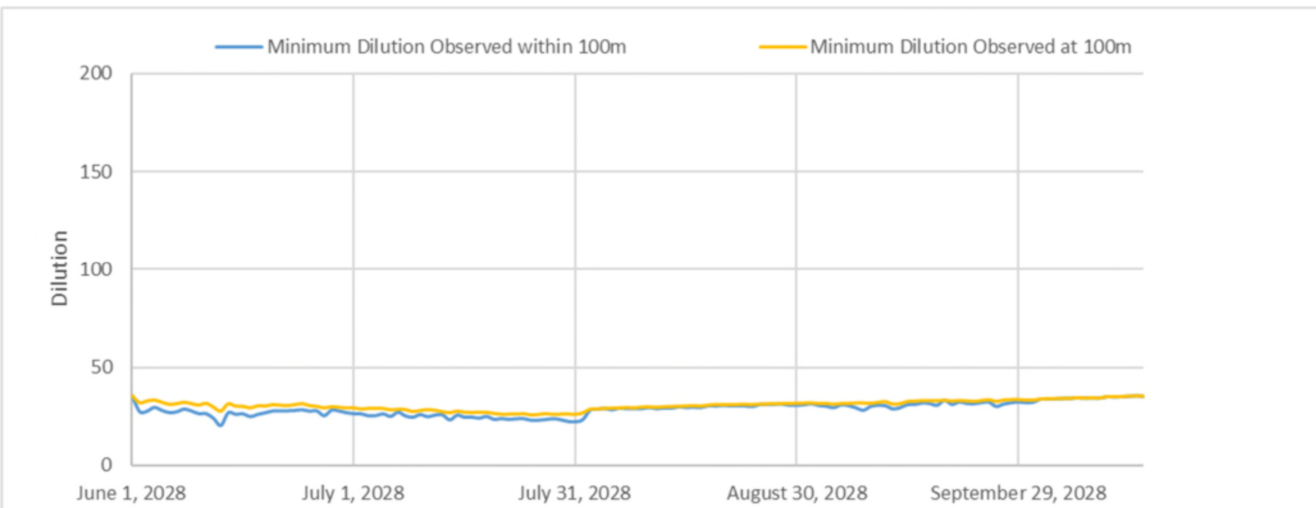


**Figure 4.11: Minimum Dilutions of Year 2028 for Base Case**

## Table 4.2: Minimum Dilution Reached at the Edge of the Mixing Zone for Each Year of Base Case

| Year | Minimum Dilution Reached at the Edge of the Mixing Zone |
|---|---|
| 2018 | 57:1 |
| 2019 | 63:1 |
| 2020 | 34:1 |
| 2021 | 30:1 |
| 2022 | 30:1 |
| 2023 | 29:1 |
| 2024 | 28:1 |

| | |
|---|---|
| 2025 | 27:1 |
| 2026 | 26:1 |
| 2027 | 26:1 |
| 2028 | 26:1 |

### Table 4.3: Averaged Dilution Obtained at the Edge of the Mixing Zone for Year 2020 during Base Case Conditions

| Year | Averaged Observed Dilution | Averaged Modelled Dilution |
|---|---|---|
| 2020 | 50:1 | 43:1 |

Figure 4.12 shows a plan-view map of the bottom layer tracer concentration, i.e. tracer concentration above the lakebed, in July 2028 therefore including the multi-year discharge. Note that the tracer is released with a concentration of 1 ($m^3/m^3$). A tracer concentration value of 0.1 corresponds to approximately a 10:1 dilution. Since the maximum tracer concentration in July 2028 is 0.035 around the diffuser, it corresponds to a dilution of approximately 28:1.

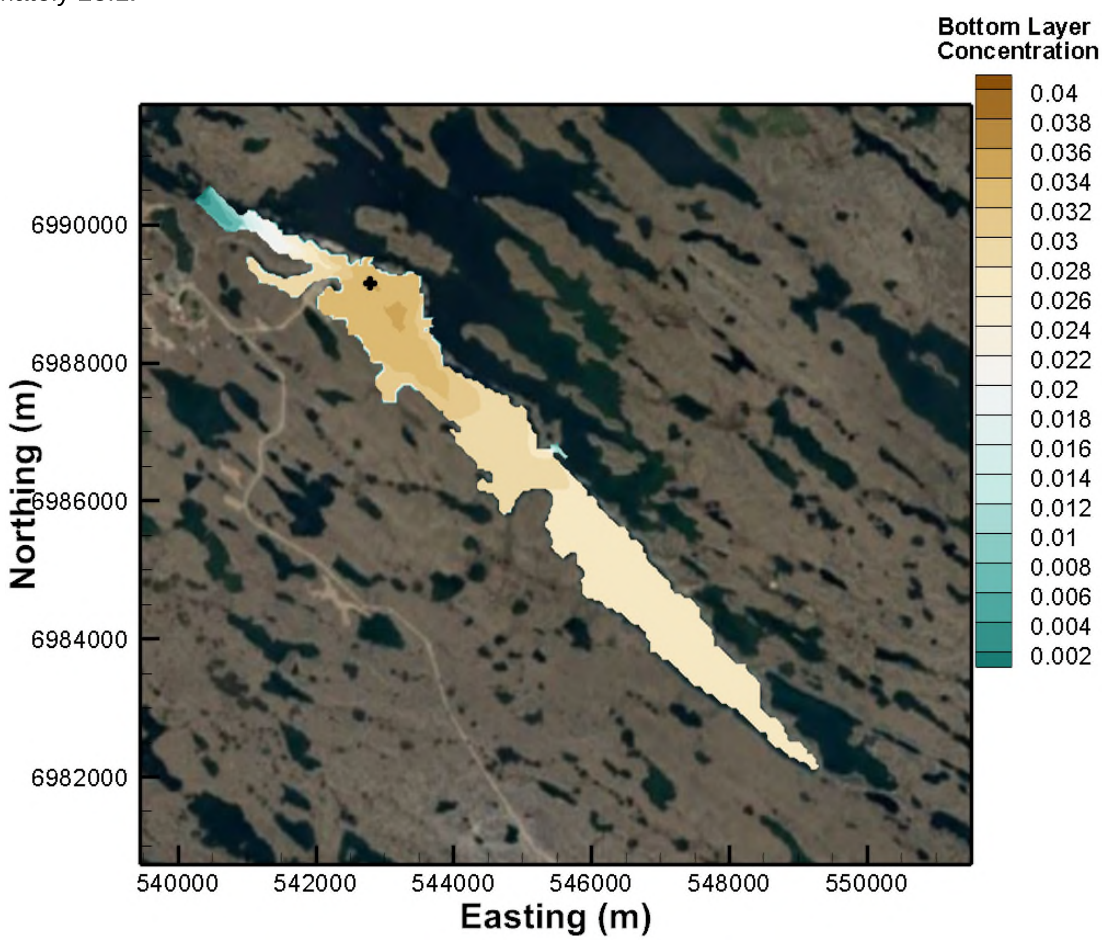


**Figure 4.12: Tracer Concentration Map of Bottom Layer in July 2028 for Base Case. Black point Represents Location of the Diffuser**

Table 4.4 presents the total volume of effluent present in the lake sub-basin (model domain) by end of each year. The difference between the total volume of effluent released and the total volume of effluent present in the sub-basin represents the quantity of effluent that went through the northwestern boundary into the main lake at very diluted concentrations. The ratio between the quantity of effluent present in the Meliadine Lake sub-basin and the total volume of the sub-basin reaches about 3% of the lake sub-basin. In other words, after 12 years of discharge, there is about 3% of the sub-basin composed of effluent at very dilute concentrations. As one can observe, the amount stabilizes after a few years, indicating a form of equilibrium taking place.

### Table 4.4: Volume of Effluent Present in the Lake Model Domain during Base Case Conditions

| Year | Total Volume of Effluent in the Lake Sub-basin ($m^3$) | Percent of Effluent Volume in South Basin Model Domain |
|---|---|---|
| 2018 | 584,302 | 1.1% |
| 2019 | 661,213 | 1.2% |
| 2020 | 1,220,058 | 2.3% |
| 2021 | 1,321,556 | 2.4% |
| 2022 | 1,362,416 | 2.5% |
| 2023 | 1,392,935 | 2.6% |
| 2024 | 1,454,428 | 2.7% |
| 2025 | 1,510,453 | 2.8% |
| 2026 | 1,561,013 | 2.9% |
| 2027 | 1,572,436 | 2.9% |
| 2028 | 1,577,173 | 2.9% |

Figure 4.13 to Figure 4.16 presents the maximum TDS concentration at the edge of the mixing zone from year 2018 to year 2021, incorporating the TDS effluent discharged (Table 4.1) combined with the observed background TDS concentration pre-discharge. This background TDS level was determined based on samplings in 2018 prior to the discharge starting in the lake and represents the average value of all samples: 41 mg/L. The maximum TDS concentration time series for year 2022 up to year 2028 is not presented in this document, since showing a similar pattern with year 2021 and with a TDS peak concentration of 170 mg/L reached on July 25 2028. This peak represents the maximum throughout the multi-year discharge.

A sampling program was undertaken since the beginning of the discharge (year 2018) to quantify TDS levels at the edge and within the mixing zone. These observations are represented as red dots in Figures 4.6, 4.7 and 4.8. As one can observe, the modelled TDS concentrations are well aligned with observations in general.

- The observations do show some variabilities but never exceed 110 mg/L.
- As an example, observed TDS concentration indicated a range mainly between 60 mg/L and 110 mg/L at the edge of the mixing zone after 3-year's discharge. The modelled TDS concentration was obtained in the same range reaching about 80 mg/L.

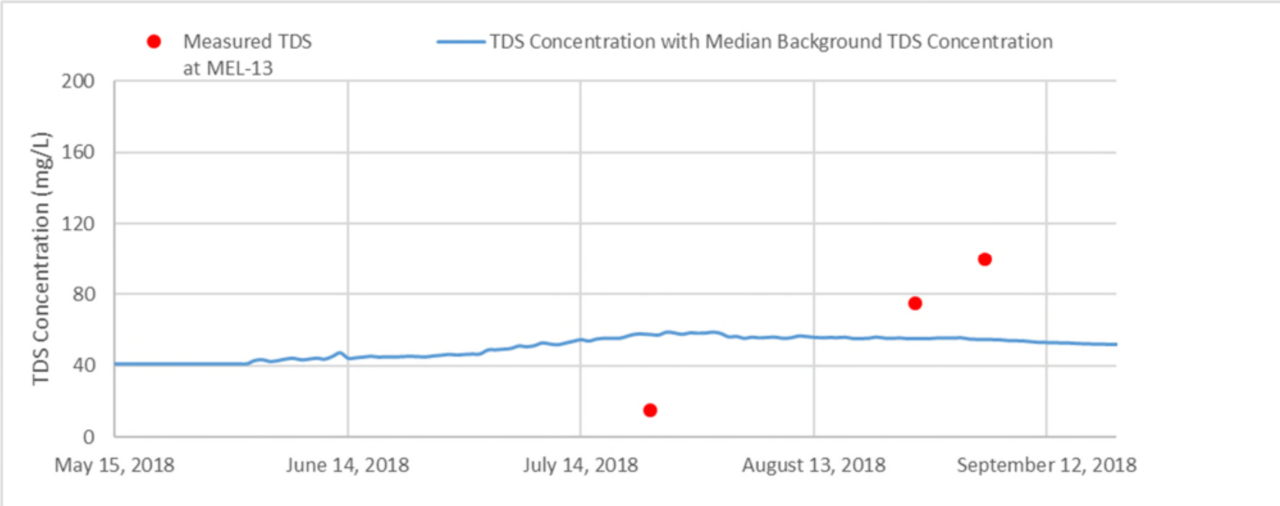


**Figure 4.13: Maximum TDS Concentration of Year 2018 (Base Case) and Comparison with Observed TDS**

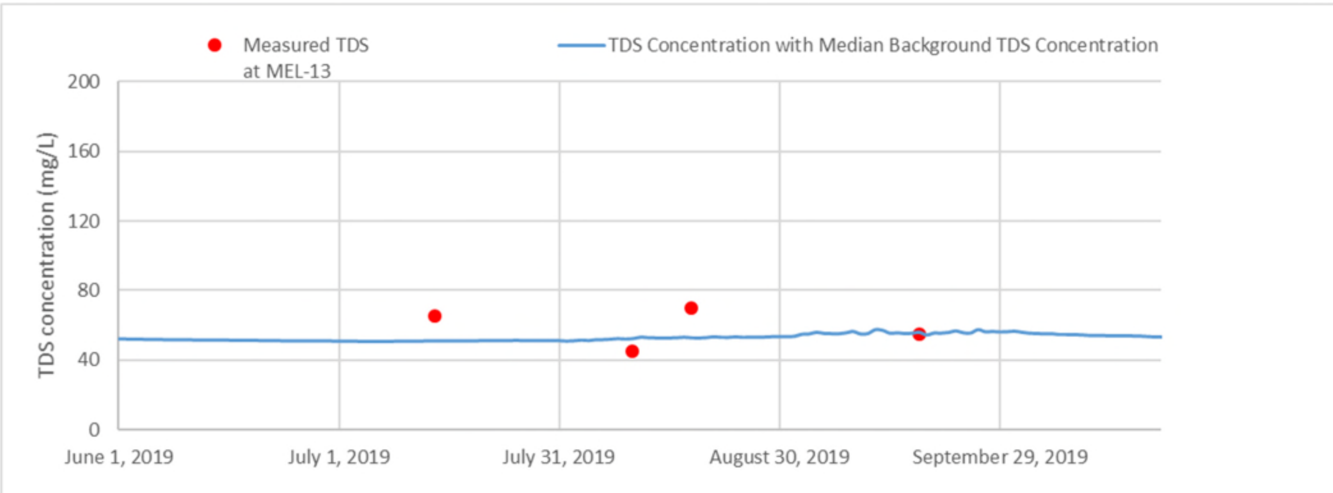


**Figure 4.14: Maximum TDS Concentration of Year 2019 (Base Case) and Comparison with Observed TDS**

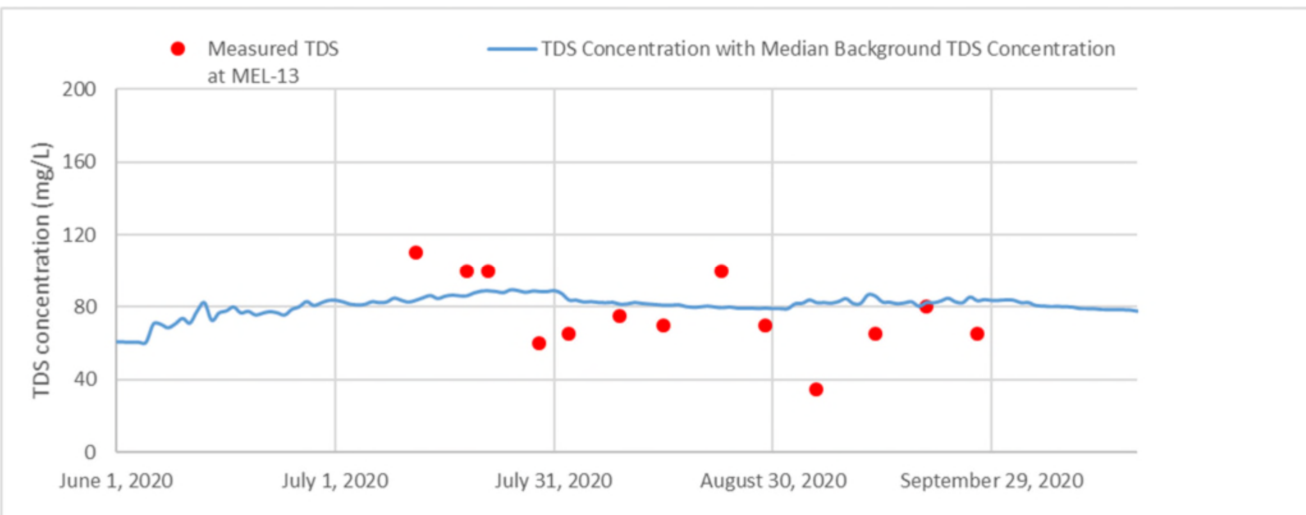


**Figure 4.15: Maximum TDS Concentration of Year 2020 (Base Case) and Comparison with Observed TDS**

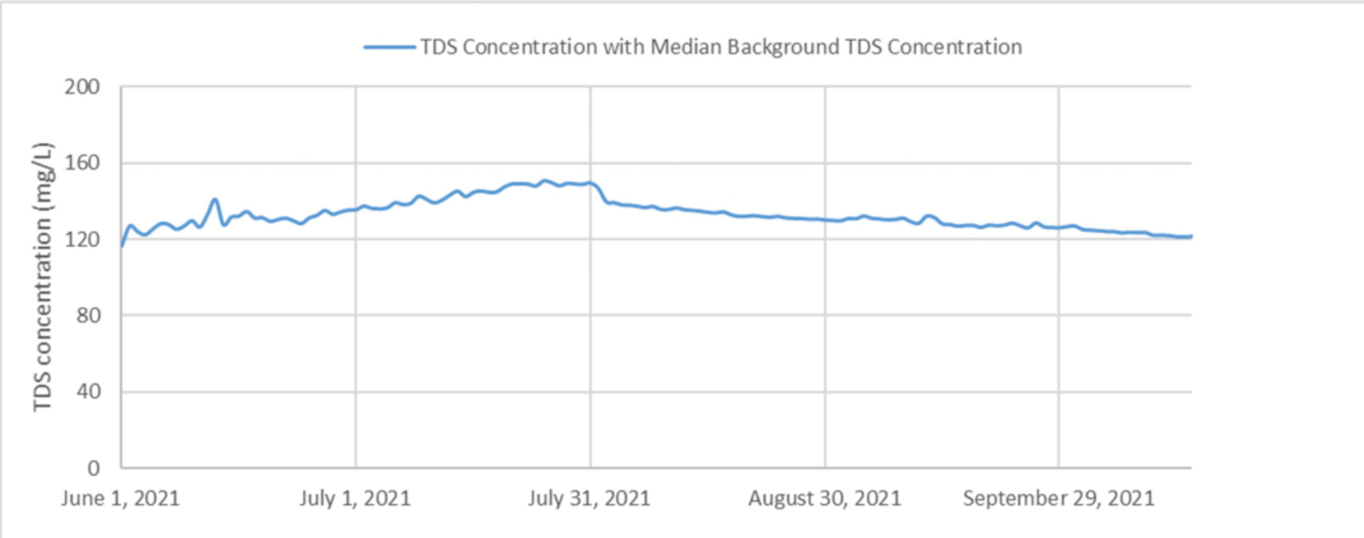


**Figure 4.16: Maximum TDS Concentration of Year 2021 for Base Case**

Table 4.5 presents the comparison between averaged observed TDS concentration and averaged modelled TDS concentration for the existing years from 2018 to 2020. Averaged modelled TDS concentrations are very similar with the averaged observed TDS concentration for all three years although some fluctuations were observed in the measured samples.

### Table 4.5: Average TDS Concentration Reached at the Edge of the Mixing Zone for Each Year of Base Case

| Year | Modelled TDS Concentration (mg/L) | Observed TDS Concentration (mg/L) |
|---|---|---|
| 2018 | 56 | 63 |
| 2019 | 53 | 58 |
| 2020 | 83 | 77 |

Table 4.6 outlines the maximum modelled TDS concentration from year 2018 to year 2028 obtained at the edge of the mixing zone. Based on the results described above, Table 4.7 summarizes the number of exceedances for the 1,000 mg/L TDS concentration thresholds at the edge of the mixing zone (100-m radius from the diffuser location) over the multi-year discharge. No exceedances were obtained.

### Table 4.6: Maximum TDS Concentration Reached at the Edge of the Mixing Zone for Each Year of Base Case

| Year | Maximum Modelled TDS Concentration (mg/L) |
|---|---|
| 2018 | 59 |
| 2019 | 58 |
| 2020 | 89 |

| | |
|---|---|
| 2021 | 150 |
| 2022 | 153 |
| 2023 | 155 |
| 2024 | 160 |
| 2025 | 164 |
| 2026 | 168 |
| 2027 | 169 |
| 2028 | 170 |

### Table 4.7: Number of Exceedances of the 1,000 TDS Concentration at the edge of Mixing Zone Over 10-year Discharge for Base Case

| Exceedance of the 1,000 mg/L TDS Concentration |
|---|
| 0 |

## 4.2 Scenario 2: Wet Year Conditions

A second simulation was conducted, taking into account of some potential wet years with more precipitation. Similar to Scenario 1 – Base Case, the discharge was conducted from June to October spanning from year 2018 to year 2020 with continuous discharge as shown in Section 3.2.2. TDS concentration of the discharged effluent remained the same as base case as presented in Table 4.1.

Since only three years post 2020 represents a change in terms of discharge schedule, the comparison between modelled and observed in 2018/2019/2020 remains the same as Scenario 1. Predicted minimum dilution (corresponding to maximum concentration) achieved at the edge of the mixing zone for each year was summarized in Table 4.8. The modelled minimum dilution reached over the multi-year discharge (i.e. 25:1) is in agreement with the past work Tetra Tech has conducted for the detailed design (i.e. 23:1, Tetra Tech 2017).

### Table 4.8: Minimum Dilution Reached at the Edge of the Mixing Zone for Each Year of Wet Year Case

| Year | Minimum Dilution Reached at the Edge of the Mixing Zone |
|---|---|
| 2018 | 57:1 |
| 2019 | 63:1 |
| 2020 | 34:1 |
| 2021 | 29:1 |
| 2022 | 29:1 |

| | |
|---|---|
| 2023 | 29:1 |
| 2024 | 28:1 |
| 2025 | 23:1 |
| 2026 | 23:1 |
| 2027 | 24:1 |
| 2028 | 25:1 |

Figure 4.17 shows the lakebed (bottom layer) tracer concentration map in mid 2028 in July after the multi-year discharge. Black point represents the diffuser location. The maximum tracer concentration at this time reaches 0.038 in the vicinity of the diffuser, representing a dilution of approximately 26:1. Note that the tracer was released with an initial concentration of 1.

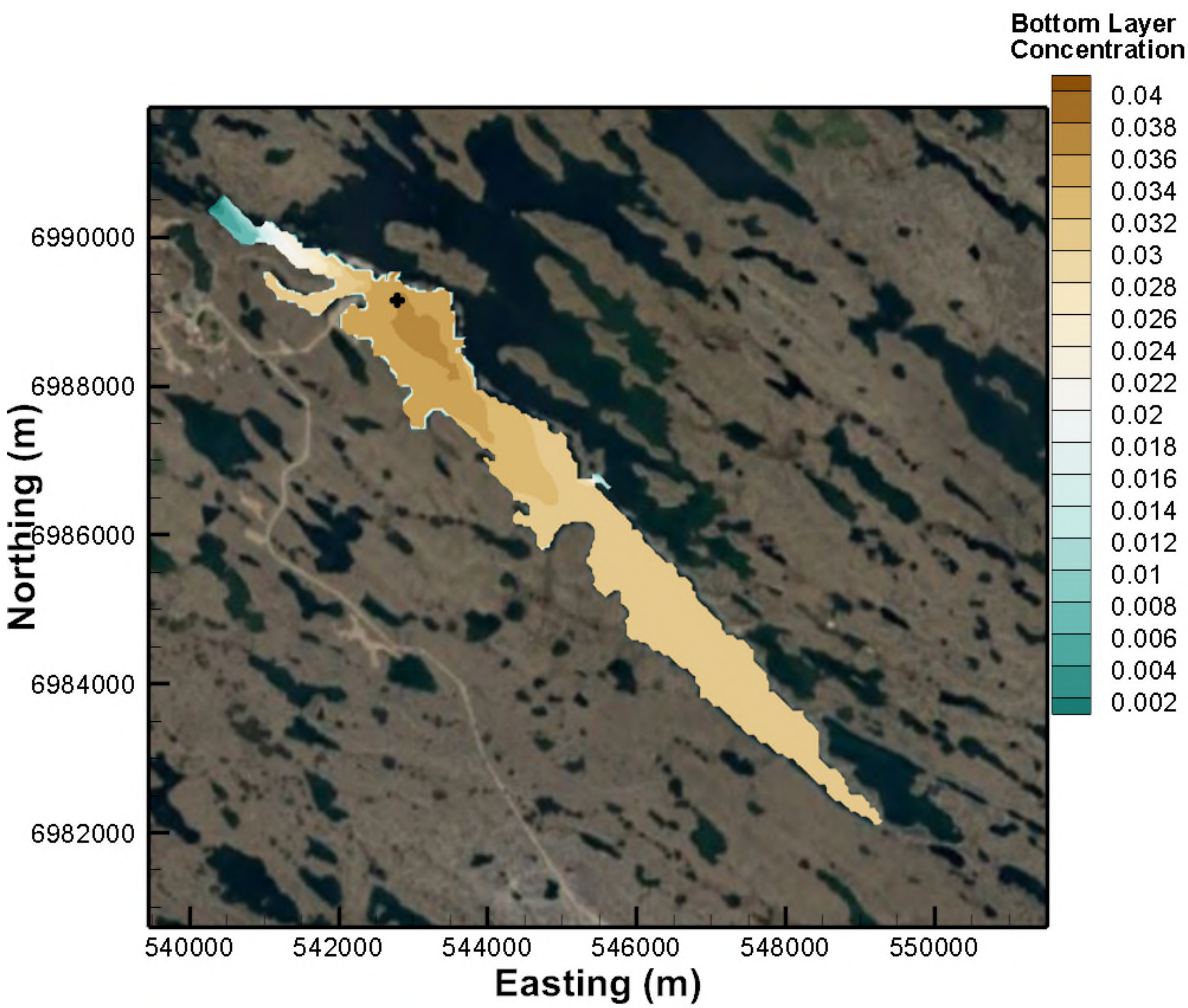


**Figure 4.17: Tracer Concentration Map of Bottom Layer in July 2028 for Wet Year Case. Black Point Represents Location of the Diffuser**

Table 4.9 presents the total volume of effluent present in the lake sub-basin (model domain) by end of each year. The difference between the total volume of effluent released and the total volume of effluent present in the sub-basin represents the quantity of effluent that went through the northwestern boundary into the main lake at very diluted concentrations.

Similar to the Base Case Scenario, one can observe a stagnation around 3% after several years of discharge. The quantity of effluent present in the sub-basin is slightly higher in this wet case scenario (reaching 1.75 $Mm^3$) compared to the Base Case Scenario reaching about 1.58 $Mm^3$. This difference is due to:

- The schedule of the discharge (most of it occurring within two months each year) is quicker than the time length for the released effluent to diffuse and reach the northwestern boundary of the model, leading to a significant increase in effluent present in the sub-basin during Year 2025 (wet year) for example.
- While the quantity of effluent present in the sub-basin was plateauing in the Base Case Scenario, it did not reach its maximum volume, with slight increases that can be observed from year 2026 to 2027 to 2028.

Therefore, based on results from the wet year scenario, the maximum effluent present in the sub-basin appears to be approximately 1.7 $Mm^3$.

### Table 4.9: Volume of Effluent Present in the Lake Model Domain during Wet Year Conditions

| Year | Total Volume of Effluent in the Lake ($m^3$) | Percent of Effluent Volume in South Basin Model Domain |
|---|---|---|
| 2018 | 585,946 | 1.1% |
| 2019 | 662,006 | 1.2% |
| 2020 | 1,222,348 | 2.3% |
| 2021 | 1,373,092 | 2.5% |
| 2022 | 1,400,824 | 2.6% |
| 2023 | 1,419,876 | 2.6% |
| 2024 | 1,472,624 | 2.7% |
| 2025 | 1,698,987 | 3.1% |
| 2026 | 1,750,844 | 3.2% |
| 2027 | 1,707,881 | 3.2% |
| 2028 | 1,669,712 | 3.1% |

Maximum TDS concentration at the edge of the mixing zone from year 2018 to year 2020 stays the same as Scenario 1 – Base Case, with difference starting from year 2021 and onward. Table 4.10 presents the maximum TDS concentrations from year 2018 to year 2028. Peak TDS concentration of 183 mg/L was obtained on July 25 2026 throughout the multi-year discharge.

### Table 4.10: Maximum TDS Concentration Reached at the Edge of the Mixing Zone for Each Year of Wet Year Scenario

| Year | Modelled TDS Concentration (mg/L) |
|---|---|
| 2018 | 59 |
| 2019 | 58 |
| 2020 | 89 |
| 2021 | 156 |
| 2022 | 155 |
| 2023 | 157 |
| 2024 | 161 |
| 2025 | 182 |
| 2026 | 183 |
| 2027 | 179 |
| 2028 | 176 |

Based on the results described above, Table 4.11 summarizes the number of exceedances for the 1,000 mg/L TDS concentration thresholds at the edge of the mixing zone (100-m radius from the diffuser location) over the 10-year discharge. No exceedances were obtained.

### Table 4.11: Number of Exceedances of the 1,000 TDS Concentration at the edge of Mixing Zone Over 10-year Discharge for Wet Year Scenario

| Exceedance of the 1,000 mg/L TDS Concentration |
|---|
| 0 |

# 5.0 CONCLUSION

This report presents the fate and behavior of the effluent discharge in Meliadine Lake. It quantifies dilutions/concentrations of the discharged effluent throughout Meliadine Lake sub-basin, and in particular at the edge of the mixing zone.

A 3-D hydrodynamic modelling coupled with a plume model was used over a multi-year simulation period ranging from year 2018 up to year 2028 to assess these dilutions. While covering multiple years, the modelling approach focused on the open-water season and excluded the winter months from the simulation. This resulted in a conservative approach, as the additional mixing and dilution occurring during the winter months, while limited, were therefore not simulated. Therefore, the modelling resulted in slightly higher concentrations in the lake sub-basin.

Two scenarios were produced, representing base-year conditions and wet-year conditions. Dilutions/concentrations at the edge of the mixing zone for each scenario were assessed. The main conclusions are highlighted below:

- Concentrations/dilutions for two scenarios:
  - Minimum modelled dilution achieved at the edge of the mixing zone over the multi-year simulation is 26:1 for the base case and 25:1 for the wet year scenario.
  - Maximum modelled TDS concentration at the edge of mixing zone is 170 mg/L over the multi-year simulation for the base case and 183 mg/L for the wet year scenario assuming conservative discharge concentration of 3,500 mg/L from 2021 to 2028.
  - No exceedances of the 1,000 TDS concentration threshold were observed at the edge of the mixing zone, respectively for both scenarios.
- Comparisons with observed TDS concentration/dilution:
  - Following three years of discharge, i.e. year 2020, the minimum modelled dilution of 34:1 is well aligned with the minimum observed dilution of 41:1.
  - Averaged TDS concentrations agree well with the observed TDS concentrations for the existing years of 2018, 2019 and 2020 as presented in Table 5.1, with 53 mg/L modelled vs 58 mg/L observed in 2019 as an example.

### Table 5.1: Average TDS Concentration Reached at the Edge of the Mixing Zone for Each Year of Base Case

| Year | Modelled TDS Concentration (mg/L) | Observed TDS Concentration (mg/L) |
|---|---|---|
| 2018 | 56 | 63 |
| 2019 | 53 | 58 |
| 2020 | 83 | 77 |

Based on the results summarized above, the existing diffuser shows its adequacy to quickly and efficiently mix an effluent containing up to 3,500 mg/L TDS concentration, with maximum TDS concentrations in the sub-basin indicated to be less than 200 mg/L after a multi-year discharge period.

# 6.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.





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# REFERENCES

Agnico Eagle Mines, *Final Environmental Impact Assessment – Meliadine Gold Project* – Report, 2014.

Golder, *Meliadine Site Water Balance and Water Quality Model* Report, August 2020.

Tetra Tech, *Meliadine Lake Diffuser Design* Report, May 2017.

# APPENDIX A

## LIMITATIONS ON THE USE OF THIS DOCUMENT

# GENERAL CONDITIONS

## HYDROTECHNICAL

This report incorporates and is subject to these "General Conditions".

### 1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. The report may include plans, drawings, profiles and other supporting documents that collectively constitute the report (the "Report").

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Both electronic file and hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

### 1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Report have been conducted in accordance with the Services Agreement, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Report.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

### 1.4 ENVIRONMENTAL AND REGULATORY ISSUES

Unless expressly agreed to in the Services Agreement, TETRA TECH was not retained to investigate, address or consider, and has not investigated, addressed or considered any environmental or regulatory issues associated with the project.

### 1.5 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Services Agreement, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

### 1.6 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Report, TETRA TECH may have relied on information provided by persons other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

### 1.7 GENERAL LIMITATIONS OF REPORT

This Report is based solely on the conditions present and the data available to TETRA TECH at the time the Report was prepared.

The Client, and any Authorized Party, acknowledges that the Report is based on limited data and that the conclusions, opinions, and recommendations contained in the Report are the result of the application of professional judgment to such limited data.

The Report is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present at or the development proposed as of the date of the Report requires a supplementary investigation and assessment.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design, in consideration of the level of the hydrotechnical information that was reasonably acquired to facilitate completion of the design.

The Client acknowledges that TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

### 1.8 JOB SITE SAFETY

TETRA TECH is only responsible for the activities of its employees on the job site and was not and will not be responsible for the supervision of any other persons whatsoever. The presence of TETRA TECH personnel on site shall not be construed in any way to relieve the Client or any other persons on site from their responsibility for job site safety.