THE CORPORATION OF THE TOWNSHIP OF PUSLINCH
December 5, 2018 COUNCIL MEETING

AGENDA

DATE: Wednesday, December 5, 2018
REGULAR MEETING: 1:00 P.M.
CLOSED MEETING: Following the regular meeting

≠ Denotes resolution prepared

1. Call the Meeting to Order

2. Disclosure of Pecuniary Interest & the General Nature Thereof.

3. **CLOSED ITEMS ≠**

   (a) Confidential Verbal Report from Karen Landry, CAO/Clerk and Gerald Moore, Chief Building Official regarding personal matters about an identifiable individual, including municipal or local board employees and labour relations or employee negotiations with respect to the Building Department.
   (b) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board with respect to an application for judicial review-Swastika Trail.

4. Adoption and Receipt of Minutes of the Previous Meeting.≠

   (a) Public Meeting – November 21, 2018
   (b) Council Meeting – November 21, 2018
   (c) Closed Council Meeting – November 21, 2018

5. Business Arising Out of the Minutes.

6. **PUBLIC MEETINGS**

7. **COMMUNICATIONS**

   1. 2017 Financial Information Return Data Review
      (a) Correspondence from the Ministry of Municipal Affairs and Housing dated November 23, 2018.

   2. City of Guelph Aqueduct Presentation- responses to questions raised at the November 21, 2018 Puslinch Council Meeting.
      (a) Correspondence from the City of Guelph dated November 23, 2018.

3. CBM Aggregates Puslinch (PQA) Pit Acoustical Audit 2018 Puslinch Quality Aggregates (PQA) Pit (License # 17600) North Half Lot 26, Conc. 1.
   (a) Correspondence from Aercoustics Engineering Ltd. dated November 9, 2018.

4. CBM Aggregated, McMillan Pit (License #5737), Comments on the 2017 Water monitoring report
   (a) Review of the 2017 Water Monitoring Report by GWS Ecological & Forestry Services Inc.
   (b) CBM Aggregates, McMillian Pit (5737) 2017 water monitoring report.

5. Roszell Pit, overview of Biological and Aquatic Monitoring Results: 2012-2017
   (a) Correspondence from GWS Ecological & Forestry Services Inc.
   (b) 2017 Groundwater Monitoring Report by Groundwater Science Corp.
   (c) 2017 Ecological and Aquatic Monitoring Report by Dance Environmental.

6. Conference delegations
   a. Rural Ontario Municipal Association January 27 - 29, 2019
   b. Ontario Good Roads February 24 –27, 2019

1. **Intergovernmental Affairs≠**

(a) Various correspondence for review.

8. DELEGATIONS / PRESENTATIONS ≠

1:05 p.m. – Inspector Scott Lawson Ontario Provincial Police Detachment Commander with respect to The New Legalization of Cannabis and how it might affect Policing and the Community

1:35 p.m. – Silvana Sangiuliano with respect to Staff Report ADM-2018-042 Cannabis Update- Retail Stores

1:45 p.m. - Wayne Wood – Senior Consulting Engineer & Project Manager, Urban and Environmental Management Inc. and John Murphy - Municipal Finance Specialist, DFA Infrastructure International Inc. with respect to Puslinch Asset Management

9. REPORTS

1. **Puslinch Fire and Rescue Services**

None

2. **Finance Department**

   (a) FIN-2018-033 Annual Indexing of Development Charges
   (b) FIN-2018-034 Ontario regulation 588/17, Asset Management Planning

3. **Administration Department**

   (a) Resolution appointing Mayor Chris White, Guelph-Eramosa to the Grand River Conservation Authority
   (b) ADM-2018-036 Feasibility Study for Municipal Water and Wastewater Services – Commercial/Industrial – Aberfoyle Area
   (c) ADM-2018-040 Committee Governance Review
   (d) ADM-2018-042 Cannabis Update – Retail Stores

4. **Planning and Building**

   (a) PD-2018-010 Telecommunication Application File A12/BEL– Bell Mobility- Site location Concession Gore Part Lot 23, Parts 2 and 4, municipally known as 7094 Gore Road

5. **Roads & Parks Department**

   None

6. **Recreation Department**

   None

7. **Mayor’s Updates**

   None

10. NOTICES OF MOTION

None

11. COMMITTEE MINUTES

None

12. MUNICIPAL ANNOUNCEMENTS

13. **UNFINISHED BUSINESS**

14. **BY-LAWS** ≠

(a) Being a by-law to amend By-law 012-2018 being the By-law to adopt the Council, Committees and Other Appointments – Compensation, Benefits and Expense Policy and to Repeal By-law No. 020-2017.

15. **CONFIRMING BY-LAW** ≠

(a) By-law to confirm the proceedings of Council for the Corporation of the Township of Puslinch.

16. **ADJOURNMENT** ≠

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH
PUBLIC MEETING MINUTES

DATE: **November 21, 2018**

TIME: **6:30 p.m.**

PLACE: **Township of Puslinch Municipal Building – Council Chambers**

FILE NUMBER: **Zoning Amendment File D14/PIE**
Pier Property Inc.
267 Brock Road South

MEMBERS: **Mayor Dennis Lever - Chair**
Councillor Ken Roth
Councillor John Sepulis
Councillor Matthew Bulmer
Councillor Susan Fielding

The Chair welcomed those attending the Public Meeting.

No pecuniary interest was declared by any member of Council.

The Chair advised the purpose of the Public Meeting is to inform and provide the public with the opportunity to ask questions, or to express views with respect to the proposed Zoning By-law Amendment commenced by the applicant Pier Property Inc., located at 267 Brock Road South.

The Chair advised that the members of Council are here to observe and listen to public comments; however, they will not provide a position on the matter.

The Chair informed attendees when Council makes a decision, should you disagree with that decision, the Planning Act provides you with an opportunity to appeal this application to the Local Planning Appeal Tribunal for a hearing. Please note that if a person or public body does not make oral submissions at a public meeting or written submissions to the Township of Puslinch before the decision is made, the person or public body is not entitled to appeal the decision of the Township of Puslinch to the Local Planning Appeal Tribunal. In addition, if a person or public body does not make an oral submission at a public meeting, or make written comments to the Township of Puslinch before the decision is made, the person or public body may not be added as a party to the hearing of an appeal before the Local Planning Appeal Tribunal unless, in the opinion of the Tribunal, there are reasonable grounds to do so.

The Chair noted that the Planning Act requires that at least one Public Meeting be held for each development proposal.

The Chair instructed the format of the Public Meeting is as follows:

- The applicant will present the purpose and details of the application and any further relevant information.
- Following this the public can obtain clarification, ask questions and express their views on the proposal.
- The applicant and staff will attempt to answer questions or respond to concerns this evening. If this is not possible, the applicant and/or staff will follow up and obtain this information. Responses will be provided when this matter is brought forward and evaluated by Council at a later date.

Presentations

Jeff Buisman of Van Harten Surveying Inc., agent, presented the application to amend Township of Puslinch Zoning By-law 19/85 to rezone the severed lands from Agricultural (A) to Highway Commercial (C2) and to rezone the retained parcel from Agricultural (A) to Industrial (IND); related to County of Wellington severance B149/17.

Question/Comments

There were no questions or comments from the Public.

The Chair called an end to the public meeting and advised that Council would not be taking action on this proposal tonight.

Adjournment

The meeting adjourned at 6:37 p.m.

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH
November 21, 2018 COUNCIL MEETING

MINUTES

DATE: Wednesday, November 21, 2018
CLOSED MEETING: 5:00 P.M.
REGULAR MEETING: 7:00 P.M.

The November 21, 2018 Regular Council Meeting was held on the above date and called to order at 5:00 p.m. in the Council Chambers, Aberfoyle.

1. ATTENDANCE:

Mayor Dennis Lever
Councillor Matthew Bulmer
Councillor Susan Fielding
Councillor Ken Roth
Councillor John Sepulis

STAFF IN ATTENDANCE:

1. Karen Landry, CAO/Clerk
2. Mary Hasan, Director of Finance/Treasurer
3. Don Creed, Director of Public Works and Parks
4. Courtenay Hoytfox, Administrative Assistant

OTHERS IN ATTENDANCE

1. Dino Paron
2. Dianne Paron
3. Jessica Goyda
4. Emily Stahl, City of Guelph
5. Robin Puskas, City of Guelph
6. James Seeley
7. Susan Course
8. Paul Course
9. Hugh Fielding
10. Kathy Whie
11. Ron Schiedel
12. Doug Smith

2. DISCLOSURE OF PECUNIARY INTEREST & THE GENERAL NATURE THEREOF:

None

3. CLOSED MEETING

Council was in closed session from 5:01 p.m. to 6:12 p.m.
Council recessed from 6:12 p.m. to 7:00 p.m.

Resolution No. 2018-326: Moved by Councillor Sepulis and
Seconded by Councillor Fielding

That Council shall go into closed session under Section 239 of the Municipal Act for the purpose of:

(a) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding litigation or potential litigation, including matters before administrative tribunals affecting the municipality or local board, and personal matters about an identifiable individual, including municipal or local board employees with respect to 4006 Highway 6;

(b) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board, and advice that is subject to solicitor-

client privilege, including communications necessary for that purpose with respect to matter before the OMB – University of Guelph – Dufferin Aggregates Zoning By-law Appeal;

(c) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding personal matters about an identifiable individual, including municipal or local board employees with respect to the Dog Catcher.

CARRIED

Resolution No. 2018-327: Moved by Councillor Fielding and
Seconded by Councillor Sepulis

THAT Council moves into open session.

CARRIED

Council resumed into open session at 7:00 p.m.

Resolution No. 2018-328: Moved by Councillor Sepulis and
Seconded by Councillor Fielding

That Council receives the:

(a) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding litigation or potential litigation, including matters before administrative tribunals affecting the municipality or local board, and personal matters about an identifiable individual, including municipal or local board employees with respect to 4006 Highway 6;

and that staff proceed as directed.

(b) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board, and advice that is subject to solicitor-client privilege, including communications necessary for that purpose with respect to matter before the OMB – University of Guelph – Dufferin Aggregates Zoning By-law Appeal; and that staff proceed as directed.

(c) Confidential Verbal Report from Karen Landry, CAO/Clerk regarding personal matters about an identifiable individual, including municipal or local board employees with respect to the Dog Catcher.

CARRIED

4. ADOPTION OF THE MINUTES:

(a) Council Meeting – November 7, 2018
(b) Closed Council Meeting – November 7, 2018

Resolution No. 2018-329: Moved by Councillor Fielding and
Seconded by Councillor Sepulis

That the minutes of the following meetings be adopted as written and distributed:

(a) **Council Meeting – November 7, 2018**
(b) **Closed Council Meeting – November 7, 2018**

CARRIED

5. BUSINESS ARISING OUT OF THE MINUTES:

6. PUBLIC MEETINGS:

1. Notice of Complete Application and Notice of Public Meeting D14-PIE, Part of Lots 26 and 27, Concession 7, municipally known as 267 Brock Road South

This Public Information Meeting was held on Wednesday November 21, 2018 at 6:30 p.m. at the Municipal Complex – 7404 Wellington Rd. 34.

Refer to Public Meeting Minutes.

7. **COMMUNICATIONS:**

1. Ontario Government Notice of Public Information Centre – Highway 401 and South Halton Truck Inspection Station- Preliminary Design and Class Environmental Assessment
   (a) Correspondence from the Ontario Ministry of Transportation

   Staff was directed to request the Ministry of Transportation to make a presentation to Council regarding the impacts and mitigation measures being taken and to provide the environmental reports for Council to review prior to the meeting. Council requested that the Ministry of Transportation specifically highlight how off site impact such as lighting will be addressed.

   Staff was directed to include for Council's consideration funding in the 2019 Budget for peer review of any reports associated with this matter.

2. Region of Waterloo- Integrated Urban Water System- Cambridge East Water Supply Class Environmental Assessment- Notice of Completion
   (a) Correspondence dated October 26, 2018

3. Freedom of Information and Protection of Privacy Act Request- Remaining documents obtained from the Ministry of Environment Conservation and Parks for records related to the Permit to Take Water for Capital Paving (as per Resolutions No. 2017-355)
   (a) Correspondence dated November 2, 2018.

4. Clair-Maltby Secondary Plan and Master Environmental Servicing Plan- Public Workshop: Secondary Plan Policy Directions.
   (a) Correspondence from the City of Guelph dated November 14, 2018.

5. Monthly Monitoring Reports, Mill Creek Pit.
   (a) September 2018 Report from Dufferin Aggregates dated October 11, 2018.
   (b) October 2018 Report from Dufferin Aggregates dated November 12, 2018.

6. Various Compliance Assessment Reports.
   (a) Aberfoyle Pits 1 and 2 License #5483 and 5609.
   (b) Arkell Ridge Development License #5709.
   (c) Arkell Ridge Development License #15338.
   (d) Glen Christie Company Limited License #5482.
   (e) Martini Pit #5654.
   (f) McMillian Pit License # 10671.
   (g) Mill Creek Pit License # 5738.
   (h) Philips Pit License # 5610.
   (i) St Mary's License # 5497 McNally Pit.
   (j) St Mary's License # 5520 Aberfoyle Pit.
   (k) St Mary's License # 5563 Coburn Pit.
   (l) St Mary's License # 5631 Edgington Pit.
   (m) St Mary's License # 5737 McMillan Pit.
   (n) St Mary's License # 17600.
   (o) St Mary's License # 129817 Mast-Snyder.
   (p) St Mary's License # 624864 McNally East.
   (q) St Mary's License # 624952.
   (r) St Mary's License # 625189.
   (s) St Mary's License # 625284 Neubauer Pit.

   Pit Licence #5483, #5609 and #5654

Council requested staff to send correspondence to the owner with a copy to the Ministry requesting when the required remedial action will be completed.

Pit Licence #5482

Council requested staff to send correspondence to the owner requesting:

- that they advise when activities related to the operation will commence including blasting;
- that they forward notice to the residents in the area (west of Wellington County Road 32) advising when the activities related to the operation especially blasting will commence

Pit Licence # 5709 or 15338

Council requested staff to check the Township records as to whether a permit, if required was obtained for the maintenance shed that was constructed.

7. Intergovernmental Affairs

Resolution No. 2018-330: Moved by Councillor Sepulis and
Seconded by Councillor Fielding

That the Intergovernmental Affairs and other correspondence items listed on the Council Agenda for the November 21, 2018 Council meeting be received.

CARRIED

8. DELEGATIONS/PRESENTATIONS

7:05 p.m. – City of Guelph with respect to the Aqueduct Middle Reach Maintenance and Inspection Activities

Resolution No. 2018-331: Moved by Councillor Fielding and
Seconded by Councillor Sepulis

That Council receives the presentation by the City of Guelph with respect to the Aqueduct Middle Reach Maintenance and Inspection Activities.

CARRIED

7:20 p.m. – Jeffrey Blythe with respect to PD-2018-011 DRS Developments Limited

Resolution No. 2018-332: Moved by Councillor Sepulis and
Seconded by Councillor Fielding

That Council receives the presentation by Jeffrey Blythe with respect to PD-2018-011 DRS Developments Limited.

CARRIED

7:30 p.m. – Ronald Schiedel with respect to PD-2018-011 DRS Developments Limited (Rob Stovel replaced Ronald Schiedel)

Resolution No. 2018-333: Moved by Councillor Fielding and
Seconded by Councillor Sepulis

That Council receives the presentation by Rob Stovel with respect to PD-2018-011 DRS Developments Limited.

CARRIED

Council requested that DRS Developments advise whether the drainage of water is occurring as expected.

9. REPORTS:

1. **Puslinch Fire and Rescue Services**

(a) FIR-2018-004 Puslinch Fire and Rescue Service's Monthly Update July – September 2018

Resolution No. 2018-334: Moved by Councillor Sepulis and
Seconded by Councillor Fielding

That Report FIR-2018-004 with respect to Puslinch Fire and Rescue Service's Monthly Update be received for information.

CARRIED

2. **Finance Department**

None

3. **Administration Department**

(a) Report ADM-2018-038 Amendment to the Council, Committees and Other Appointments – Compensation, Benefits and Expense Policy

Resolution No. 2018-335: Moved by Councillor Fielding and
Seconded by Councillor Sepulis

THAT Council receives Report ADM-2018-038 regarding the Amendment to the Council, Committees and Other Appointments – Compensation, Benefits and Expense Policy;

And that Council enacts a By-law amending By-law 012-2018 Being a by-law to adopt the Council, Committees and Other Appointments - Compensation, Benefits and Expense Policy as outlined in this report.

CARRIED

(b) Report ADM-2018-039 Cambridge East Water Supply Class Environmental Assessment Update

Resolution No. 2018-336: Moved by Councillor Roth and
Seconded by Councillor Bulmer

THAT Council receives Report ADM-2018-039 regarding the Cambridge East Water Supply Class Environmental Assessment Update for information;

And that a copy of the report be forwarded to the Region of Waterloo.

CARRIED

Council requested that as part of its correspondence to the Region of Waterloo, staff request recovery of the cost for septic inspections and risk assessment plans.

4. **Planning and Building Department**

(a) BLDG-2018-004 Building Department Monthly Update- October 2018

Resolution No. 2018-337: Moved by Councillor Bulmer and
Seconded by Councillor Roth

That Report BLDG-2018-004 with respect to the Building Department Monthly Update- October 2018 be received for information.

CARRIED

(b) PD-2018-011 DRS Developments Limited, Noise Concern Stemming from Development of Subdivision L04DRS – DRS Development Limited.

Resolution No. 2018-338: Moved by Councillor Roth and
Seconded by Councillor Bulmer

That Report PD-2018-011 regarding a noise concern regarding DRS Developments Limited be received.

CARRIED

5. **Roads & Parks Department**

None

6. **Recreation Department**

None

7. **Mayor's Updates**

10. NOTICE OF MOTION:

11. COMMITTEE MINUTES

(a) Planning and Development October 9, 2018.
(b) Committee of Adjustment October 9, 2018.

Resolution No. 2018-339: Moved by Councillor Bulmer and
Seconded by Councillor Roth

That Council receives the following Committee Minutes:

(a) **Planning and Development October 9, 2018.**
(b) **Committee of Adjustment October 9, 2018.**

CARRIED

12. MUNICIPAL ANNOUNCEMENTS

(a) None

13. UNFINISHED BUSINESS

14. BY-LAWS:

15. CONFIRMING BY-LAW

(a) By-Law to confirm the proceedings of Council for the Corporation of the Township of Puslinch

Resolution No. 2018-340: Moved by Councillor Roth and
Seconded by Councillor Bulmer

That the following By-law be taken as read three times and finally passed in open Council:

By-Law 065-2018 being a by-law to confirm the proceedings of Council for the Corporation of the Township of Puslinch at its meeting held on the 21st day of November 2018.

CARRIED

16. ADJOURNMENT:

Resolution No. 2018-341: Moved by Councillor Bulmer and
Seconded by Councillor Roth

That Council hereby adjourns at 8:17 p.m.

CARRIED

Dennis Lever, Mayor

Karen Landry, CAO/Clerk

From: Mary Hasan
To: Nina Lecic; Karen Landry
Subject: FW: 2017 Financial Information Return Data Review
Date: Monday, November 26, 2018 12:58:03 PM
Attachments: FITC18_Puslinch Tp.pdf

From: Flaherty, Megan (MMAH) <Megan.Flaherty@ontario.ca>
Sent: Friday, November 23, 2018 11:14 AM
To: Mary Hasan <mhasan@puslinch.ca>
Cc: Karen Landry <KLandry@puslinch.ca>
Subject: 2017 Financial Information Return Data Review

Good morning,

The Ministry of Municipal Affairs and Housing reviews each municipality's financial health through the use of key financial indicators in relation to established provincial thresholds. Please find attached the financial indicator template that has been calculated using your 2017 FIR data.

The Ministry reviews the indicators from time-to-time, to make sure they provide useful information, and you will notice that there have been a few changes in the report this year.

The changes this year are relatively minor and are intended to represent improvements in the value of the calculations (making them more representative of overall financial situation) and make them easier for municipal staff and councils to understand.

The Debt Servicing indicator (Debt Servicing Cost as a % of Total Operating Revenue) has been changed to Debt Servicing Cost as a % of Total Revenue in order to recognize all revenues available to the municipality.

Net Financial Assets or Net Debt is now labelled as a % of Own Purpose Taxation, User Fees and Service Charges (previously Own Purpose Taxation plus User Fees). This is just a name change, the data sources remain the same.

The indicator previously named "Cash and Cash Equivalents as a % of Current Liabilities" has been changed to "Cash Ratio". The formula for this indicator remains the same; however it is now displayed as a ratio as opposed to a percentage. The thresholds for this indicator have also been updated to:

- Low = >0.5:1
- Moderate= 0.5:1 to 0.25:1
- High = <0.25:1

The names of the Asset Consumption and Operating Surplus Ratios have been changed to recognize that they are displayed as percentages, not ratios. They are now displayed as:

- Closing Amortization Balance as a % of Total Cost of Capital Assets (Asset Consumption Ratio)
- Annual Surplus/(Deficit) as a % of Own Purpose Taxation, User Fees and Service Charges (Operating Surplus Ratio)

The formulas (SLC references and calculations) have been added to the report for all indicators.

Financial indicators are an important but incomplete measure of municipal financial health.

This year, there is one indicator for Puslinch Township that exceeds the threshold for “low” level of risk:

- Asset Consumption Ratio (Closing Amortization Balance as a % of Total Cost of Capital Assets) – Moderate Level of Risk

Please do not hesitate to contact me should you wish to discuss further.

Megan Flaherty

Ministry of Municipal Affairs and Housing
Municipal Services Office – Western Ontario
659 Exeter Road, 2nd Floor
London ON N6E 1L3
Tel: 519 873 4037
Toll Free: 1 800 265 4736
E-mail: Megan.Flaherty@Ontario.ca

FINANCIAL INDICATOR REVIEW

(Based on 2017 Financial Information Return)

Puslinch Tp

Date Prepared: 19-Nov-18
MSO Office: Western
Prepared By: Megan Flaherty
Tier LT

2017 Households: 3,063
2017 Population 7,960
2018 MFCI Index 0.2

Median Household Income: 111,808
Taxable Residential Assessment as a % of Total Taxable Assessment: 75.6%
Own Purpose Taxation: 3,715,079

SUSTAINABILITY INDICATORS

Indicator	Ranges		Actuals	South - LT - Counties - Rural		Level of Risk
				Median	Average	
Total Taxes Receivable less Allowance for Uncollectibles as a % of Total Taxes Levied	Low: < 10% Mod: 10% to 15% High: > 15%	2013	**6.9%**	10.6%	11.6%	LOW
		2014	**5.3%**	10.3%	11.3%	LOW
		2015	**4.6%**	9.9%	10.6%	LOW
		2016	**2.4%**	9.0%	10.2%	LOW
		2017	**4.7%**	8.5%	9.5%	**LOW**
Net Financial Assets or Net Debt as % of Own Purpose Taxation, User Fees and Service Charges	Low: > -50% Mod: -50% to -100% High: < -100%	2013	**61.3%**	30.6%	31.6%	LOW
		2014	**78.3%**	32.2%	31.2%	LOW
		2015	**86.1%**	36.5%	34.2%	LOW
		2016	**87.5%**	43.7%	40.8%	LOW
		2017	**102.6%**	53.1%	45.7%	**LOW**
Total Reserves and Discretionary Reserve Funds as a % of Municipal Expenses	Low: > 20% Mod: 10% to 20% High: < 10%	2013	**39.9%**	50.7%	55.2%	LOW
		2014	**46.3%**	53.3%	57.9%	LOW
		2015	**58.0%**	55.8%	61.2%	LOW
		2016	**56.6%**	58.9%	65.2%	LOW
		2017	**62.7%**	62.0%	68.6%	**LOW**
Cash Ratio (Total Cash and Cash Equivalents as a % of Current Liabilities)	Low: > 0.5:1 Mod: 0.5:1 to 0.25:1 High: < 0.25:1	2013	**2.2:1**	3.32:1	4.17:1	LOW
		2014	**2.26:1**	3.13:1	4.25:1	LOW
		2015	**2.57:1**	3.03:1	4.23:1	LOW
		2016	**2.69:1**	3.24:1	4.21:1	LOW
		2017	**2.57:1**	3.25:1	4.57:1	**LOW**

FLEXIBILITY INDICATORS

Indicator	Ranges		Actuals	Median	Average	Level of Risk
Debt Servicing Cost as a % of Total Revenues	Low: < 5% Mod: 5% to 10% High: >10%	2013	**2.2%**	3.0%	3.9%	LOW
		2014	**2.0%**	3.0%	3.6%	LOW
		2015	**2.1%**	2.4%	3.5%	LOW
		2016	**2.0%**	2.6%	3.3%	LOW
		2017	**1.9%**	2.6%	3.0%	**LOW**
Closing Amortization Balance as a % of Total Cost of Capital Assets (Asset Consumption Ratio)	Low: < 50% Mod: 50% to 75% High: > 75%	2013	**61.9%**	39.8%	42.2%	MODERATE
		2014	**63.2%**	40.5%	43.2%	MODERATE
		2015	**64.2%**	41.8%	44.0%	MODERATE
		2016	**65.1%**	42.3%	44.6%	MODERATE
		2017	**65.7%**	43.6%	45.5%	**MODERATE**
Annual Surplus / (Deficit) as a % of Own Purpose Taxation, User Fees and Service Charges (Operating Surplus Ratio)	Low: > -1% Mod: -1% to -30% High: < -30%	2013	**-1.7%**	5.5%	6.7%	MODERATE
		2014	**0.0%**	5.4%	6.6%	LOW
		2015	**-4.1%**	8.4%	12.4%	MODERATE
		2016	**-1.2%**	9.7%	12.2%	MODERATE
		2017	**4.2%**	13.5%	16.3%	**LOW**

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The data and information contained in this document is for informational purposes only. It is not an opinion about a municipality and is not intended to be used on its own - it should be used in conjunction with other financial information and resources available. It may be used, for example, to support a variety of strategic and policy discussions.

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FINANCIAL INDICATOR REVIEW

(Based on 2017 Financial Information Return)

Puslinch Tp

NOTES

Financial Information Returns ("FIRs") are a standard set of year-end reports submitted by municipalities to the Province which capture certain financial information. On an annual basis, Ministry staff prepare certain financial indicators for each municipality, based on the information contained in the FIRs. It is important to remember that these financial indicators provide a snapshot at a particular moment in time and should not be considered in isolation, but supported with other relevant information sources. In keeping with our Financial Information Return review process and follow-up, Ministry staff may routinely contact and discuss this information with municipal officials.

Supplementary Indicators of Sustainability and Flexibility

The following is a summary, adapted from the Chartered Professional Accountants of Canada Statement of Recommended Practice (SORP) 4.

- A government (including a municipality) may choose to report supplementary information on financial condition, to expand on and help explain the government's financial statements.
- Supplementary assessment of a government's financial condition needs to consider the elements of sustainability and flexibility.
- Sustainability in this context may be seen as the degree to which a municipality can maintain its existing financial obligations both in respect of its service commitments to the public and financial commitments to creditors, employees and others without inappropriately increasing the debt or tax burden relative to the economy within which it operates.
- Sustainability is an important element to include in an assessment of financial condition because it may help to describe a government's ability to manage its financial and service commitments and debt burden. It may also help to describe the impact that the level of debt could have on service provision.
- Flexibility is the degree to which a government can change its debt or tax level on the economy within which it operates to meet its existing financial obligations both in respect of its service commitments to the public and financial commitments to creditors, employees and others.
- Flexibility provides insights into how a government manages its finances. Increasing taxation or user fees may reduce a municipality's flexibility to respond when adverse circumstances develop if the municipality approaches the limit that citizens and businesses are willing to bear.

  A municipality may temporarily use current borrowing, subject to the requirements set out in the Municipal Act to meet expenses and certain other amounts required in the year, until taxes are collected and other revenues are received. Municipal current borrowing cannot be carried over the long term or converted to long term borrowing except in very limited circumstances.
- For each element of financial condition, the report on indicators of financial condition should include municipality-specific indicators and municipality-related indicators. It may be useful to also include economy-wide information when discussing financial condition.

Additional Notes on what Financial Indicators may indicate:

Total Taxes Receivable less Allowance for Uncollectibles as a % of Total Taxes Levied - *How much of the taxes billed are not collected.*

Net Financial Assets or Net Debt as % of Own Purpose Taxation, User Fees and Service Charges - *How much tax and fee revenue is servicing debt?*

Reserves and Reserve Funds as a % of Municipal Expenses - *How much money is set aside for future needs / contingencies?*

Cash Ratio (Total Cash and Cash Equivalents as a % of Current Liabilities) - *Measures the ability of the municipality to meet its current obligations with its current resources on hand.*

Debt Servicing Cost as a % of Total Revenues - *Indicates the extent to which past borrowing decisions may impact the current budget.*

Closing Amortization Balance as a % or Total Cost of Capital Assets (Asset Consumption Ratio) - *measures the age of a municipality's physical assets. It measures the extent to which depreciable assets have been consumed by comparing the amount of the assets that have been used up and their historical cost.*

Annual Surplus / (Deficit) as a % of Own Purpose Taxation, User Fees and Service Charges (Operating Surplus Ratio)- *Indicates the municipality's ability to cover its operational costs and have funds available for other purposes (i.e. reserves, debt repayment, etc.)*

The Northern and Rural Municipal Fiscal Circumstances Index (MFCI) *is used by the Ministry of Finance to calculate the "Northern and Rural Fiscal Circumstances Grant" aimed at northern as well as single and lower-tier rural municipalities. The index measures a municipality's fiscal circumstances. The MFCI is determined by six indicators: Weighted Assessment per Household, Median Household Income, Average Annual Change in Assessment (New Construction), Employment Rate, Ratio of Working Age to Dependent Population, and Per Cent of Population Above Low-Income Threshold. A lower MFCI corresponds to relatively positive fiscal circumstances, whereas a higher MFCI corresponds to more challenging fiscal circumstances. (Note: the MFCI index is only available for northern and rural municipalities)*

FINANCIAL INDICATOR REVIEW

(Based on 2017 Financial Information Return)

Puslinch Tp

CALCULATIONS

Total Taxes Rec. less Allowance for Uncollectibles as % of Total Taxes Levied	SLC 70 0699 01 / (SLC 26 9199 03 - SLC 72 2899 09)
Net Financial Assets or Net Debt as % of Own Purpose Taxation, User Fees and Service Charges	SLC 70 9945 01 / (SLC 10 0299 01 + SLC 10 1299 01)
Total Reserves and Reserve Funds as a % of Municipal Expenses	(SLC 60 2099 02+SLC 60 2099 03)/(SLC 40 9910 11-SLC 12 9910 03-SLC 12 9910 07)
Cash Ratio (Total Cash and Cash Equivalents as a % of Current Liabilities)	SLC 70 0299 01 / (SLC 70 2099 01 + SLC 70 2299 01)
Debt Servicing Cost as a % of Total Revenues	(SLC 74 3099 01 + SLC 74 3099 02) / SLC 10 9910 01
Closing Amortization Balance as a % or Total Cost of Capital Assets (Asset Consumption Ratio)	SLC 51 9910 10 / SLC 51 9910 06
Annual Surplus / (Deficit) as a % of Own Purpose Taxation, User Fees and Service Charges (Operating Surplus Ratio)	SLC 10 2099 01 / (SLC 10 0299 01 + SLC 10 1299 01)

CITY OF Guelph
Making a Difference

MEMO

TO: Emily Stahl
FROM: Robin Puskas
DATE: Friday November 23, 2018
SUBJECT: **Puslinch Township Council Nov 21 Aqueduct Presentation - Notes**

Below is a brief of the councillor questions and the City's responses:

Q. Is the City looking into a different alignment – north on Watson and west on Stone?

A. Potentially, yes. There is current preliminary plans in the Water and Wastewater Servicing Master Plan. The Water Supply Master Plan and Aqueduct resiliency project scheduled to be complete in 2019 will review this.

Q. What, if any, trails will be affected? And is the City communicating with trail users?

A. There is a trail from Stone Road to Cooks Mills but no set trail south of Cooks Mill. The City are in communication with the Trail Groups. They have been notified and informed their users.

Q. Is there a concern of tree root infiltration into the pipe?

A. Yes, that is one of the reasons for the planned inspection. The City is also concerned with tree roots that may have wrapped around the pipe that is why we are only planning to grub the trees that are growing over the aqueduct.

Q. Please make sure that the Township and County are appraised of the planned work.
A. Yes, the City can ensure to keep everyone in the loop. They can also visit www.guelph.ca/water

Q. How wide is the City owned property? Is it wide enough for the planned work?

A. Yes and the planned work will be on City owned property. The planned laneway will be of a special unobtrusive design to minimize effects on the environment.

Robin Puskas

Robin Puskas, P.Eng.
Project Manager, Water Services

aercoustics

Aercoustics Engineering Ltd.
50 Ronson Drive, Suite 165
Toronto, ON M9W 1B3

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

November 9, 2018

St Marys Cement Group (CBM Aggregates)
55 Industrial Street
Toronto, Ontario, Canada
M4G 3W9

Attn: Mr. Colin Evans, Environment and Lands Manager, CBM

CC: Mr. Bruce Klein, CBM

Re: CBM Aggregates Puslinch (PQA) Pit Acoustical Audit 2018
Puslinch Quality Aggregates (PQA) Pit (License # 17600)
North Half Lot 26, Conc. 1, Township of Puslinch, County of Wellington

1 Introduction

Aercoustics Engineering Limited (Aercoustics) was retained to conduct an acoustic audit of the Puslinch Quality Aggregates (PQA) Pit (formerly Mast Pit) to fulfil the annual monitoring condition set by the Ministry of Natural Resources and Forestry (MNRF).

The PQA Pit is located at the southeast corner of Concession Road 2 and Sideroad 25 in the Township of Puslinch. It is adjacent to the CBM Lanci Pit to the west and the CBM McNally Pit to the north.

The audit has been conducted in accordance with the guidelines and procedures of the Ministry of the Environment, Conservation and Parks (MECP). The noise study for the pit was titled “The Potential Impact and Control of Noise from Aggregate Extraction as Proposed by Puslinch Quality Aggregates” (May 31, 1995), and was prepared by Aercoustics.

2 Site Visit Conditions

A site visit was carried out on October 5, 2018, however wind generated noise and traffic noise from Highway 401 not associated with the pit operations had a significant effect on the measurements and valid measurement results could not be obtained during this visit.

A second site visit was carried out on October 25, 2018. During this time, a crusher, two loaders and a drag line were operating in the pit. A bulldozer was on site but was not operational during measurements.

It is a condition of the license that the sound levels from the pit comply with the MECP guidelines for noise from stationary sources. The current MECP criteria for noise from a stationary source are set forth in publication NPC-300, "*Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning*".

The allowable noise levels from the extraction, processing and shipping operations in the pit as established by the MECP are outlined in Table 1. The equivalent sound level (L_{EQ}) is an average sound level based on acoustical energy. It is a steady sound level that for the specified time period contains the same acoustical energy as the varying sound level which prevails.

The average air temperature was 5 degrees Celsius with clear skies and the wind was from the North at approximately 2 km/hr during the site visit. This wind had minimal effect on the impact of the Highway 401 road traffic noise, which is typically dominant in the area.

The dwellings at receptors R1 and R2 are located on the CBM Lanci Pit property and are also adjacent to the main haul route in the area. The dwellings at receptors R3 and R4 are demolished. The sound level limits for receptors R1, R2 and R5 to R8 are summarized in Table 1.

Table 1: Applicable MOECC Sound Level Limits

Receptor	Sound Level Limit One Hour L_{EQ} (dBA)
R1	50
R2	50
R5	50
R6	50
R7	50
R8	50

The allowable sound level limits for the pit operations at the residences correspond to the Class 2 daytime equivalent sound level exclusion limit of 50 dBA. At the time of the initial noise study, these receptors were assumed to be Class 3 (rural). However, based on the substantial contribution of man-made noise sources such as road traffic (Highway 401, Concession Road 2), the receptors are now considered Class 2. The surrounding receptors and measurement locations are illustrated in Figure 1.

The extraction and processing operations in the pit are restricted to weekday daytime hours (07:00-18:00). The noise from a stationary source should not in any hour exceed the limits outlined in Table 1.

3 Equipment

Measurements were taken with a RION NL-32 Sound Level Meter equipped with windscreen. The equipment was calibrated before and after the measurements and no significant drift in calibration was observed.

4 Measurements

During the site visit, sound level measurements were conducted where appropriate at locations representative of the residences surrounding the pit as indicated on the attached Figure 1. It should be noted that during the measurements, the sound level meter was paused as required to minimize the contribution from vehicle passbys on the local road. Table 2 tabulates the noise measurements at receptors R5 and R7.

Table 2: Measured Sound Levels at Receptors

Location/ Receptor	Sound Level LEQ (dBA)	Noise Sources
R5	41	PQA Pit activities barely audible, mostly dragline; Neighbouring Lanci Pit activity barely audible, birds and insect noise contributed.
R7	40	PQA Pit activities barely audible; Neighbouring Lanci Pit barely audible, birds and insects noise contributed.

5 Observations and Conclusions

The measured sound levels include the contribution from the background noise sources with local vehicle traffic minimized. The PQA Pit operations were barely audible at the receptor locations, with the neighbouring Lanci pit being the dominant noise source.

The measurement results at receptors R5 and R7 were below the allowable limits. It can be concluded from the acoustical audit that, based on the measurements, the PQA Pit is operating in compliance with the MECP guidelines for stationary sources.

Sincerely,

Sean Syman, B.Eng. (Hons)

Derek Flake

Derek Flake, M.Sc., P.Eng.

AERCOUSTICS ENGINEERING LIMITED

aercoustics

The scope of the work outlined in this document is limited to the acoustic, noise and/or vibration control aspects of the design. Contractor to verify all dimensions

Scale: N.T.S.
Drawn: MA
Eng: DF
Date: 2017.08.02

1004 Middlegate Rd,
Suite 1100,
Mississauga, ON
P: 416.249.3361
F: 416.249.3613

Project Name:

PQA Pit 2018 Acoustical Audit

AEL File: 06221.03

Drawing Title:
Key Plan Showing Site Location and Receptors

Figure 1

File:3409
By: Email

August 27, 2018

Township of Puslinch
7404 Wellington Road 34
Guelph, Ontario
N1H 6H9

Attention: Mrs. Karen Landry
C.A.O./ Clerk

Dear: Mrs. Landry

Re: CBM Aggregates, McMillan Pit (License #5737), 2017 Water Monitoring Report

As requested, I have reviewed the 2017 Water Monitoring Report for the McMillan Pit of CBM Aggregates which was prepared by 8 Trees Inc. Extraction activities ceased on this site in 2004 and hence the 2005 to 2017 monitoring data represents post extraction conditions. Over this period samples of benthic macroinvertebrates found in Tributary 3 were collected and analyzed. This Tributary of Mill Creek is fed by groundwater discharging from the McMillan Pit. The biological data indicates an unimpaired creek with a similar species composition to that found in previous years. The types of organisms inhabiting this tributary are typical of a closed canopy, cool-to-cold water creek. The average Water Quality Index (WQI) for 2017 was 17.2 which is above the trigger level of 14 and the mean sensitivity value was above 3 which indicates high quality habitat conditions.

In conclusion, the monitoring data still indicates no negative impacts to water quality as a result of aggregate extraction. I have no concerns with the information presented in this report.

Yours truly,
GWS Ecological & Forestry Services Inc.

Greg Scheifele

Greg W. Scheifele, M. A., R.P.F.
Principal Ecologist/Forester

cc Stan Denhoed, Harden Environmental Services Ltd.
Fred Natolochny, Grand River Conservation Authority

GWS Ecological & Forestry Services Inc.
4670 Townline Road, Cambridge, ON. N3C 2V1
Tel.: (519) 651-2224 Fax: (519) 651-2002
Email: gwsefs@sympatico.ca

Votorantim
Cimentos

ST MARYS CBM

May 22, 2018

RECEIVED
MAY 3 1 2018
Township of Puslinch

Township of Puslinch
7404 Wellington Rd 34.
Guelph ON
N1H 6H9

RE: CBM Aggregates, McMillan Pit (5737), 2017 Water monitoring report

Please accept this monitoring report as a condition of our McMillan Pit Aggregate license #5737. Our consultant, 8 trees Inc. made the submission of this report directly to the MNR.

This report is from the 2017 monitoring year.

The 2009 monitoring was the last full monitoring report for the McMillan pit. On January 27, 2010 James Williams from the MNR granted permission via e-mail to reduce the monitoring to just the bio mapping component. This is due to extraction being complete at this location and a partial surrender of the licence in process.

Thank you very much,

Colin Evans
Votorantim Cimentos
VCNA | Director, Lands and Environment
Lands -Ready Mix and Cement
Environment- CBM
Cobourg Office
colin.evans@vcimentos.com

Mobile: (905) 440-5745
50 Veronica St, Cobourg Ont K9A 0B8

File: 2517
By: Email

August 27, 2018

Township of Puslinch
7404 Wellington Road 34
RR# 3
Guelph, Ontario
N1H 6H9

Attention: Mrs. Karen Landry
Clerk/ CAO
Dear: Mrs. Landry

Re: Overview of Biological and Aquatic Monitoring Results: 2012-2017

As requested, I have reviewed the 2018 Overview Report prepared by Dance Environmental Inc. for the Roszell Pit. Based on the information supplied I offer the following comments.

1. The vegetation sample plot data collected from 2012 to 2017 indicates that no significant changes have occurred with respect to soil moisture, vegetation diversity, species dominance or cover density.

2. Although the number of brook trout spawning beds (redds) found in the Main Creek and Tributary #7 varied somewhat from year to year, they were nonetheless consistently recorded from 2012 to 2017. No trout spawning was ever detected in Tributaries #8 and #9.

3. Blue-spotted salamanders have continued to breed successfully in the Roszell Wetland from 2013, when the egg mass survey was first initiated, to 2017.

4. Amphibian call surveys conducted in the vicinity of the Roszell wetland and the Jones pond have indicted that the same species of frogs have continued to use these habitats for breeding purposes from 2013 to 2017.

In conclusion, the ecological and aquatic monitoring data indicates that aggregate extraction has not caused any negative impacts to natural heritage features or functions. Please do not hesitate to contact me if further clarification is needed on these matters.

Yours truly,
GWS Ecological & Forestry Services Inc.

Greg Scheifele

Greg W. Scheifele, M. A., R.P.F.
Principal Ecologist/Forester

cc: Fred Natolochny, Grand River Conservation Authority
Stan Denhoed, Hardem Environmental Services

8 Trees Inc.

Anne R. Yagi, President
8Trees Inc.
11 Berkwood Place
Fonthill, Ontario, L0S 1E2

E-mail[1]: ayagi@cogeco.ca
E-mail[2]: anne.yagi@8trees.ca
Website: www.8trees.ca

Ontario Ministry of Natural Resources & Forestry,
1 Stone Rd. West, Guelph,
Ontario, Canada
N1G 4Y2
Phone: 519-826-4927
Fax: 519-826-4929.

April 9, 2018

ATTN: Ken Cornelisse

RE: Monitoring Report CBM – St Mary's Cement McMillan Pit (License#5737)

Dear Mr. Cornelisse,

8Trees Inc. has taken on the annual monitoring of the CBM ST Mary's Cement McMillan Gravel Pit as of 2017. We are pleased to submit the present report in compliance with the reporting requirements for the McMillan Gravel Pit as per the "Monitoring Program –McMillan Property" submitted by Limnoterra Ltd. to your office on January 15, 1998 and modified with agreement from James Williams of your office on January 27, 2010.

Extraction ceased on the site in 2004 and in 2010 CBM requested and obtained a reduction of monitoring requirements from your office. Monitoring now required at this site is benthic macroinvertebrate sampling in tributary T3 and calculation of the water quality index based on BioMAP methodologies.

The analysis for 2017 includes data for the site from 1997 to 2017. Extraction activities ceased on the site in 2004, thus 2005 to 2017 monitoring data represents 13 years of post-extraction conditions.

If you have questions, or require clarification, please do not hesitate to contact us.

Kind Regards,

Cathy Blott

On behalf of
Anne Yagi, President, 8Trees Inc.

Water Quality Rationale:

Tributary 3 of Mill Creek is the nearest discharge point of groundwater crossing the pit site and reflects the quality of groundwater discharging from the McMillan Pit (Figure 1). Water quality monitoring is based on an assessment of the benthic biota that Tributary 3 supports. The community of benthic biota is subject to the full rigor of the environment through the annual or biannual life cycles of the species. The community therefore represents the integrated temporal effects of all pollutants and environmental conditions through the year and not only those conditions at the time of sampling.

The composition of benthic macroinvertebrate communities reflects water and habitat quality in streams. BioMAP (Biological Monitoring and Assessment Program) is a water quality assessment tool designed for southern Ontario watercourses. It provides a quantitative measure of water quality that can be used to diagnose water quality at a site, monitor water quality over time, and evaluate the impact of point source and diffuse source pollution on water quality. The index calculated for a watercourse is based on sensitivity values assigned to each macroinverterbrate species. The sensitivity values are based on the species tolerance to factors of pollution. (organics, reduced dissolved oxygen, suspended solids, temperature, metals, acidity, nutrients etc).

Water Quality Methods:

Benthic macroinvertebrates were collected from Tributary T3 on October 3, 2017 (Figure 2). Two quantitative samples were collected from the site, downstream of Regional Side Road 20. A qualitative sample was taken from various types of habitat extending along the tributary length including the same general area as samples T1 and T2, and includes sampling from the small backwater area/wetland just upstream of Side Road 20. Sampling procedures followed the BioMAP protocols described in the BioMAP Report SWR-1[1] and have been outlined previously (refer to TCG McMillan Report 1996/1997). Aquatic Ecostudies Limited provided benthic identification services for the samples collected by Limnoterra staff.

Water Quality Analysis:

The BioMAP analysis methodology was used to analyze the results and obtain a Water Quality Index for the Tributary (WQI). Sensitivity values from *Version 110430 Sensitivity Values for Aquatic Macroinvertebrates* of Ontario were used for the 2017 analysis. Sensitivity Values can range from 4 to 0 which correspond to the longitudinal distribution of macroinvertebrates along the river continuum. A value of 4 designates species that typically inhabit small, groundwater fed, headwater creeks with a predominance of leaf and wood litter as the main energy source. A value of 3 corresponds to larger more open streams with solar radiation driving greater periphyton growth supporting species that feed on attached algae, and so on down to species ranked 0 that feed on fine particulate organic matter most abundant in turbid slow moving warm aquatic systems.

In the Mill Creek tributary T3 we expect to see a population dominated by species with ranks of 4 and 3 and a BioMAP analysis calculation of greater than 14 Water Quality Index (WQI).

Mean Sensitivity refers to the average sensitivity of the top 25% of the species collected. For Mill Creek we expect to see a Mean Sensitivity above 3.

---

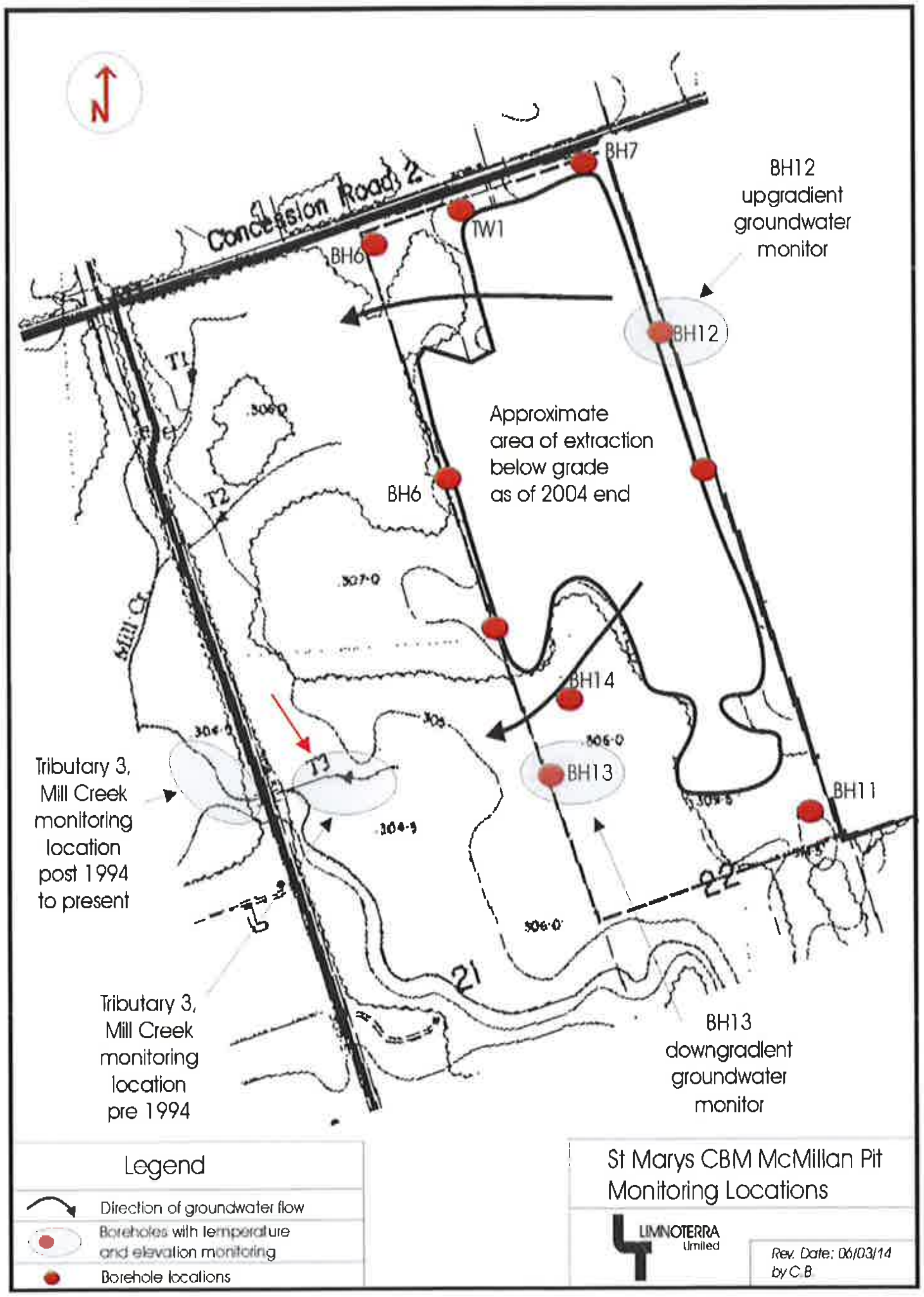
[1] Griffiths, R.W. 1993. BioMAP: Concepts, Protocols and Sampling Procedures for the Southwestern Region of Ontario. BioMAP Report SWR-1. Ministry of Environment and Energy, Southwestern Region, London, Ontario. The sensitivity values for the 2011 analysis were the updated version 110430.

Figure 1: McMillan Pit Location in 2017 (left) and in the early 2000's (right).

Photo from google earth

Photo from Limnoterra Ltd Report, early 2000's

Figure 2: Location of Tributary T3 benthic monitoring as originally set up by Limnterra Ltd, showing groundwater boreholes and direction of groundwater movement across the landscape towared Mill Creek. Monitoring at Tributary T3 is the closest permanent stream to the pit.



Water Quality Proposed Trigger:

WQI > 14 (i.e. unimpaired condition). No negative impacts to water quality have occurred from extraction when WQI > 14 for Tributary T3.

Water Quality Results:

Results of the BioMAP analysis from 1997 – 2017 are shown graphically in Figure 3 and listed in Table 1 and. The WQI for 2017 is 17.2 (average of 14.3 at T1 and 20.12 at T2). Flow in the tributary at the time of sampling in October was adequate to take a full sample, similar to previous years.

The species composition collected in 2017 is similar to previous years and represents an unimpaired creek. The types of organisms found in 2017 are typical of a closed canopy, cool-to-cold water creek. The available habitat quality remains high as indicated by the presence of highly sensitive species and the number of individuals, or the density, in the 2017 sample is higher than average.

Figure 3. McMillan Pit BioMAP Water Quality Index, 1997-2017

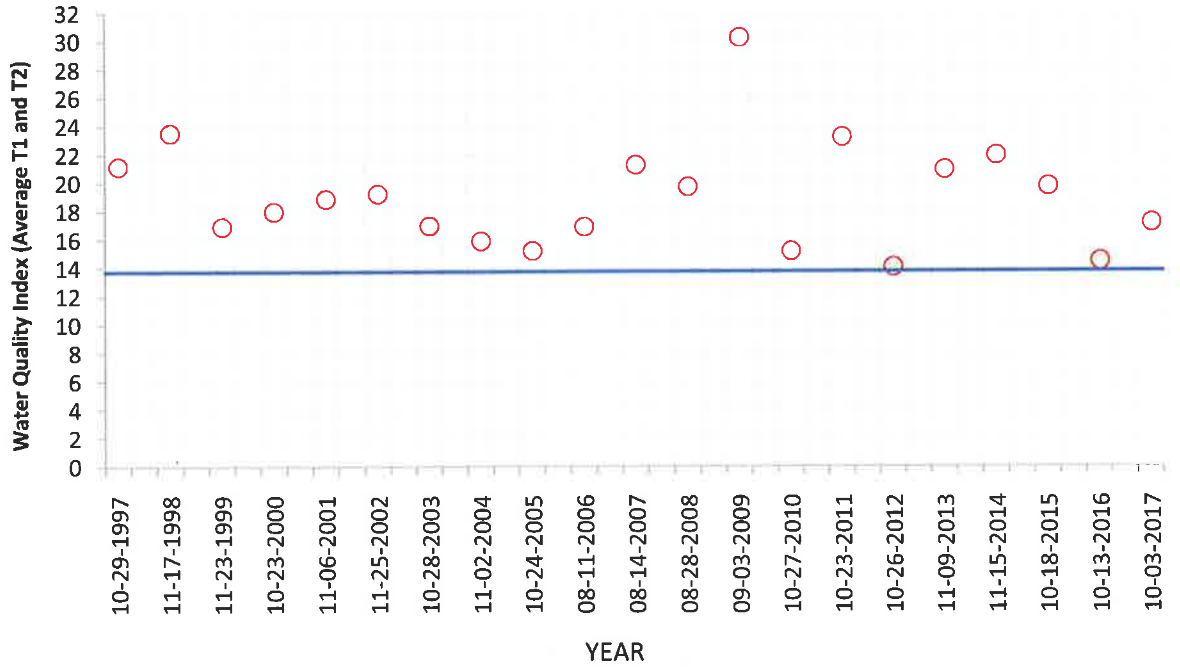


Table 1: Benthic Analysis Results 1997 – 2017

Sample	Date	Water Quality Index (WQ1)	Ave WQI	Qualitative Mean Sensitivity Value
Quantitative 1	10-29-1997	23.3	21.2	3.67
Quantitative 2		19.1		
Quantitative 1	11-17-1998	22.6	23.6	3.20
Quantitative 2		24.6		
Quantitative 1	11-23-1999	18.5	17.0	3.50
Quantitative 2		15.5		
Quantitative 1	10-23-2000	15.6	18.1	3.17
Quantitative 2		20.5		
Quantitative 1	11-06-2001	20.6	19.0	3.20
Quantitative 2		17.3		
Quantitative 1	11-25-2002	20.5	19.3	3.25
Quantitative 2		18.2		
Quantitative 1	10-28-2003	15.6	17.1	3.33
Quantitative 2		18.5		
Quantitative 1	11-02-2004	13.1	16.0	3.25
Quantitative 2		18.9		
Quantitative 1	10-24-2005	14.9	15.3	3.20
Quantitative 2		15.7		
Quantitative 1	08-11-2006	15.9	17.0	3.43
Quantitative 2		18.1		
Quantitative 1	08-14-2007	24.6	21.4	3.16
Quantitative 2		18.1		
Quantitative 1	08-28-2008	21.6	19.8	4.00
Quantitative 2		18.0		
Quantitative 1	09-03-2009	32.1	30.3	3.71
Quantitative 2		28.5		
Quantitative 1	10-27-2010	13.6	15.3	3.29
Quantitative 2		16.9		
Quantitative 1	10-23-2011	21.8	23.3	4.00
Quantitative 2		24.8		
Quantitative 1	10-26-2012	11.7	14.1	3.25
Quantitative 2		16.5		
Quantitative 1	11-9-2013	20.4	21.0	3.33
Quantitative 2		21.6		
Quantitative 1	11-15-2014	19.2	22.0	3.17
Quantitative 2		24.8		
Quantitative 1	10-18-2015	21.2	19.8	3.50
Quantitative 2		18.4		
Quantitative 1	10-13-2016	13.8	14.5	3.17
Quantitative 2		15.2		
Quantitative 1	10-03-2017	14.3	17.2	3.33
Quantitative 2		20.1		
1997 to 2017 Accumulative Ave			**19.1**	**3.39**

Table 2: Quantitative Benthic Sampling Results 2017

Density of macroinvertebrates (No. per 0.05 sq. m.) collected from a tributary of Mill Creek, downstream of the CBM McMillan Pit near Side Rd. 20, Puslinch Township. Samples collected on Oct 3, 2017 by C. Blott.

Quantitative Sample locations: T1 in Tributary T3, within 5m downstream of Side Rd 20
T2 in Tributary T3, 40m downstream of Side Rd 20

		SV		Qual	T1	T2
Insects:	ALDERFLIES:					
	Sialidae:					
	Sialis	2				1
	BUGS:					
	Gerridae:					
	Aquarius	3		P		
	CADDISFLIES:					
	Goeridae:					
	Goera	3				4
	Limnephilidae:					
	Hydratophylax argus	4			1	
	Limnophilus	1		P		
	Pycnopsyche	3		P	1	
	Molannidae:					
	Molanna	2		P		
	Phryganeidae:					
	Ptilostomis	1			1	
	Rhyacophilidae:					
	Ryacophila vibox	4		P		1
	DRAGONFLIES:					
	Aeshnidae:					
	Aeshna	2		P		
	MAYFLIES:					
	Leptophlebiidae:					
	Paraleptophlebia	3		P	25	6
	STONEFLIES:					
	Chloroperlidae:					
	Sweltza onkos	4				1
	Nemouridae:					
	Amphinemura	4		P		
	Nemoura trispinosa	3		P	30	25
	TRUE FLIES:					
	Chironomidae:					
	Brillia	2				
	Conchapelopia	2		P		
	Corynoneura	2		P		
	Macropelopia	3			1	
	Metriocnemus	3		P		1
	Micropsectra	3		P	1	
	Orthocladius	-			2	
	Parametriocnemus	3		P	2	1
	Polypedilum scalaenum	1				1

		SV		Qual	T1	T2
	Prodiamesa	3			3	
	Tvetenia	2		P		1
	Simuliidae	2		P		
	Tabanidae:					
	Chrysops	2				4
	Tipulidae:					
	Dicranota	3		P		5
	Tipula	-		P		
Chelicerates:	WATERMITES:					
	Hydryphantidae:					
	Panisopsis	4				12
	Hygrobatidae:					
	Hygrobates	3		P	1	3
	Lebertiidae:					
	Libertia	2				3
	Sperchonidae:					
	Sperchon	2		P		
Crustaceans:	AMPHIPODS:					
	Gammaridae:					
	Crangonyx	2		P		
	Hyallelidae:					
	Hyallela	2			1	
Molluscs:	SNAILS:					
	Lymnaeidae:					
	Fossaria	0			2	1
	Lymnaea stagnalis	0		P		
	Pseudosuccinea columella	0		P		
	Stagnicola elodes	0			2	
	Physidae:					
	Physella	0		P	1	3
	Planorbiidae:					
	Gyraulus	1			18	2
Annelids:	WORMS:					
	Lumbriculidae:					
	Lumbriculus varigatus	-			4	
	Tubificidae:					
	Aulodrilus pluriseta	2		P	4	1
	Number of taxa			25	18	19
	Number of organisms				100	76
	BioMAP(q) score (ave top 25%)			**3.33**		
	BioMAP(d) Score				14.3	20.1

Table 3: Qualitative Benthic Sampling Results 2016

Qualitative Analysis Taxa	SV
Ryacophila vibox	4
Amphinemura	4
Aquarius	3
Dicranota	3
Pycnopsyche	3
Paraleptophlebia	3
Nemoura trispinosa	3
Hygrobates	3
Metriocnemus	3
Micropsectra	3
Parametriocnemus	3
Molanna	2
Sperchon	2
Aeshna	2
Crangonyx	2
Conchapelopia	2
Aulodrilus pluriseta	2
Corynoneura	2
Tvetenia	2
Simuliidae	2
Limnophilus	1
Physella	0
Lymnaea stagnalis	0
Pseudosuccinea columella	0
#species	24
Average Sensitivity (Top 25%)	3.33

Note: records in red are from last year. There were also 7 more species from last year that were part of the qualitative sample this year i.e. this year's 1st stages in the substrate.

Conclusion:

The water quality index remains above the trigger level of 14. The overall species composition continues to reflect the community collections of previous years and the benthic community in Tributary 3 remains representative of a southern Ontario unimpaired creek. No negative impacts to water quality due to extraction activities have been detected in the 2017 sampling.

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Roszell Road Pit, Licence No. 625189
2017 Groundwater Monitoring Report

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March 2018

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1.0 INTRODUCTION

This report summarizes the results of the 2017 Roszell Road Pit groundwater monitoring program as per conditions shown under the *Hydrogeological Recommendations (Monitoring, Triggers and Mitigation)* of the approved Site Plan. The Roszell Road Pit is operated by CBM Aggregates.

The monitoring program is summarized in **Section 1.1** of this report. Information regarding Items listed on the Site Plan under *General Controls, Part D below water extraction* is provided in **Section 2.0** of this report. Site details; test and extraction pond locations; and, monitoring locations are shown on **Figure 1**.

1.1 MONITORING PROGRAM

The groundwater monitoring program requirements for the Roszell Road Pit are outlined in the document: *Groundwater Monitoring Program, Preston Sand & Gravel Company Limited, Roszell Pit, Part Lots 1 and 2, Concessions 3 and 4, Township of Puslinch*; Blackport Hydrogeology Inc. (and Groundwater Science Corp.), December 2009. Please refer to that report for specific additional details (e.g. Trigger Mechanisms, Mitigation Measures, Contingency Plans and Response Protocol, etc.).

The monitoring and reporting requirements for the site are summarized as follows:

1. Manual groundwater level measurements will be obtained on a monthly basis at the following existing on-site locations as accessible:

   BH1, BH2-S, BH2-D, BH3-S, BH3-D, BH4-S, BH4-D, BH5 (and/or replacement well), BH6-S, BH6-D, BH7-S, BH7-D, BH8, BH9-S, BH9-D, BH10-S, BH10-D, DP1, DP2, DP3, DP4, DP5, DP6, DP7 and DP8.

   And at the following new on-site locations as accessible:

   BH14, BH15; and,
   Monitors installed for the thermal assessment (see item #14).

   And at the following off-site locations as accessible:

   BH11, BH12 and BH13.

2. Monitors BH6-S and BH6-D will be removed as extraction or site preparation proceeds into that area and will not be replaced.
3. Monitor BH5 may be abandoned as extraction or site preparation proceeds into that area and if abandoned will be replaced by another water table monitor in the same general area.
4. Manual and/or datalogger groundwater level measurements will be obtained on a regular basis (frequency to be determined in conjunction with the landowner) at the following off-site private wells as accessible and at landowner request:

   PW1, PW2 and other private wells where access has been granted.

   Monitoring at private wells can include datalogger measurements as access permits. Where dataloggers are installed the monitoring frequency will be every hour (on the hour, Eastern Standard Time) and data downloaded quarterly as accessible.

5. Dataloggers will be installed to collect groundwater level measurements and/or groundwater temperature within the screened interval every hour (on the hour, Eastern Standard Time) and data downloaded quarterly at the following existing on-site monitoring wells as accessible:

   BH1, BH3-S, BH3-D, BH4-D, BH5 (and/or replacement well), BH7-S, BH7-D, BH8, BH9-S, BH9-D, BH10-S and BH10-D

   And at the following new on-site locations as accessible:

   BH14, BH15, and,
   Monitors installed for the thermal assessment (see item #14).

6. Manual groundwater temperature profiles will be obtained on a monthly basis by measuring the temperature within the monitors at one metre intervals starting at ground surface and proceeding to the bottom of the well at the following existing locations as accessible:

   BH1, BH2-D, BH3-D, BH4-D, BH5 (and/or replacement well), BH7-D, BH8, BH9-D, BH10-D, DP1, DP2, DP3, DP7, DP8

   And at the following new locations as accessible:

   BH14, BH15, and,
   Monitors installed for the thermal assessment (see item #14).

7. Staff gauges and/or stilling wells will be installed at the following off-site ponds along Roszell Road to the immediate east of the extraction area, if accessible, prior to below water table extraction at the site:

   PG1, PG2, PG3, PG4, PG5 and PG6

   Manual pond level measurements will be obtained on a monthly basis as accessible.

   In addition, dataloggers will be installed at these pond gauges, if accessible, and pond level measurements will be obtained every hour (on the hour, Eastern Standard Time). Datalogger data will be downloaded quarterly.

8. Staff gauges and/or stilling wells will be installed on-site to measure the water level in the wash pond (LG1) and extraction lake(s) (LG2, LG3, LG4, etc.) as soon as possible after the lakes are developed. Manual pond and lake level measurements will be obtained on a monthly basis as accessible. Water level dataloggers will be installed at the wash pond and lake gauges to collect water level measurements every hour (on the hour, Eastern Standard Time). Datalogger data will be downloaded quarterly.

9. Manual surface water level and temperature measurements will be obtained on a monthly basis at the following locations as accessible:

   DP1, DP2, DP3, DP4, DP5, DP6, DP7 and DP8.

10. A stilling well and datalogger will be installed prior to below water extraction at the site within the Roszell Wetland (between DP4 and DP5) to measure surface water

(pond) level every hour (on the hour, Eastern Standard Time), data will be downloaded quarterly.

11. Dataloggers will be installed to collect surface water temperature measurements every hour (on the hour, Eastern Standard Time) and data downloaded quarterly at the following locations as accessible:

    SW1, SW2, SW3, SW4, SW5, SW6, SW8, SW10, SW12, DP3, DP7, DP8 and extraction lakes at depths of 1 m and 5 m.

12. Manual stream-flow measurements will be obtained as conditions allow and under baseflow conditions (if possible) on a monthly basis during extraction periods at the following locations as accessible:

    SW1, SW2, SW3 and SW4.

13. Water quality samples will be obtained for major anions, metals, pH, nutrients, and total petroleum hydrocarbons (F1 to F3) on an annual basis at the end of the extraction season at the following locations as accessible:

    BH1, BH5 (and/or replacement well), BH7-S, BH7-D, BH8, BH10-S, BH10-D, active extraction lake, SW2, SW3, SW6, SW8 and SW10.

14. For the three years after the "test pond" is in place thermal monitoring will be completed in the vicinity of the "test pond" to monitor the extent and magnitude of downgradient temperature changes in the groundwater system. Temperature profiles will be obtained on a monthly basis and/or temperature dataloggers will be installed at the lake, within 20 m downgradient of the lake edge and at approximately 60 m distance downgradient of the lake edge. The results of the monitoring will be summarized in a separate report completed to the satisfaction of the MNR discussing the development and extent of any thermal impact and making appropriate recommendations regarding final setback distances between the lake(s) and the west Licence boundary.

15. After excavation of both Lakes A and B are complete (or near complete) the available monitoring data will be reviewed to the satisfaction of the MNR to determine if excavation of Lake C and/or development of a single lake is feasible. A separate report will be prepared at that time, and could include a computer groundwater model update, and submitted to MNR.

16. Threshold exceedance or Incident Response reporting will be completed as specified in the Action Response Plan

17. Annual Monitoring Reports summarizing the results of all of the monitoring specified by the monitoring program for the period January 1 to December 31 will be provided to the MNR, the MOE, the GRCA and the Township of Puslinch by March 31 following each year of operation, and will include the following:
    - description of monitoring methodology and locations,
    - all monitoring data, including tables of manual measurements and graphs of both manual and datalogger data,
    - figures showing extraction locations and extents,
    - description of operational activities,

- a summary and discussion of monitoring results (including thermal impacts and water quality),
- documentation of any threshold exceedances and resulting action and results, as per the incident response protocol,
- documentation of any remedial or contingency actions that are implemented, rationale for implementation and evaluation of success (if available at that time).

2.0 MONITORING COMPLETED

2.1 OPERATIONS SUMMARY

In 2017 site operations included continued above and below water table extraction. In addition, the Silt Barrier construction was completed. The current working area (as of March 2018), extraction Lake outline, and, Silt Barrier are shown on **Figure 1**.

CBM reports below water extraction occurred at Lake 1 over a total of 42 days within the periods from January 16th to February 23rd, and, from May 1st to May 18th. At that point the Lake 1 extraction was complete. The Silt barrier construction occurred over 20 days within the period from March 31st to April 28th. The extent of the Silt Barrier, which is largely complete, is shown on **Figure 1**. Extraction at Lake 2 occurred over a total of 69 days within the remainder of the operational year, from May 23rd to November 12th. There was no below water extraction during the month of August, and over extended periods in July and September/October.

2.2 LOCATIONS MONITORED

In 2016 the following locations were monitored:

> <u>On-Site</u>
> Monitoring wells (groundwater level and temperature) BH1, BH2-S, BH2-D, BH3-S, BH3-D, BH4-S, BH4-D, BH5, BH6-S, BH6-D, BH7-S, BH7-D, BH8, BH9-S, BH9-D, BH10-S, BH10-D, BH14, BH15, BH16 and BH17.
>
> Pond and Wetland Gauges (surface water level and temperature), LG3 (Lake 1), LG4 (Lake 2) and PG7 (Roszell Wetland).
>
> Drive-Points (groundwater and surface water level and temperature) DP1, DP2, DP3, DP4, DP5, DP6, DP7 and DP8.
>
> Surface Water monitoring (streamflow and/or temperature) sites SW2, SW3, SW4, SW5, SW6, SW7, SW8, SW9, SW10, and SW12.
>
> <u>Off-Site</u>
> Monitoring wells (groundwater level) BH11, BH12 and BH13.
>
> Surface water monitoring (streamflow and temperature) site SW1.
>
> Private wells (groundwater level) PW1 and PW2.
>
> Private Pond Gauges (surface water level) PG1, PG2, PG3, PG4, PG5 and PG6.

Water quality samples were obtained in November and December at the locations specified by the monitoring program. The water level monitoring locations and current extent of extraction is shown on **Figure 1**.

2.3 METHODOLOGY

Monitoring conducted for this program includes: manual water level measurements or observations; manual temperature measurements; manual streamflow measurements; automated continuous (datalogger) water level or barometric measurements; and, automated continuous temperature measurements. All manual measurements are recorded in the field as they are collected. Datalogger data is downloaded and saved onto a field laptop computer. Water level elevations are calculated based on the elevation of the reference point from which the measurement is made.

The manual water level measurements are obtained from an established reference point (typically top of well) using a Heron Instruments® electronic graduated water level tape according to manufacturer's instructions. Water level observations are also obtained visually at staff gauges (Water Survey of Canada type) installed in ponds (reference point is bottom, or zero mark, of gauge).

The manual water temperature measurements are obtained using electronic thermistor type instruments (Heron Instruments® temperature option included with the water level tape or Oakton Acorn Series Temp 4 ® meter) according to manufacturer's instructions.

The manual streamflow measurements are obtained using the area-velocity method. Stream width and depth is measured using commercially available fiberglass measuring tape and aluminum meter-stick. Historical water velocity was measured using a Swoffer Instruments Inc. Model 2100 ® current meter according to manufacturer's instructions. In 2017 water velocity measurements were obtained using an OTT Hydromet MF Pro ® current meter according to manufacturer's instructions.

Automated water level measurements are obtained using commercially available non-vented water level dataloggers according to the manufacturer's instructions. All of the dataloggers are currently programmed to take hourly measurements as specified by the Monitoring Program. Historical measurements have varied from 0.5 hour to 4 hour frequency, depending on location and according to the baseline data requirements at the time of installation. Water level dataloggers currently in use at the site include Schlumberger Diver®, and, In-Situ RT® or LT® series units. Barometric pressure is measured on-site using an In-Situ® dedicated barometric datalogger.

Automated temperature measurements within monitoring wells are obtained using: temperature sensors integrated into the water level dataloggers; Onset Tidbit® dataloggers (sealed integrated datalogger/temperature probe); or, Onset Hobo U12 Outdoor® units (enclosed weatherproof datalogger with up to 4 external temperature probes), and, according to the manufacturer's instructions. Automated temperature measurements within surface water locations are also obtained using the Tidbit® or Hobo® series temperature dataloggers. All of the temperature dataloggers are currently programmed to take hourly measurements as specified by the Monitoring Program. Historical measurements have varied from 0.5 hour to 4 hour frequency, depending on location and according to the baseline data requirements at the time of installation.

3.0 DATA SUMMARY

Monitoring data available at the site includes measurements beginning in March 2004, obtained as part of the original site characterization. Over the impact assessment and Licence application process the series of monitoring wells, private wells or surface water locations in use was expanded to the current network. Historical data was presented in the 2011 Annual Monitoring Report. Additional data was presented in the 2012 to 2016 annual reports. This report provides the manual data collected in 2017, in addition to hydrographs illustrating historical data.

3.1 WATER LEVEL MEASUREMENTS

A summary table of manual water level measurements obtained in 2017, and hydrographs illustrating overall historical trends, are included in **Appendix A**. Hydrographs illustrating datalogger data available for the site are included in **Appendix B**. Note that datalogger data was downloaded last in early December 2017 at most locations. Overall, a detailed set of baseline data defining annual and seasonal groundwater and surface water level fluctuation has been established at most locations. Occasional issues with datalogger operations continue to occur, however given the frequency of manual measurements and historical record, datalogger data losses that have occurred have not affected the ability to monitor and assess groundwater conditions and/or impact.

Monitoring and datalogger installation at private wells and ponds has been implemented according to access permissions with respective residents. Location PG4 is instrumented with a datalogger and locations PG2, PG3 and PG5 are each instrumented with a Staff Gauge and monitored (manually) on a quarterly basis.

3.2 TEMPERATURE MEASUREMENTS

Tables summarizing manual temperature measurements collected in 2017 included in **Appendix A**. Manual measurements include temperature profiles at monitoring wells and drive-points, and, surface water temperatures.

A detailed record of seasonal temperatures at various depths within monitoring wells, drive-points and surface water locations continues to be collected. Relevant temperature data plots are included in the Thermal Impact Assessment (Monitoring Recommendation item #14) report submitted in March 2018. Please refer to that report for the additional details.

3.3 STREAMFLOW MEASUREMENTS

A summary table of streamflow calculated from measurements obtained in 2017 is included in **Appendix A**. Streamflow measurements are available since 2004.

3.4 WATER QUALITY SAMPLING

Water quality samples were obtained at locations SW2, SW3, SW6, SW8, SW10, BH1, BH5, BH7-S, BH7-D, BH8, BH10-S, BH10-D and Extraction Pond on November 29th and 30th. The 2017 water quality sampling results are summarized in **Appendix C**.

4.0 DISCUSSION

Below water table extraction at the site was initiated at Lake 1 and Lake 2 in March 2014. Since that time most below water extraction was limited to Lake 1. In 2017 below water extraction from January to May expanded Lake 1 to the full extent as shown on **Figure 1**. Lake 2 extraction occurred subsequently, from May to November.

4.1 PRECIPITATION

Water level variation at and near the site is influenced by seasonal and annual precipitation. Groundwater recharge in southern Ontario typically follows a pattern that includes significant infiltration in response to spring snowmelt and rainfall which results in high water table conditions; a subsequent reduction in infiltration through the summer/fall growing period (as plants use much of the rainfall that does occur) which results in a water table decline; and, moderate rainfall infiltration during late fall and early winter periods which can result in some water table recovery. Critical periods are spring and fall seasons, if snowmelt and precipitation volumes are low during these periods then groundwater recharge can be significantly reduced. This would result in lower than average seasonal or annual water table levels. Extended dry periods can lead to overall seasonal or annual water table declines.

For comparison to the hydrographs, a plot of the monthly precipitation and current 30-year monthly precipitation normal (1981-2010) reported by Environment Canada for the weather station location closest to the site (at the Region of Waterloo International Airport) for the years 2001 to 2017 is included in **Appendix A**. The data is provided by Golder Associates as part of a coordinated approach to monthly and annual precipitation analysis for the Township of Puslinch (at the request of the Township) is consistent with other annual monitoring reporting for the area (e.g. Nestlé Waters Canada).

The graph indicates seasonal and annual variation, and a comparison to "average" values as represented by the Environment Canada reported 30-year Climate Normal. As indicated, on an annual basis the reported total precipitation in 2017 of 949.4 mm was slightly above "average" (916.5 mm). Relatively "wet" conditions occurred early in the year and relatively "dry" conditions occurred later in the year.

4.2 NATURAL WATER TABLE FLUCTUATION

The "natural" water table response at the site to seasonal and annual conditions appears to be best represented by BH8, based on a comparison of hydrographs and the location of the monitor relative to site activities (cross-gradient and most distant). As illustrated by the BH8 hydrograph, in 2017 the spring water table "high" was generally with the historical range, however was maintained over a longer period than historically observed, likely due to the relatively wet conditions sustained from late 2016 to early 2017. The seasonal water table decline was relatively rapid, likely due to the relatively dry conditions over the remainder of the year. A small rebound occurred as usual toward the end of the year. Overall water levels were within the historical range at this location.

4.3 WATER TABLE RESPONSE

4.3.1 Potential Groundwater Changes Due To Extraction

Potential water table response to the below water extraction can be associated with two separate "mechanisms", temporary changes due to the removal of aggregate (gravel), and, longer term changes due to the creation of a pond.

The first factor is related to the removal of the gravel and corresponding immediate inflow of water into the resulting "hole" to form a pond. The gravel is piled beside the pond and allowed to drain. Water flowing into the pond is a combination of water drained from the gravel pile, any direct precipitation on the pond, any surface water (runoff) that occurs from the pit floor surrounding the pond and groundwater from the surrounding aquifer. The inflow of groundwater can result in water table changes in the area surrounding the excavation, primarily within the upgradient flow system. These changes are temporary because once aggregate removal stops (either at the end of each day, at the end of the extraction season, and, once site extraction is complete), the groundwater system begins to recover. Over time normal seasonal recharge will mitigate the temporary effect and the overall system will return to a natural condition.

The second factor is related to the formation of the extraction pond (or Lake) within the water table flow system. The open water body created will have no resistance to flow. However the Roszell Lakes have no direct "outlet", therefore will not result in a significant increase in the volume of groundwater flow from east to west in the overall area. The total rate and volume of groundwater flow toward the Speed River valley will be controlled by the material left in place between the lake and the valley. Water level changes associated with the lake will also not be large enough to change the amount of water flowing toward the site from the east within the regional system. The lake will focus local flow, resulting in a water table decline immediately upgradient of the lake and a corresponding rise in water table downgradient of the lake. The Silt Barrier along the south edge of the extraction area is designed to limit water level change south of the site.

4.3.2 Water Table Response

In general, the seasonal water table low at the site (as an indicator of potential extraction related effects) in 2017 was higher than observed in 2015 and 2016, which could be related to increasing annual precipitation volumes from year to year over that period. In addition, the overall system may be adjusting to the expanding extraction ponds and newly completed silt barrier.

No discernable significant short-term "drawdown" response is noted either adjacent to the extraction pond or in the general area.

The detailed hydrographs of both manual and datalogger measurements indicate a limited local gradual response to the pond creation. However, based on the seasonal low levels observed from 2015 to 2017, this response appears to be moderating, with some overall "recovery" from the initial effects.

Current water table effects on the order of 30 to 35 cm (or less) are observed immediately adjacent to, and upgradient of, the extraction pond at BH5 and BH6. The cross-gradient water table effect immediately adjacent to the pond, at BH4, is less than 20 cm. The potential up-gradient effect near the southeast corner of the site, at BH10-S and BH15, is less than 10 cm. With distance from the pond the potential effect decreases, such that no overall change in water table elevations is observed at BH11, BH12 or BH13.

No water table response to below water extraction is observed along the west (downgradient) edge of the site or at the north end of the site. The capture and recharge of water within the pit appears to have resulted in an increase in water table elevations at BH7S and BH7D.

Water levels measured within the Roszell Wetland at PG7 showed no response to the extraction. This wetland interacts with the water table, however also relies on local runoff. It is likely that surface water inputs help to maintain conditions within the wetland, and may have more influence on the hydrology of the feature as compared to direct groundwater inputs.

No water level threshold exceedances were observed on-site.

4.3.3 Conditions Off-Site

As noted above, no water level response is observed at BH11, BH12 or BH13. In addition, no response was noted at the private wells monitored, PW1 and PW2.

Water levels in 2017 at PG1, which is a pond located across the road from BH5, were within the historical range for this location, and generally higher than 2015 and 2016. Similarly, seasonal low levels at PG3 in 2017 were higher than both 2015 and 2016, and, within the historical range. Location PG2 is a very shallow, and often seasonal, wetland/pond. The PG2 gauge was damaged in 2017, however monitoring at PG3 and PG4 provide sufficient information in this area.

Seasonal low water levels at PG4 in 2017 were higher than to those observed in 2015 and 2017, and back within the historical range. Pond levels at PG5 continue a declining trend since 2007. This trend is likely related to drainage conditions in the area and does not show any correlation to extraction activities. Overall pond levels at PG6 levels in 2017 were higher in than observed in 2015 and 2016.

Off-site monitoring results indicate that precipitation is a major factor in controlling seasonal groundwater and surface water levels in the area. No specific threshold exceedances were noted.

4.4 TEMPERATURE

A detailed record of seasonal temperatures at various depths within monitoring wells, drive-points and surface water locations continues to be collected. An analysis of relevant temperature data is provided in the Thermal Impact Assessment (Monitoring Recommendation item #14) report submitted in March 2018. Please refer to that report for the specific summary, discussion and recommendations related to thermal influences and monitoring.

4.5 STREAMFLOW

Due to equipment malfunction no usable streamflow data was collected during monthly monitoring up until September 2017. New, more accurate, streamflow monitoring equipment was obtained in August and data collection resumed. The available data, including the historical record, reflect seasonal variations. Overall, flows were within previously observed rates and seasonal fluctuation.

4.6 WATER QUALITY

The water quality results from 2017 continue to reflect agricultural activities in the area (e.g. elevated Nitrate-N concentrations) in addition to some road salt effects (e.g. some elevated sodium and chloride concentrations). Based on the overall sampling results no evidence of petroleum hydrocarbon impact is found at within the groundwater or surface water system.

4.7 THRESHOLD RESPONSE

No Trigger Mechanisms have been exceeded or Threshold Response has occurred according to the existing threshold definitions. No active Mitigation Measures or Contingency Plans (Response Protocol) required or implemented.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The following conclusions are based on the monitoring program results to date.

1. The current monitoring program implementation is in accordance with the requirements of the Site Plan.
2. The historical and ongoing monitoring program results provide a detailed characterization of baseline conditions at the site.
3. Extraction to date has had limited effect on groundwater and surface water conditions observed at the site.
4. No water level threshold exceedances occurred in 2017. Temperature thresholds are under review and proposed revisions are presented in the March 2018 Thermal Impact Assessment Report, submitted separately.
5. To date no Mitigation Measures have been required or taken; and no Contingency Plans and/or Response Protocol have been required or implemented.

5.2 RECOMMENDATIONS

The following recommendations are based on the monitoring program results to date.

1. The monitoring program should be implemented in 2018 according to the requirements of the Site Plan and recommendations of the Thermal Impact Assessment.

All of which is respectfully submitted,

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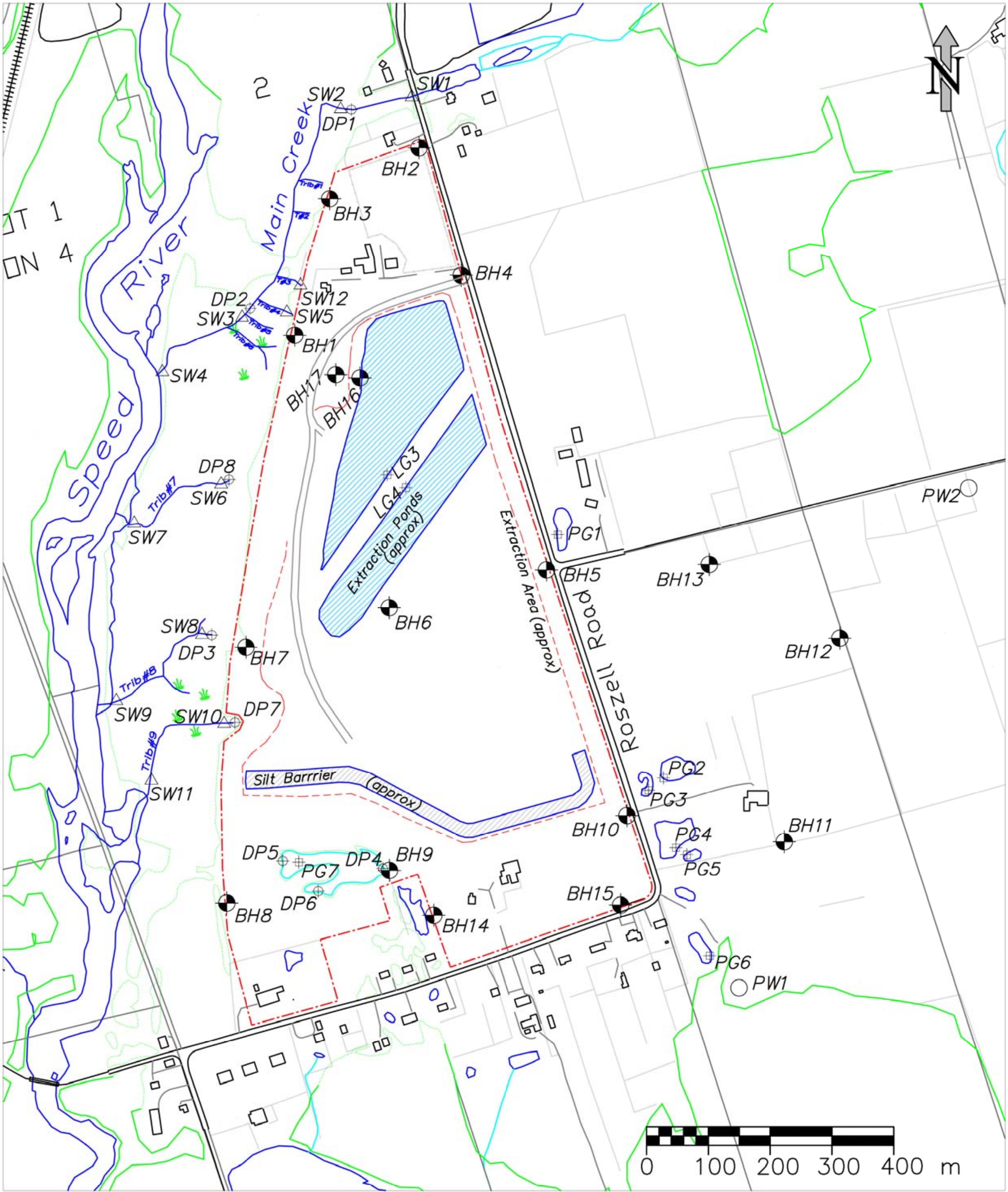
Figures



◐	existing monitoring well (or well nest)
⊕	drive-point piezometer
△	surface water flow/temperature
⊞	pond/Lake gauge
○	private well

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Figure 1: Site Details (2017), Monitor Locations

March 2018 Scale: as shown modified from: 1:10,000 OBM	Groundwater Monitoring Program	CBM Aggregates Roszell Pit	Part Lots 1 & 2, Concessions 3 & 4 Township of Puslinch, County of Wellington

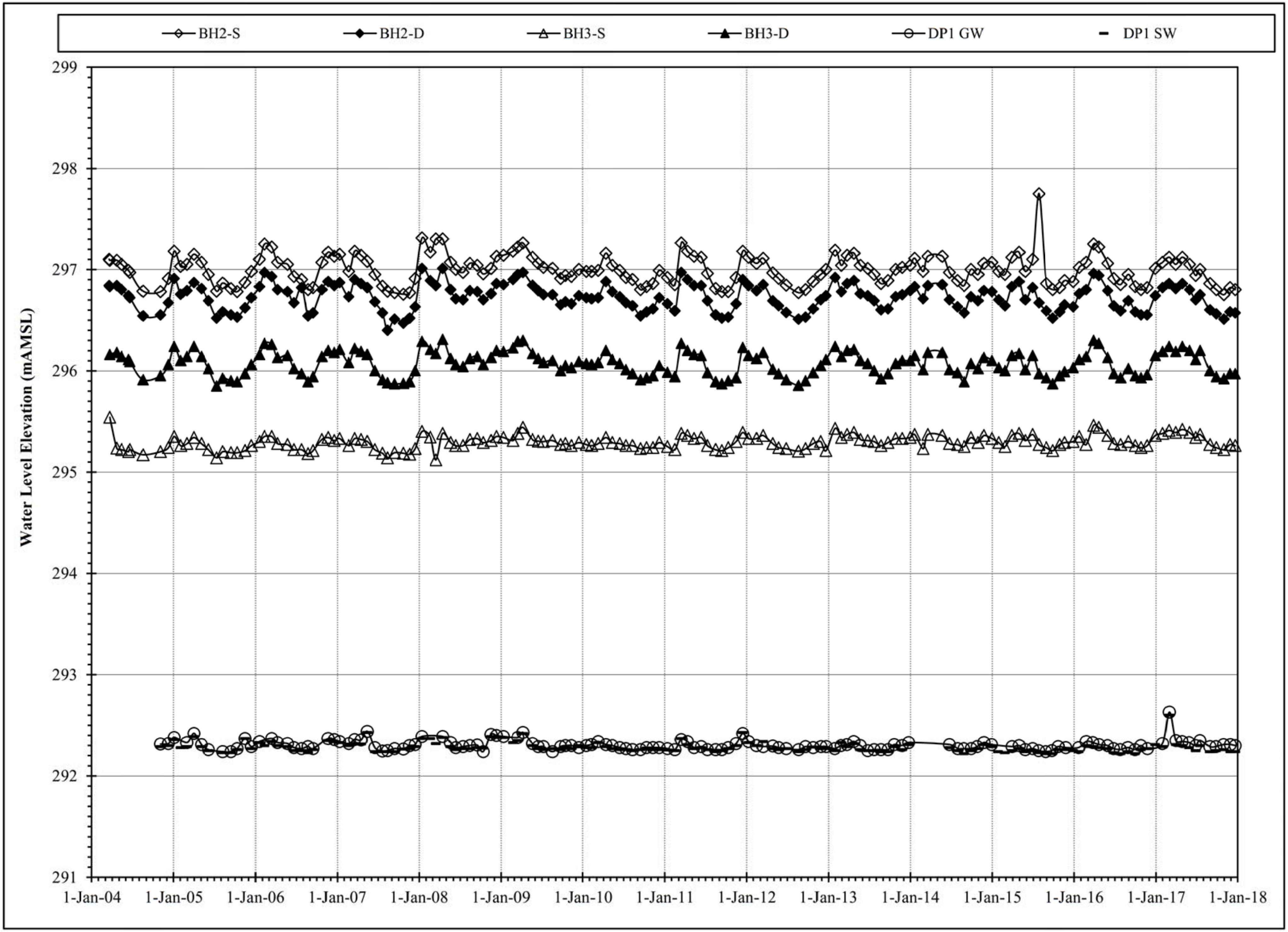
Appendix A
Manual Monitoring Results

Date	Groundwater Elevation Summary - Monitoring Wells (mAMSL)																							
	BH1	BH2-S	BH2-D	BH3-S	BH3-D	BH4-S	BH4-D	BH5	BH6-S	BH6-D	BH7-S	BH7-D	BH8	BH9-S	BH9-D	BH10-S	BH10-D	BH11	BH12	BH13	BH14	BH15	BH16	BH17
30-Jan-15	297.47	296.98	296.70	295.29	296.03	298.04	298.03	299.01	298.68	298.68	296.66	294.47	297.19	299.06	299.07	299.62	299.71	303.47	303.10	302.29	299.22	299.62	298.18	298.07
27-Feb-15	297.40	296.95	296.64	295.25	296.00	297.91	297.92	298.96	298.65	298.65	296.62	294.44	297.13	299.03	299.04	299.57	299.71	303.43	303.07	302.24	299.19	299.58	298.09	297.99
30-Mar-15	297.81	297.12	296.83	295.36	296.15	298.28	298.29	299.16	298.87	298.88	296.80	294.52	297.39	299.27	299.27	299.82	299.93	303.60	303.12	302.39	299.42	299.82	298.42	298.30
01-May-15	297.73	297.17	296.88	295.38	296.17	298.35	298.36	299.17	298.85	298.86	296.87	294.53	297.55	299.26	299.25	299.84	299.96	303.52	303.17	302.47	299.39	299.81	298.48	298.36
28-May-15	297.46	296.98	296.70	295.31	296.01	297.99	298.00	299.01	298.67	298.68	296.74	294.44	297.22	299.03	299.04	299.62	299.72	303.45	303.06	302.35	299.17	299.60	298.17	298.07
30-Jun-15	297.61	297.10	296.82	295.37	296.15	298.16	298.16	299.16	298.74	298.74	296.87	294.50	297.41	299.21	299.21	299.81	299.89	303.51	303.10	302.37	299.35	299.78	298.34	298.24
29-Jul-15	297.43	297.75	296.67	295.27	295.97	297.93	297.94	298.96	298.45	298.46	296.83	294.46	297.20	298.98	298.99	299.59	299.69	303.40	303.01	302.27	299.13	299.56	298.10	298.00
31-Aug-15	297.34	296.86	296.59	295.24	295.93	297.83	297.85	298.85	298.32	298.33	296.82	294.47	297.11	298.92	298.91	299.51	299.61	303.22	302.92	302.17	299.06	299.49	298.00	297.91
29-Sep-15	297.22	296.80	296.52	295.21	295.87	297.71	297.78	298.58	298.22	298.22	296.62	294.38	297.04	298.77	298.76	299.27	299.38	303.17	302.83	302.07	298.89	299.29	297.74	297.66
29-Oct-15	297.24	296.82	296.58	295.27	295.95	297.58	297.66	298.66	298.15	298.16	296.55	294.37	297.03	298.67	298.67	299.42	299.52	303.15	302.81	302.01	298.95	299.34	297.74	297.69
20-Nov-15	297.33	296.89	296.65	295.29	295.99	297.80	297.80	298.66	298.32	298.32	296.76	294.54	297.11	298.71	298.71	299.37	299.44	303.21	302.88	302.04	298.91	299.38	297.88	297.80
29-Dec-15	297.29	296.88	296.63	295.30	296.03	297.78	297.74	298.65	298.31	298.31	296.72	294.57	297.18	298.77	298.77	299.39	299.46	303.18	302.85	302.02	298.98	299.41	297.87	297.78
25-Jan-16	297.48	297.02	296.76	295.35	296.11	297.99	297.99	298.93	298.58	298.58	296.91	294.65	297.33	298.97	298.98	299.57	299.64	303.40	302.94	302.11	299.16	299.56	298.13	298.03
23-Feb-16	297.58	297.07	296.80	295.27	296.14	298.13	298.13	299.01	298.65	298.65	296.87	294.60	297.32	299.07	299.07	299.65	299.74	303.29	302.89	302.21	299.26	299.66	298.27	298.16
28-Mar-16	297.78	297.25	296.96	295.46	296.30	298.33	298.34	299.29	298.93	298.93	297.13	294.77	297.79	299.40	299.38	300.01	300.12	303.50	303.02	302.43	299.59	300.07	298.52	298.42
20-Apr-16	297.84	297.22	296.94	295.44	296.27	298.47	298.47	299.24	298.91	298.91	297.32	294.84	297.65	299.24	299.24	299.89	299.95	303.54	303.31	302.60	299.38	299.80	298.69	298.56
31-May-16	297.61	297.06	296.79	295.36	296.13	298.12	298.13	299.05	298.75	298.75	297.05	294.67	297.27	299.08	299.08	299.73	299.79	303.53	303.22	302.47	299.25	299.66	298.32	298.22
28-Jun-16	297.40	296.91	296.64	295.28	295.97	297.83	297.83	298.79	298.48	298.48	296.77	294.47	296.97	298.86	298.86	299.49	299.57	303.40	303.13	302.36	299.03	299.43	298.04	297.95
28-Jul-16	297.36	296.85	296.59	295.27	295.93	297.75	297.75	298.70	298.40	298.40	296.81	294.51	296.94	298.79	298.78	299.39	299.49	303.36	303.10	302.26	298.94	299.37	297.97	297.87
31-Aug-16	297.43	296.95	296.69	295.30	296.02	297.83	297.83	298.82	298.46	298.47	297.03	294.67	297.27	299.00	299.00	299.60	299.68	303.40	303.12	302.30	299.16	299.57	298.03	297.95
30-Sep-16	297.29	296.83	296.58	295.26	295.95	297.69	297.67	298.65	298.28	298.29	296.67	294.48	297.07	298.78	298.78	299.37	299.45	303.17	302.80	302.15	298.93	299.35	297.89	297.79
26-Oct-16	297.30	296.80	296.55	295.24	295.93	297.66	297.65	298.70	298.34	298.34	296.68	294.53	297.09	298.84	298.85	299.35	299.48	303.21	302.85	302.10	298.96	299.36	297.94	297.84
22-Nov-16	297.34	296.82	296.55	295.26	295.96	297.69	297.68	298.74	298.41	298.42	296.67	294.56	297.14	298.89	298.87	299.45	299.52	303.23	302.88	302.08	299.04	299.44	298.02	297.91
29-Dec-16	297.53	297.01	296.74	295.36	296.15	297.91	297.90	299.04	298.68	298.68	296.92	294.77	#N/A	#N/A	#N/A	299.79	299.88	303.38	303.02	302.23	#N/A	299.81	298.25	298.13
31-Jan-17	297.57	297.07	296.82	295.38	296.19	298.03	298.02	299.05	298.69	298.69	297.22	294.95	297.65	299.19	299.19	299.78	299.82	303.36	303.01	302.44	299.35	299.74	298.36	298.23
28-Feb-17	297.60	297.12	296.86	295.41	296.24	298.07	298.09	299.11	298.73	298.74	297.20	294.91	297.79	299.31	299.29	299.88	299.94	303.52	303.17	302.50	299.43	299.85	298.38	298.24
29-Mar-17	297.60	297.05	296.81	295.39	296.19	298.08	298.08	299.06	298.68	298.69	297.20	294.86	297.49	299.16	299.15	299.70	299.80	303.55	303.21	302.57	299.28	299.69	298.44	298.28
28-Apr-17	297.65	297.12	296.86	295.42	296.24	298.12	298.13	299.12	298.69	298.70	297.22	294.83	297.67	299.23	299.21	299.80	299.89	303.58	303.28	302.69	299.36	299.78	298.45	298.34
31-May-17	297.59	297.05	296.80	295.39	296.20	298.05	298.04	299.04	298.65	298.64	297.17	294.80	297.47	299.20	299.19	299.82	299.93	303.76	303.46	302.74	299.36	299.80	298.36	298.24
28-Jun-17	297.52	296.94	296.70	295.34	296.11	297.94	297.94	298.97	298.61	298.61	296.96	294.63	297.25	299.06	299.07	299.71	299.80	303.61	303.31	302.64	299.17	299.66	298.26	298.15
18-Jul-17	297.57	297.00	296.75	295.37	296.20	297.98	297.98	299.10	298.75	298.74	296.97	294.67	297.30	299.10	299.11	299.81	299.91	303.70	303.38	302.67	299.20	299.68	298.30	298.19
30-Aug-17	297.39	296.86	296.60	295.27	296.00	297.76	297.76	298.88	298.49	298.49	296.80	294.59	297.09	298.92	298.91	299.57	299.66	303.90	303.61	302.91	299.08	299.52	298.06	297.96
27-Sep-17	297.30	296.80	296.56	295.24	295.94	297.66	297.66	298.62	298.27	298.26	296.65	294.50	297.00	298.77	298.77	299.38	299.46	303.51	303.22	302.42	298.90	299.36	297.94	297.86
31-Oct-17	297.26	296.75	296.51	295.22	295.92	297.59	297.58	298.64	298.29	298.29	296.62	294.54	297.12	298.80	298.80	299.43	299.53	303.46	303.15	302.34	298.96	299.42	297.90	297.81
27-Nov-17	297.29	296.82	296.58	295.27	295.97	297.67	297.67	298.87	298.52	298.52	296.63	294.56	297.25	299.03	299.03	299.62	299.70	303.44	303.16	302.34	299.18	299.59	298.01	297.89
21-Dec-17	297.25	296.80	296.57	295.26	295.97	297.62	297.62	298.82	298.45	298.45	296.58	294.55	297.16	299.00	298.98	299.57	299.66	303.38	303.09	302.31	299.14	299.55	297.96	297.85
Notes	mAMSL = metres above mean sea level							#NA = not available (no access or not measured)																

BH Water Level Summary - Manual Measurements

	Groundwater and Surface Water Elevation Summary - LG, PG and DP Locations On-Site (mAMSL)																			
Well No.:	LG2	LG3	LG4	PG7	DP1		DP2		DP3		DP4		DP5		DP6		DP7		DP8	
	SW	SW	SW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW
27-Jan-15	#N/A	#N/A	#N/A	#N/A	#N/A	292.24	#N/A	291.93	292.29	292.20	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	292.06	292.06
26-Feb-15	#N/A	#N/A	#N/A	#N/A	#N/A	292.23	#N/A	291.93	#N/A	292.16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	292.06	292.05
31-Mar-15	#N/A	#N/A	#N/A	#N/A	292.29	292.25	292.07	291.96	292.29	292.18	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	297.83	297.53	292.06	292.05
01-May-15	#N/A	#N/A	#N/A	#N/A	292.30	292.27	292.08	291.97	292.29	292.19	299.41	299.71	299.21	299.31	#N/A	#N/A	297.88	297.55	292.06	292.05
28-May-15	#N/A	298.38	298.56	#N/A	292.26	292.24	291.98	291.94	292.29	292.20	299.17	#N/A	298.97	#N/A	299.22	299.28	297.82	297.54	292.05	292.06
30-Jun-15	#N/A	298.51	298.68	299.39	292.27	292.25	292.03	291.95	292.29	292.19	299.35	#N/A	299.14	#N/A	299.41	299.39	297.85	297.55	292.06	292.06
27-Jul-15	#N/A	298.32	298.51	299.07	292.25	292.23	292.00	291.94	292.29	292.20	299.13	#N/A	298.90	#N/A	299.10	#N/A	297.82	#N/A	292.06	292.07
28-Aug-15	#N/A	298.17	298.39	298.97	292.24	292.22	291.98	291.93	292.28	292.18	299.04	#N/A	298.83	#N/A	299.06	#N/A	297.83	297.51	292.06	292.05
25-Sep-15	#N/A	297.77	298.06	298.91	292.25	292.22	291.99	291.93	292.30	292.19	298.98	#N/A	298.78	#N/A	299.05	#N/A	297.73	#N/A	292.05	292.04
23-Oct-15	#N/A	297.63	297.99	298.80	292.29	292.26	292.07	291.95	292.30	292.20	298.94	#N/A	298.73	#N/A	299.03	#N/A	297.73	297.53	292.08	292.07
25-Nov-15	#N/A	297.87	298.21	299.15	292.28	292.26	292.09	291.96	292.31	292.19	298.87	#N/A	298.68	#N/A	299.06	#N/A	297.92	297.54	292.09	292.05
28-Dec-15	#N/A	297.89	298.13	#N/A	#N/A	292.25	#N/A	291.95	292.28	292.18	298.95	#N/A	298.75	#N/A	299.08	#N/A	#N/A	297.53	292.07	292.04
22-Jan-16	#N/A	298.15	#N/A	#N/A	292.28	292.24	#N/A	291.95	292.30	292.20	299.16	#N/A	298.93	#N/A	299.11	#N/A	#N/A	#N/A	292.07	292.05
24-Feb-16	#N/A	298.77	298.18	#N/A	292.34	292.30	292.11	291.98	292.31	292.19	299.26	#N/A	299.03	#N/A	299.30	#N/A	#N/A	297.54	292.06	292.04
24-Mar-16	#N/A	298.45	298.69	#N/A	292.33	292.29	292.09	291.98	292.31	292.19	299.56	299.64	299.31	299.24	299.57	299.50	#N/A	297.59	292.07	292.04
21-Apr-16	#N/A	298.73	298.82	#N/A	292.31	292.28	292.07	291.96	292.30	292.18	299.45	299.67	299.22	299.25	299.46	299.52	298.07	297.57	292.06	292.04
30-May-16	#N/A	298.41	298.62	299.31	292.30	292.27	292.06	291.96	292.29	292.19	299.25	#N/A	299.01	#N/A	299.29	#N/A	297.93	297.54	292.05	292.04
27-Jun-16	#N/A	298.12	298.36	299.00	292.27	292.23	291.97	291.95	292.28	292.18	299.19	#N/A	298.96	#N/A	299.15	#N/A	297.76	297.55	292.05	292.04
26-Jul-16	#N/A	298.01	298.26	298.66	292.26	292.22	291.96	291.94	292.28	292.20	298.93	#N/A	298.73	#N/A	298.96	#N/A	297.85	#N/A	292.05	292.04
29-Aug-16	#N/A	298.09	298.27	299.15	292.28	292.24	292.06	291.93	292.29	292.18	299.14	#N/A	298.99	#N/A	299.21	#N/A	297.94	297.53	292.06	292.03
29-Sep-16	#N/A	297.88	298.10	298.89	292.26	292.22	292.03	291.93	292.28	292.18	298.91	#N/A	298.71	#N/A	298.95	#N/A	297.72	#N/A	292.06	292.04
25-Oct-16	#N/A	297.95	298.21	#N/A	292.30	292.26	292.05	291.93	292.29	292.20	298.95	#N/A	298.76	#N/A	299.02	#N/A	297.73	297.50	292.07	292.04
24-Nov-16	#N/A	298.05	298.28	299.07	292.27	292.27	292.08	291.95	292.30	292.20	299.03	#N/A	298.81	#N/A	299.09	#N/A	297.73	297.52	292.08	292.06
28-Dec-16	#N/A	#N/A	#N/A	#N/A	#N/A	292.31	#N/A	292.02	292.31	292.20	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	297.92	297.53	292.07	292.04
Notes	mAMSL = metres above mean sea level SW = surface water						GW = groundwater				#NA = not available (dry, frozen, no access, or not measured)									

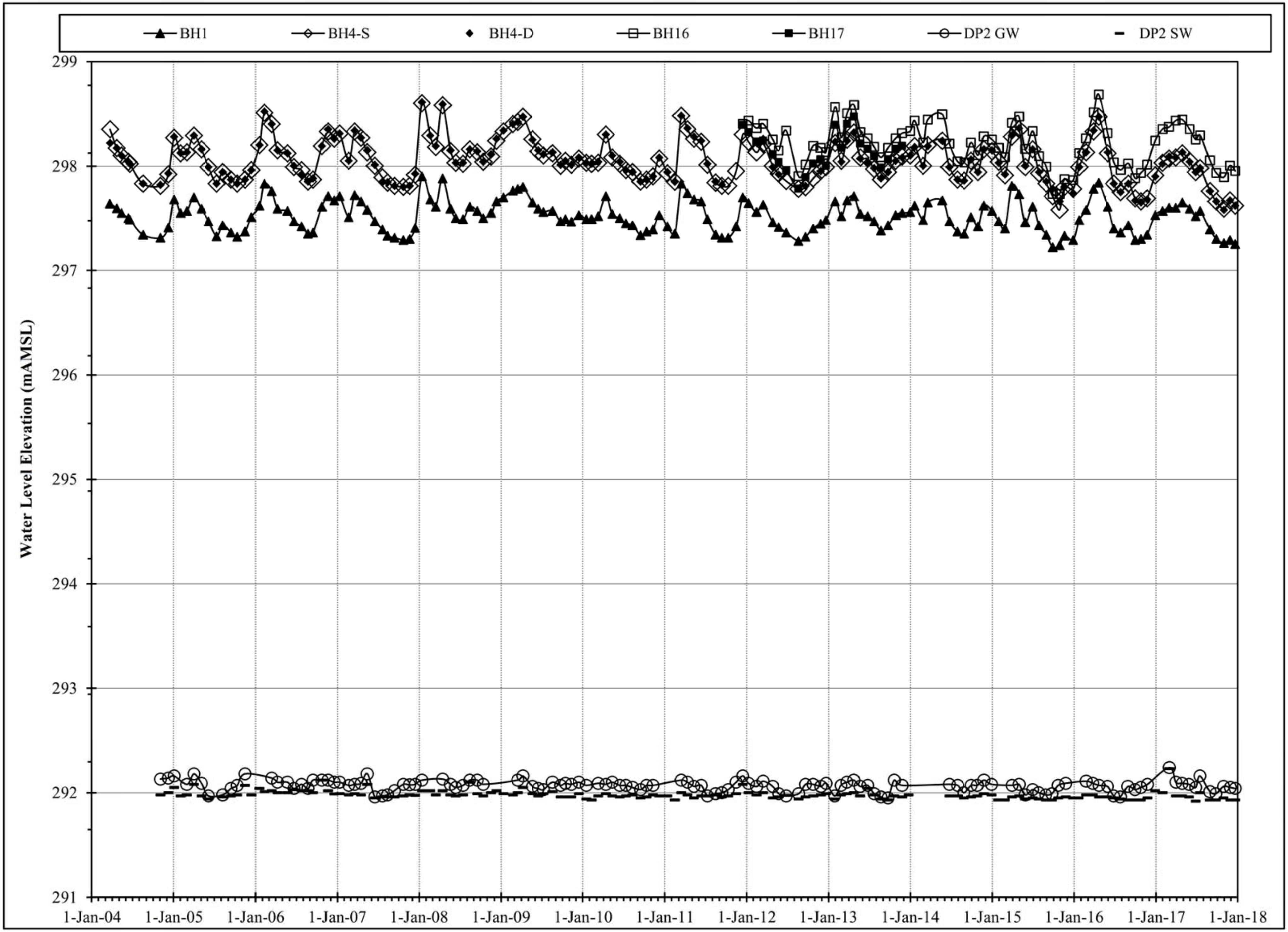
	Groundwater and Surface Water Elevation Summary - Off-Site (mAMSL)							
Well No.:	PG1	PG2	PG3	PG4	PG5	PG6	PW1	PW2
30-Jan-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27-Feb-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
30-Mar-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-May-15	301.22	301.77	301.62	301.84	301.57	#N/A	#N/A	#N/A
28-May-15	301.00	301.19	301.76	301.66	301.57	#N/A	#N/A	#N/A
05-Jun-15	#N/A	#N/A	#N/A	#N/A	#N/A	300.95	302.04	303.75
30-Jun-15	301.06	301.21	301.84	301.71	301.58	#N/A	#N/A	#N/A
29-Jul-15	300.87	300.99	301.67	301.58	301.56	#N/A	#N/A	#N/A
31-Aug-15	300.78	300.85	301.61	301.49	301.54	#N/A	#N/A	#N/A
14-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	300.65	301.82	303.58
29-Sep-15	300.74	#N/A	301.51	301.36	301.44	#N/A	#N/A	#N/A
29-Oct-15	#N/A	#N/A	301.51	301.37	301.46	#N/A	#N/A	#N/A
25-Nov-15	#N/A	#N/A	301.54	301.42	301.48	#N/A	#N/A	#N/A
15-Dec-15	#N/A	#N/A	#N/A	#N/A	#N/A	300.64	301.75	303.49
28-Dec-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28-Mar-16	301.17	301.58	301.78	301.77	301.57	#N/A	#N/A	#N/A
20-Apr-16	301.45	301.56	301.77	301.85	301.58	#N/A	#N/A	#N/A
31-May-16	301.14	301.51	301.72	301.72	301.55	#N/A	#N/A	#N/A
28-Jun-16	300.94	301.16	301.65	301.56	301.54	#N/A	#N/A	#N/A
28-Jul-16	300.80	300.79	301.63	301.46	301.52	#N/A	#N/A	#N/A
31-Aug-16	300.88	300.86	301.58	301.51	301.47	#N/A	#N/A	#N/A
30-Sep-16	#N/A	#N/A	301.60	301.43	301.49	#N/A	#N/A	#N/A
26-Oct-16	#N/A	#N/A	301.56	301.37	301.47	#N/A	#N/A	#N/A
22-Nov-16	#N/A	#N/A	301.59	301.41	#N/A	#N/A	#N/A	#N/A
29-Dec-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
31-Jan-17	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28-Feb-17	#N/A	#N/A	301.88	#N/A	301.54	#N/A	#N/A	#N/A
29-Mar-17	301.18	#N/A	301.98	301.77	301.55	#N/A	#N/A	#N/A
10-Apr-17	#N/A	#N/A	#N/A	#N/A	#N/A	301.12	302.22	303.95
28-Apr-17	301.38	#N/A	302.10	301.85	301.56	#N/A	#N/A	#N/A
31-May-17	301.33	#N/A	302.13	301.87	301.55	#N/A	#N/A	#N/A
28-Jun-17	301.16	#N/A	302.07	301.76	301.55	#N/A	#N/A	#N/A
13-Jul-17	#N/A	#N/A	#N/A	#N/A	#N/A	300.85	302.14	304.11
18-Jul-17	301.16	#N/A	302.08	301.88	301.54	#N/A	#N/A	#N/A
30-Aug-17	301.06	#N/A	301.92	301.65	301.54	#N/A	#N/A	#N/A
27-Sep-17	300.79	#N/A	301.79	301.55	301.50	#N/A	#N/A	#N/A
31-Oct-17	300.76	#N/A	301.70	301.56	301.47	#N/A	#N/A	#N/A
27-Nov-17	300.84	#N/A	301.74	301.64	301.47	#N/A	#N/A	#N/A
06-Dec-17	#N/A	#N/A	#N/A	#N/A	#N/A	300.83	302.04	303.91
21-Dec-17	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Notes	mAMSL = metres above mean sea level			#NA = not available (no access, frozen, or not measured)				



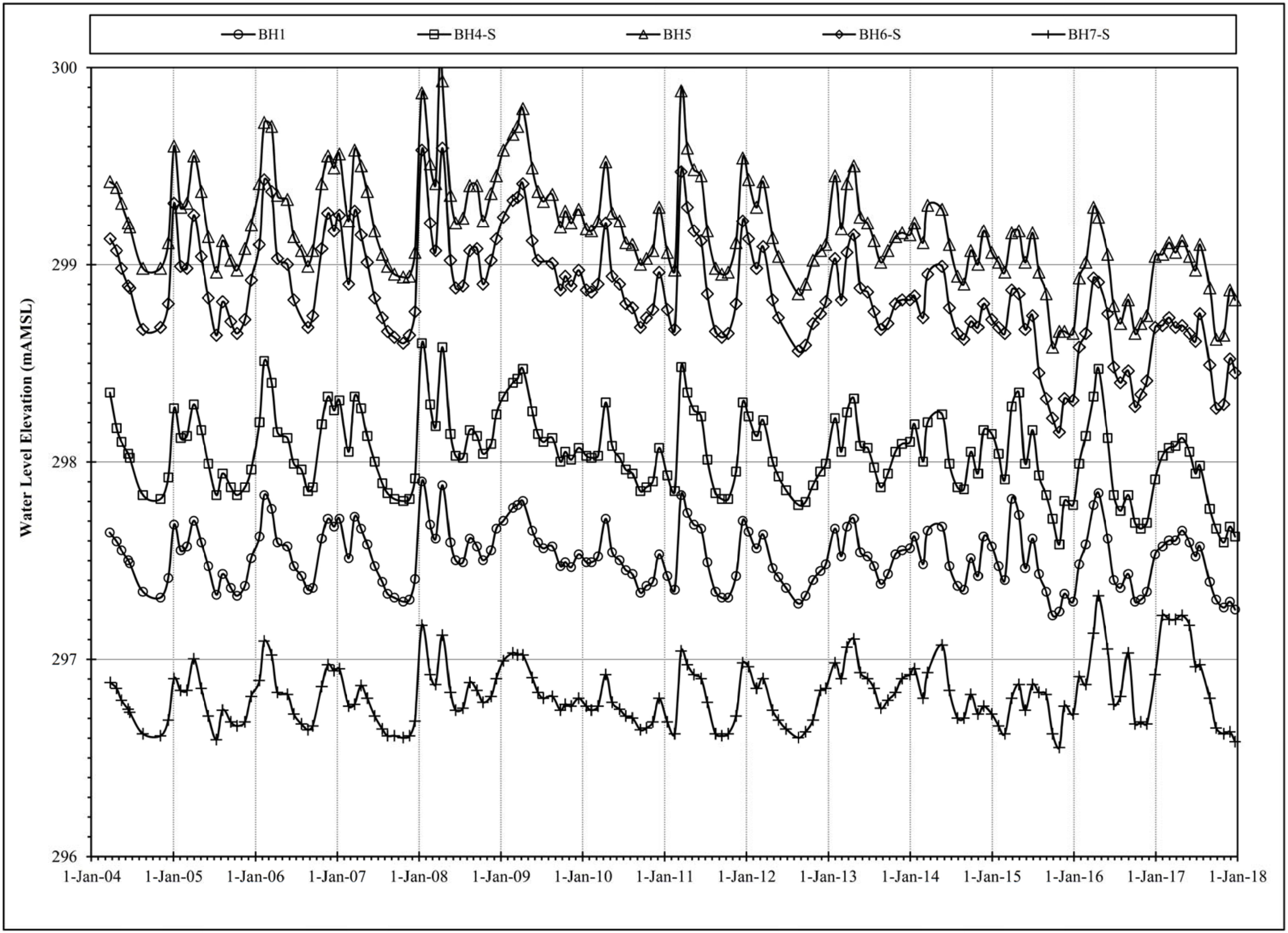
CBM Aggregates
Roszell Road Pit

Hydrograph - North of Extraction Area

Groundwater Science Corp.
Annual Monitoring Report



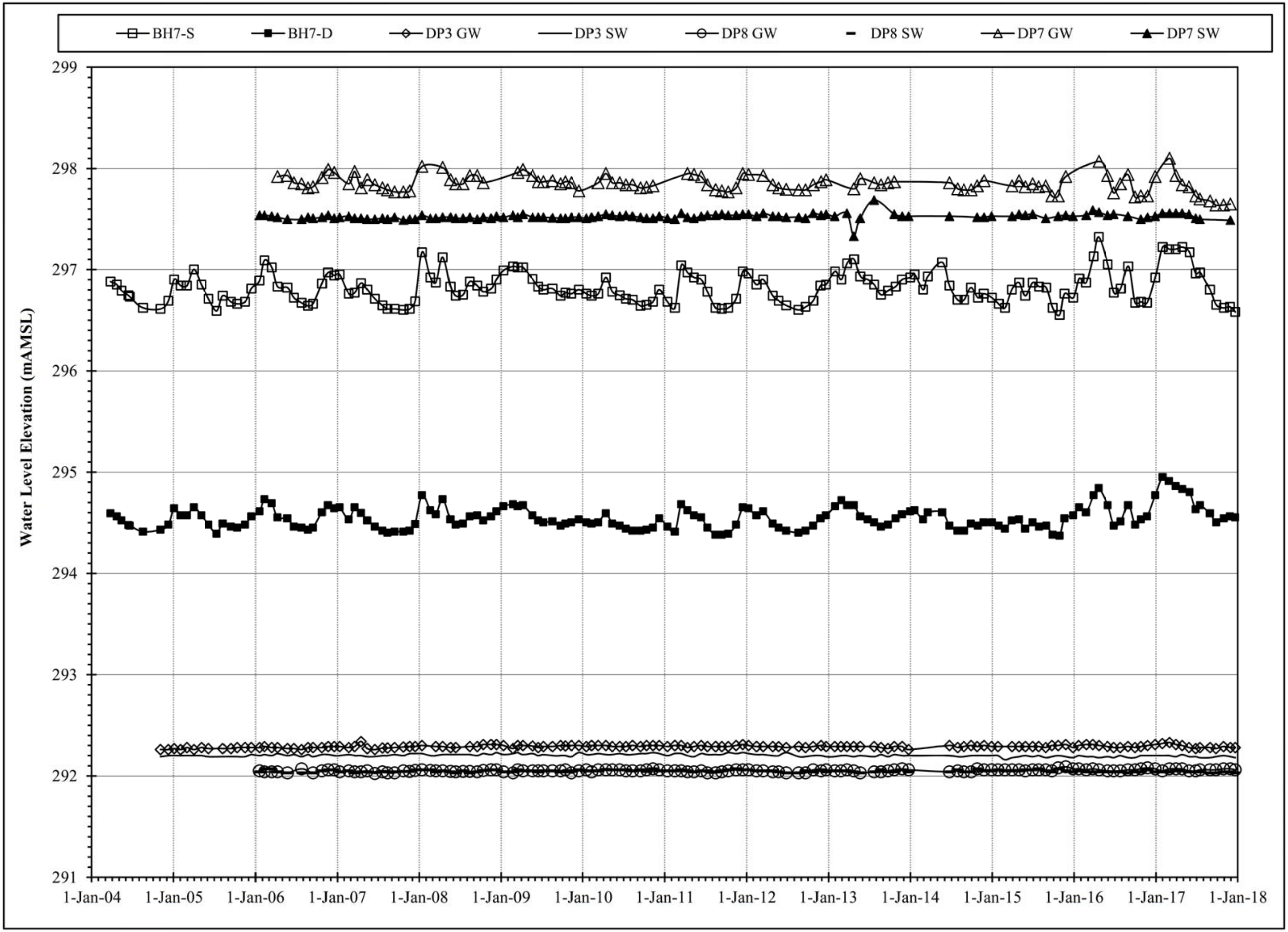
Hydrograph - North Edge of Extraction Area



CBM Aggregates
Roszell Road Pit

Hydrograph - Monitors Surrounding Extraction Area

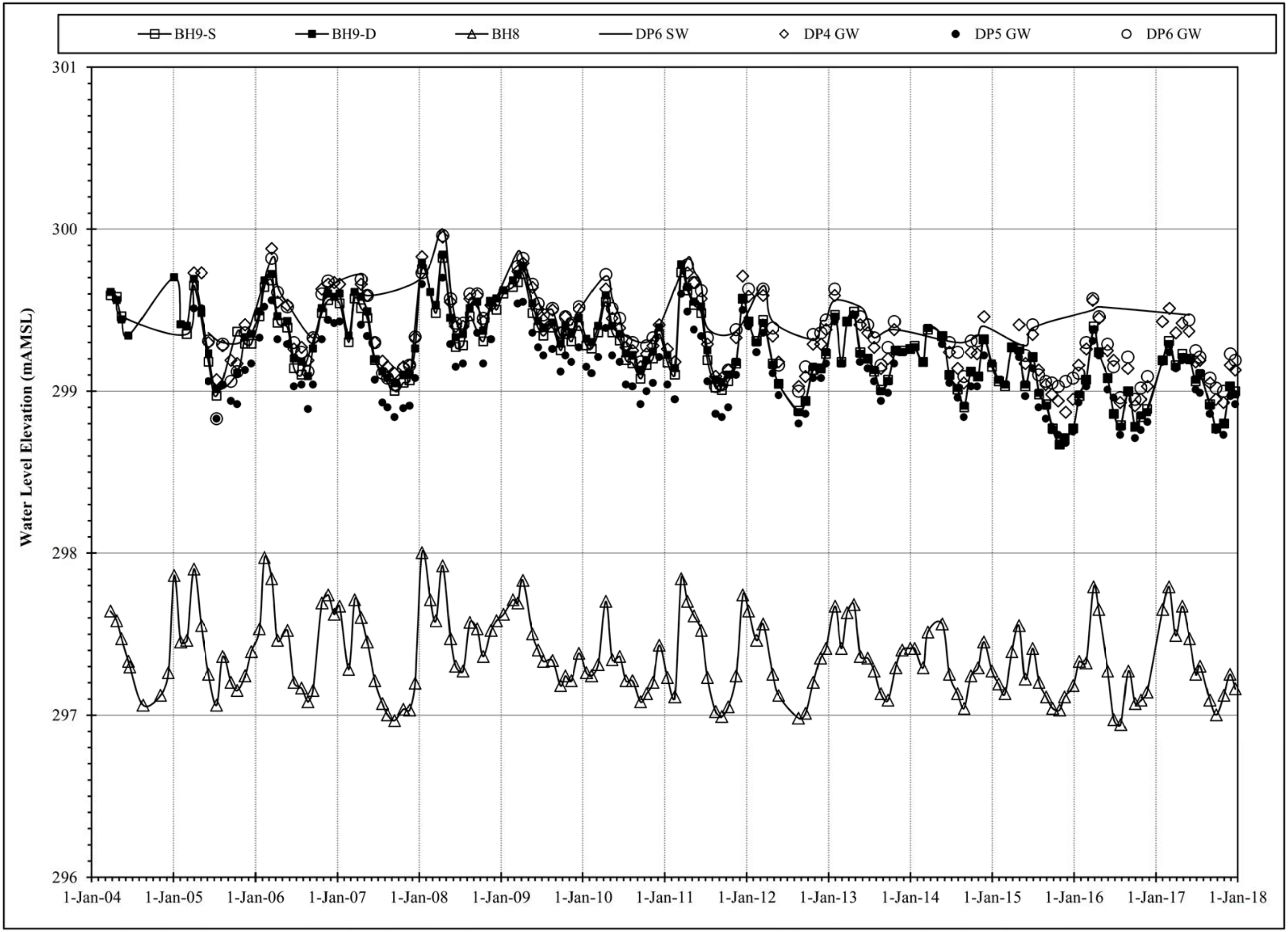
Groundwater Science Corp.
Annual Monitoring Report



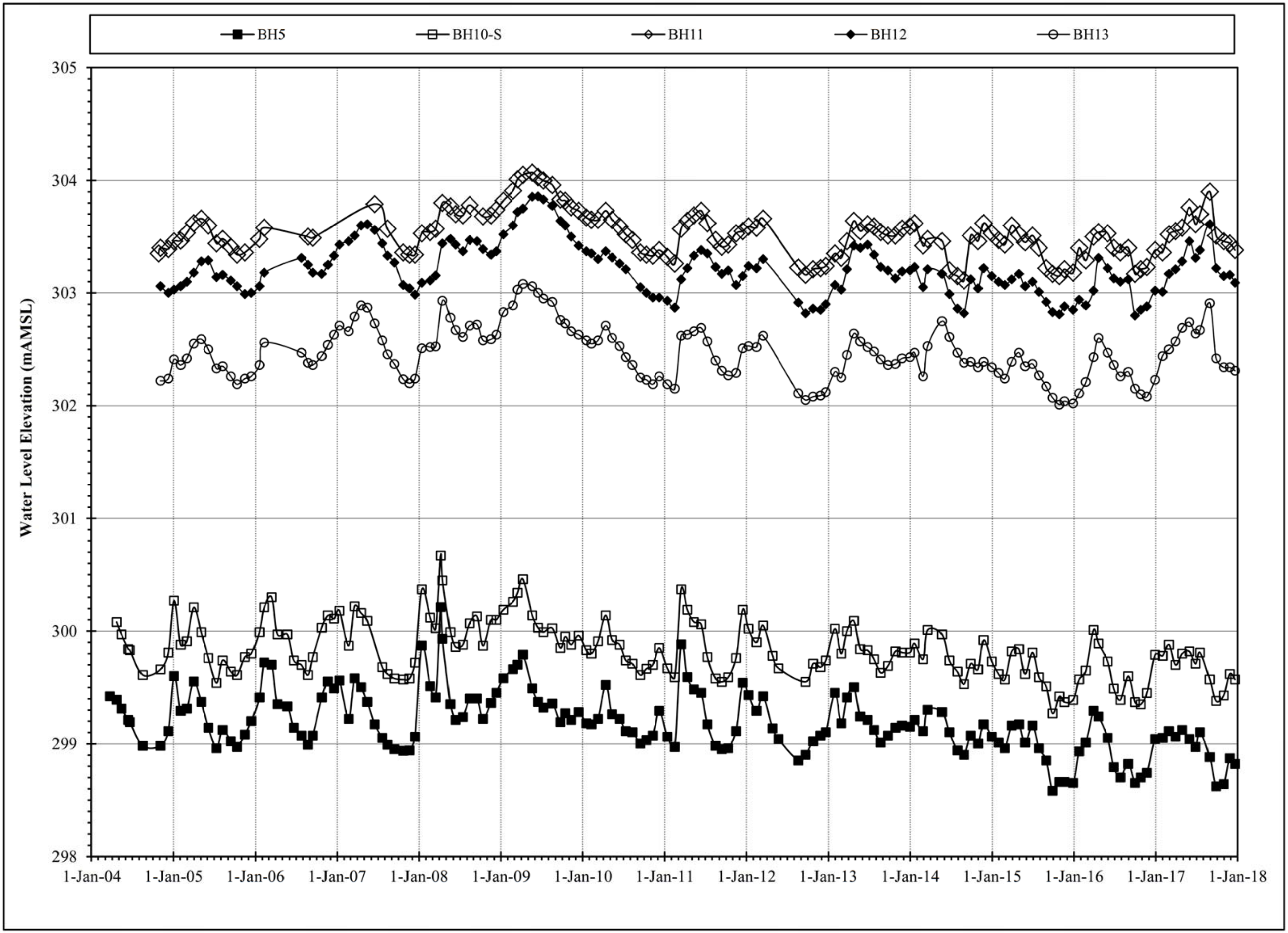
CBM Aggregates
Roszell Road Pit

Hydrograph - West Edge, Middle of Site

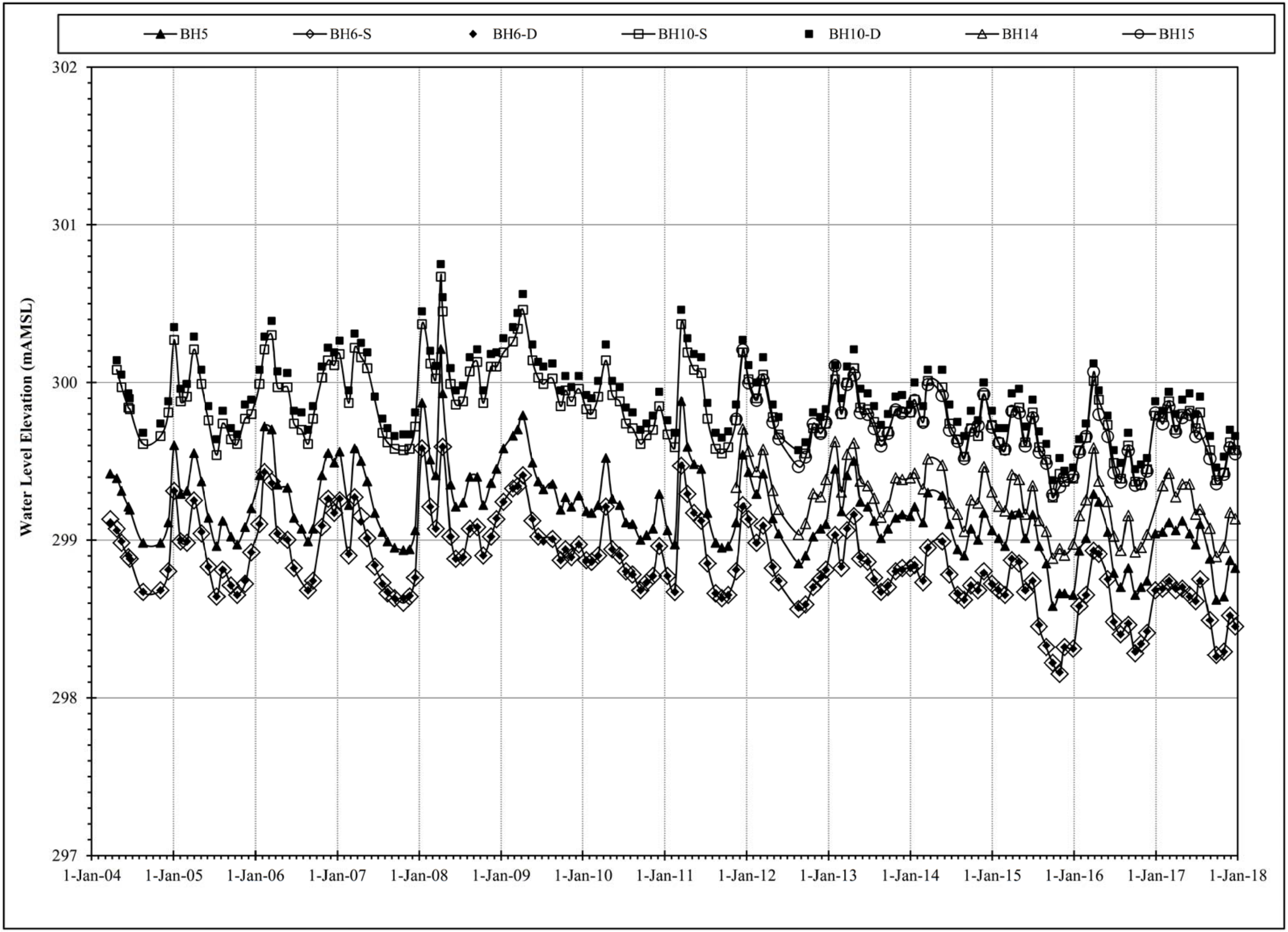
Groundwater Science Corp.
Annual Monitoring Report



Hydrograph - Roszell Wetland Area



Hydrograph - East and Off-Site



Hydrograph - Southeast Portion of Site

Monitor:	BH1	Temperature (C) at **Depth** (mBGS)							
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**
31-Jan-17	-3.1	1.2	1.3	2.1	7.4	9.1	10.0	10.6	10.8
28-Feb-17	6.8	7.3	7.0	6.9	7.6	8.5	9.1	9.4	9.7
29-Mar-17	12.0	7.6	7.3	7.1	7.2	7.8	8.3	9.0	8.9
28-Apr-17	13.2	10.3	10.1	9.8	8.3	8.0	8.1	8.4	8.4
31-May-17	21.9	15.0	14.7	13.8	9.9	8.9	8.5	8.5	8.4
28-Jun-17	22.5	16.2	16.0	15.4	10.6	9.7	9.1	8.9	8.8
18-Jul-17	18.7	18.1	17.8	17.3	13.1	11.5	10.4	9.8	9.7
30-Aug-17	17.8	16.3	16.2	15.9	13.4	12.2	11.4	10.9	10.8
27-Sep-17	27.5	21.3	20.3	19.5	14.3	13.1	12.5	11.9	11.8
31-Oct-17	temperature probe malfunction								
27-Nov-17	4.1	7.3	7.4	7.4	10.1	10.9	11.4	11.5	11.5
21-Dec-17	-2.7	3.8	3.7	4.5	9.0	10.8	12.0	12.7	13.2

Monitor:	BH2-D	Temperature (C) at **Depth** (mBGS)																	
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**	**13.0**	**14.0**	**15.0**	**16.0**	**17.0**	**18.0**	**18.8**
31-Jan-17	-3.1	2.9	2.9	3.0	5.5	7.3	8.5	9.2	10.0	11.0	11.6	11.4	11.1	10.7	10.4	10.1	9.8	9.5	9.3	9.1
28-Feb-17	6.8	5.8	5.6	5.7	6.0	7.1	8.1	8.6	9.5	10.5	11.0	11.1	10.9	10.7	10.4	10.2	9.9	9.6	9.3	9.1
29-Mar-17	12.0	6.8	6.6	6.4	6.1	7.0	7.8	9.0	9.7	10.3	10.6	10.6	10.5	10.4	10.2	10.0	9.7	9.5	9.4	9.3
28-Apr-17	13.2	13.2	13.1	13.2	11.5	11.0	10.9	10.8	10.8	10.6	10.5	10.4	10.3	10.1	9.9	9.8	9.6	9.5	9.5	9.4
31-May-17	21.9	13.4	13.5	13.1	10.2	9.2	8.9	8.7	8.7	8.9	9.2	9.4	9.6	9.7	9.7	9.7	9.7	9.6	9.6	9.5
28-Jun-17	22.5	19.0	18.6	14.6	12.8	11.2	10.4	9.9	9.5	9.3	9.1	9.4	9.5	9.6	9.7	9.7	9.7	9.7	9.7	9.5
18-Jul-17	18.7	18.5	16.9	15.2	13.1	10.9	10.8	10.4	9.8	9.5	9.4	9.5	9.5	9.6	9.7	9.6	9.6	9.6	9.5	9.4
30-Aug-17	17.8	16.5	16.7	16.7	16.5	13.7	12.9	12.0	11.8	10.4	10.1	9.5	9.4	9.3	9.3	9.4	9.4	9.4	9.4	9.4
27-Sep-17	27.5	22.5	20.9	15.6	15.2	14.1	12.8	11.5	10.2	9.9	9.8	9.5	9.4	9.4	9.4	9.4	9.3	9.3	9.3	9.2
31-Oct-17	temperature probe malfunction																			
27-Nov-17	4.1	7.3	7.6	8.0	8.8	10.0	10.5	11.1	10.2	10.0	9.8	9.6	9.6	9.6	9.5	9.5	9.4	9.4	9.2	9.2
21-Dec-17	-2.7	4.5	4.8	6.1	7.6	8.5	9.1	9.5	9.7	9.8	10.0	9.9	9.8	9.8	9.6	9.6	9.5	9.5	9.4	9.4

Monitor:	BH3-D	Temperature (C) at **Depth** (mBGS)																	
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**	**13.0**	**14.0**	**15.0**	**16.0**	**17.0**	**18.0**
31-Jan-17	-3.1	2.8	4.6	6.7	8.2	9.3	9.8	9.7	9.6	9.6	9.6	9.3	9.2	9.2	9.1	9.1	9.0	9.0	9.0
28-Feb-17	6.8	6.3	6.4	7.3	8.4	9.3	9.8	9.8	9.7	9.6	9.5	9.4	9.3	9.2	9.1	9.0	8.9	8.9	8.8
29-Mar-17	12.0	6.9	6.9	7.5	8.6	9.4	9.9	9.9	9.8	9.7	9.6	9.5	9.4	9.3	9.2	9.1	9.0	8.9	8.8
28-Apr-17	13.2	13.8	13.6	10.6	10.0	10.0	10.0	9.9	9.8	9.7	9.5	9.4	9.4	9.3	9.1	9.0	8.9	8.8	8.7
31-May-17	21.9	14.1	13.8	11.6	10.8	10.5	10.3	10.2	10.0	9.8	9.7	9.5	9.4	9.3	9.2	9.1	8.9	8.8	8.7
28-Jun-17	22.5	19.3	18.9	14.6	12.9	11.3	10.8	10.4	10.2	10.0	9.9	9.8	9.6	9.5	9.4	9.3	9.1	9.0	8.9
18-Jul-17	18.7	18.6	18.3	14.2	12.5	11.5	10.9	10.4	10.2	10.1	9.9	9.8	9.6	9.5	9.5	9.2	9.1	9.0	8.9
30-Aug-17	17.8	19.2	19.0	15.1	13.5	11.8	11.0	10.5	10.4	10.2	10.0	9.9	9.7	9.6	9.6	9.4	9.2	9.1	8.9
27-Sep-17	27.5	19.4	19.0	14.5	12.7	11.3	10.7	10.3	10.1	9.9	9.8	9.6	9.4	9.3	9.2	9.1	9.0	8.8	8.7
31-Oct-17	temperature probe malfunction																		
27-Nov-17	4.1	6.5	6.3	8.0	9.2	10.1	10.3	10.4	10.4	10.3	10.3	10.1	9.9	9.8	9.7	9.5	9.4	9.3	9.2
21-Dec-17	-2.7	4.2	5.4	9.5	10.6	11.2	11.9	12.0	12.2	12.3	12.3	12.4	12.5	12.5	12.5	12.4	12.4	12.4	12.4

BH Temperature Profile Summary

Monitor:	BH5	Temperature (C) at **Depth** (mBGS)							
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**7.8**
31-Jan-17	-3.1	2.3	2.2	2.7	3.4	8.3	9.5	9.7	n/a
28-Feb-17	6.8	6.1	5.7	5.7	5.9	7.8	8.2	8.4	n/a
29-Mar-17	12.0	8.4	7.9	7.6	7.6	7.5	7.4	7.4	n/a
28-Apr-17	13.2	11.2	10.6	10.2	9.9	7.8	7.3	7.4	n/a
31-May-17	21.9	14.5	13.9	13.2	12.4	9.0	8.1	7.8	n/a
28-Jun-17	22.5	14.5	14.1	13.7	13.5	9.1	8.8	8.8	n/a
18-Jul-17	18.7	15.2	14.9	14.5	13.9	10.9	10.3	10.1	n/a
30-Aug-17	17.8	20.2	19.3	18.8	18.3	14.1	13.1	12.7	n/a
27-Sep-17	27.5	25.8	23.4	21.9	20.7	17.1	16.2	15.5	n/a
31-Oct-17	temperature probe malfunction								
27-Nov-17	4.1	7.0	7.3	7.6	8.2	12.0	12.9	13.1	n/a
21-Dec-17	-2.7	4.2	4.8	5.8	6.4	11.4	15.2	15.3	n/a

Monitor:	BH8	Temperature (C) at **Depth** (mBGS)					
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**
31-Jan-17	-3.1	3.5	3.8	5.2	6.9	7.6	8.1
28-Feb-17	6.8	6.9	6.2	6.1	6.5	6.8	7.3
29-Mar-17	12.0	9.6	8.4	7.8	7.0	6.8	6.9
28-Apr-17	13.2	11.2	11.0	10.6	7.9	7.3	7.2
31-May-17	21.9	15.4	14.9	14.7	9.6	8.5	8.2
28-Jun-17	22.5	16.5	16.0	15.5	15.0	10.0	9.0
18-Jul-17	18.7	18.1	16.8	16.3	16.0	11.2	10.5
30-Aug-17	17.8	17.7	17.3	17.1	16.6	13.4	11.9
27-Sep-17	27.5	23.4	21.8	20.4	19.2	14.1	12.8
31-Oct-17	temperature probe malfunction						
27-Nov-17	4.1	7.7	7.8	8.0	8.3	10.4	10.8
21-Dec-17	-2.7	4.3	4.9	5.5	6.0	10.7	11.3

Monitor:	BH7-D	Temperature (C) at **Depth** (mBGS)											
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**
31-Jan-17	-3.1	1.3	1.4	2.1	3.1	4.2	5.0	5.4	5.7	11.2	12.5	13.0	13.2
28-Feb-17	6.8	6.8	7.1	7.3	7.6	8.0	8.5	9.1	10.0	9.8	10.0	10.4	10.9
29-Mar-17	12.0	6.9	7.0	7.1	7.2	7.1	7.1	7.0	7.4	7.0	7.1	7.7	8.4
28-Apr-17	13.2	9.3	9.1	8.9	9.3	9.6	10.2	10.9	11.5	7.1	6.1	6.3	6.8
31-May-17	21.9	14.2	14.1	14.0	13.9	13.6	13.4	13.2	13.1	7.5	6.3	5.9	6.1
28-Jun-17	22.5	20.2	19.5	18.7	17.9	16.9	16.3	15.7	15.1	8.0	7.2	6.9	6.8
18-Jul-17	18.7	18.0	17.9	17.6	17.0	16.3	15.5	14.5	14.0	10.2	9.0	8.3	7.9
30-Aug-17	17.8	17.8	17.9	17.9	17.6	16.8	16.6	16.3	13.4	12.1	11.3	10.4	10.3
27-Sep-17	27.5	22.9	23.0	22.5	21.9	21.1	19.6	18.0	16.7	14.7	13.6	12.6	11.7
31-Oct-17	temperature probe malfunction												
27-Nov-17	4.1	8.9	9.6	9.7	10.1	10.6	11.4	12.0	12.5	14.4	14.7	14.4	13.8
21-Dec-17	-2.7	5.6	5.5	5.9	6.5	7.4	8.5	9.6	10.5	13.9	15.0	15.4	15.2

Monitor:	BH9-D	Temperature (C) at **Depth** (mBGS)														
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**	**13.0**	**14.0**	**15.0**
31-Jan-17	-3.1	1.8	2.6	4.2	5.8	6.9	7.8	8.6	9.1	9.3	9.3	9.3	9.3	9.2	9.2	9.1
28-Feb-17	6.8	4.8	4.7	4.4	5.2	6.0	6.8	7.6	8.1	8.5	8.8	8.9	8.9	8.9	8.9	8.9
29-Mar-17	12.0	6.4	6.0	4.3	4.5	5.3	6.1	6.9	7.5	8.1	8.5	8.7	8.8	8.8	8.9	8.9
28-Apr-17	13.2	9.2	9.0	6.6	6.4	6.3	6.2	7.8	8.0	8.2	8.2	8.2	8.4	8.5	8.6	8.6
31-May-17	21.9	12.7	12.3	8.7	7.6	7.0	6.8	7.0	7.2	7.6	8.0	8.2	8.2	8.6	8.7	8.7
28-Jun-17	22.5	14.7	14.6	11.0	9.5	8.5	7.9	7.7	7.7	7.9	8.1	8.3	8.4	8.5	8.6	
18-Jul-17	18.7	16.9	16.8	11.5	9.6	9.1	7.8	7.8	7.9	8.0	8.2	8.4	8.5	8.7	8.8	8.8
30-Aug-17	17.8	18.3	18.2	14.9	13.5	12.5	11.7	10.8	10.2	9.8	9.5	9.4	9.4	9.3	9.2	9.2
27-Sep-17	27.5	22.2	22.0	15.2	14.3	12.9	12.2	11.5	10.0	9.9	9.6	9.5	9.4	9.3	9.3	9.3
31-Oct-17	temperature probe malfunction															
27-Nov-17	4.1	4.7	4.8	8.4	8.9	9.6	10.5	10.1	10.0	9.8	9.7	9.7	9.5	9.4	9.4	9.5
21-Dec-17	-2.7	4.2	4.4	6.9	8.0	9.4	10.0	10.1	10.1	10.2	10.2	10.2	10.4	10.5	10.6	10.6

Monitor:	BH10-D	Temperature (C) at **Depth** (mBGS)								
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**
31-Jan-17	-3.1	2.4	2.5	5.6	6.9	7.2	7.4	7.6	8.2	8.9
28-Feb-17	6.8	6.0	5.7	4.7	5.0	5.8	6.4	7.0	8.0	8.4
29-Mar-17	12.0	8.5	8.2	5.1	4.8	5.3	5.9	6.5	7.5	7.9
28-Apr-17	13.2	9.0	8.8	6.6	5.8	5.7	6.0	6.4	7.2	7.6
31-May-17	21.9	15.9	15.6	9.6	8.0	7.4	7.4	7.4	7.6	7.7
28-Jun-17	22.5	15.5	15.4	11.8	10.1	9.1	8.6	8.2	7.9	7.8
18-Jul-17	18.7	18.0	17.7	13.9	12.0	10.7	9.9	9.3	8.6	8.3
30-Aug-17	17.8	18.7	18.5	15.3	13.8	12.5	11.6	10.7	9.4	8.9
27-Sep-17	27.5	23.2	22.3	20.1	14.8	12.9	12.2	11.4	10.3	9.9
31-Oct-17	temperature probe malfunction									
27-Nov-17	4.1	6.4	6.5	8.7	10.0	10.6	10.7	10.4	9.8	9.6
21-Dec-17	-2.7	5.8	5.6	8.3	10.5	11.1	11.3	11.4	11.1	11.4

Monitor:	BH14	Temperature (C) at **Depth** (mBGS)					
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**
31-Jan-17	-3.1	2.2	4.3	5.7	6.6	7.3	8.3
28-Feb-17	6.8	6.0	5.4	5.7	6.3	6.6	7.4
29-Mar-17	12.0	6.7	4.9	5.5	5.9	6.3	6.7
28-Apr-17	13.2	9.8	8.6	7.8	7.4	7.3	7.2
31-May-17	21.9	12.9	12.0	10.2	9.0	8.2	8.0
28-Jun-17	22.5	18.6	16.0	13.7	11.6	9.7	8.8
18-Jul-17	18.7	17.4	18.0	16.2	14.5	12.6	11.6
30-Aug-17	17.8	21.3	17.4	15.9	14.4	12.5	11.4
27-Sep-17	27.5	17.4	18.0	16.2	14.5	12.6	11.6
31-Oct-17	temperature probe malfunction						
27-Nov-17	4.1	5.3	7.9	9.2	10.3	10.8	11.1
21-Dec-17	-2.7	3.5	6.2	10.1	11.1	11.6	12.2

Monitor:	BH15	Temperature (C) at **Depth** (mBGS)					
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**
31-Jan-17	-3.1	2.8	2.9	5.3	6.8	7.1	7.9
28-Feb-17	6.8	5.9	5.7	5.6	6.3	6.7	6.9
29-Mar-17	12.0	6.1	6.2	5.3	5.7	5.8	6.1
28-Apr-17	13.2	9.1	8.5	6.9	6.9	6.7	6.6
31-May-17	21.9	12.2	11.7	9.5	8.3	7.6	7.2
28-Jun-17	22.5	15.1	14.4	12.3	10.5	9.2	8.3
18-Jul-17	18.7	15.8	15.5	13.8	11.4	10.8	9.7
30-Aug-17	17.8	16.1	15.9	14.4	12.9	11.9	10.9
27-Sep-17	27.5	24.1	22.6	16.8	15.0	14.0	13.3
31-Oct-17	temperature probe malfunction						
27-Nov-17	4.1	6.9	7.1	9.2	10.1	10.4	10.8
21-Dec-17	-2.7	5.7	6.5	10.0	11.2	11.3	11.5

Monitor:	BH16	Temperature (C) at **Depth** (mBGS)									
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**
31-Jan-17	-3.1	1.2	1.3	1.4	1.5	1.5	2.0	2.3	2.6	4.0	5.0
28-Feb-17	6.8	4.5	4.1	3.7	3.4	2.0	2.1	2.2	2.5	3.1	3.7
29-Mar-17	12.0	4.6	4.2	3.9	3.7	2.4	2.3	2.5	2.7	3.2	3.8
28-Apr-17	13.2	8.6	8.6	8.4	8.3	7.4	7.3	6.9	6.4	6.4	6.9
31-May-17	21.9	12.7	12.8	12.8	12.6	13.1	13.3	12.7	11.8	11.0	10.5
28-Jun-17	22.5	17.2	16.9	17.4	19.3	19.8	19.4	18.2	16.8	14.8	14.1
18-Jul-17	18.7	20.1	20.3	20.4	20.6	21.5	21.7	21.3	20.5	19.3	17.7
30-Aug-17	17.8	18.7	18.8	19.0	19.4	19.7	21.8	22.2	22.1	21.6	20.4
27-Sep-17	27.5	23.7	22.5	22.1	21.8	21.4	21.3	21.2	21.1	20.6	19.9
31-Oct-17	temperature probe malfunction										
27-Nov-17	4.1	5.1	5.4	5.6	5.9	7.3	7.8	8.2	9.1	9.5	9.8
21-Dec-17	-2.7	5.7	5.4	5.3	5.3	4.2	3.6	4.2	5.5	6.3	7.3

Monitor:	BH17	Temperature (C) at **Depth (mBGS)**								
Date	Air	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**
31-Jan-17	-3.1	4.2	4.3	4.4	4.9	9.4	10.6	11.1	11.5	11.6
28-Feb-17	6.8	6.1	5.8	5.7	5.9	7.6	8.1	8.4	8.6	8.7
29-Mar-17	12.0	6.3	6.0	5.8	5.8	5.7	5.8	5.9	6.2	6.3
28-Apr-17	13.2	9.1	8.9	8.8	8.4	5.9	5.1	5.0	5.1	5.3
31-May-17	21.9	13.1	13.0	12.7	12.1	7.3	5.8	5.1	5.0	5.2
28-Jun-17	22.5	16.3	16.5	16.3	14.8	8.1	6.9	6.2	5.9	5.9
18-Jul-17	18.7	16.8	17.1	16.9	16.2	11.0	8.8	7.8	7.4	7.2
30-Aug-17	17.8	16.1	16.3	16.4	16.2	13.9	12.7	11.9	11.4	11.0
27-Sep-17	27.5	20.8	20.1	19.6	19.0	16.4	15.6	15.2	14.8	14.3
31-Oct-17	temperature probe malfunction									
27-Nov-17	4.1	8.1	8.0	8.3	8.9	14.3	16.0	16.4	16.5	16.5
21-Dec-17	-2.7	6.3	6.1	6.5	7.2	17.4	18.8	19.4	20.0	20.5

Monitor: DP1/SW2			
Date:	Air	SW	1.2 m
30-Jan-17	-5.1	1.8	0.7
01-Mar-17	11.1	3.4	4.7
30-Mar-17	1.1	3.3	4.6
27-Apr-17	16.8	11.7	10.1
29-May-17	21.6	13.6	12.5
28-Jun-17	22.5	16.5	14.9
17-Jul-17	19.2	18.2	15.3
30-Aug-17	17.8	17.3	16.2
25-Sep-17	25.4	17.5	16.6
30-Oct-17	6.8	8.7	9.6
29-Nov-17	3.8	6.5	6.7
21-Dec-17	-2.7	6.2	4.6

Monitor: DP2/SW3			
Date:	Air	SW	1.2m
30-Jan-17	-5.1	2.1	fr
01-Mar-17	11.1	3.9	5.2
30-Mar-17	1.1	5.0	4.7
27-Apr-17	16.8	11.1	9.8
29-May-17	21.6	14.5	12.4
28-Jun-17	22.5	14.9	13.8
17-Jul-17	19.2	17.1	15.3
30-Aug-17	17.8	14.3	13.5
25-Sep-17	25.4	15.7	14.9
30-Oct-17	6.8	8.7	9.1
29-Nov-17	3.8	6.7	6.2
21-Dec-17	-2.7	6.5	4.7

Monitor: DP3/SW8			
Date:	Air	SW	1.2m
30-Jan-17	-5.1	11.5	9.0
01-Mar-17	11.1	9.8	10.6
30-Mar-17	1.1	10.2	8.5
27-Apr-17	16.8	9.1	9.7
29-May-17	21.6	8.3	9.3
28-Jun-17	22.5	8.1	9.4
17-Jul-17	19.2	8.5	9.5
30-Aug-17	17.8	9.5	11.2
25-Sep-17	25.4	11.6	9.9
30-Oct-17	6.8	10.6	10.1
29-Nov-17	3.8	11.1	10.2
21-Dec-17	-2.7	11.3	11.2

Monitor: DP7/SW10			
Date:	Air	SW	1.0m
30-Jan-17	-5.1	5.1	fr
01-Mar-17	11.1	5.4	6.5
30-Mar-17	1.1	3.1	4.4
27-Apr-17	16.8	7.7	6.6
29-May-17	21.6	10.8	9.6
28-Jun-17	22.5	12.2	11.7
17-Jul-17	19.2	15.5	12.1
30-Aug-17	17.8	dry	13.2
25-Sep-17	25.4	dry	15.4
30-Oct-17	6.8	dry	12.9
29-Nov-17	3.8	9.0	11.4
21-Dec-17	-2.7	dry	fr

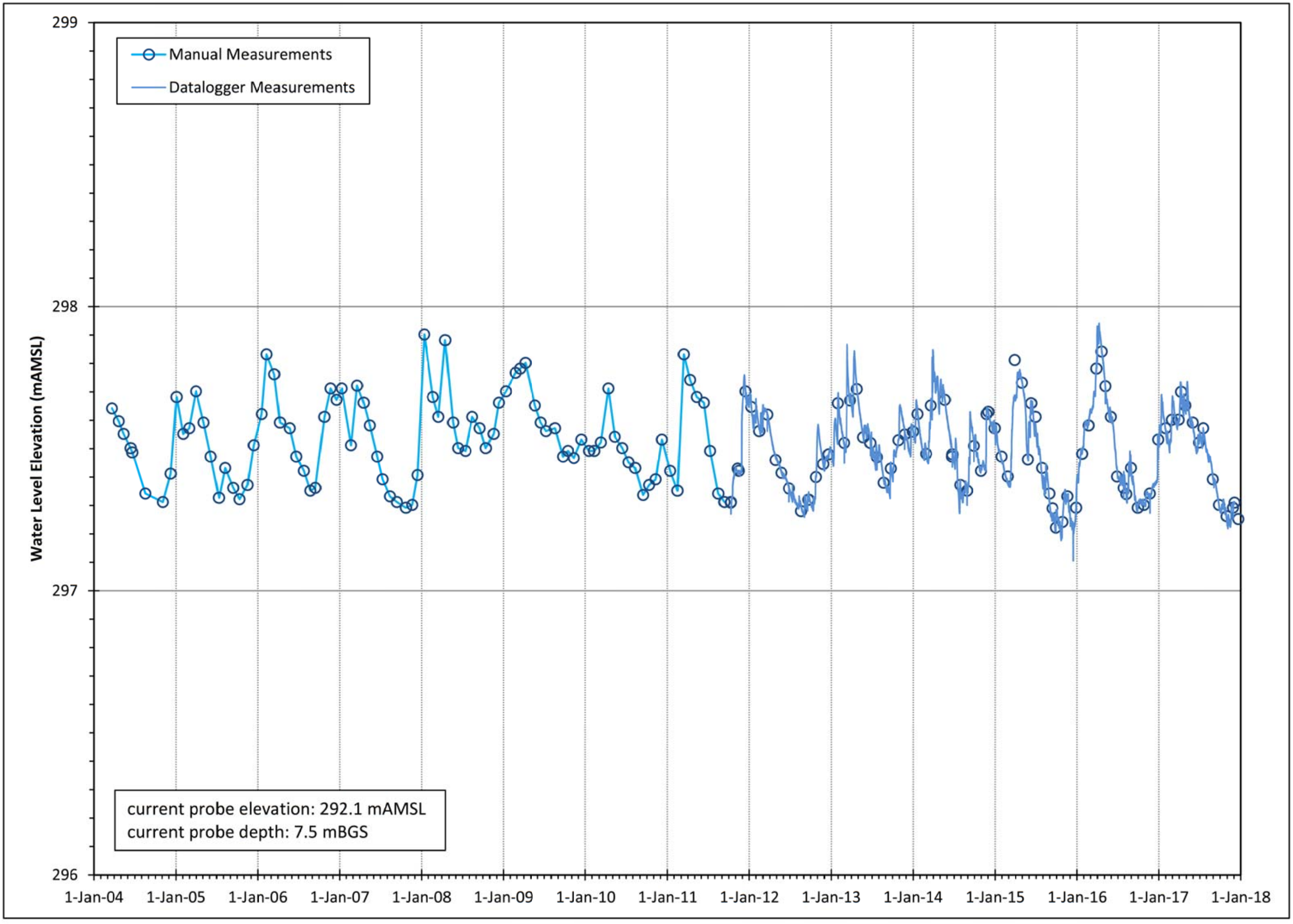
Monitor: DP8/SW6			
Date:	Air	SW	1.9m
30-Jan-17	-5.1	10.5	7.2
01-Mar-17	11.1	10.5	8.5
30-Mar-17	1.1	9.3	6.7
27-Apr-17	16.8	9.5	9.6
29-May-17	21.6	8.8	9.9
28-Jun-17	22.5	8.5	10.1
17-Jul-17	19.2	8.8	10.2
30-Aug-17	17.8	9.7	11.0
25-Sep-17	25.4	10.6	12.3
30-Oct-17	6.8	11.3	10.0
29-Nov-17	3.8	11.6	9.1
21-Dec-17	-2.7	11.8	9.3

Monitor:	SW5	
Date:	Air	SW
30-Jan-17	-5.1	10.9
01-Mar-17	11.1	9.9
30-Mar-17	1.1	9.2
27-Apr-17	16.8	9.2
29-May-17	21.6	9.2
28-Jun-17	22.5	9.8
17-Jul-17	19.2	10.4
30-Aug-17	17.8	11.8
25-Sep-17	25.4	11.1
30-Oct-17	6.8	10.6
29-Nov-17	3.8	10.2
21-Dec-17	-2.7	11.2

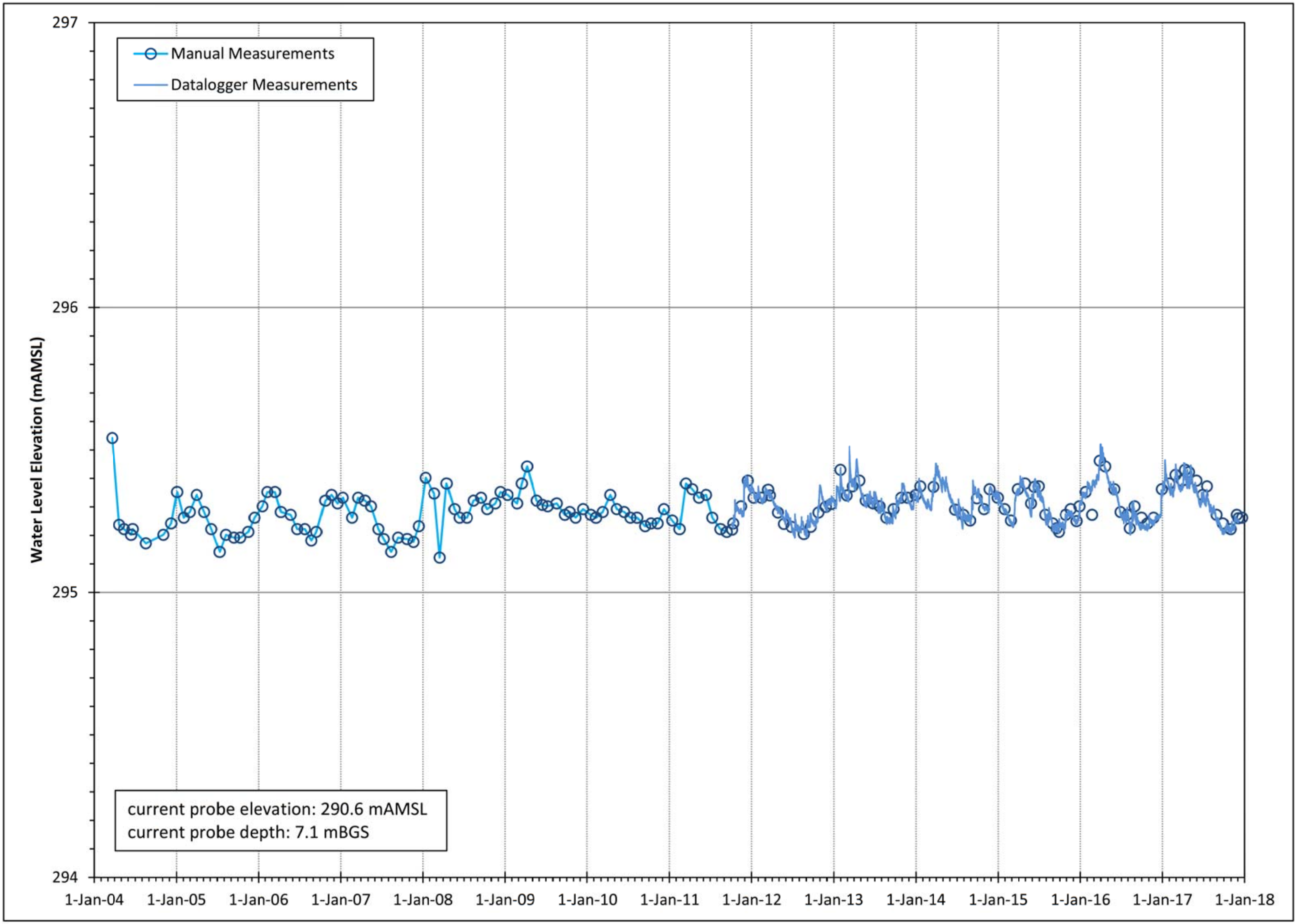
Monitor:	SW12	
Date:	Air	SW
30-Jan-17	-5.1	12.4
01-Mar-17	11.1	10.4
30-Mar-17	1.1	8.3
27-Apr-17	16.8	7.8
29-May-17	21.6	7.5
28-Jun-17	22.5	8.2
17-Jul-17	19.2	10.6
30-Aug-17	17.8	11.9
25-Sep-17	25.4	13.7
30-Oct-17	6.8	14.3
29-Nov-17	3.8	14.2
21-Dec-17	-2.7	14.5

	SW1		SW2		SW3		SW4	
Date	Flow (L/s)	Temp. (°C)	Flow (L/s)	Temp. (°C)	Flow (L/s)	Temp. (°C)	Flow (L/s)	Temp. (°C)
21-Apr-16	28.9	10.9	45.1	9.7	70.7	9.7	76.2	8.8
30-May-16	17.4	19.5	20.9	16.4	36.3	16.5	49.9	17.0
27-Jun-16	11.6	n/a	19.6	n/a	22.7	n/a	42.9	n/a
26-Jul-16	12.1	22.2	25.3	14.8	32.6	15.0	54.7	16.5
29-Aug-16	15.2	20.8	48.8	19.3	55.1	17.0	53.2	16.9
29-Sep-16	11.3	14.4	26.7	12.8	33.2	13.2	43.4	13.1
25-Oct-16	13.1	9.8	16.1	9.6	28.2	9.2	30.5	9.2
24-Nov-16	15.6	3.4	27.6	4.8	30.4	5.7	24.1	5.0
28-Dec-16	57.5	0.7	67.0	1.7	73.8	1.9	84.1	1.7
30-Jan-17	n/a	1.7	n/a	1.8	n/a	2.1	n/a	2.3
01-Mar-17	n/a	3.1	n/a	3.4	n/a	5.2	n/a	3.7
30-Mar-17	n/a	3.3	n/a	3.3	n/a	3.1	n/a	4.8
27-Apr-17	n/a	12.4	n/a	11.7	n/a	11.1	n/a	11.0
29-May-17	n/a	13.8	n/a	13.6	n/a	14.5	n/a	14.6
28-Jun-17	n/a	16.5	n/a	16.5	n/a	14.9	n/a	14.7
17-Jul-17	n/a	18.1	n/a	18.2	n/a	17.1	n/a	16.8
30-Aug-17	16.6	17.7	26.3	17.3	53.3	14.3	48.7	13.6
25-Sep-17	11.2	19.3	14.9	17.5	81.2	15.7	38.6	16.3
30-Oct-17	12.0	8.4	26.6	8.7	38.0	8.7	44.9	8.8
29-Nov-17	12.0	6.9	33.9	6.5	34.2	6.7	38.1	6.2
21-Dec-17	18.9	4.8	40.2	6.2	42.1	6.5	45.7	9.4
Notes:	n/a = not available, no measurement obtained							

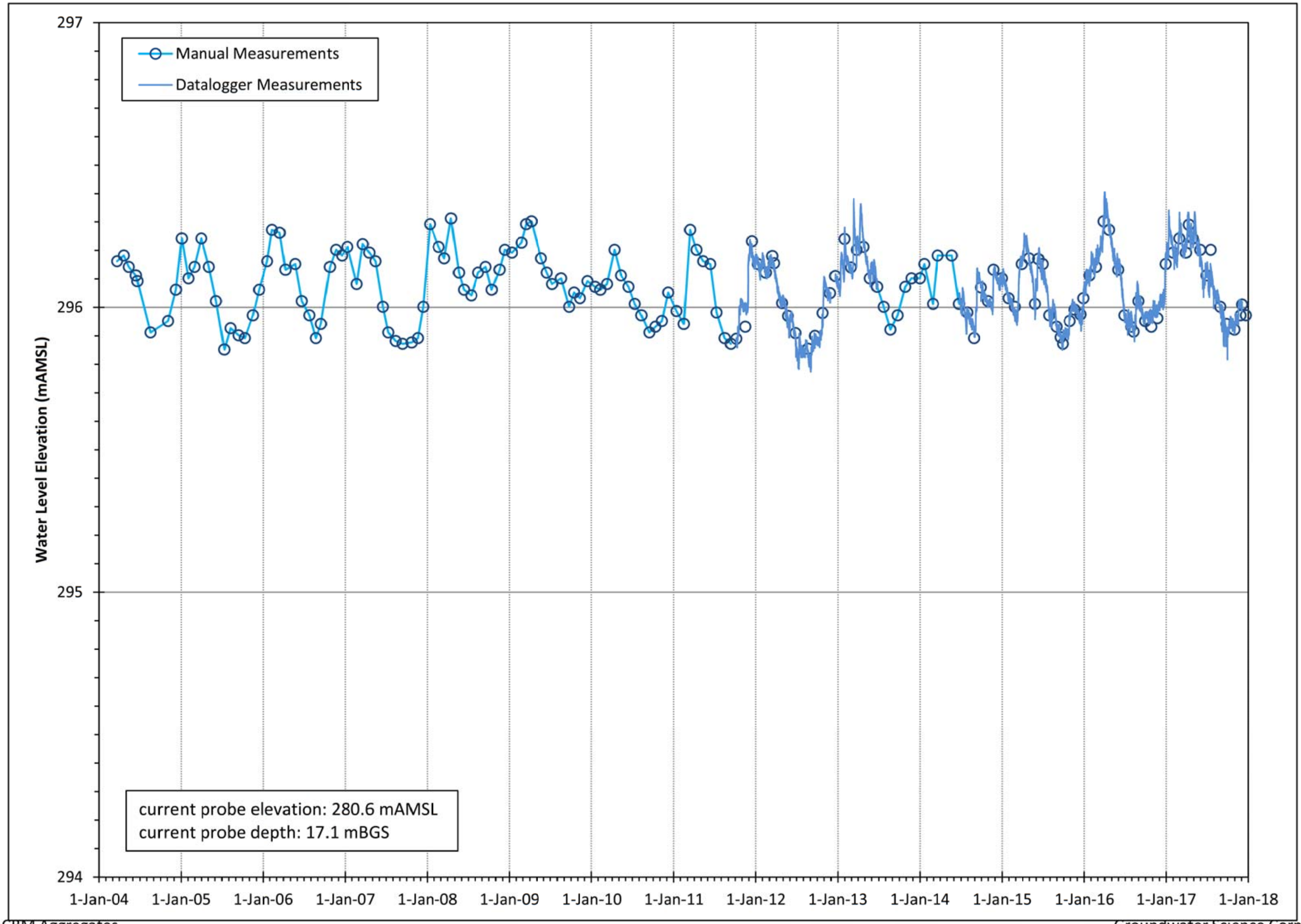
Appendix B
Hydrographs of Datalogger Data



BH1 Hydrograph



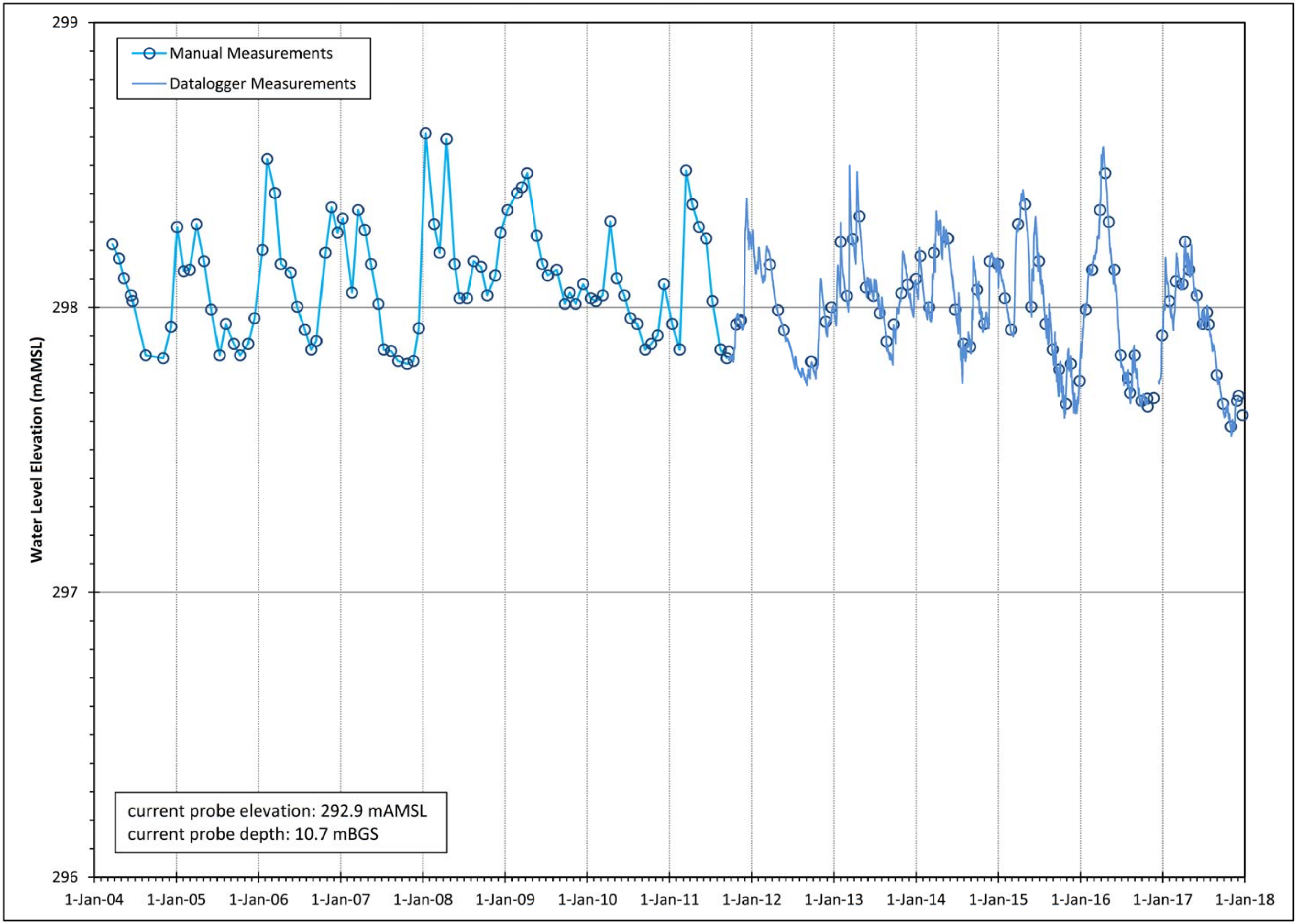
BH3-S Hydrograph



CBM Aggregates
Roszell Road Pit

BH3-D Hydrograph

Groundwater Science Corp.
Monitoring Program

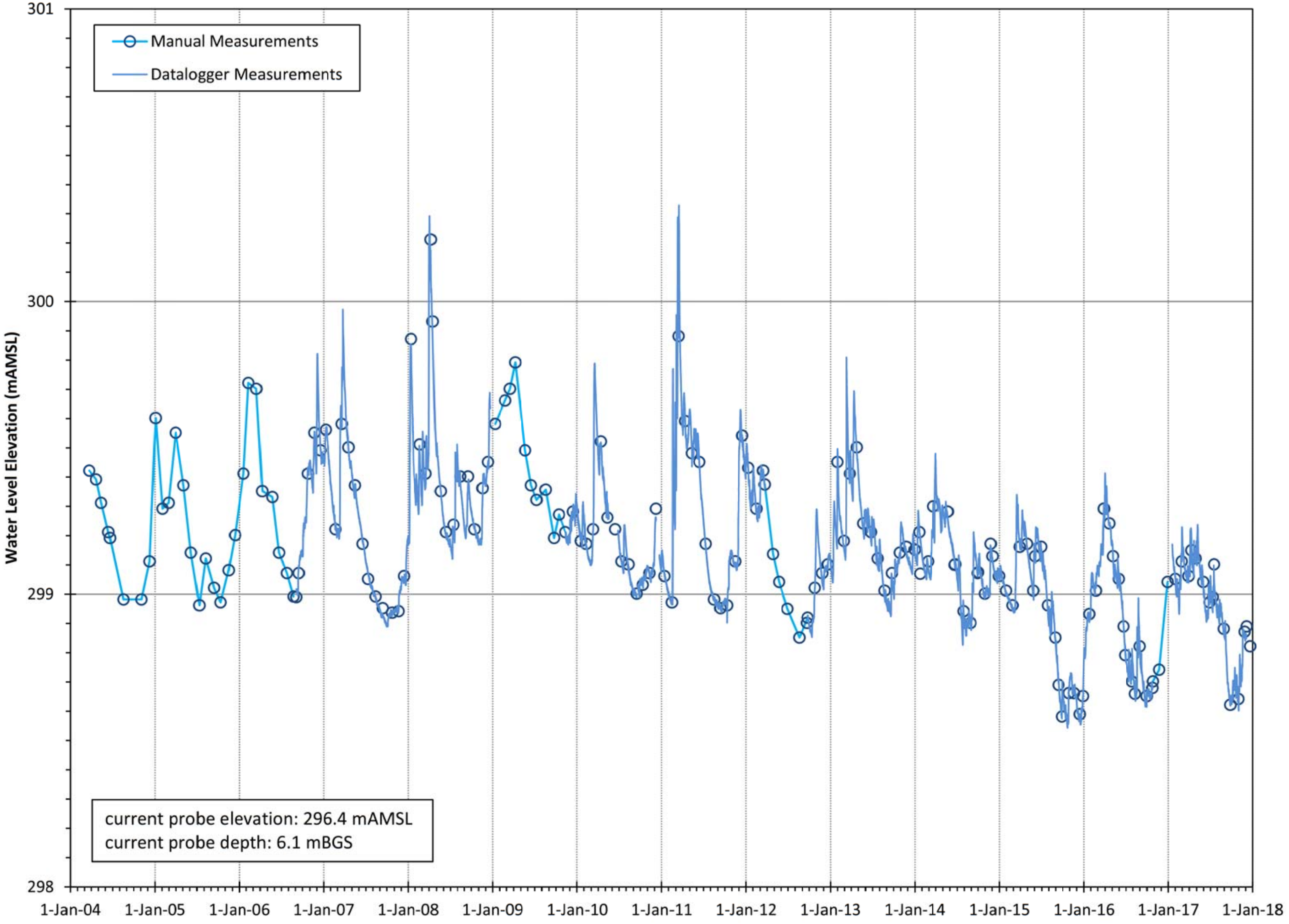


current probe elevation: 292.9 mAMSL
current probe depth: 10.7 mBGS

CBM Aggregates
Roszell Road Pit

BH4-D Hydrograph

Groundwater Science Corp.
Monitoring Program

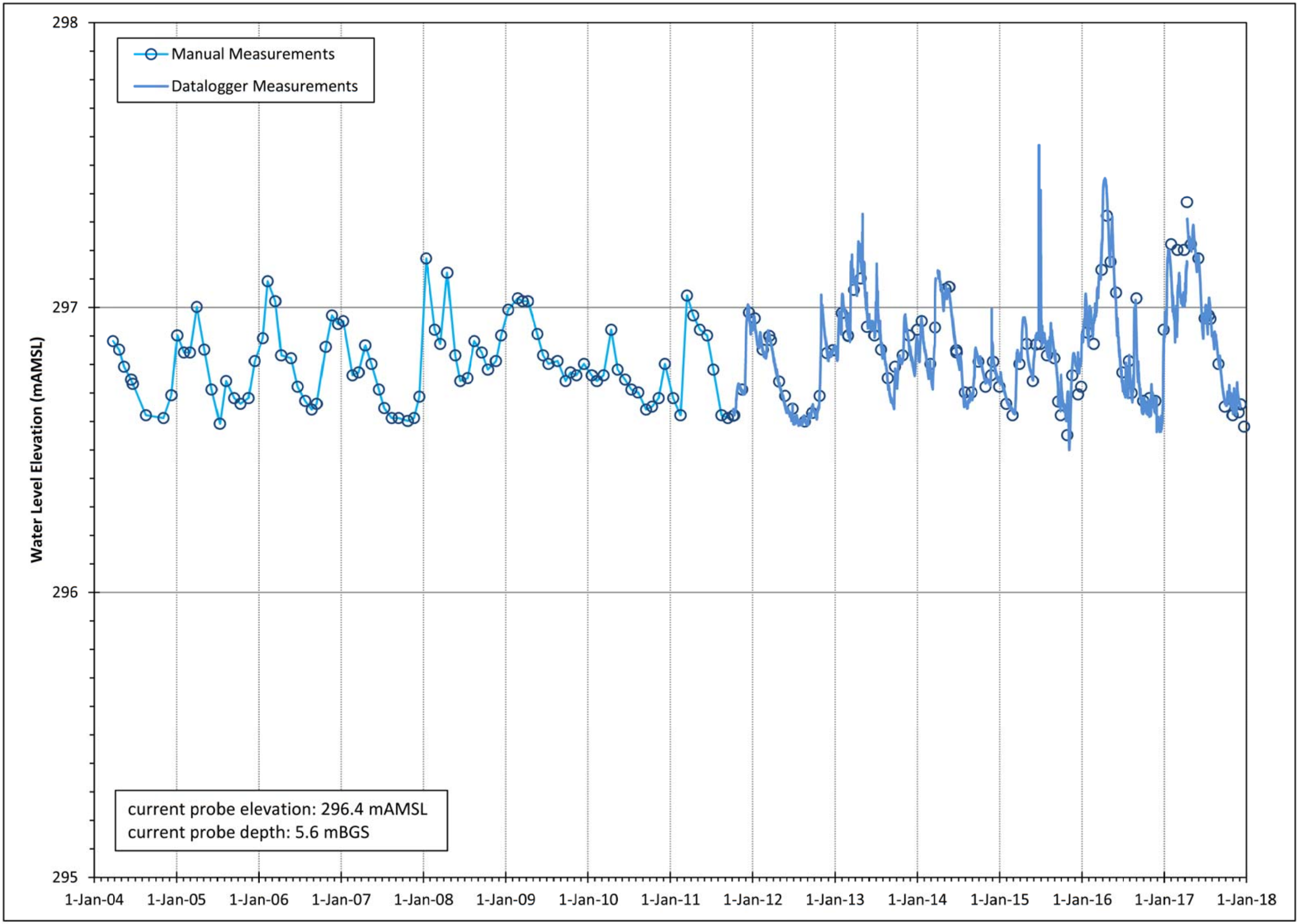


current probe elevation: 296.4 mAMSL
current probe depth: 6.1 mBGS

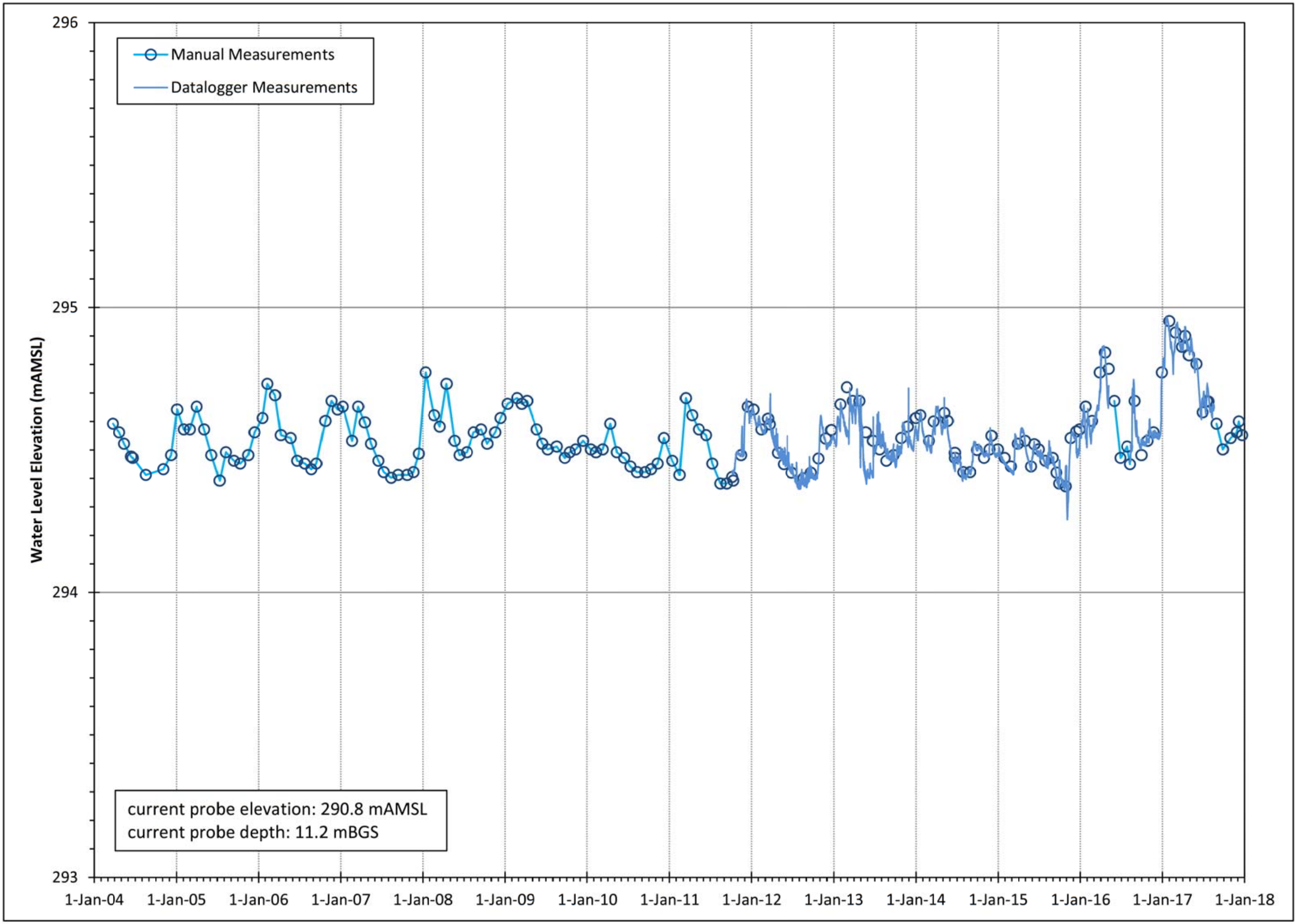
CBM Aggregates
Roszell Road Pit

BH5 Hydrograph

Groundwater Science Corp.
Monitoring Program



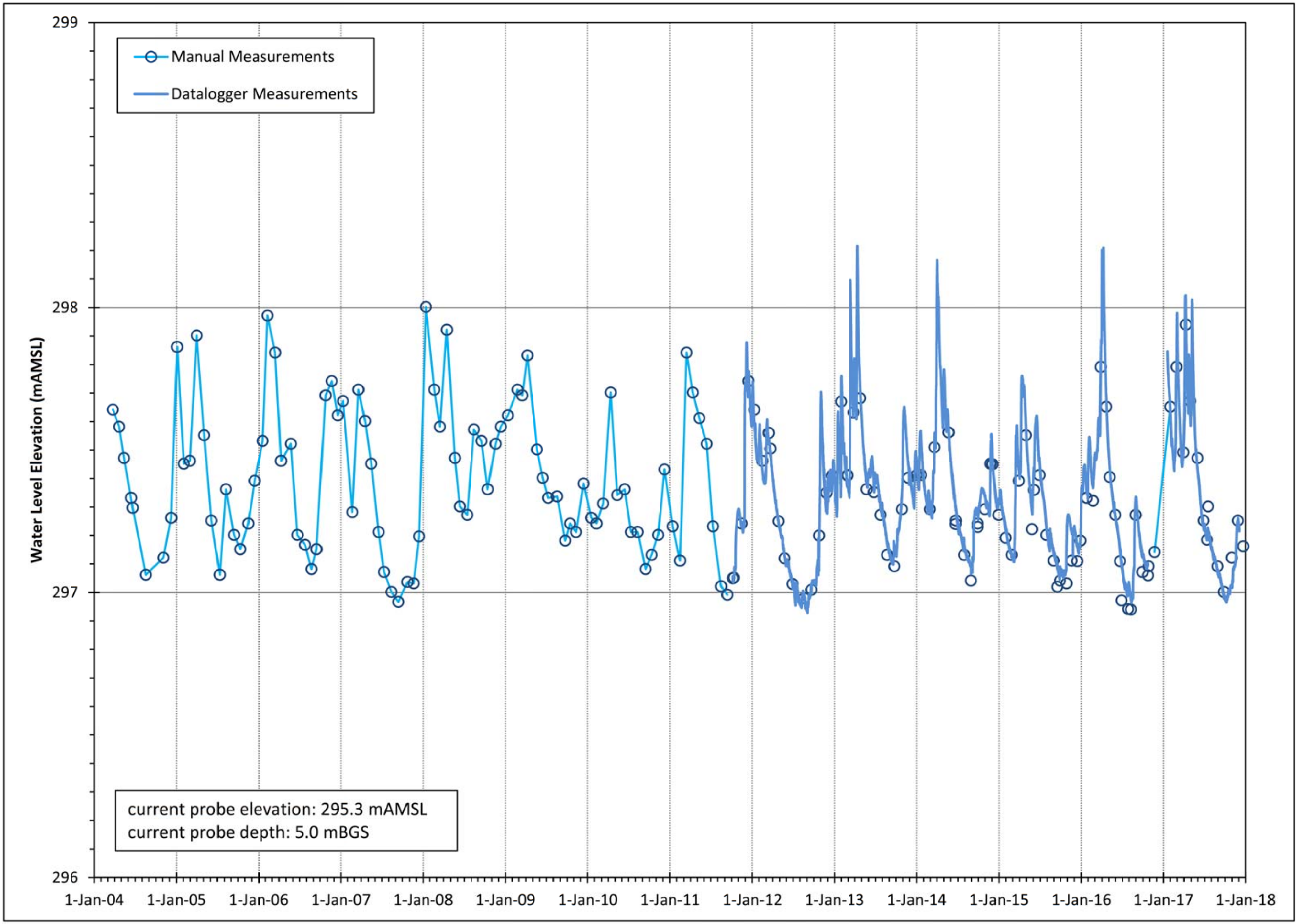
BH7-S Hydrograph



CBM Aggregates
Roszell Road Pit

BH7-D Hydrograph

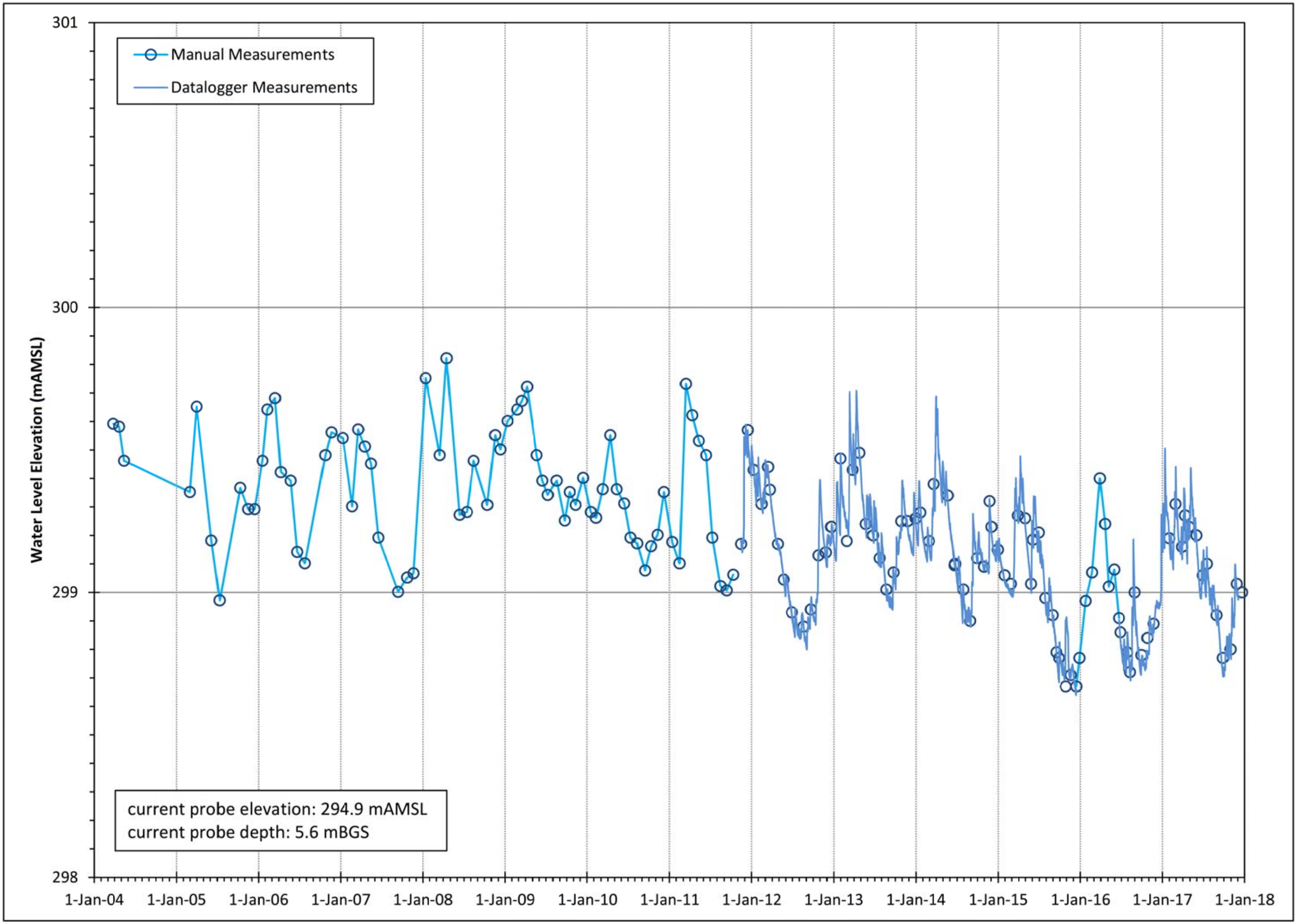
Groundwater Science Corp.
Monitoring Program



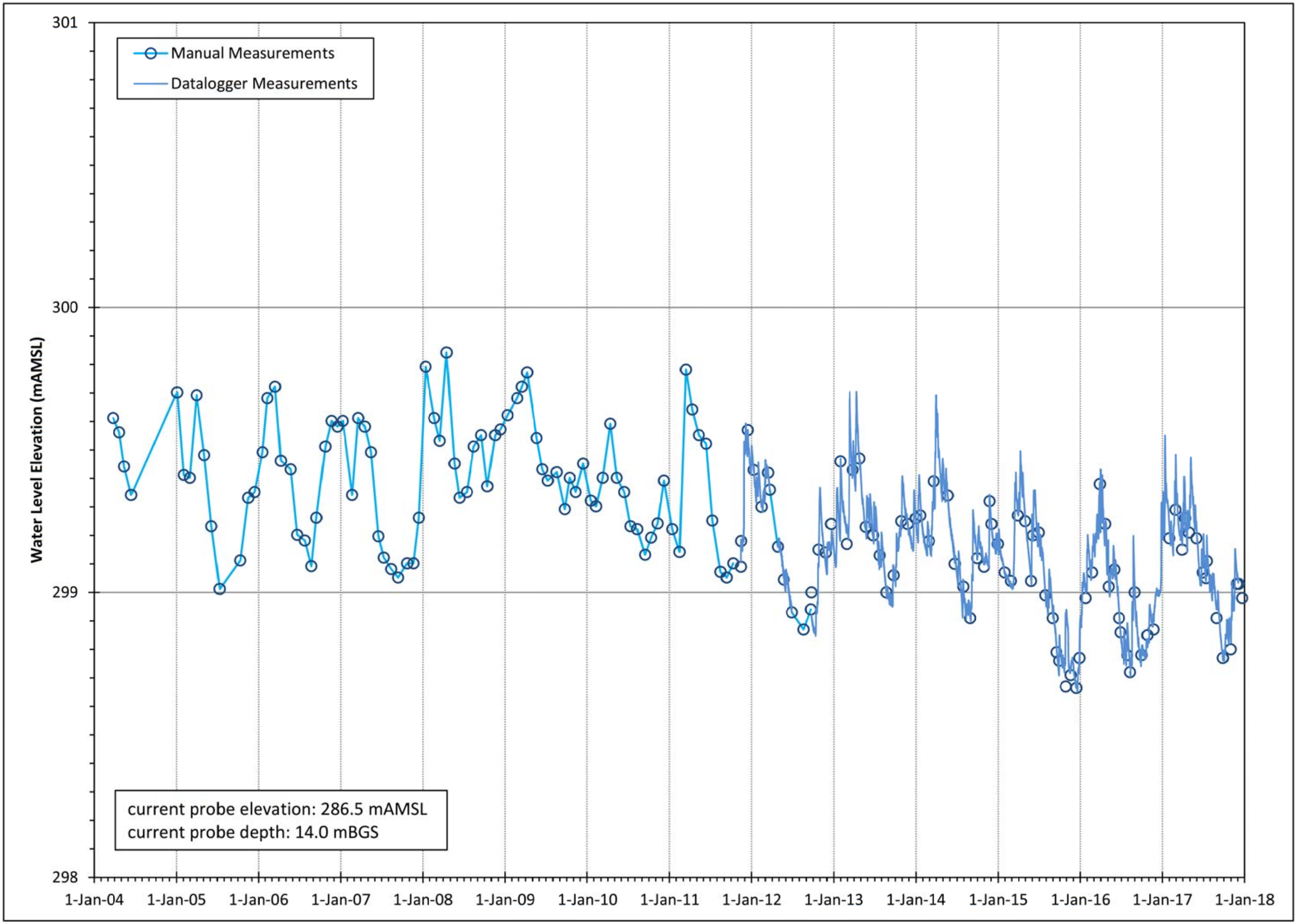
CBM Aggregates
Roszell Road Pit

BH8 Hydrograph

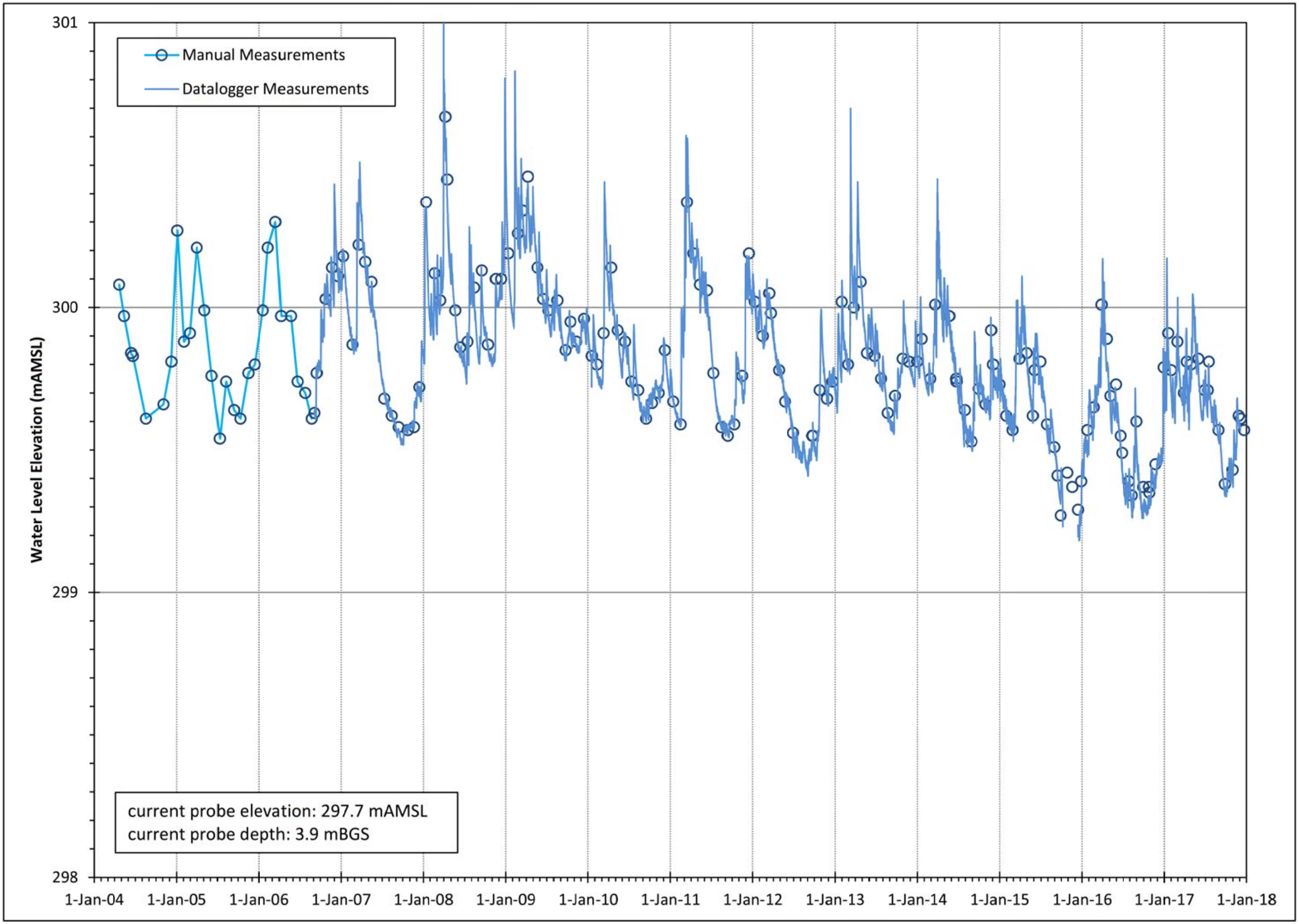
Groundwater Science Corp.
Monitoring Program



BH9-S Hydrograph

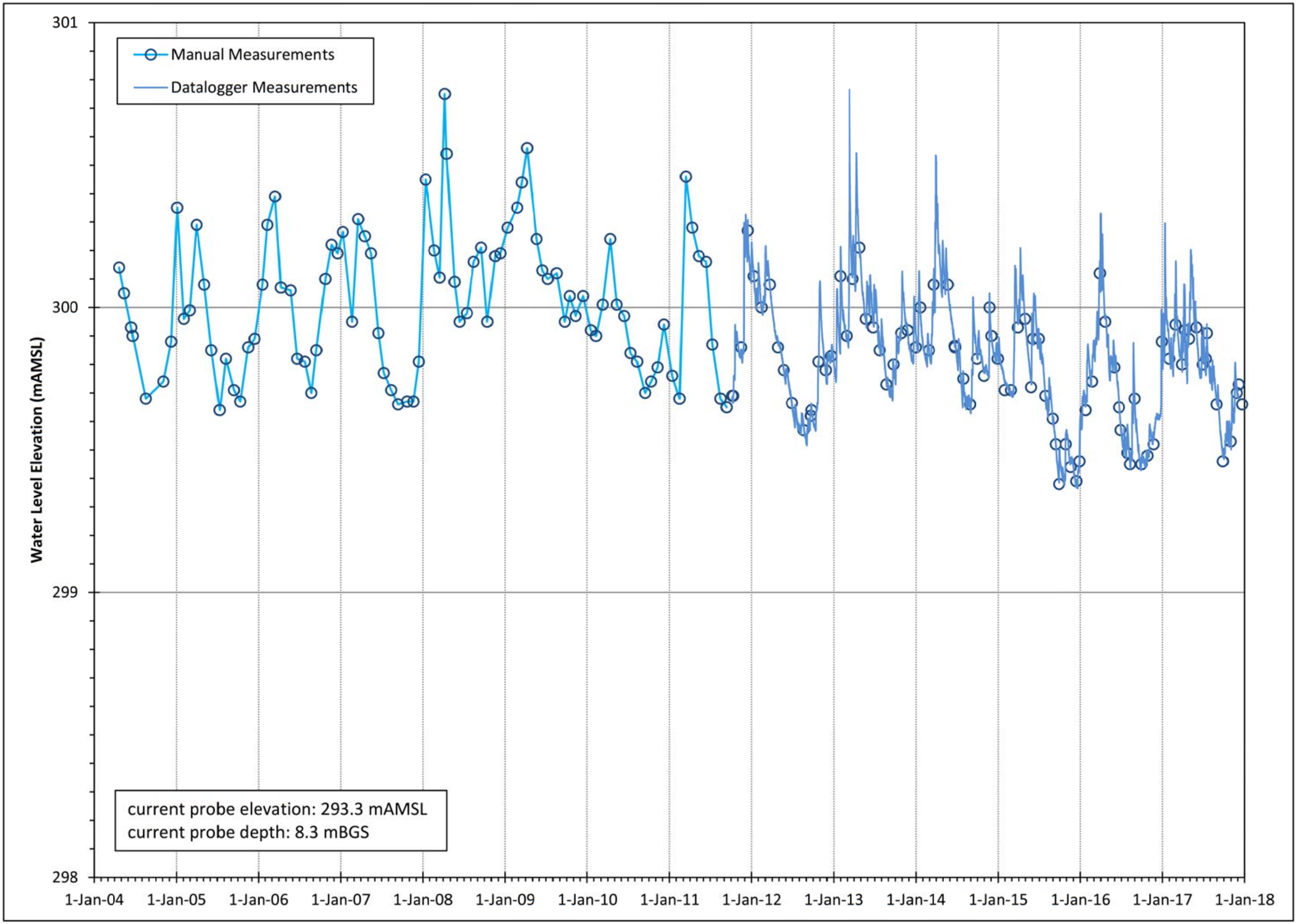


BH9-D Hydrograph



current probe elevation: 297.7 mAMSL
current probe depth: 3.9 mBGS

BH10-S Hydrograph

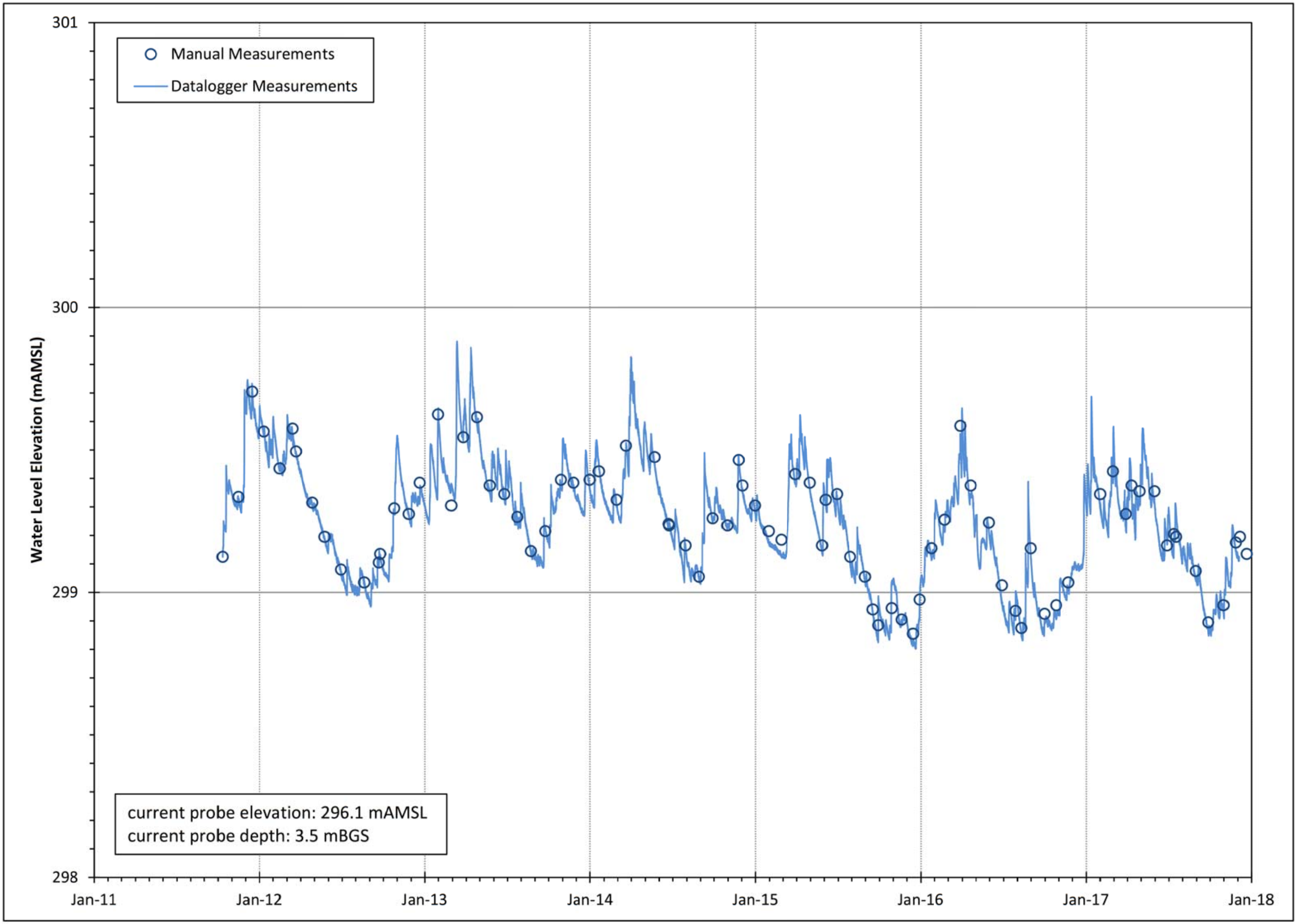


current probe elevation: 293.3 mAMSL
current probe depth: 8.3 mBGS

CBM Aggregates
Roszell Road Pit

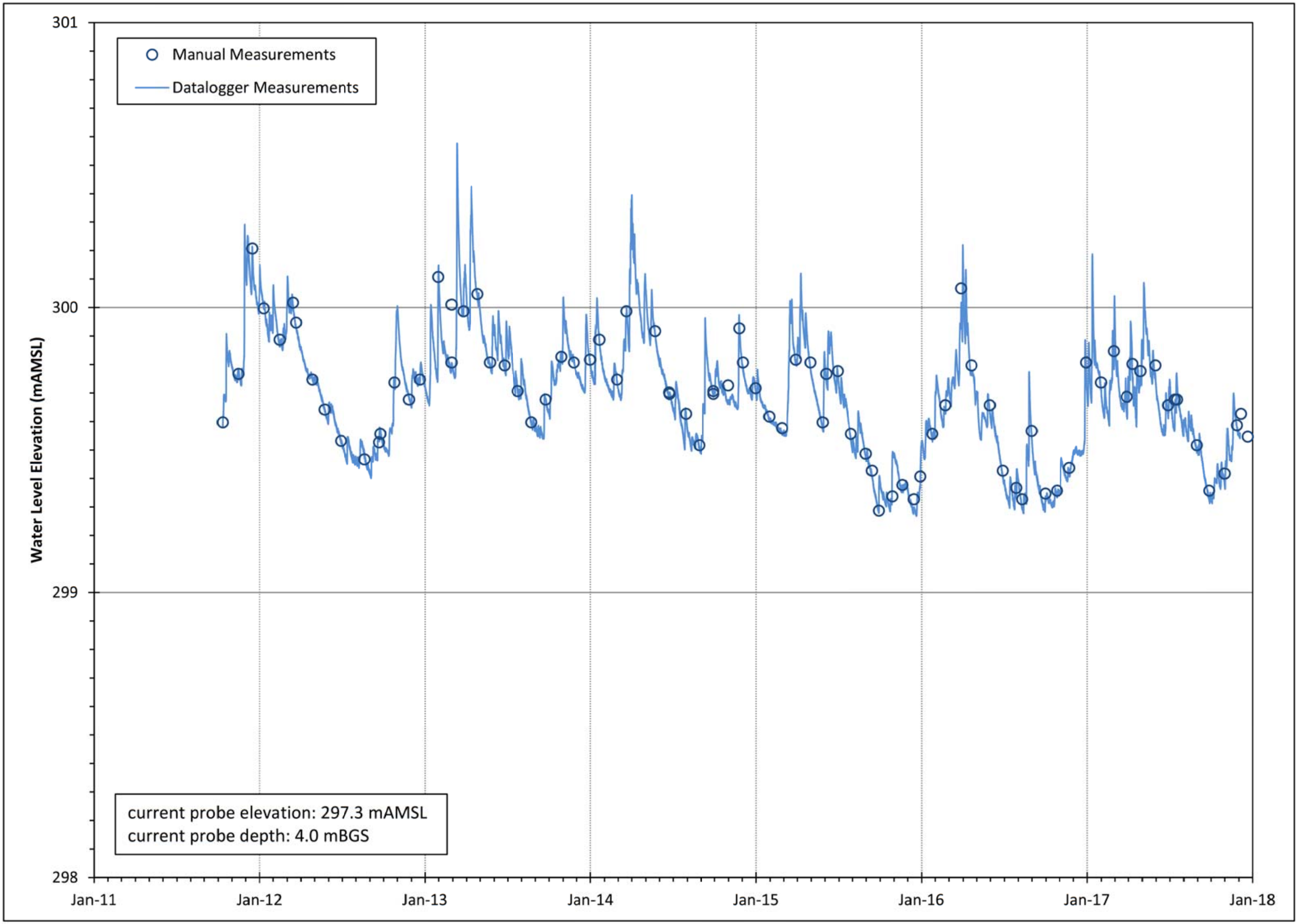
BH10-D Hydrograph

Groundwater Science Corp.
Monitoring Program

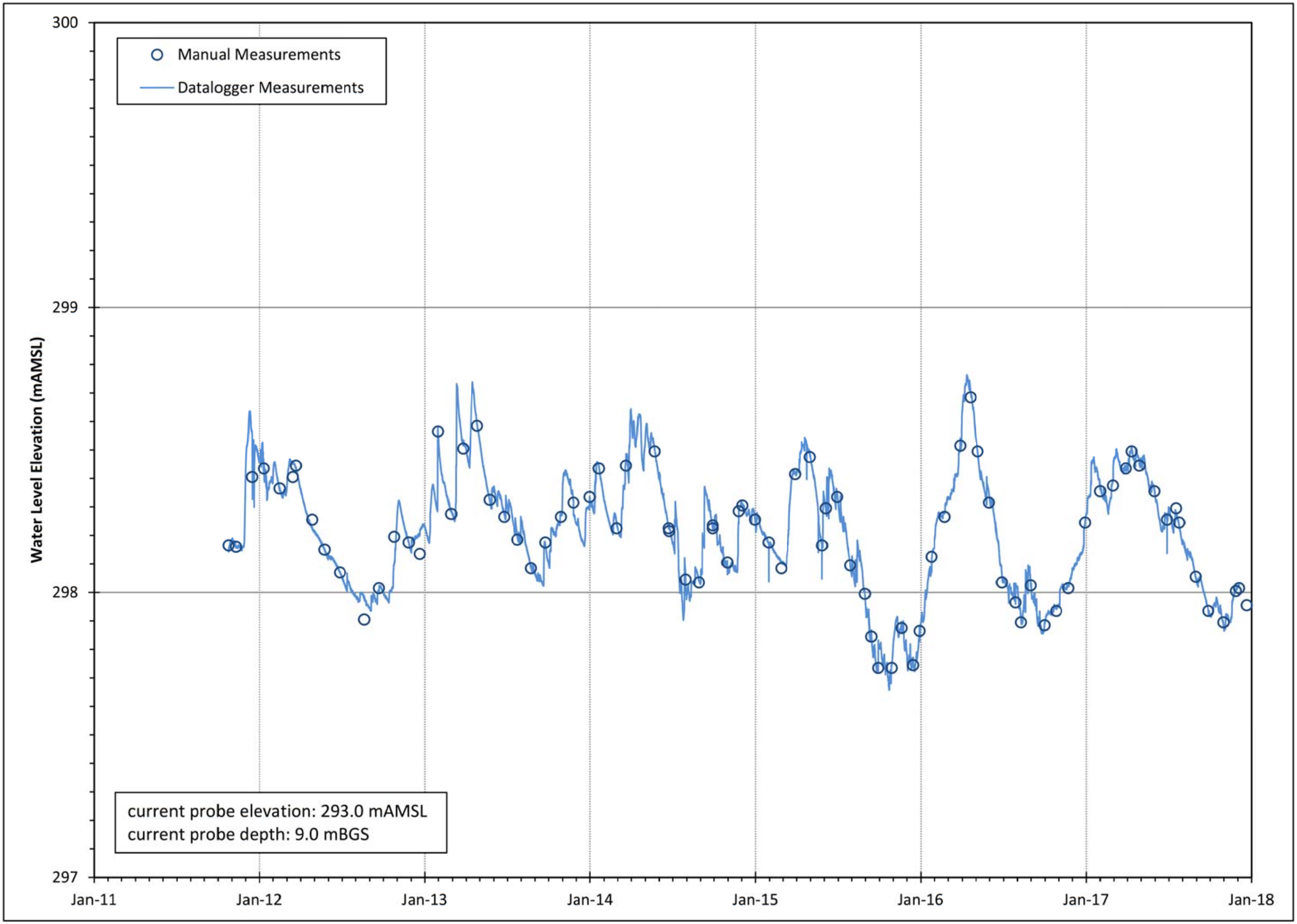


current probe elevation: 296.1 mAMSL
current probe depth: 3.5 mBGS

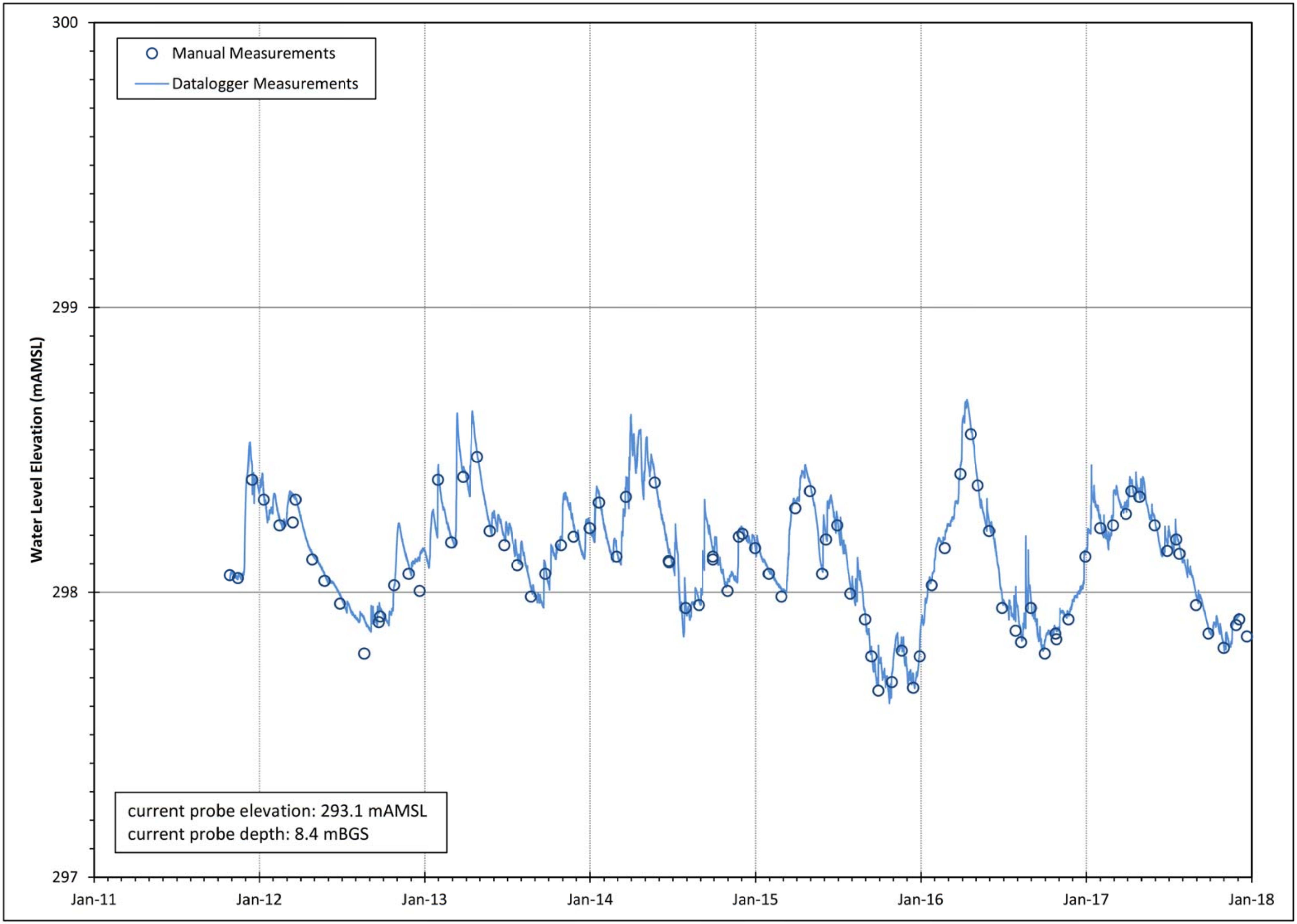
BH14 Hydrograph



BH15 Hydrograph

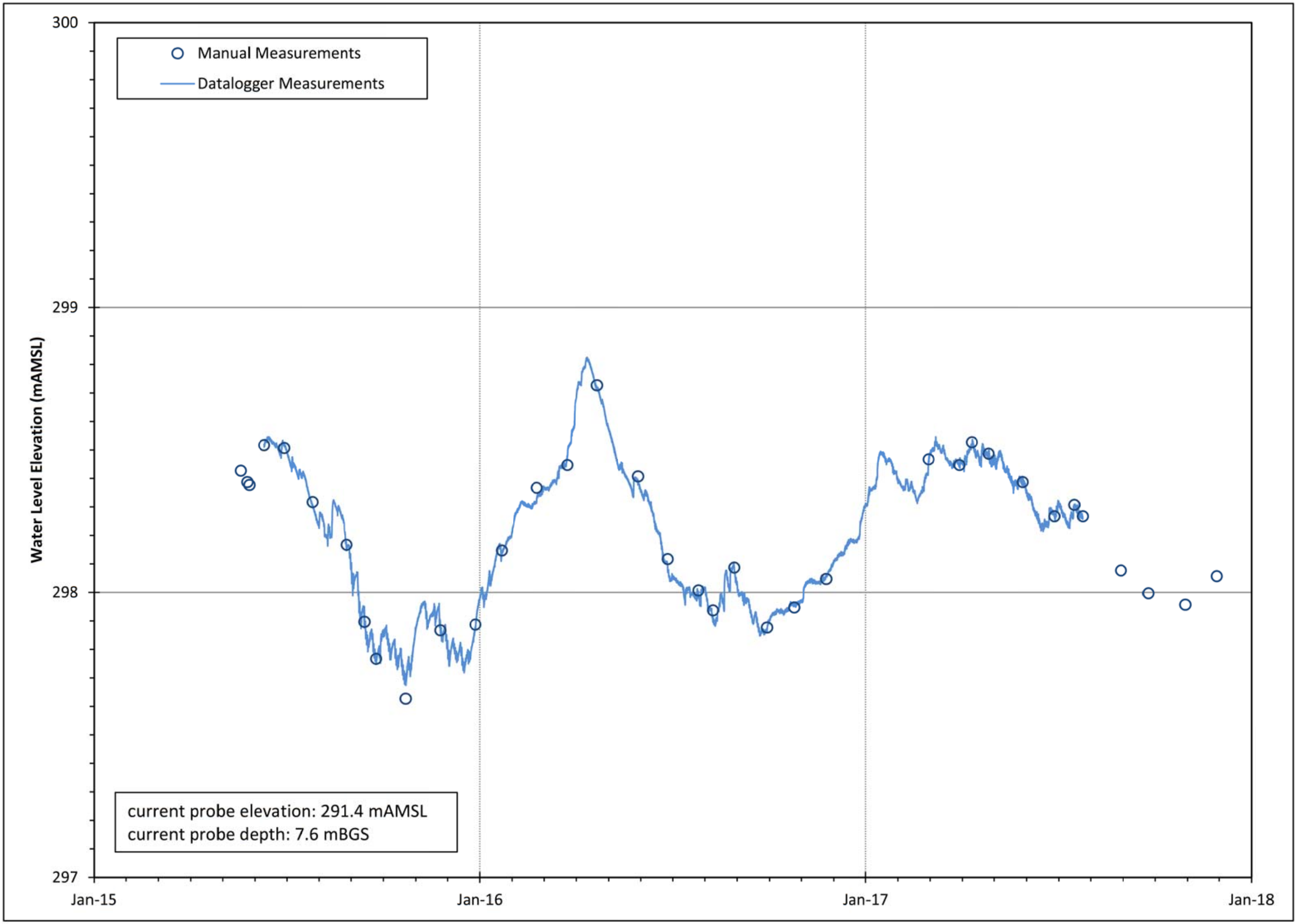


BH16 Hydrograph

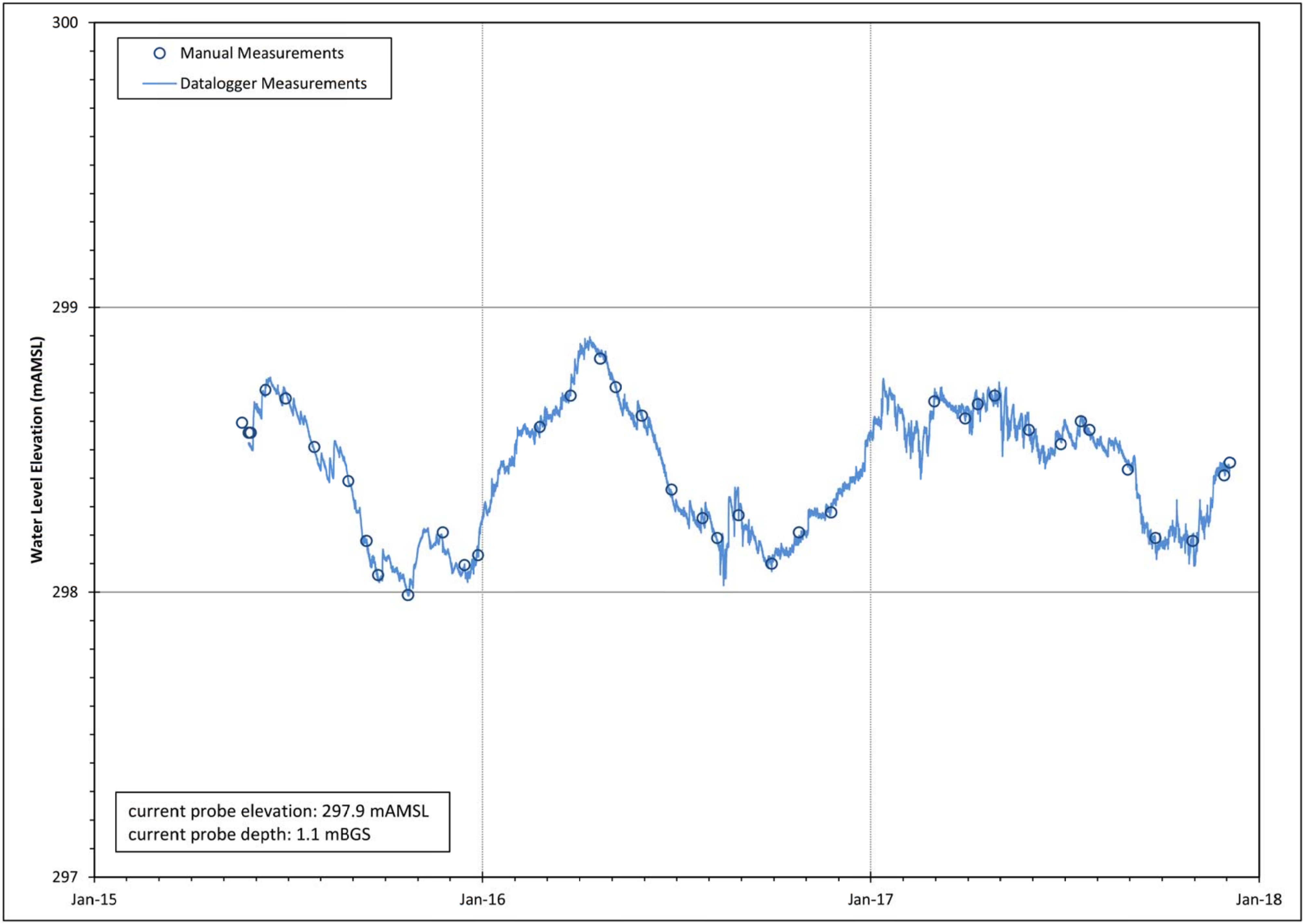


current probe elevation: 293.1 mAMSL
current probe depth: 8.4 mBGS

BH17 Hydrograph

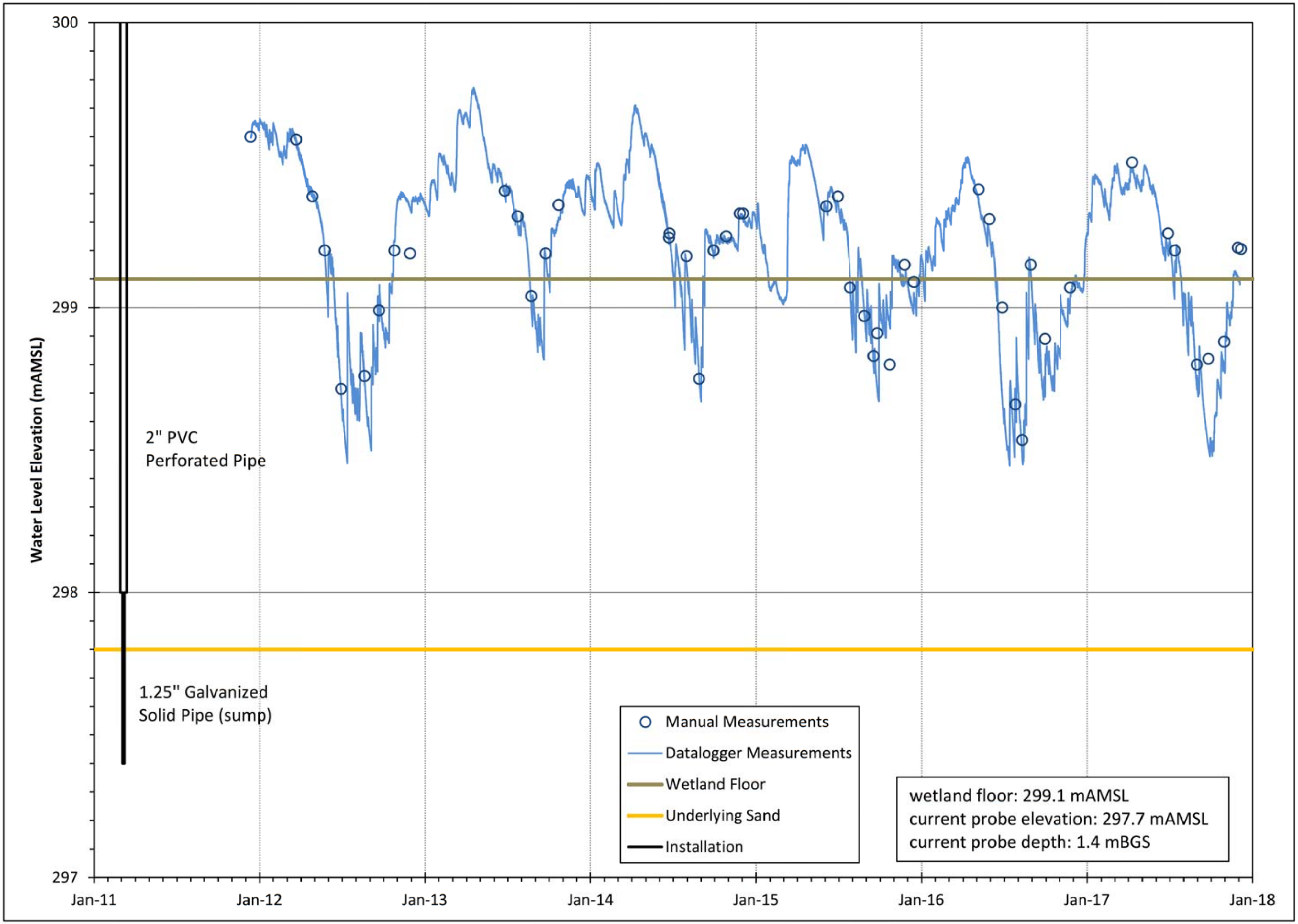


LG3 Hydrograph

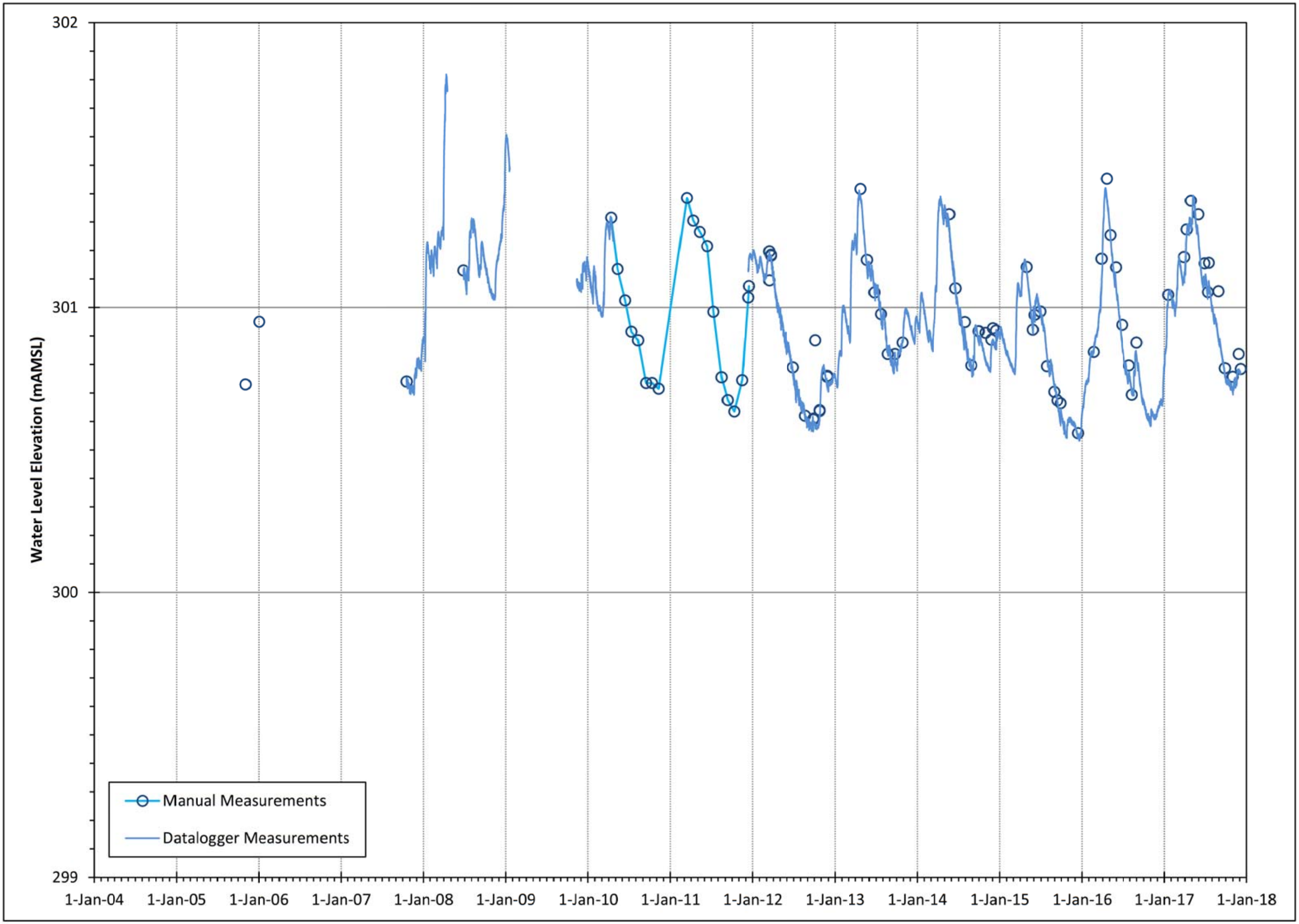


current probe elevation: 297.9 mAMSL
current probe depth: 1.1 mBGS

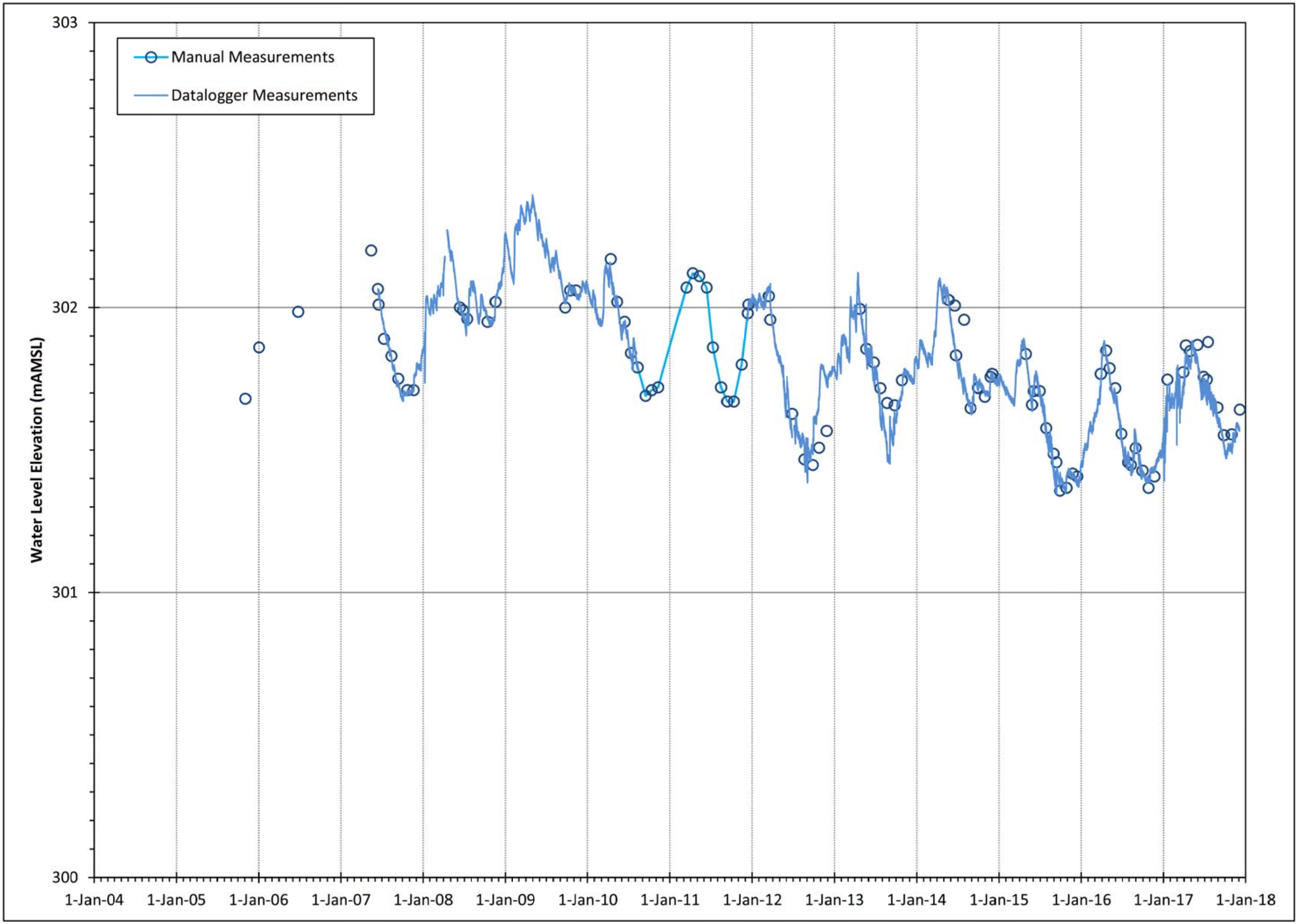
LG4 Hydrograph



PG7 (Roszell Wetland) Hydrograph



PG1 Hydrograph

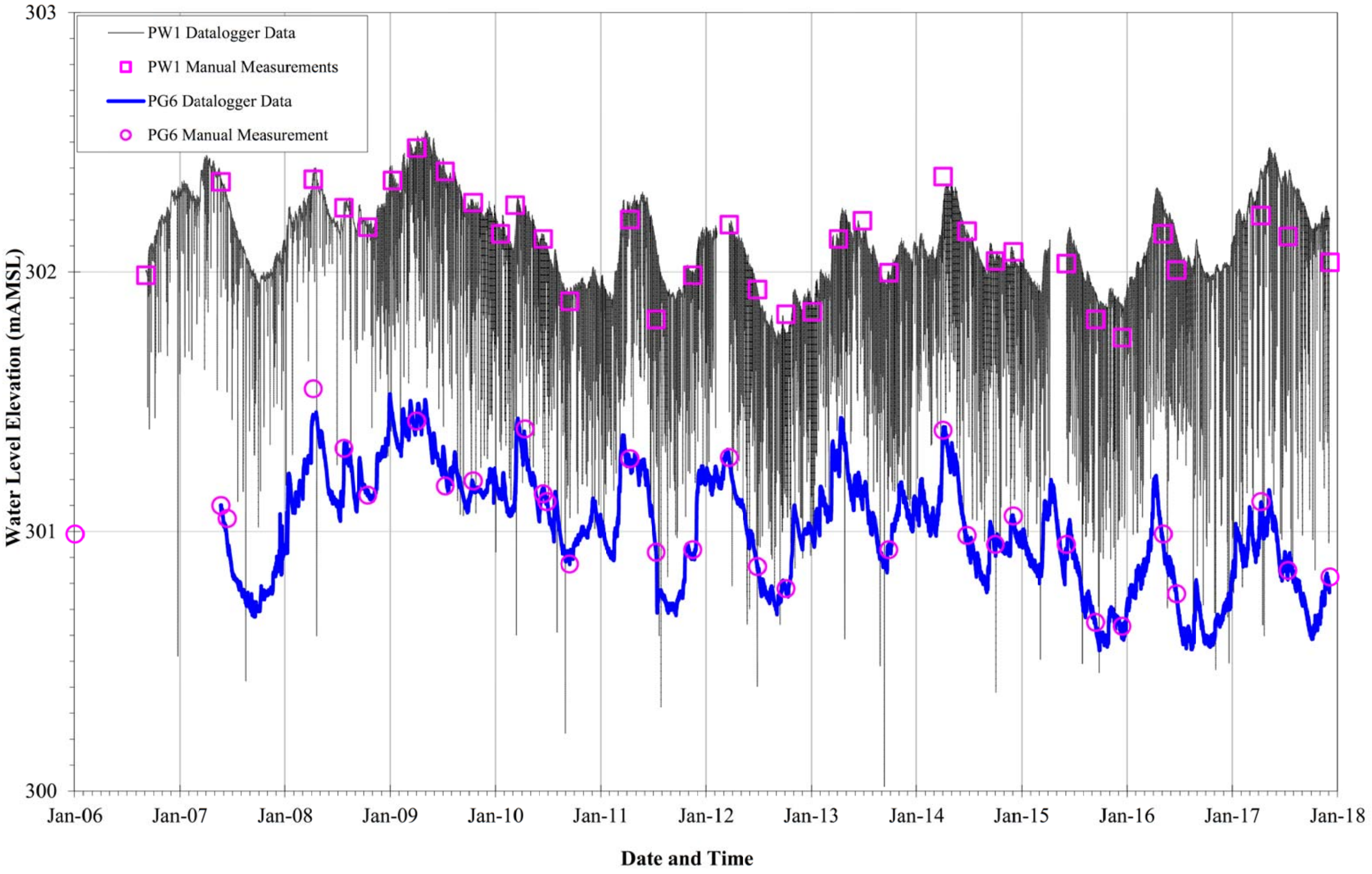


Preston Sand and Gravel Company Limited
Roszell Road Pit

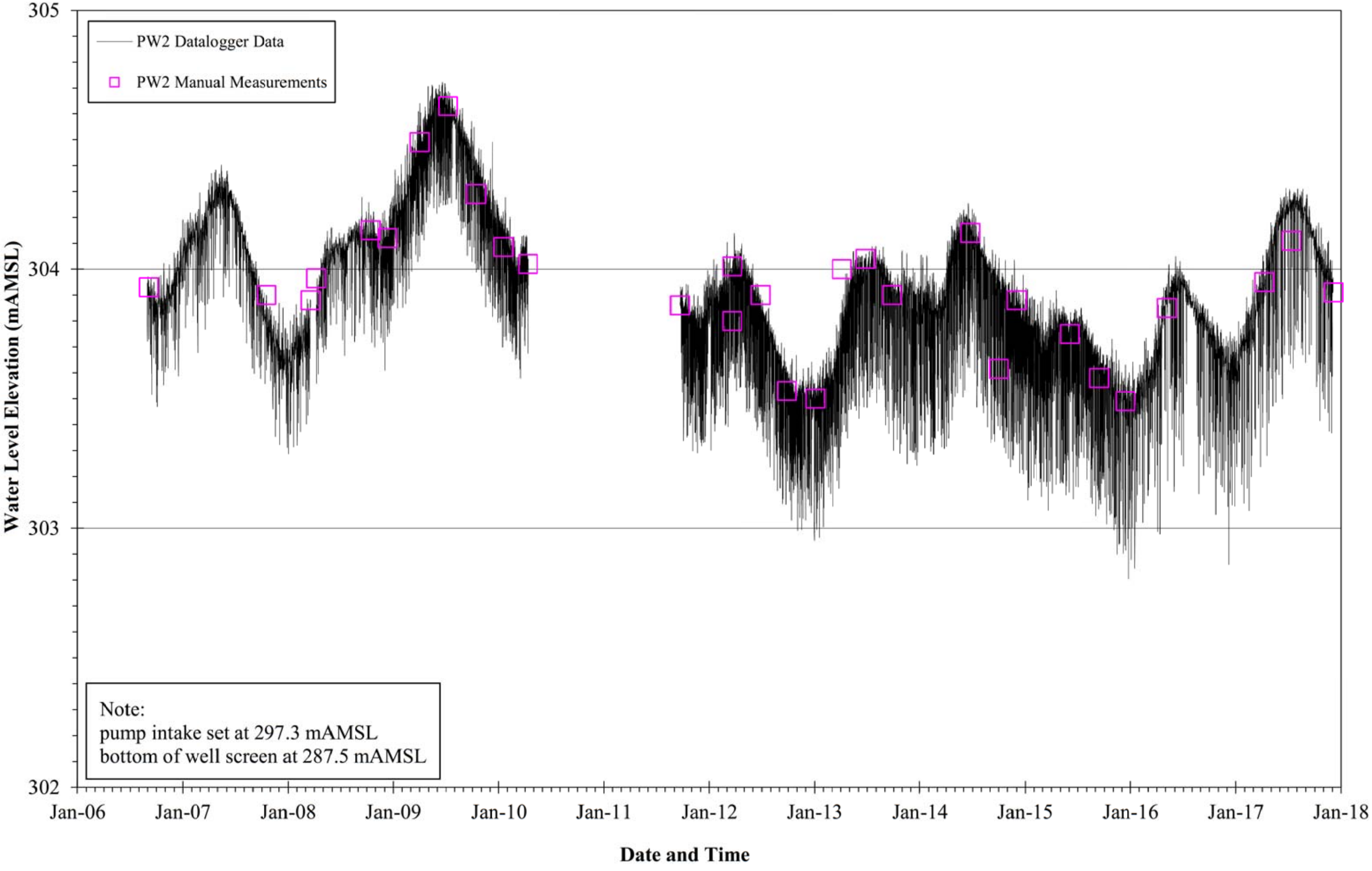
PG4 Hydrograph

Groundwater Science Corp.
Monitoring Program

Hydrograph - Private Well PW1 and Pond PG6



Hydrograph - Private Well PW2



Note:
pump intake set at 297.3 mAMSL
bottom of well screen at 287.5 mAMSL

Appendix D
Water Quality Results

GROUNDWATER SCIENCE
ATTN: ANDREW PENTNEY
328 Daleview Place
WATERLOO ON N2L 5M5

Date Received: 29-NOV-17
Report Date: 07-DEC-17 14:17 (MT)
Version: FINAL

Client Phone: 519-746-6916

Certificate of Analysis

Lab Work Order #: L2028934
Project P.O. #: NOT SUBMITTED
Job Reference: ROSZELL RD
C of C Numbers: 17-617195
Legal Site Desc:

N. Gudzak

Nellie Gudzak
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-1 BH8							
Sampled By: D.NAHRGANG on 28-NOV-17 @ 10:10							
Matrix: GROUNDWATER							
Physical Tests							
pH	8.02		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	50.0		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.060		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	5.52		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	0.0077		0.0030	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	35.5		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00023		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0629		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.019		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000521		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	85.9		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00068		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Iron (Fe)-Dissolved	0.011		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	0.000053		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0026		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	30.1		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	0.0149		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Molybdenum (Mo)-Dissolved	0.000438		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	1.64		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00210		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Selenium (Se)-Dissolved	0.000186		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	5.24		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	18.1		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.110		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-1 BH8 Sampled By: D.NAHRGANG on 28-NOV-17 @ 10:10 Matrix: GROUNDWATER							
Dissolved Metals							
Sulfur (S)-Dissolved	12.1		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	0.000023		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.00103		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0110		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	30-NOV-17	R3899436
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
Total Hydrocarbons (C6-C50)	<370		370	ug/L		01-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	30-NOV-17	R3899436
Surrogate: 2-Bromobenzotrifluoride	96.3		60-140	%	30-NOV-17	30-NOV-17	R3899436
Surrogate: 3,4-Dichlorotoluene	95.8		60-140	%		30-NOV-17	R3899082
L2028934-2 BH10S Sampled By: D.NAHRGANG on 28-NOV-17 @ 10:30 Matrix: GROUNDWATER							
Physical Tests							
pH	7.98		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	0.075		0.020	mg/L		06-DEC-17	R3906146
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	62.0		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.048		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	15.0		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	4.8	DLM	1.5	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	2.32	DLHC	0.015	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	25.5		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392
Aluminum (Al)-Dissolved	0.0130		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00027		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0904		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-2 BH10S Sampled By: D.NAHRGANG on 28-NOV-17 @ 10:30 Matrix: GROUNDWATER							
Dissolved Metals							
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.019		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000505		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	92.1		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00156		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Iron (Fe)-Dissolved	0.013		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	0.000360		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0015		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	28.1		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	0.00163		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Molybdenum (Mo)-Dissolved	0.000329		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	2.75		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00044		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Selenium (Se)-Dissolved	0.000390		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	5.44		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	24.0		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.127		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Sulfur (S)-Dissolved	8.72		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	0.00015		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	0.00053		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.000408		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0126		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	30-NOV-17	R3899436
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
Total Hydrocarbons (C6-C50)	<370		370	ug/L		01-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	30-NOV-17	R3899436

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-2 BH10S Sampled By: D.NAHRGANG on 28-NOV-17 @ 10:30 Matrix: GROUNDWATER							
Hydrocarbons							
Surrogate: 2-Bromobenzotrifluoride	101.6		60-140	%	30-NOV-17	30-NOV-17	R3899436
Surrogate: 3,4-Dichlorotoluene	77.1		60-140	%		30-NOV-17	R3899082
L2028934-3 BH10D Sampled By: D.NAHRGANG on 28-NOV-17 @ 11:00 Matrix: GROUNDWATER							
Physical Tests							
pH	8.04		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	0.020		0.020	mg/L		06-DEC-17	R3906146
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	22.1		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.055		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	16.2		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	0.438		0.0030	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	25.5		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00025		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0596		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.011		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000211		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	85.0		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00161		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	0.000087		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0016		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	28.4		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Molybdenum (Mo)-Dissolved	0.000187		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	1.95		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00146		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-3 BH10D Sampled By: D.NAHRGANG on 28-NOV-17 @ 11:00 Matrix: GROUNDWATER							
Dissolved Metals							
Selenium (Se)-Dissolved	0.000352		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	6.19		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	9.18		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.109		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Sulfur (S)-Dissolved	8.70		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.000379		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0117		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	30-NOV-17	R3899436
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
Total Hydrocarbons (C6-C50)	<370		370	ug/L		01-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	30-NOV-17	R3899436
Surrogate: 2-Bromobenzotrifluoride	100.2		60-140	%	30-NOV-17	30-NOV-17	R3899436
Surrogate: 3,4-Dichlorotoluene	80.5		60-140	%		30-NOV-17	R3899082
L2028934-4 BH5 Sampled By: D.NAHRGANG on 28-NOV-17 @ 11:45 Matrix: GROUNDWATER							
Physical Tests							
pH	7.87		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	150		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.064		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	8.56		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	0.0083		0.0030	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	21.3		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-4 BH5							
Sampled By: D.NAHRGANG on 28-NOV-17 @ 11:45							
Matrix: GROUNDWATER							
Dissolved Metals							
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00014		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0906		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.013		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000927		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	103		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00051		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Iron (Fe)-Dissolved	0.013		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0017		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	28.2		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	0.00075		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Molybdenum (Mo)-Dissolved	0.000146		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	1.64		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00166		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Selenium (Se)-Dissolved	0.000423		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	6.27		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	79.0		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.151		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Sulfur (S)-Dissolved	7.53		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.000446		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0217		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-4 BH5 Sampled By: D.NAHRGANG on 28-NOV-17 @ 11:45 Matrix: GROUNDWATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	30-NOV-17	R3899436
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	30-NOV-17	R3899436
Total Hydrocarbons (C6-C50)	<370		370	ug/L		01-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	30-NOV-17	R3899436
Surrogate: 2-Bromobenzotrifluoride	100.1		60-140	%	30-NOV-17	30-NOV-17	R3899436
Surrogate: 3,4-Dichlorotoluene	87.8		60-140	%		30-NOV-17	R3899082
L2028934-5 BH1 Sampled By: D.NAHRGANG on 28-NOV-17 @ 12:10 Matrix: GROUNDWATER							
Physical Tests							
pH	8.05		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	0.022		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	56.9		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.077		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	8.01		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	0.0040		0.0030	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	20.1		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00012		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0488		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.012		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000514		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	65.1		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00054		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	0.000065		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0012		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	21.0		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-5 BH1 Sampled By: D.NAHRGANG on 28-NOV-17 @ 12:10 Matrix: GROUNDWATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	0.000955		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	1.50		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00146		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Selenium (Se)-Dissolved	0.000107		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	4.54		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	16.7		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.0859		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Sulfur (S)-Dissolved	6.67		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	0.00046		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.000291		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0096		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	01-DEC-17	R3902741
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	01-DEC-17	R3902741
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	01-DEC-17	R3902741
Total Hydrocarbons (C6-C50)	<370		370	ug/L		04-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	01-DEC-17	R3902741
Surrogate: 2-Bromobenzotrifluoride	97.3		60-140	%	30-NOV-17	01-DEC-17	R3902741
Surrogate: 3,4-Dichlorotoluene	92.9		60-140	%		30-NOV-17	R3899082
L2028934-6 BH7S Sampled By: D.NAHRGANG on 28-NOV-17 @ 12:50 Matrix: GROUNDWATER							
Physical Tests							
pH	8.02		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	34.8		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.078		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	10.5		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-6 BH7S Sampled By: D.NAHRGANG on 28-NOV-17 @ 12:50 Matrix: GROUNDWATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	0.0941		0.0030	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	22.9		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392
Aluminum (Al)-Dissolved	0.0120		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	0.00011		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00016		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0464		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.015		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000549		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	69.0		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00639		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Iron (Fe)-Dissolved	0.020		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	0.000442		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0016		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	24.3		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	0.00640		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Molybdenum (Mo)-Dissolved	0.000418		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	0.00071		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	2.00		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00256		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Selenium (Se)-Dissolved	0.000198		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	4.68		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	13.2		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.0946		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Sulfur (S)-Dissolved	8.00		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	0.00036		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.000416		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-6 BH7S Sampled By: D.NAHRGANG on 28-NOV-17 @ 12:50 Matrix: GROUNDWATER							
Dissolved Metals							
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0173		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	01-DEC-17	R3902741
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	01-DEC-17	R3902741
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	01-DEC-17	R3902741
Total Hydrocarbons (C6-C50)	<370		370	ug/L		04-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	01-DEC-17	R3902741
Surrogate: 2-Bromobenzotrifluoride	99.6		60-140	%	30-NOV-17	01-DEC-17	R3902741
Surrogate: 3,4-Dichlorotoluene	89.3		60-140	%		30-NOV-17	R3899082
L2028934-7 BH7D Sampled By: D.NAHRGANG on 28-NOV-17 @ 13:15 Matrix: GROUNDWATER							
Physical Tests							
pH	8.09		0.10	pH units		30-NOV-17	R3899302
Anions and Nutrients							
Ammonia, Total (as N)	0.120		0.020	mg/L		06-DEC-17	R3906146
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	37.6		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.085		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	10.7		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	2.0	DLM	1.5	mg/L	04-DEC-17	05-DEC-17	R3905009
Phosphorus, Total	1.93	DLHC	0.0060	mg/L	05-DEC-17	06-DEC-17	R3905534
Sulfate (SO4)	23.0		0.30	mg/L		01-DEC-17	R3902509
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					30-NOV-17	R3898392
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	30-NOV-17	30-NOV-17	R3898895
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Arsenic (As)-Dissolved	0.00017		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Barium (Ba)-Dissolved	0.0464		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Boron (B)-Dissolved	0.013		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Cadmium (Cd)-Dissolved	0.0000437		0.0000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Calcium (Ca)-Dissolved	66.9		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cesium (Cs)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Copper (Cu)-Dissolved	0.00075		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2028934-7 BH7D Sampled By: D.NAHRGANG on 28-NOV-17 @ 13:15 Matrix: GROUNDWATER							
Dissolved Metals							
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	30-NOV-17	30-NOV-17	R3898895
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Lithium (Li)-Dissolved	0.0016		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Magnesium (Mg)-Dissolved	22.7		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Molybdenum (Mo)-Dissolved	0.000385		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Potassium (K)-Dissolved	1.29		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Rubidium (Rb)-Dissolved	0.00201		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Selenium (Se)-Dissolved	0.000239		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silicon (Si)-Dissolved	5.04		0.050	mg/L	30-NOV-17	30-NOV-17	R3898895
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-NOV-17	30-NOV-17	R3898895
Sodium (Na)-Dissolved	13.6		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Strontium (Sr)-Dissolved	0.0876		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Sulfur (S)-Dissolved	7.57		0.50	mg/L	30-NOV-17	30-NOV-17	R3898895
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-NOV-17	30-NOV-17	R3898895
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-NOV-17	30-NOV-17	R3898895
Uranium (U)-Dissolved	0.000449		0.000010	mg/L	30-NOV-17	30-NOV-17	R3898895
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-NOV-17	30-NOV-17	R3898895
Zinc (Zn)-Dissolved	0.0095		0.0010	mg/L	30-NOV-17	30-NOV-17	R3898895
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-NOV-17	30-NOV-17	R3898895
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		30-NOV-17	R3899082
F2 (C10-C16)	<100		100	ug/L	30-NOV-17	01-DEC-17	R3902741
F3 (C16-C34)	<250		250	ug/L	30-NOV-17	01-DEC-17	R3902741
F4 (C34-C50)	<250		250	ug/L	30-NOV-17	01-DEC-17	R3902741
Total Hydrocarbons (C6-C50)	<370		370	ug/L		04-DEC-17	
Chrom. to baseline at nC50	YES				30-NOV-17	01-DEC-17	R3902741
Surrogate: 2-Bromobenzotrifluoride	95.0		60-140	%	30-NOV-17	01-DEC-17	R3902741
Surrogate: 3,4-Dichlorotoluene	79.2		60-140	%		30-NOV-17	R3899082

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Boron (B)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Phosphorus (P)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Nitrate (as N)	MS-B	L2028934-1, -2, -3, -4, -5, -6, -7

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BR-IC-N-WT	Water	Bromide in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

ALS Test Code	Matrix	Test Description	Method Reference**
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

ALS Test Code	Matrix	Test Description	Method Reference**
F2-F4-511-WT	Water	F2-F4-O.Reg 153/04 (July 2011)	EPA 3511/CCME Tier 1

Reference Information

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	**Laboratory Location**
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

17-617195

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

GROUNDWATER SCIENCE
ATTN: ANDREW PENTNEY
328 Daleview Place
WATERLOO ON N2L 5M5

Date Received: 30-NOV-17
Report Date: 11-DEC-17 14:33 (MT)
Version: FINAL

Client Phone: 519-746-6916

Certificate of Analysis

Lab Work Order #: L2029161
Project P.O. #: NOT SUBMITTED
Job Reference: ROSZELL RD
C of C Numbers: 17-617578
Legal Site Desc:

N. Gudzak

Nellie Gudzak
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-1 POND Sampled By: D. NAHRGANG on 29-NOV-17 @ 10:55 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	35.6		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.054		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	10.6		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	0.011		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	0.26	TKNI	0.15	mg/L	08-DEC-17	11-DEC-17	R3909331
Phosphorus, Total	0.0057		0.0030	mg/L	06-DEC-17	07-DEC-17	R3906738
Sulfate (SO4)	22.0		0.30	mg/L		01-DEC-17	R3902509
Total Metals							
Aluminum (Al)-Total	0.0274		0.0050	mg/L	01-DEC-17	01-DEC-17	R3899391
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Arsenic (As)-Total	0.00042		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Barium (Ba)-Total	0.0442		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Boron (B)-Total	0.012		0.010	mg/L	01-DEC-17	01-DEC-17	R3899391
Cadmium (Cd)-Total	0.0000133		0.0000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Calcium (Ca)-Total	74.6		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Copper (Cu)-Total	<0.0010		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Iron (Fe)-Total	<0.050		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lead (Pb)-Total	0.000178		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lithium (Li)-Total	0.0015		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Magnesium (Mg)-Total	27.1		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Manganese (Mn)-Total	0.00312		0.00050	mg/L	01-DEC-17	04-DEC-17	R3899391
Molybdenum (Mo)-Total	0.000345		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Phosphorus (P)-Total	<0.050		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Potassium (K)-Total	1.85		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Rubidium (Rb)-Total	0.00140		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Selenium (Se)-Total	0.000272		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Silicon (Si)-Total	5.22		0.10	mg/L	01-DEC-17	01-DEC-17	R3899391
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Sodium (Na)-Total	17.1		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Strontium (Sr)-Total	0.119		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Sulfur (S)-Total	7.93		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Thallium (Tl)-Total	0.000013		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-1 POND Sampled By: D. NAHRGANG on 29-NOV-17 @ 10:55 Matrix: WATER							
Total Metals							
Thorium (Th)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Titanium (Ti)-Total	0.00096		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Uranium (U)-Total	0.000404		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Vanadium (V)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Zinc (Zn)-Total	0.0038		0.0030	mg/L	01-DEC-17	01-DEC-17	R3899391
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		01-DEC-17	R3899682
F2 (C10-C16)	<100		100	ug/L	01-DEC-17	01-DEC-17	R3904126
F3 (C16-C34)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
F4 (C34-C50)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
Total Hydrocarbons (C6-C50)	<370		370	ug/L		05-DEC-17	
Chrom. to baseline at nC50	YES				01-DEC-17	01-DEC-17	R3904126
Surrogate: 2-Bromobenzotrifluoride	103.0		60-140	%	01-DEC-17	01-DEC-17	R3904126
Surrogate: 3,4-Dichlorotoluene	92.0		60-140	%		01-DEC-17	R3899682
L2029161-2 SW10 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:15 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	0.119		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	30.9		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.037		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	5.46		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	26.4	DLHC	1.5	mg/L	08-DEC-17	11-DEC-17	R3909331
Phosphorus, Total	3.50	DLM	0.030	mg/L	06-DEC-17	07-DEC-17	R3906738
Sulfate (SO4)	27.2		0.30	mg/L		01-DEC-17	R3902509
Total Metals							
Aluminum (Al)-Total	8.58		0.0050	mg/L	01-DEC-17	01-DEC-17	R3899391
Antimony (Sb)-Total	0.00018		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Arsenic (As)-Total	0.00562		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Barium (Ba)-Total	0.153		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Beryllium (Be)-Total	0.00046		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Bismuth (Bi)-Total	0.000120		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Boron (B)-Total	0.026		0.010	mg/L	01-DEC-17	01-DEC-17	R3899391
Cadmium (Cd)-Total	0.00208		0.0000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Calcium (Ca)-Total	92.7		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Cesium (Cs)-Total	0.000483		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Chromium (Cr)-Total	0.0102		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-2 SW10 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:15 Matrix: WATER							
Total Metals							
Cobalt (Co)-Total	0.00499		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Copper (Cu)-Total	0.0334		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Iron (Fe)-Total	13.1		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lead (Pb)-Total	0.109		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lithium (Li)-Total	0.0092		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Magnesium (Mg)-Total	34.6		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Manganese (Mn)-Total	1.06		0.00050	mg/L	01-DEC-17	04-DEC-17	R3899391
Molybdenum (Mo)-Total	0.000724		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Nickel (Ni)-Total	0.0106		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Phosphorus (P)-Total	0.550		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Potassium (K)-Total	2.33		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Rubidium (Rb)-Total	0.0117		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Selenium (Se)-Total	0.00159		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Silicon (Si)-Total	13.9		0.10	mg/L	01-DEC-17	01-DEC-17	R3899391
Silver (Ag)-Total	0.000063		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Sodium (Na)-Total	10.2		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Strontium (Sr)-Total	0.133		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Sulfur (S)-Total	10.7		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Thallium (Tl)-Total	<0.00030	DLUI	0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Thorium (Th)-Total	0.00018		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Tin (Sn)-Total	0.00020		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Titanium (Ti)-Total	0.140		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Uranium (U)-Total	0.00115		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Vanadium (V)-Total	0.0159		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Zinc (Zn)-Total	0.442		0.0030	mg/L	01-DEC-17	01-DEC-17	R3899391
Zirconium (Zr)-Total	0.00060		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		01-DEC-17	R3899682
F2 (C10-C16)	<100		100	ug/L	01-DEC-17	01-DEC-17	R3904126
F3 (C16-C34)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
F4 (C34-C50)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
Total Hydrocarbons (C6-C50)	<370		370	ug/L		05-DEC-17	
Chrom. to baseline at nC50	YES				01-DEC-17	01-DEC-17	R3904126
Surrogate: 2-Bromobenzotrifluoride	99.5		60-140	%	01-DEC-17	01-DEC-17	R3904126
Surrogate: 3,4-Dichlorotoluene	87.3		60-140	%		01-DEC-17	R3899682
L2029161-3 SW8 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:30 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-3 SW8 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:30 Matrix: WATER							
Anions and Nutrients							
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	34.9		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.070		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	9.62		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	1.98		0.15	mg/L	08-DEC-17	11-DEC-17	R3909331
Phosphorus, Total	0.107		0.0030	mg/L	06-DEC-17	07-DEC-17	R3906738
Sulfate (SO4)	24.7		0.30	mg/L		01-DEC-17	R3902509
Total Metals							
Aluminum (Al)-Total	0.419		0.0050	mg/L	01-DEC-17	01-DEC-17	R3899391
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Arsenic (As)-Total	0.00048		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Barium (Ba)-Total	0.0540		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Boron (B)-Total	0.015		0.010	mg/L	01-DEC-17	01-DEC-17	R3899391
Cadmium (Cd)-Total	0.000361		0.0000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Calcium (Ca)-Total	81.0		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Cesium (Cs)-Total	0.000053		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Chromium (Cr)-Total	0.00201		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Cobalt (Co)-Total	0.00026		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Copper (Cu)-Total	0.0120		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Iron (Fe)-Total	0.560		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lead (Pb)-Total	0.00552		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lithium (Li)-Total	0.0017		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Magnesium (Mg)-Total	25.0		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Manganese (Mn)-Total	0.0456		0.00050	mg/L	01-DEC-17	04-DEC-17	R3899391
Molybdenum (Mo)-Total	0.000364		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Nickel (Ni)-Total	0.00128		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Phosphorus (P)-Total	0.068		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Potassium (K)-Total	1.44		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Rubidium (Rb)-Total	0.00235		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Selenium (Se)-Total	0.000465		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Silicon (Si)-Total	5.42		0.10	mg/L	01-DEC-17	01-DEC-17	R3899391
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Sodium (Na)-Total	13.3		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Strontium (Sr)-Total	0.110		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Sulfur (S)-Total	8.43		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Thallium (Tl)-Total	0.000043		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Thorium (Th)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-3 SW8 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:30 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Titanium (Ti)-Total	0.0103		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Uranium (U)-Total	0.000503		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Vanadium (V)-Total	0.00086		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Zinc (Zn)-Total	0.0626		0.0030	mg/L	01-DEC-17	01-DEC-17	R3899391
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		01-DEC-17	R3899682
F2 (C10-C16)	<100		100	ug/L	01-DEC-17	01-DEC-17	R3904126
F3 (C16-C34)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
F4 (C34-C50)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
Total Hydrocarbons (C6-C50)	<370		370	ug/L		05-DEC-17	
Chrom. to baseline at nC50	YES				01-DEC-17	01-DEC-17	R3904126
Surrogate: 2-Bromobenzotrifluoride	102.8		60-140	%	01-DEC-17	01-DEC-17	R3904126
Surrogate: 3,4-Dichlorotoluene	93.1		60-140	%		01-DEC-17	R3899682
L2029161-4 SW6 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:45 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	45.5		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.067		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	8.61		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	0.29	TKNI	0.15	mg/L	08-DEC-17	11-DEC-17	R3909331
Phosphorus, Total	<0.0030		0.0030	mg/L	06-DEC-17	07-DEC-17	R3906738
Sulfate (SO4)	21.5		0.30	mg/L		01-DEC-17	R3902509
Total Metals							
Aluminum (Al)-Total	0.0053		0.0050	mg/L	01-DEC-17	01-DEC-17	R3899391
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Arsenic (As)-Total	0.00015		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Barium (Ba)-Total	0.0448		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Boron (B)-Total	0.013		0.010	mg/L	01-DEC-17	01-DEC-17	R3899391
Cadmium (Cd)-Total	0.0000397		0.0000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Calcium (Ca)-Total	66.1		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-4 SW6 Sampled By: D. NAHRGANG on 29-NOV-17 @ 11:45 Matrix: WATER							
Total Metals							
Copper (Cu)-Total	<0.0010		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Iron (Fe)-Total	<0.050		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lead (Pb)-Total	0.000054		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lithium (Li)-Total	0.0016		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Magnesium (Mg)-Total	25.1		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Manganese (Mn)-Total	<0.00050		0.00050	mg/L	01-DEC-17	04-DEC-17	R3899391
Molybdenum (Mo)-Total	0.000454		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Phosphorus (P)-Total	<0.050		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Potassium (K)-Total	1.76		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Rubidium (Rb)-Total	0.00182		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Selenium (Se)-Total	0.000135		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Silicon (Si)-Total	4.82		0.10	mg/L	01-DEC-17	01-DEC-17	R3899391
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Sodium (Na)-Total	17.0		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Strontium (Sr)-Total	0.0988		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Sulfur (S)-Total	7.53		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Thorium (Th)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Titanium (Ti)-Total	<0.00030		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Uranium (U)-Total	0.000346		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Vanadium (V)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Zinc (Zn)-Total	0.0096		0.0030	mg/L	01-DEC-17	01-DEC-17	R3899391
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		01-DEC-17	R3899682
F2 (C10-C16)	<100		100	ug/L	01-DEC-17	01-DEC-17	R3904126
F3 (C16-C34)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
F4 (C34-C50)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
Total Hydrocarbons (C6-C50)	<370		370	ug/L		05-DEC-17	
Chrom. to baseline at nC50	YES				01-DEC-17	01-DEC-17	R3904126
Surrogate: 2-Bromobenzotrifluoride	98.8		60-140	%	01-DEC-17	01-DEC-17	R3904126
Surrogate: 3,4-Dichlorotoluene	93.9		60-140	%		01-DEC-17	R3899682
L2029161-5 SW3 Sampled By: D. NAHRGANG on 29-NOV-17 @ 12:25 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-5 SW3 Sampled By: D. NAHRGANG on 29-NOV-17 @ 12:25 Matrix: WATER							
Anions and Nutrients							
Chloride (Cl)	42.0		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.051		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	8.94		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	0.77	TKNI	0.15	mg/L	08-DEC-17	11-DEC-17	R3909331
Phosphorus, Total	0.0390		0.0030	mg/L	06-DEC-17	07-DEC-17	R3906738
Sulfate (SO4)	20.2		0.30	mg/L		01-DEC-17	R3902509
Total Metals							
Aluminum (Al)-Total	0.173		0.0050	mg/L	01-DEC-17	01-DEC-17	R3899391
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Arsenic (As)-Total	0.00033		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Barium (Ba)-Total	0.0468		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Boron (B)-Total	0.012		0.010	mg/L	01-DEC-17	01-DEC-17	R3899391
Cadmium (Cd)-Total	0.0000947		0.0000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Calcium (Ca)-Total	86.5		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Cesium (Cs)-Total	0.000017		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Chromium (Cr)-Total	0.00060		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Cobalt (Co)-Total	0.00014		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Copper (Cu)-Total	0.0019		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Iron (Fe)-Total	0.268		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lead (Pb)-Total	0.00165		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lithium (Li)-Total	<0.0010		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Magnesium (Mg)-Total	27.0		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Manganese (Mn)-Total	0.0304		0.00050	mg/L	01-DEC-17	04-DEC-17	R3899391
Molybdenum (Mo)-Total	0.000338		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Phosphorus (P)-Total	0.055		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Potassium (K)-Total	2.05		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Rubidium (Rb)-Total	0.00133		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Selenium (Se)-Total	0.000159		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Silicon (Si)-Total	4.84		0.10	mg/L	01-DEC-17	01-DEC-17	R3899391
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Sodium (Na)-Total	19.7		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Strontium (Sr)-Total	0.120		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Sulfur (S)-Total	7.15		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Thorium (Th)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-5 SW3							
Sampled By: D. NAHRGANG on 29-NOV-17 @ 12:25							
Matrix: WATER							
Total Metals							
Titanium (Ti)-Total	0.00525		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Uranium (U)-Total	0.000444		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Vanadium (V)-Total	0.00056		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Zinc (Zn)-Total	0.0225		0.0030	mg/L	01-DEC-17	01-DEC-17	R3899391
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		01-DEC-17	R3899682
F2 (C10-C16)	<100		100	ug/L	01-DEC-17	01-DEC-17	R3904126
F3 (C16-C34)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
F4 (C34-C50)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
Total Hydrocarbons (C6-C50)	<370		370	ug/L		05-DEC-17	
Chrom. to baseline at nC50	YES				01-DEC-17	01-DEC-17	R3904126
Surrogate: 2-Bromobenzotrifluoride	100.4		60-140	%	01-DEC-17	01-DEC-17	R3904126
Surrogate: 3,4-Dichlorotoluene	91.9		60-140	%		01-DEC-17	R3899682
L2029161-6 SW2							
Sampled By: D. NAHRGANG on 29-NOV-17 @ 13:00							
Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	0.082		0.020	mg/L		04-DEC-17	R3904431
Bromide (Br)	<0.10		0.10	mg/L		01-DEC-17	R3902509
Chloride (Cl)	40.9		0.50	mg/L		01-DEC-17	R3902509
Fluoride (F)	0.039		0.020	mg/L		01-DEC-17	R3902509
Nitrate (as N)	10.1		0.020	mg/L		01-DEC-17	R3902509
Nitrite (as N)	<0.010		0.010	mg/L		01-DEC-17	R3902509
Total Kjeldahl Nitrogen	0.34	TKNI	0.15	mg/L	08-DEC-17	11-DEC-17	R3909331
Phosphorus, Total	0.0078		0.0030	mg/L	06-DEC-17	07-DEC-17	R3906738
Sulfate (SO4)	18.8		0.30	mg/L		01-DEC-17	R3902509
Total Metals							
Aluminum (Al)-Total	0.0103		0.0050	mg/L	01-DEC-17	01-DEC-17	R3899391
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Arsenic (As)-Total	0.00025		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Barium (Ba)-Total	0.0405		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Boron (B)-Total	0.011		0.010	mg/L	01-DEC-17	01-DEC-17	R3899391
Cadmium (Cd)-Total	0.0000184		0.0000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Calcium (Ca)-Total	91.5		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Copper (Cu)-Total	0.0010		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2029161-6 SW2 Sampled By: D. NAHRGANG on 29-NOV-17 @ 13:00 Matrix: WATER							
Total Metals							
Iron (Fe)-Total	<0.050		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lead (Pb)-Total	0.000073		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Lithium (Li)-Total	<0.0010		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Magnesium (Mg)-Total	28.1		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Manganese (Mn)-Total	0.00790		0.00050	mg/L	01-DEC-17	04-DEC-17	R3899391
Molybdenum (Mo)-Total	0.000210		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Phosphorus (P)-Total	<0.050		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Potassium (K)-Total	1.90		0.050	mg/L	01-DEC-17	01-DEC-17	R3899391
Rubidium (Rb)-Total	0.00094		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Selenium (Se)-Total	0.000169		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Silicon (Si)-Total	4.67		0.10	mg/L	01-DEC-17	01-DEC-17	R3899391
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-DEC-17	01-DEC-17	R3899391
Sodium (Na)-Total	20.1		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Strontium (Sr)-Total	0.116		0.0010	mg/L	01-DEC-17	01-DEC-17	R3899391
Sulfur (S)-Total	6.96		0.50	mg/L	01-DEC-17	01-DEC-17	R3899391
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-DEC-17	01-DEC-17	R3899391
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Thorium (Th)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Titanium (Ti)-Total	<0.00050	DLUI	0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-DEC-17	01-DEC-17	R3899391
Uranium (U)-Total	0.000452		0.000010	mg/L	01-DEC-17	01-DEC-17	R3899391
Vanadium (V)-Total	<0.00050		0.00050	mg/L	01-DEC-17	01-DEC-17	R3899391
Zinc (Zn)-Total	0.0061		0.0030	mg/L	01-DEC-17	01-DEC-17	R3899391
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	01-DEC-17	01-DEC-17	R3899391
Hydrocarbons							
F1 (C6-C10)	<25		25	ug/L		01-DEC-17	R3899682
F2 (C10-C16)	<100		100	ug/L	01-DEC-17	01-DEC-17	R3904126
F3 (C16-C34)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
F4 (C34-C50)	<250		250	ug/L	01-DEC-17	01-DEC-17	R3904126
Total Hydrocarbons (C6-C50)	<370		370	ug/L		05-DEC-17	
Chrom. to baseline at nC50	YES				01-DEC-17	01-DEC-17	R3904126
Surrogate: 2-Bromobenzotrifluoride	94.8		60-140	%	01-DEC-17	01-DEC-17	R3904126
Surrogate: 3,4-Dichlorotoluene	88.4		60-140	%		01-DEC-17	R3899682

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Copper (Cu)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Potassium (K)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Silicon (Si)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Sulfur (S)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Uranium (U)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6
Matrix Spike	Zinc (Zn)-Total	MS-B	L2029161-1, -2, -3, -4, -5, -6

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BR-IC-N-WT	Water	Bromide in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

ALS Test Code	Matrix	Test Description	Method Reference**
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

ALS Test Code	Matrix	Test Description	Method Reference**
F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

Reference Information

F2-F4-511-WT Water F2-F4-O.Reg 153/04 (July 2011) EPA 3511/CCME Tier 1

Petroleum Hydrocarbons (F2-F4 fractions) are extracted from water using a hexane micro-extraction technique. Instrumental analysis is by GC-FID, as per the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Tier 1 Method, CCME, 2001.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MET-T-CCMS-WT Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

17-617578

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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Roszell Road Pit, Licence No. 625189
Thermal Monitoring Report

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1.0 INTRODUCTION

This report summarizes the results of the thermal monitoring program undertaken to date at the Roszell Road Pit. Site details and monitoring locations are shown on **Figure 1**.

1.1 BACKGROUND

The studies completed for the original pit Licence application included an assessment of potential thermal impacts on groundwater and surface water systems related to the creation of aggregate extraction ponds. A new pond created at the site acts as a flow-through feature, with groundwater entering the pond on the upgradient side and the pond water returning to the groundwater system on the downgradient side.

The creation of a pond in this setting can alter groundwater temperatures within the downgradient flow system. The (new) pond temperature is typically warmer in the summer, and cooler in the winter, than the original groundwater temperatures at that location. This thermal effect can move within the downgradient flow system, typically as a "pulse" of warmer water beginning in the summer and a corresponding "pulse" of cooler water beginning in the winter. The thermal changes dissipate with distance from the pond, as sequential and off-setting warm and cold pulses of water move through the system. The process and effect is described in more detail in the paper: *Thermal plume transport from sand and gravel pits - Potential thermal impacts on cool water streams*; Jeff M. Markle, Robert A. Schincariol, Journal of Hydrology (2007) 338, pages 174-195.

Groundwater at the site flows generally toward the Speed River valley. Groundwater discharge occurs at the valley in a variety of forms, including:

- as diffuse discharge distributed along the valley wall slope;
- as spot upwellings (springs) on the valley wall and at the base of the slope;
- as diffuse discharge distributed over the valley floor; and,
- as diffuse discharge along tributary channels flowing across the valley floor to the Speed River.

The groundwater discharge occurring along the valley wall is interpreted to originate as groundwater flow through the sand and gravel unit; whereas the discharge at the base of the slope and valley floor is interpreted to originate from both the sand/gravel and deeper bedrock groundwater flow systems.

The tributary channels include a Main Creek (unnamed) as the largest system near the site, and several smaller channels that flow directly to the Speed River. The Main Creek and Trib #7 form cold water fish habitat, where the trout can reside and reproduce (spawn). Channels Trib #8 and Trib #9 form cold water fish habitat, where trout can reside. In this system groundwater discharge helps create the temperature conditions within the stream channels that allow trout to reside and seek refuge (for example while the Speed River is too warm for survival). In addition, groundwater discharge helps create conditions in specific areas to allow trout spawning to occur.

Trout spawning beds (redds) have been identified at the Main Creek and Trib #7 (see: *2017 Ecological and Aquatic Monitoring Report, Roszell Pit, Puslinch Township, ARA Licence No. 625189*, Dance Environmental Inc., December 19, 2017). The area of the Main Creek between SW1 and SW2 has been identified as the primary spawning area within this system. Other spawning areas identified include the Main Creek just upstream of SW4 (closer to the Speed River); and, Trib #7 just upstream of SW7 (also near the Speed River).

Smaller tributaries (Trib #1 to #6) direct (generally diffuse) overland flow from spot upwellings toward the Main Creek, and therefore support the cold water habitat conditions within the creek that allow trout to reside. This diffuse overland flow is shallow and open to the air, therefore will be influenced by air temperatures.

The cold water fish habitat within the valley floor is the "receptor" which has thermal sensitivity and for which impacts were assessed. This report recognizes two general receptors, consisting of: 1) surface water temperature conditions within the stream system in which trout reside and can seek refuge; and, 2) surface water and groundwater temperatures within specific reaches of the stream system that support spawning activity. Of the latter, the area between SW1 and SW2 is of primary importance.

The potential impact of the Roszell Pit ponds was examined during the original Licencing process using a computer modelling assessment (*Updated Groundwater Model Assessing Potential Extraction and Mitigation Scenarios, Preston Sand and Gravel Company Limited Proposed Roszell Pit*; Waterloo Numerical Modelling Corp., February 2007). The size, shape and location of the approved pit ponds were based on the results of the computer modelling assessment.

In addition, a 120 metre (m) "thermal set-back" area was defined along the west boundary of the Licence, near the primary discharge areas that support habitat within the main stream system. The thermal set-back area is shown on **Figure 2**. The feasibility of extraction within the thermal set-back area is to be determined through monitoring and assessment as extraction proceeds.

It was recognized that a thermal monitoring program to examine the impact on an ongoing basis, given that all site specific conditions may not be reflected fully in the modelling study. The groundwater monitoring program included two primary components:

1. Groundwater temperature monitoring within the flow system downgradient of the ponds to assess the propagation of any potential thermal impact.
2. Surface water temperature monitoring to assess potential temperature changes at fish habitat locations.

In addition, a separate ecological monitoring program (Dance Environmental Inc.) is tracking spawning activity, which can have a thermal sensitivity.

1.2 MONITORING REQUIREMENTS

Overall monitoring requirements are outlined in the document: *Groundwater Monitoring Program, Preston Sand & Gravel Company Limited, Roszell Pit, Part Lots 1 and 2, Concessions 3 and 4, Township of Puslinch*; Blackport Hydrogeology Inc. (and Groundwater Science Corp.), December 2009. Please refer to that report for specific additional details (e.g. Trigger Mechanisms, Mitigation Measures, Contingency Plans and Response Protocol, etc.).

The monitoring requirements related to thermal (temperature) monitoring at the site are summarized as follows:

- Dataloggers will be installed to collect groundwater level measurements and/or groundwater temperature within the screened interval every hour (on the hour, Eastern Standard Time) and data downloaded quarterly at the following existing on-site monitoring wells as accessible:
    - BH1, BH3-S, BH3-D, BH4-D, BH5, BH7-S, BH7-D, BH8, BH9-S, BH9-D, BH10-S and BH10-D

  And at the following new on-site locations as accessible:
    - BH14, BH15, and,
    - Monitors installed for the thermal assessment (see item #14).
- Manual groundwater temperature profiles will be obtained on a monthly basis by measuring the temperature within the monitors at one metre intervals starting at ground surface and proceeding to the bottom of the well at the following existing locations as accessible:
    - BH1, BH2-D, BH3-D, BH4-D, BH5, BH7-D, BH8, BH9-D, BH10-D, DP1, DP2, DP3, DP7, DP8

  And at the following new locations as accessible:
    - BH14, BH15, and,
    - Monitors installed for the thermal assessment (see item #14).
- Manual surface water level and temperature measurements will be obtained on a monthly basis at the following locations as accessible:
    - DP1, DP2, DP3, DP4, DP5, DP6, DP7 and DP8.
- Dataloggers will be installed to collect surface water temperature measurements every hour (on the hour, Eastern Standard Time) and data downloaded quarterly at the following locations as accessible:
    - SW1, SW2, SW3, SW4, SW5, SW6, SW8, SW10, SW12, DP3, DP7, DP8 and extraction lakes at depths of 1 m and 5 m.
- (Item #14) For the three years after the "test pond" is in place thermal monitoring will be completed in the vicinity of the "test pond" to monitor the extent and magnitude of downgradient temperature changes in the groundwater system. Temperature profiles will be obtained on a monthly basis and/or temperature dataloggers will be installed at the lake, within 20 m downgradient of the lake edge and at approximately 60 m distance downgradient of the lake edge. The results of the monitoring will be summarized in a separate report completed to the satisfaction of the MNR discussing the development and extent of any thermal impact and making appropriate recommendations regarding final setback distances between the lake(s) and the west Licence boundary.

1.3 TEMPERATURE RELATED TRIGGER THRESHOLDS

The following temperature related trigger thresholds were established as part of the Groundwater Monitoring Program (December 2009):

- Groundwater temperature increase within the screened interval at BH1, BH7 or BH8 of 3 degrees Celsius beyond predicted change.
- Groundwater temperature increase within the screened interval at DP2 or DP3 of 1 degree Celsius beyond predicted change.
- Surface water temperature increase at SW5, SW6, SW8 or SW10 of 1 degree Celsius beyond seasonal natural range (defined as the maximum 7-day average temperature observed prior to below water table extraction).

Monitoring results relative to established thresholds, and threshold responses to date, are discussed in **Section 4.4** of this report.

2.0 MONITORING COMPLETED

2.1 POND DEVELOPMENT

The current, and former, pond outlines are shown on **Figure 1**.

The Test Pond was constructed between December 16, 2011 and January 19, 2012 in order to facilitate monitoring thermal impact within the groundwater system. The elevation of the pond bottom was approximately 293 mASL. Water levels in the pond were monitored from March 2012 to September 2015. During that period the Test Pond depth varied from approximately 4.8 m to 5.9 m. In 2016 extraction at Lake 1 extended through the Test Pond area.

The below water extraction to form Lake 1 occurred intermittently from March 2014 to May 2017. Lake 1 extraction is now complete. Lake 1 is approximately 4 hectares (ha) in size. The elevation of the pond bottom is approximately 291.4 mASL. Water levels monitoring at Lake 1 (LG3) began in May 2015. To date the pond depth has varied from approximately 6.3 m to 7.4 m.

The initial below water extraction to form Lake 2 occurred in 2014. From 2015 to 2017 below water table extraction occurred primarily at Lake 1. In May 2017 below water extraction moved to Lake 2, and is ongoing.

2.2 LOCATIONS MONITORED

Temperatures are measured at the site manually (e.g. monthly measurements at pre-determined locations) using a temperature probe, and, using temperature sensor/datalogger combinations (e.g. hourly measurements at fixed locations). Monitoring equipment and methodologies are described in **Section 2.3** and **Section 2.4**.

Groundwater temperature monitoring currently occurs at the site as follows:

- by manual "profile" (only) at BH2-D, DP1, DP2, DP3, DP7 and DP8;
- using water level/temperature dataloggers (only) installed within the well screen at BH3-S, BH7-S, BH9-S, and, BH10-S;
- manual profile and water level/temperature dataloggers installed within the well screen at BH3-D, BH5, BH7-D, BH8, BH9-D, BH10-D, BH14 and BH15;
- datalogger temperature profile (only) at BH4-D; and,
- manual profiles and datalogger temperature profile(s) at BH1, BH16 and BH17.

Surface water temperature monitoring currently occurs at the site as follows:

- by manual spot measurement and temperature dataloggers at SW1, SW2 (DP1), SW3 (DP2), SW4, SW5, SW6 (DP8), SW7, SW8 (DP3), SW9, SW10 (DP7) and SW12; and,
- using temperature datalogger(s) at LG2 (profile), LG3 (profile) and LG4 (single water level/temperature datalogger).

2.3 EQUIPMENT AND METHODOLOGY

All manual measurements are recorded in the field as they are collected. Datalogger data is downloaded and saved onto a field laptop computer. Temperature is measured in degrees Celsius (°C).

The manual water temperature measurements are obtained using electronic thermistor type probes (Heron Instruments temperature option included with the water level tape or Oakton Acorn Series Temp 4 meter) according to manufacturer's instructions. Based on equipment specifications, the manual temperature measurements obtained for this program are generally considered accurate to within 1°C to 2°C.

Automated temperature measurements within monitoring wells are obtained using temperature sensors integrated into the water level dataloggers (which have included Heron Instruments dipperLog, Schlumberger Diver, and, In-Situ RT or LT series units); individual Onset Tidbit dataloggers (sealed integrated datalogger/temperature probe); or, Onset Hobo U12 Outdoor units (enclosed weatherproof datalogger with up to 4 external temperature probes) and TMCx-HD water/soil temperature sensors of various lengths. Automated temperature measurements within surface water locations are also obtained using the Tidbit or Hobo series temperature dataloggers. All of the dataloggers and sensors are installed and operated according to the manufacturer's instructions. The temperature dataloggers are currently programmed to take hourly measurements as specified by the Monitoring Program. Historical measurements have varied from 0.5 hour to 4 hour frequency, depending on location and according to the baseline data requirements at the time of installation. Based on equipment specifications, temperature measurements obtained for this program are generally considered accurate to within 1°C.

Depending on the datalogger used, programing specifications and/or time of year the datalogger is started, measurements are obtained in either Eastern Standard Time (EST) or Daylight Saving Time (DST). For the purposes of this assessment, all measurements are reported, shown or assessed based on normalizing the data to EST to allow comparison between locations.

Manual surface water temperature measurements generally confirm the datalogger data obtained at each location, however given the nature of spot measurements obtained at surface water locations, the manual measurements are not considered as accurate or repeatable. Therefore the detailed surface water measurements obtained using dataloggers is used primarily for this analysis.

2.4 GROUNDWATER TEMPERATURE METHODOLOGY COMPARISON

Temperature measurements are obtained within monitoring wells at various depths within the water column, as "profiles", using two methodologies:

- monthly manual measurements taken by lowering a temperature probe down the well in 1 m increments; and,
- hourly automated (datalogger) measurements obtained using temperature sensors installed at fixed depths, typically as a "bundle" within a well but also including individual Tidbit dataloggers at BH1.

The "bundle" installations include an LT water level/temperature datalogger set within the well screen using a direct read cable and 4 TMCx-HD temperature sensors fixed to the datalogger direct read cable at pre-determined depths. The temperature sensors are connected to a Hobo U12 multi-channel datalogger at the well head.

Both of these methodologies assume that the temperature measured at each depth within the monitoring well casing, which at the site consists of 2.5 to 5 cm diameter schedule 40 PVC, also represents the temperature at those depths within the groundwater system adjacent to the well.

In order to test this assumption, monitors BH16 and BH17 were equipped with 1.6 cm diameter polyethylene tubes of various lengths, each including a 10 cm long screened "tip", fixed to the exterior of the PVC well casing. The tubing and screened tip are in direct contact with the surrounding aquifer. In November 2015 three TMCx-HD temperature sensors were installed within the exterior tubes at depths corresponding to similar temperature sensors within the well casing. The temperature sensors installed within the exterior tubes were also connected to a Hobo U12 multi-channel datalogger installed at the well head.

A comparison of the temperature measurements obtained within the well casing and within the tubing installed on the exterior of the well is included in **Appendix A**. A long-term comparison of manual temperature measurements at 6 m depth to the Tidbit datalogger installed at 5.9 m depth in BH1 (discussed in more detail in **Section 3.2.2**) is also included in **Appendix A**.

In summary, the comparison indicates that the automated temperature measurements obtained within the well casing closely match the automated measurements obtained on the exterior of the casing, and therefore adequately represent groundwater temperatures within the aquifer.

In addition, manual temperature profile measurements as obtained for this monitoring program generally match the measurements obtained using dataloggers installed on both the interior and exterior of the well casing. The manual profile measurements do not appear to be as accurate or consistent as the automated measurements, however can also be used to assist in the impact assessment.

3.0 DATA SUMMARY

Graphs summarizing the temperature monitoring data collected at the Roszell Pit site are included in **Appendix B** (surface water) and **Appendix C** (groundwater). Further discussion is provided in **Section 4** of this report.

3.1 SURFACE WATER TEMPERATURE MEASUREMENTS

3.1.1 Test and Extraction Pond

Water temperatures measured within the Test Pond (LG2) are shown on **Figure B1**. Monitoring began in April 2012 and continued until September 2015, after which the approaching extraction at Lake 1 made access to LG2 unsafe. The Lake 1 extraction pond now incorporates the former Test Pond. Temperatures were measured using Tidbit dataloggers suspended on a weighted cable in a stilling well pipe at 3 elevations within the pond: 293 mASL; 295 mASL; and, 297 mASL. Datalogger failure occurred from late 2014 to early 2015, however seasonal high and low temperatures were established.

Water levels within the pond over most of this period generally ranged between 298 mASL and 298.5 mASL. Therefore temperature measurements were obtained primarily at depths of: 1 to 1.5 m; 3 to 3.5 m; and, 5 to 5.5 m. Maximum and minimum pond levels measured were 298.9 mASL in March 2013 to 297.8 mASL in September 2015.

Data from 2014 and 2015 indicate that the test pond summer temperature was relatively consistent at up to 5.5 m depth. Seasonal low temperatures of 4°C to 6°C occurred from November to April. Seasonal high temperatures of 21°C to 25°C occurred between June and September.

Water temperatures with the Lake 1 extraction pond (LG3) are shown on **Figure B2**. Monitoring began in June 2015 and is ongoing. Temperatures are measured using a RT water level/temperature datalogger and three Tidbit dataloggers suspended on a cable in a stilling well pipe at 4 elevations within the pond: 291.4 mASL, 293 mASL; 295 mASL; and, 297 mASL. In addition, air temperatures are measured at LG3 using a Hobo datalogger and TMCx-HD temperature sensor. Data is currently available up to July 2017 due to problems extracting the datalogger string from the stilling well at the last download in late November 2017 (immediately before pond freeze-up). The pond installation is to be revised in spring 2018 after the ice thaws. However, seasonal high and low temperatures have been established. Note that extraction was ongoing in Lake 1 extraction pond until late 2017, therefore temperatures as measured may be affected somewhat by the associated disturbance of the water column.

Water levels within the pond over this period ranged from a low of 297.7 mASL in October 2015 to 298.8 in April 2016. Therefore temperature measurements were obtained at depths of 0.6 to 1.8 m, 1.6 to 2.8 m; 3.6 to 5.8 m, and, 6.2 to 7.4 m.

Similar seasonal temperatures measured across the entire 6 to 7 m water column within the pond. In 2016 seasonal low temperatures of 2°C to 5°C were observed from December to April. Seasonal high temperatures of 19°C to 23°C were observed from July to September.

3.1.2 Main Creek

Monitoring locations SW1 to SW4 represent the Main Creek reach adjacent to the site as it flows from Roszell Road (upstream) to the Speed River (downstream).

Water temperatures measured at SW1 are shown on **Figure B3**. Temperatures at SW1 have been monitored using Tidbit and Hobo series dataloggers since October 2007. Location SW1 is at the downstream end of a culvert that crosses Roszell Road, and is directly downstream of an on-line pond with a controlled outlet. The temperature probe is set at the bottom of the stream channel directly below the culvert outflow. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions within the creek.

The SW1 data set includes over 5 years of baseline data prior to extraction (prior to summer of 2013). As shown, current temperatures are consistent with the historical baseline data. Typical seasonal low stream temperatures of 0.5°C to 1.5°C occur from December to March/April. Seasonal high temperatures of 20°C to 24°C typically occur between June and September.

Water temperatures measured at SW2 on **Figure B4**. Temperatures at SW2 have been monitored using Tidbit dataloggers since May 2008. The temperature probe is set at the bottom of the creek channel. Originally the datalogger was attached to DP1, but is now housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions within the creek.

The SW2 data set includes over 4 years of baseline data prior to extraction. As shown, current temperatures are consistent with the historical baseline data. Typical seasonal low stream temperatures of 1°C to 2°C occur from late December to March/April. Seasonal high temperatures of 17°C to 19°C, with occasional short-term “spikes” to 20+°C, typically occur between June and September.

Water temperatures measured at SW3 are shown on **Figure B5**. Temperatures at SW3 have been monitored using Tidbit dataloggers since April 2005. The temperature probe is set at the bottom of the creek channel. Originally the datalogger was attached to DP2, but is now housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions within the creek.

The SW3 data set includes over 8 years of baseline data prior to extraction. As shown, current temperatures are consistent with the historical baseline data. Typical seasonal low stream temperatures of 1°C to 2°C occur from late December to March/April. Seasonal high temperatures of 16°C to 18°C, with occasional short-term “spikes” to 20+°C, typically occur between June and September.

Water temperatures measured at SW4 are shown on **Figure B6**. Temperatures at SW4 have been monitored using Tidbit dataloggers since October 2007. The temperature probe is set at the bottom of the creek channel. Originally the datalogger was attached to a stake set into the streambed, but is now housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions within the creek.

The SW4 data set includes over 5 years of baseline data prior to extraction. As shown, current temperatures are consistent with the historical baseline data. Typical seasonal low stream temperatures of 1°C to 2°C occur from December to March/April. Seasonal high temperatures of 16°C to 18°C, with occasional short-term "spikes" to 20+°C, typically occur between June and September.

3.1.3 Upwelling Areas

Monitoring locations SW12, SW5, SW6, SW8 and SW10 represent spot upwelling areas (proceeding from north to south respectively), along the Speed River valley wall at the west edge of the pit. Monitoring location SW7 is downstream of SW6, near the confluence of Trib #7 with the Speed River. Monitoring location SW9 is downstream of SW8, near the confluence of Trib #8 with the Speed River.

Water temperatures measured at SW12 are shown on **Figure B7**. Temperatures at SW12 have been monitored using Tidbit dataloggers since October 2007. The temperature probe is set at surface within a large upwelling area, water depths are less than 1.5 cm. The upwelling area has a stony surface, and cattle regularly access the area. Erosion due to the cattle access is evident at this location. The datalogger is housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions at this location.

The SW12 data set includes over 5 years of baseline data prior to extraction. Historically temperatures at SW12 varied from approximately 7.5°C in April to 11°C in September/October. Since 2015 the temperature range at SW12 has changed, these changes may be ongoing. The most recent data indicates the temperature range has increased to between approximately 7.5°C in May 2017 to 15°C in November 2017.

Water temperatures measured at SW5 are shown on **Figure B8**. Temperatures at SW5 have been monitored using Tidbit dataloggers since October 2007. The temperature probe is set at surface within a small upwelling area, water depths are less than 1.5 cm. The upwelling area has a mucky surface over stony material, and cattle access the area. Erosion due to the cattle access is evident at this location. The datalogger is housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions at this location.

The SW5 data set includes over 5 years of baseline data prior to extraction. Historically temperatures at SW5 varied from approximately 6.7°C - 7.2°C in April/May to 11.5°C - 12°C in September. Since 2016 the temperature range at SW5 has changed, these changes may be ongoing. The most recent data indicates the temperature range has decreased to between approximately 9°C in May 2017 to 11.5°C in October 2017.

Water temperatures measured at SW6 are shown on **Figure B9**. Temperatures at SW6 have been monitored using Tidbit dataloggers since April 2005. The temperature probe is set at surface within a small natural upwelling area, water depths are less than 8 cm. Originally the datalogger was attached to DP8, but is now housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions at this location.

The SW6 data set includes over 7 years of baseline data prior to extraction. Historically temperatures at SW6 varied from approximately 8°C in April/May to 9.5°C in September/October. In 2013 and 2014 the temperature range increased, however has since moderated. Temperatures appear to have stabilized since about late 2015. The most recent data indicates the temperature range consisting of a seasonal low of approximately 9°C in June/July and a seasonal high of approximately 12°C in December.

Water temperatures measured at SW7 are shown on **Figure B10**. Temperatures at SW7 have been monitored using Tidbit dataloggers since May 2015. Although not included in the mentoring program requirements, SW7 is monitored as a voluntary threshold type response to help assess the temperature conditions within Trib#7 as related to fish habitat and in response to concerns regarding the temperature changes that were noted at SW6. The temperature probe is set at the bottom of the creek channel and is housed within a perforated stilling well, constructed of 2.5 cm diameter ABS pipe.

The SW7 data set includes over 2 years of data. Over the monitoring period seasonal low stream temperatures of 4°C to 5°C occur from late December to April. Seasonal high temperatures of 12°C to 14°C, with occasional short-term “spikes” to 19°C, occur between June and October.

Water temperatures measured at SW8 are shown on **Figure B11**. Temperatures at SW8 have been monitored using Tidbit dataloggers since April 2005. The temperature probe is set at surface within a small natural upwelling area, water depths are less than 10 cm. Originally the datalogger was attached to DP3, but is now housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions at this location.

The SW8 data set includes over 7 years of baseline data prior to extraction. Historically temperatures at SW8 varied from approximately 8.5°C in June/July to 9.3°C in the period December to February. In 2014/2015 a temperature change became apparent and the temperature range increased. This change may be ongoing. The most recent data indicates the temperature range consisting of a seasonal low of about 8.2°C in July to a seasonal high of about 12°C in December/January.

Water temperatures measured at SW9 are shown on **Figure B12**. Temperatures at SW9 have been monitored using Tidbit dataloggers since May 2015. Although not included in the mentoring program requirements, SW9 is monitored as a voluntary threshold type response to help assess the temperature conditions within Trib#8 as related to fish habitat and in response to concerns regarding the temperature changes that were noted at SW8. The temperature probe is set at the bottom of the creek channel and is housed within a perforated stilling well, constructed of 2.5 cm diameter ABS pipe.

The SW9 data set includes over 2 years of data. Over the monitoring period seasonal low stream temperatures of 4°C to 5°C occur from late December to April. Seasonal high temperatures of 11°C to 13°C, with occasional short-term "spikes" to 17.5°C, occur between June and October.

Water temperatures measured at SW10 are shown on **Figure B13**. Temperatures at SW10 have been monitored using Tidbit dataloggers since April 2005. The temperature probe is set at surface within a small natural upwelling area, water depths are less than 2 cm. The upwelling area has a mucky surface over stony material. Originally the datalogger was attached to DP7, but is now housed within a small perforated stilling well, constructed of 2.5 cm diameter ABS pipe. Occasional datalogger failure has occurred, however the overall data set is considered representative of both pre and post extraction conditions at this location.

The SW10 data set includes over 7 years of baseline data prior to extraction. As shown, current temperatures are consistent with the historical baseline data. Typical seasonal low stream temperatures of 1°C to 6°C occur from December to March. Seasonal high temperatures of 11°C to 15°C typically occur between July to October.

3.2 DETAILED GROUNDWATER TEMPERATURE MEASUREMENTS

3.2.1 Background Conditions

Background or "ambient" groundwater temperatures are collected using water level dataloggers installed within the well screen at locations along the east and south edge of the Licenced boundary, away from any potential temperature influence of the below water table extraction to date. The background monitors include BH5, BH8, BH9-S/D, BH10-S/D, BH14 and BH15. Monitoring results at these locations are shown on **Figure C1** to **Figure C8** respectively (**Appendix C**). Occasional datalogger failure has occurred, however the overall data sets are considered representative of both pre and post extraction conditions at these locations. The observed seasonal range in background groundwater temperatures at various depths over the monitoring period to date are summarized in **Table 1**.

Monitor	Depth (mBGS)	Elev. (mASL)	Seasonal Low (°C)			Seasonal High (°C)		
			Min.	Max.	Range	Min.	Max.	Range
BH5	6.1	296.4	4.1	7.3	3.2	13.8	14.7	0.9
BH8	5.0	295.3	6.3	7.1	0.8	12.0	11.3	0.7
BH9-S	5.6	294.9	6.4	7.1	0.7	10.9	11.6	0.7
BH9-D	14.0	286.5	8.8	9.2	0.4	9.0	9.2	0.2
BH10-S	3.9	297.7	4.6	6.2	1.6	11.6	12.8	1.2
BH10-D	8.3	293.3	8.0	8.5	0.5	9.6	9.8	0.2
BH14	3.9	296.6	5.6	6.6	1.0	11.4	12.5	1.1
BH15	4.0	297.6	4.5	6.1	1.6	11.8	13.0	1.2

Table 1: Background Seasonal Groundwater Temperature Variation

We note that location BH5 will be influenced by focused recharge due to the location at the base of the hill and ditches along Concession Road 4 directing runoff water to this area. The seasonal low and high temperature at BH5 may be affected by this process.

Overall, in the area of the Roszell Pit the natural seasonal low groundwater temperatures at shallow depths (4 to 6 mBGS) generally range from 4.5°C to 7°C, and the seasonal high temperatures generally range from 11°C to 14.5°C. Background seasonal low and high "shallow" groundwater temperatures have varied from year to year by approximately 0.5°C to 1.5°C.

Similarly, the natural seasonal low groundwater temperatures at depth (8 to 14 mBGS) generally range from 8°C to 9°C, and the seasonal high temperatures generally range from 9°C to 10°C. Background seasonal low and high groundwater temperatures "at depth" have varied from year to year by approximately 0.5°C or less.

3.2.2 Detailed Profiles Downgradient of Pond

Detailed vertical profile groundwater temperature monitoring, using dataloggers, occurs along a transect between the Lake 1 extraction pond and downgradient groundwater discharge locations. The transect, in order of distance from the extraction pond, includes: BH16; BH17; and, BH1. Cross-Section A-A, illustrating conditions in this area is included in **Appendix D**. Coss-Section locations are shown on **Figure 2**.

Similar detailed monitoring occurs at location BH4, which was intended to provide background control data. Borehole logs for select monitors are included in **Appendix D**. Occasional datalogger failure has occurred at some monitoring locations and depths, however the overall data sets are considered representative of the groundwater conditions at these locations over time.

Temperature measurements obtained at within the well casing at BH16 are shown on **Figure C9**. Location BH16 was installed prior to the Test Pond, at an intended separation distance of 20 m. However the Test Pond as constructed extended to within 15 m of BH16. The Lake 1 extraction, which now includes the Test Pond area, has extended to within approximately 5 m of the well at the pond surface (as measured in December 2017). The pond bottom slopes away from the well, therefore at the base of the current pond is approximately 12.8 m (or more) from the well.

Detailed groundwater temperature monitoring began at BH16 in October 2011 and is ongoing. Temperatures are measured inside the well casing using an LT water level/temperature datalogger installed in the screen at an elevation of 293 mASL; and, 4 TMCx-HD sensors installed at elevations of 295 mASL, 297 mASL; 299 mASL; and, 301 mASL.

The original ground surface at BH16 was approximately 302 mASL. However, above water extraction activities have lowered the surrounding ground surface to elevations of approximately 299 mASL. Water levels within BH16 over the monitoring period generally ranged between 297.7 mASL and 298.8 mASL. Therefore temperature measurements obtained at 299 and 301 mASL do not represent groundwater temperatures and are not used as part of this analysis. Groundwater temperature measurements obtained at the remaining elevations in BH16 are shown on **Figure C10**. These measurements are obtained at depths below the water table of: 0.7 to 1.1 m; 2.7 to 3.1 m; and, 4.7 to 5.1 m.

The groundwater temperature changes observed at BH16 include an increased overall seasonal temperature fluctuation and convergence of temperatures measured at various depths within the water column. From 2012 to 2017 seasonal low temperatures have decreased by about 3 to 5°C, and seasonal high temperatures have increased by about 5°C to 7°C. In 2012 the seasonal low at all measured points occurred simultaneously in March. The seasonal high occurred earlier at depth and later near the water table, from August (293 mASL) to September (297 mASL). In 2017 the seasonal low occurred simultaneously at all depths and over a longer period, from January to March. The seasonal high occurred relatively simultaneously for all depths in August.

In 2017, at the elevation of 293 mASL in BH16, the seasonal low temperature was approximately 4.3°C to 5°C, over the period January to March. The seasonal high temperature was approximately 20°C in early September.

Temperature measurements obtained within the well casing at BH17 are shown on **Figure C11**. Location BH17 was installed prior to the Test Pond, at an intended separation distance of 60 m. However the Test Pond as constructed extended to within 55 m of BH17. The Lake 1 extraction, which now includes the Test Pond area, has extended to within approximately 45 m of the well

Detailed groundwater temperature monitoring began at BH17 in October 2011 and is ongoing. Temperatures are measured inside the well casing using an LT water level/temperature datalogger installed in the screen at an elevation of 293.1 mASL; and, 4 TMCx-HD sensors installed at elevations of 295 mASL, 297 mASL; 299 mASL; and, 301 mASL.

The original ground surface at BH17 was approximately 301.5 mASL. However, above water extraction activities have lowered the surrounding ground surface to elevations of approximately 300 mASL. Water levels within BH17 over the monitoring period generally ranged between 297.6 mASL and 298.7 mASL. Therefore temperature measurements obtained at 299 and 301 mASL do not represent groundwater temperatures and are not used as part of this analysis. Groundwater temperature measurements obtained at the remaining elevations in BH17 are shown on **Figure C12**. These measurements are obtained at depths below the water table of: 0.6 to 1.7 m; 2.6 to 3.7 m; and, 4.5 to 5.6 m.

The groundwater temperature changes observed at BH17 include an increased overall seasonal temperature fluctuation and convergence of temperatures measured at various depths within the water column. From 2012 to 2017 seasonal low temperatures have decreased by about 2.4°C, and seasonal high temperatures have increased by about 5.5°C to 6°C. In 2012 the seasonal low occurred earlier near the water table and later at depth, from April (297 mASL) to May (293.1 mASL). The seasonal high occurred earlier at near the water table and later at depth, from August (297 mASL) to September (293.1 mASL). In 2017 the seasonal low occurred over a similar time period beginning in April and extending into June. The seasonal high occurred for all depths in November.

In 2017, at the elevation of 293.1 mASL in BH17, the seasonal low temperature was approximately 5.8°C in mid-May. The seasonal high temperature at that elevation was approximately 16.2°C in late November.

Location BH1 is approximately 115 m downgradient of Lake 1 and represents the final groundwater monitoring location prior to the discharge that occurs along the river valley.

Initial baseline groundwater temperature monitoring began at BH1 in April 2005 using Tidbits installed on a weighted cable in the well casing at elevations of 293.8 mASL and 296.6 mASL. For consistency this monitoring array has been maintained throughout the program and is ongoing. The long-term temperature record is shown on **Figure C13**.

Additional profile groundwater temperature monitoring at BH1, consistent with that undertaken at BH16 and BH17, began at BH1 in October 2011 and is ongoing. The profile temperature record is shown on **Figure C14**. Temperatures are measured inside the well casing using an LT water level/temperature datalogger installed in the screen at an elevation of 292.1 mASL; and, 4 TMCx-HD sensors installed at elevations of 293 mASL, 295 mASL; 297 mASL; and, 299 mASL.

The ground surface at BH1 is approximately 299.7 mASL and has remained unchanged over the monitoring program. Water levels within BH1 over the monitoring period generally ranged between 297.1 mASL and 297.9 mASL. Therefore temperature measurements obtained at 299 mASL do not represent groundwater temperatures and are not used as part of this analysis. Groundwater temperature measurements obtained at the remaining elevations in BH1 are shown on **Figure C15**. These measurements are obtained at depths below the water table of: 0.1 to 0.9 m; 0.5 to 1.3 m; 2.1 to 2.9 m; 3.3 to 4.1 m; 4.1 to 4.9 m; and 5 to 5.9 m.

The groundwater temperature changes observed at BH1 are most clearly illustrated by the long-term historical record (**Figure C13**). The estimated annual seasonal high and low temperatures since 2005, measured at an elevation of 293.8 (5.9 m below ground surface), are summarized in **Table 2**.

Year	Seasonal High		Seasonal Low	
	Temp (°C)	Month(s)	Temp (°C)	Month(s)
2005	11.4	October	-	-
2006	11.4	Sept/Oct	6.9	April
2007	11.4	Sept/Oct	6.6	April
2008	11.6	Sept/Oct	-	-
2009	11.3	September	6.9	April
2010	11.4	Sept/Oct	7.1	April
2011	11.4	Sept/Oct	6.8	March
2012	11.6	Sept/Oct	7.6	March
2013	-	-	7.1	April
2014	11.7	October	-	-
2015	11.2	Sept/Oct	7.1	May
2016	12.3	Oct/Nov	8.2	May
2017	11.7	November	8.7	May

Table 2: BH1 Estimated Seasonal Groundwater Temperatures – 5.9 m Depth

As indicated by **Figure C13** and **Table 2**, no significant changes occurred prior to 2016. The seasonal high temperatures at BH1 remain within the historical range, with the exception of a brief peak in 2016, however may be occurring slightly later each year. Beginning in 2016 the seasonal low temperatures have increased on the order of 1°C to 1.9°C, and are also occurring slightly later each year.

Temperature measurements obtained at within the well casing at BH4-D are shown on **Figure C16**. Location BH4 was located distant from, and cross-gradient of, the original Test Pond. However Lake 1 extraction has extended to approximately 50 m of the well.

Detailed groundwater temperature monitoring began at BH4-D in September 2011 and is ongoing. Temperatures are measured inside the well casing using an LT water level/temperature datalogger installed in the screen at an elevation of 292.9 mASL; and, 4 TMCx-HD sensors installed at elevations of 295 mASL, 297 mASL; 299 mASL; and, 301 mASL.

The ground surface at BH4 is approximately 303.6 mASL and has remained unchanged over the monitoring program. Water levels within BH4 over the temperature monitoring period generally ranged between 297.6 mASL and 298.5 mASL. Therefore temperature measurements obtained at 299 and 301 mASL do not represent groundwater temperatures. Groundwater temperature measurements obtained at the remaining elevations in BH4 are shown on **Figure C17**. These measurements are obtained at depths below the water table of: 0.6 to 1.5 m; 2.6 to 3.5 m; and, 4.7 to 5.6 m.

Groundwater temperature changes have been observed at BH4 beginning in 2015, at a time when Lake 1 extraction approached the well. Therefore current BH4 measurements do not represent background "control" as originally intended.

The groundwater temperature changes observed to date at BH4 include a slight increase in overall seasonal temperature fluctuation, convergence of temperatures measured at various depths within the water column, and, a change in the timing of seasonal highs and lows. Changes reached a maximum in 2016 (during active extraction), however appear to have moderated in 2017.

Based on "background" data collected in 2012 the seasonal low temperatures were similar at all 3 measurement depths (between 7.8°C and 8.2°C), however, as would be expected, the lowest temperatures occurred earlier in the year (May) at the upper sensor and later in the year (July) at the lower sensors. The seasonal high temperatures varied based on sensor depth, between about 12°C at the upper sensor in November and about 10.5°C in December at the lower sensor.

In 2017 the seasonal low temperatures were similar at all 3 measurement depths (7.5 to 8.3) and are relatively unchanged as compared to 2012 data. However, in 2017 the seasonal low occurred first at the lower sensor (April) and last at the upper sensor (May). Seasonal high temperatures at all 3 measurement depths were between about 12.3 and 12.5°C, which represents a change of approximately 2°C at the lower sensor as compared to 2012 data. In 2017 The seasonal high occurred first at the lower sensor (September) and last at the upper sensor (November).

3.2.3 Conditions North of Extraction Area

Monitors BH2 and BH3 are located near the norther limits of the Licence boundary, between the extraction area and the primary spawning reach within the Main Creek. Monitor DP1 is located in the creek within the primary spawning area (at SW2). Cross-Section B-B', illustrating conditions in this area is included in **Appendix D**.

Based on elevation data available at each location, the creek at DP1 is approximately 8 m lower than the ground surface at BH2, and approximately 6 m lower than the ground surface at BH3.

At location BH2-D manual vertical groundwater temperature profiles are available since October 2007. Although the data set provided by the manual profiles is not as accurate or "representative" as the datalogger data, the profiles provide a reasonable indication of potential changes over time. At BH2-D monthly measurements are obtained at 1 m intervals within the well to a depth of 18.8 mBGS. Water levels at BH2-D have ranged up to 3.3 mBGS. Therefore measurement obtained at BH2-D from 1 to 3 mBGS do not represent groundwater conditions. The monthly temperature measurements at depths of 4, 6 and 8 mBGS (flow system above the creek) are shown on **Figure C18.** The measurements obtained at depths of 10, 14 and 18 mBGS are shown on **Figure C19**.

At BH2-D little overall change in temperature is observed at 4 m depth. At 6 and 8 m depths temperature changes consist of a 1 to 2°C increase in seasonal low values, and, a 0 to 1°C increase in seasonal high values. At 10 to 16 m depth a "spike" in temperatures of approximately 0.5°C to 2°C appeared to occur in late 2016 and early 2017, however it is unknown if this is related to measurement error. Since that time temperatures appear to have moderated. Overall trends at 10 to 16 m depth appear to be minimal, with a potential change in seasonal low or high of less than 1°C.

At location BH3-S and BH3-D groundwater temperature measurements within the well screens are obtained using water level dataloggers. Temperature measurements collected using dataloggeres at BH3-S and BH3-D are shown on **Figure C20** and **Figure C21**, respectively. Occasional datalogger failure has occurred, however the overall data sets are considered representative of the groundwater conditions at these locations over time.

Temperature change within the well screen at BH3-S (7.1 mBGS, or 290.6 mASL) consists of an overall dampening o seasonal variation and slight increase in temperature. We note that the temperatures measured in 2017 at BH3-S are approximately 0.1°C higher than the observed pre-extraction seasonal high temperature. The temperatures recorded within the well screen at BH3-D (17.1 mBGS or 280.6 mASL) indicate a slight increase in temperature over time, in the range of approximately 0.5°C.

Manual profile measurements are also obtained at BH3-D. Monthly measurements are obtained at 1 m intervals within the well to a depth of 18 mBGS. Water levels at BH3-D have ranged up to 2.7 mBGS. Therefore measurement obtained at BH2-D at 1 and 2 mBGS do not represent groundwater conditions. The monthly temperature measurements at depths of 4, 6 and 8 mBGS (upper flow system relative to the creek) are shown on **Figure C22.** The measurements obtained at depths of 10, 14 and 18 mBGS are shown on **Figure C23**.

At BH3-D the overall change in temperature observed to date at 4 m depth consists of an increase in seasonal low, of approximately 1°C. At 6 and 8 m depths temperature changes are similar to that observed in the well screen at BH3-S. We note that the observed change in seasonal high temperature is less than 0.5°C. At 10 to 16 m depth a reduction in seasonal temperature range is noted, however overall temperature change is observed to be less than 1°C.

Manual temperature monitoring results within the screened interval at DP1, as compared to surface water temperatures measured at SW2, are shown on **Figure C24**. As shown, the measurements at DP1 correlate closely with SW2. No overall trend with time is apparent. We note that manual temperature monitoring at DP2 has not provided additional useful data as compared to the stream temperature datalogger measurements obtained at this location.

3.2.4 Trigger Threshold Locations

Temperature Triggers (thresholds) were established for groundwater temperatures within the screen at monitoring wells BH1, BH7 and BH8; and, at piezometers DP2 and DP3.

Temperature monitoring results within the well screen at BH1, BH7-D and BH8 are included as **Figure C25**, **Figure C26** and **Figure C2**. Note that at location BH7-S there is typically less than 0.5 m of water within the screen, therefore the threshold is applied to BH7-D.

The well screen at BH1 is installed from approximately 292.1 to 295.1 mASL. Therefore the temperature monitors at 292.1, 293, 293.8 and 295 mASL are all installed within the well screen. The monitor at 293.8 mASL has the longest data set and the most baseline data. As discussed in **Section 3.2.1**, temperature changes to date at this elevation consist of an increase in seasonal low temperatures, on the order of 1°C to 2°C.

The well screen at BH7-D is installed from approximately 290.1 to 291.6 mASL. The water level/temperature datalogger at BH7-D is installed at an elevation of 290.8 mASL. As shown in **Figure C26**, the historical temperature range was from approximately 8°C to 10.4°C (seasonal low to seasonal high). The current temperature range is from approximately 6.8°C to 14.5°C (seasonal low to seasonal high), which represents a change in seasonal low of about 1.2°C and in seasonal high of about 4.5°C. Therefore the change in measured temperature is greater than predicted, however remains within the trigger threshold.

The well screen at BH8 is installed from approximately 294.9 to 297.9 mASL. The water level/temperature datalogger at BH8 is installed at an elevation of 295.3 mASL. As shown in **Figure C2**, the seasonal range in temperature observed at BH8 is from approximately 6.4°C to 11.9°C. No significant trend, or change, in seasonal high and low temperature has been observed at BH8 over time.

Manual temperature monitoring results within the screened interval at DP2, as compared to surface water temperatures measured at SW3, are shown on **Figure C27**. As shown, the measurements at DP2 correlate closely with SW3. No overall trend with time is apparent. As illustrated, manual temperature monitoring at DP2 has not provided additional useful data at this location.

Manual temperature monitoring results within the screened interval at DP3 as compared to surface water temperature measurements at SW8, are shown on **Figure C28**. As shown, the measurements at DP3 correlate closely with SW8, and similar trends are noted. Given the setting, this would be expected. Manual temperature monitoring at DP3 has not provided additional useful data at this location.

Although the remaining groundwater temperature monitoring data collected actively (e.g. as manual profiles) or passively (as incidental measurements obtained at water level dataloggers) may provide background "control" data at various depths below ground and/or below the water table, the data sets referenced above are sufficient for the current analysis. Therefore additional data is not presented or assessed at this time.

4.0 DISCUSSION

4.1 EXTRACTION POND DEVELOPMENT

The Test Pond as constructed may not have provided a representative example (or test) of the water temperatures within a full extraction pond or the propagation of temperature impacts within the downgradient groundwater flow system. The current Lake 1 pond is considered more appropriate for monitoring thermal influences within the groundwater system. However, active extraction at Lake 1 to date may have resulted in "mixing" of the water column within the pond and reduced thermal stratification.

Below water table extraction is to continue at Lake 2 (only), proceeding generally southward. As this extraction pond expands additional temperature monitoring data will become available. Specifically, conditions at Lake 1, and the downgradient groundwater flow system, will be allowed to "equilibrate" over time.

The entrance road to the pit is along the east edge of the 120 m thermal set-back area. Extraction within this area, if allowed, would only occur as part of the final operational stage. Therefore additional time is available for ongoing monitoring and assessment.

4.2 SURFACE WATER TEMPERATURES

4.2.1 Main Creek

In this setting temperatures in the Main Creek are moderated relative to air temperature in both summer and winter conditions. During the warmest part of the summer stream temperatures are lower than air temperature due to shading effects and groundwater inputs. In winter conditions the creek temperature is higher than the air temperature, and kept above freezing, due to groundwater inputs.

Comparing surface water temperature plots from SW1 to SW4, shown on **Figure B3** to **Figure B6**, the moderating effects are evident.

Comparing stream temperatures from SW1 to SW4 shows a consistent seasonal pattern that reflects groundwater inputs helping to moderate temperature conditions within this stream reach, as expected. The monitoring results indicate the creek at SW4 is 1°C to 2°C warmer in the winter, and 3°C to 6°C cooler in summer, than SW1.

Similar effects are noted from SW1 to SW2 and SW2 to SW3, which indicate significant groundwater inputs occur in this area. The results from SW1 to SW2 are consistent with the use of this reach as the primary spawning area. We note that creek temperatures at SW1 are influenced by the pond immediately upstream of this location.

A comparison of temperature graphs for SW3 and SW4 indicates limited groundwater input occurs within this reach, however creek temperatures are maintained (potentially due to shading in combination with diffuse groundwater inputs from the bedrock flow system). An overall slight cooling effect may occur.

The measurements obtained within the Main Creek indicate no significant temperature changes have occurred within the creek due to the extraction, or due to changes that have been observed at SW12 and SW5.

In addition, measurements obtained at SW1, SW2 and DP1 indicate that there is no overall change in groundwater or surface water temperatures at the creek within the primary spawning area. This is consistent with the original interpretation that the majority of the groundwater moving to this stream reach originates from outside of the Roszell Road Pit extraction area.

4.2.2 Upwelling Areas

Temperature changes over time have been observed at upwelling areas SW12, SW5, SW6 and SW8 (in order from north to south).

Temperature changes at SW12 to date consist of a shift in timing of the seasonal low and high, and an increase in seasonal high temperature. Both seasonal low and high temperatures appear to occur approximately 1 month later in the year. The seasonal low temperature has not changed significantly, however the most recent seasonal high value represents an increase of approximately 4°C (from 11°C to 15°C). However the overall temperature range and seasonality is still well within (prime residence/refuge) habitat conditions for trout (Dance). As noted in **Section 4.2.1**, no change in Main Creek temperature has occurred within this reach, therefore changes at SW12 have not impacted habitat conditions with the creek. The upwelling area at SW12 is affected by regular disturbance due to cattle access. Surface water movement from SW12 to the creek is diffuse overland flow over a relatively wide area, also affected by cattle access. Therefore water flowing from SW12 to the creek has always been exposed to air temperature effects. The temperature changes noted at upwelling area SW12 may be minor relative to other natural factors, and as a result no effect is observed at the creek. Therefore the relatively minor temperature changes recorded at SW12 to date have not had a significant influence on overall habitat conditions in this area.

Temperature changes at SW5 to date consist of a shift in timing of the seasonal high, and an increase in seasonal low temperature. The seasonal high temperature appears to occur approximately 1 month later in the year. The seasonal high temperature has not changed significantly, however the most recent seasonal low value represents an increase of approximately 2°C (from ±7°C to 9°C). However the overall temperature range and seasonality is still well within (prime residence/refuge) habitat conditions for trout (Dance). As noted in **Section 4.2.1**, no change in Main Creek temperatures has occurred within this reach, therefore changes at SW5 have also not impacted habitat conditions with the creek. The upwelling area at SW5 is affected by occasional disturbance due to cattle access. Surface water movement from SW5 to the creek is diffuse overland flow over an area also affected by cattle access. Therefore this water has always been exposed to air temperature effects. The temperature changes noted upwelling area SW5 may be minor relative to other natural factors, and as a result no effect is observed at the creek. Therefore the relatively minor temperature changes recorded at SW5 to date have not had a significant influence on overall habitat conditions in this area.

Temperature changes at SW6 to date consist of a shift in timing of the seasonal low and high, and an increase in seasonal temperature range. Based on the most recent data, the seasonal low temperature appears to occur approximately 1 month later in the year and the seasonal high temperature appears to occur approximately 2 months later in the year. The current seasonal low temperature represents an increase of approximately 1°C (from

8°C to 9°C) and the seasonal high temperature represents an increase of approximately 2.5°C (from 9.5°C to 12°C). However the overall temperature range and seasonality is still well within (prime residence/refuge) habitat conditions for trout (Dance). No spawning occurs at SW6, likely due to water depth and streambed conditions (consisting of organic soil). Monitoring at location SW7 (downstream of SW6 in Trib #7) also confirms that surface water temperatures within this system are well within (prime spawning and residence/refuge) habitat conditions for trout (Dance). Redd surveys indicate that trout spawning that occurs close to SW7 is unaffected by temperature changes at SW6. Therefore the relatively minor temperature changes recorded at SW6 to date have not had a significant influence on overall habitat conditions in this area.

Temperature changes at SW8 to date consist of an increase in the seasonal high recorded at this location. Based on the most recent data, the seasonal low temperature appears to be similar in value and timing to that measured historically. The current seasonal high temperature represents an increase of approximately 3°C (from ±9°C to 12°C). No significant change in timing of the seasonal high appears to have occurred. The temperature range and seasonality at SW8 is still well within (prime residence/refuge) habitat conditions for trout (Dance). No spawning occurs at SW8, likely due to water depth and streambed conditions (consisting of organic soil). Monitoring at location SW9 (downstream of SW8 in Trib #8) also confirms that surface water temperatures within this system are well within (prime residence/refuge) habitat conditions for trout (Dance). Redd surveys indicate that Trib #8 is not used for trout spawning. Therefore the relatively minor temperature changes recorded at SW8 to date have not had a significant influence on overall habitat conditions in this area.

4.3 GROUNDWATER TEMPERATURES

Background seasonal high and low groundwater temperatures at this site are observed to vary from year to year according to depth, with shallow groundwater (>6 m depth) having a natural range in fluctuation of approximately 0.5°C to 1.5°C, and deeper groundwater (>8 m) having a natural range in fluctuation of 0.5°C or less.

The groundwater temperature monitoring program has illustrated in detail the thermal changes that have occurred downgradient of the Lake 1 extraction pond. We note that the flow system, and related temperature changes, appears to have varied during the Lake 1 extraction period. Now that extraction in Lake 1 is complete, the overall system will have an opportunity to reach a new "equilibrium". Ongoing monitoring is expected to better reflect post-extraction conditions.

Temperature monitoring to date at Lake 1 indicate that air temperature effects extend to depth, with a seasonal range of temperatures from approximately 2°C to 23°C. Compared to air temperature measurements obtained on-site, the pond temperatures are generally 1°C to 7°C cooler in the summer and up to 15°C warmer in the winter. This likely represents the moderating effect of groundwater through-flow and ice cover in the winter. The downgradient groundwater monitors BH16, BH17 and BH1 are 5 m, 45 m and 115 m from the Lake respectively.

Location BH16 now represents the flow system immediately downgradient of the lake. Similar to the extraction pond, at BH16 groundwater temperatures over the entire water column below water table have converged, generally to a seasonal range between ±4°C and 20°C. Therefore, within 5 m of the pond, groundwater temperatures have moderated by 2°C to 3°C.

Location BH17 now represents the flow system 45 m downgradient of the lake. Again, monitoring results indicate a convergence of groundwater temperatures with depth have occurred, generally to a seasonal range of 5°C to 17°C. Therefore within 45 m of the pond, water temperatures have moderated by 3°C to 6°C. We note that the range in groundwater temperatures measured at BH17 is still well within (prime) habitat conditions for trout in surface water systems (Dance), and would still represent a temperature moderating effect when compared to pre-extraction monitoring result at SW3.

Location BH1 now represents the flow system 115 m downgradient of the lake. Monitoring results indicate groundwater temperature variation with depth has been maintained (i.e. convergence effects are not as apparent) over time. Overall temperature changes within the groundwater system, based on a comparison to historical data, range from 1°C to 2°C. We note that the range in groundwater temperatures measured at BH1 is still well within (prime) habitat conditions for trout in surface water systems (Dance), and would represent a significant temperature moderating effect when compared to pre-extraction monitoring result at SW3.

The detailed groundwater monitoring program results indicates that overall groundwater temperature changes downgradient of the pond are slightly greater than predicted by the modelling study, however remain generally within 1°C to 2°C at the Licence boundary. The changes noted at the Licence boundary are slightly above the natural year to year variation in groundwater temperatures at this site.

Temperature changes noted at surface water upwelling areas, of up to to 4°C (depending on location), may represent areas where preferential groundwater flow (i.e. having greater flow velocity) occur.

The combined groundwater and surface water temperature monitoring program indicates that no significant thermal influence has occurred to date at the Main Creek, or to trout habitat in the creek and associated tributary systems, in response to the below water extraction that has occurred to date.

Thermal conditions at Lake 1, and within the downgradient groundwater flow system, may still be equilibrating to existing conditions. Now that currently permitted extraction at Lake 1 is complete, ongoing monitoring should confirm the extent of thermal influence under stabilized conditions. We recommend that the ongoing monitoring be assessed again at a future date in order to determine what, if any, extraction could occur within the 120 m thermal set-back area.

Given the program experience to date, and this analysis, we also recommend that groundwater temperature monitoring be revised to the following:

- Detailed groundwater temperature profiles using dataloggers at established elevations within BH16, BH17 and BH1.
- Recording of groundwater temperatures using dataloggers at established elevations within the screened interval at BH2-S, BH2-D, BH3-S, BH3-D, BH7-D and BH8.

The detailed monitoring would continue to be collected in order to assess the feasibility of extraction within the 120 m thermal set-back, and as a reference for any potential future surface water temperature concerns or threshold exceedances that may arise. No other specific groundwater temperature monitoring is recommended at this time (e.g. manual groundwater temperature profiles would be discontinued as having no ongoing value to the program). We note that groundwater temperatures would continue to be collected at all water level datalogger locations.

We also recommend that manual measurements and datalogger download/maintenance at the site be collected on a quarterly basis. Given the extensive array of dataloggers at the site, monthly manual water level, temperature or flow measurements provide little additional value to the program.

4.4 THRESHOLDS

A summary of Thresholds are provided in **Table 3**. The threshold triggers additional examination and assessment in order to determine if remedial actions are needed.

Type	Limit	Location	Predicted Change (°C)	Threshold Change (°C)
Groundwater (as measured within screened interval)	3°C beyond predicted change	BH1	1°C	4°C
		BH7	1.6°C	4.6°C
		BH8	0°C	3°C
	1°C beyond predicted change	DP1	0°C	1°C
		DP3	0°C	1°C
Surface Water	1°C beyond seasonal natural range	SW5	-	1°C
		SW6	-	1°C
		SW8	-	1°C
		SW10	-	1°C

Table 3: Threshold Summary

The predicted changes noted in **Table 3** are based on the computer modelling assessment (February 2007, page 11 and Figure 27), and represent the predicted magnitude of change in both seasonal high and seasonal low temperatures, as compared to the historical (pre-extraction) record. Within the model the "background" groundwater temperature is 9°C over the entire year (no seasonal fluctuation). The model then calculated the expected annual groundwater temperature fluctuation within the flow system that would result from the off-setting warm and cold "pulses" of water from the pond. For example, due to the pond the groundwater temperature at BH7 was predicted to range seasonally up to 10.6°C (change of 1.6°C). Similarly, a decrease in seasonal low is predicted.

The magnitude of observed changes (if any) at groundwater threshold locations was described in **Section 3.2.4**. The magnitude of observed change within surface water threshold locations was described in **Section 3.1.2** and **Section 3.1.3**.

At BH1 the temperature change observed within the well screen consists of a slight increase (<2°C) in seasonal low temperature, and no overall change in seasonal high temperature. Therefore there is no threshold exceedance at BH1.

At BH7-D the temperature change observed within the screened interval consists of a decrease in seasonal low of about 1.2°C, and, an increase in seasonal high of about 4.5°C. Therefore the changes in measured seasonal high and low temperature are greater than predicted, however remain within the trigger threshold (of 4.6°C). Therefore there is no threshold exceedance at BH7-D.

At BH8 and DP2 no overall temperature change is observed within the screened interval. Therefore there are no threshold exceedances at BH8 or DP2.

At DP3 a change in temperature is noted within the screened interval, however the change correlates closely with the results for the adjacent surface water location SW8. We note that both DP3 and SW8 have the same threshold value.

As described in **Section 4.2.2**, no temperature change or exceedance is observed at SW10. Temperature changes have occurred at SW5, SW6 and SW8. However some of the changes are not comparable to the thresholds as established. For example, seasonal low temperatures have increased at SW5 (by 2°C) and SW6 (by 1°C). The thresholds as established were based on the model that seasonal low temperatures could decrease. At SW6 and SW8 seasonal high temperatures are observed to increase by 2.5°C to 3°C respectively. These changes would be considered exceedances under current thresholds.

The original thresholds established for the spot upwelling locations SW5, SW6, SW8 and SW10, of 1°C, as part of the monitoring program were very conservative and based on a typical approach for a cold water fish stream that provides direct habitat and/or refuge for fish. The spot upwelling areas at SW5, SW6, SW8 and SW10 contribute to stream systems (Main Creek, Trib #7 and Trib #8), however do not provide direct residence or refuge habitat for fish. The thresholds would be more appropriately applied to conditions within the main stream systems.

The original thresholds established have provided a mechanism to trigger additional monitoring at the site (e.g. at SW7 and SW9), a more detailed examination of temperature data overall, and, a detailed assessment of potential fish habitat implications. As illustrated by the detailed monitoring program, temperature changes to date at the upwelling locations have not resulted in any negative impact to temperatures within the stream systems or to fish habitat.

We therefore recommend the temperature trigger thresholds be revised to the following:

- Surface water temperature increase of 1 degree Celsius beyond the seasonal natural range observed to date (defined as the maximum 7-day average temperature at each location) at SW3, SW4, SW7 or SW9.

No other surface water or groundwater trigger thresholds are recommended at this time.

Automated surface water temperature monitoring, using dataloggers, should remain in place as per the existing monitoring program. Experience with this program and at this site indicates that manual spot water temperature measurements have little ongoing value. Therefore manual spot temperature measurements are no longer recommended.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The following conclusions are based on the monitoring program results to date.

1. Temperature profile data collected in the well casing at BH16, BH17 and BH1 appropriately reflect groundwater conditions within the surrounding aquifer.
2. Monitoring results to date reflect conditions during below water table extraction and may not represent equilibrium conditions. Future monitoring downgradient of Lake 1 is expected to better reflect post-extraction conditions in that area.
3. Temperature changes observed to date in the groundwater system and at some surface water upwelling areas are slightly greater than predicted, however, conditions at upwelling areas remain well within typical cold water habitat temperature ranges.
4. To date no significant thermal influence is observed in the groundwater system at the Licence boundary.
5. Temperature changes observed at the site have not resulted in any negative influences on fish habitat within the Main Creek, Trib #7 or Trib #8.
6. No groundwater or surface water temperature changes are observed within spawning areas of the Main Creek (including the primary spawning area between SW1 and SW2) or Tributary #7.
7. Extraction within the thermal set-back area, if approved, would only occur during the final operational stage of the pit. Therefore additional time is available for ongoing monitoring and assessment.
8. Thermal monitoring should continue at the site to assess potential for groundwater and surface water related changes.

5.2 RECOMMENDATIONS

The following recommendations are based on the monitoring program results to date.

1. The monitoring program be revised as follows:
    a. Manual spot surface water temperature measurements shall be discontinued;
    b. Manual groundwater temperature profile or spot measurements shall be discontinued;
    c. Manual groundwater level, surface water level and streamflow measurements shall be obtained on a quarterly basis;
    d. Detailed groundwater temperature monitoring at the site shall consist of profiles using dataloggers as established elevations within BH116, BH17 and BH1, and, using dataloggers at established elevations within the screened interval at BH2-S, BH2-D, BH3-S, BH3-D, BH7-D and BH8.

2. The temperature trigger thresholds be revised to the following:
    a. Surface water temperature increase of 1 degree Celsius beyond the seasonal natural range observed to date (defined as the maximum 7-day average temperature at each location) at SW3, SW4, SW7 or SW9.

3. The monitoring results continue to be reviewed to allow determination if extraction within the 120 m thermal set-back is appropriate at a later date.

All of which is respectfully submitted,

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ANDREW H, PENTNEY
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ONTARIO

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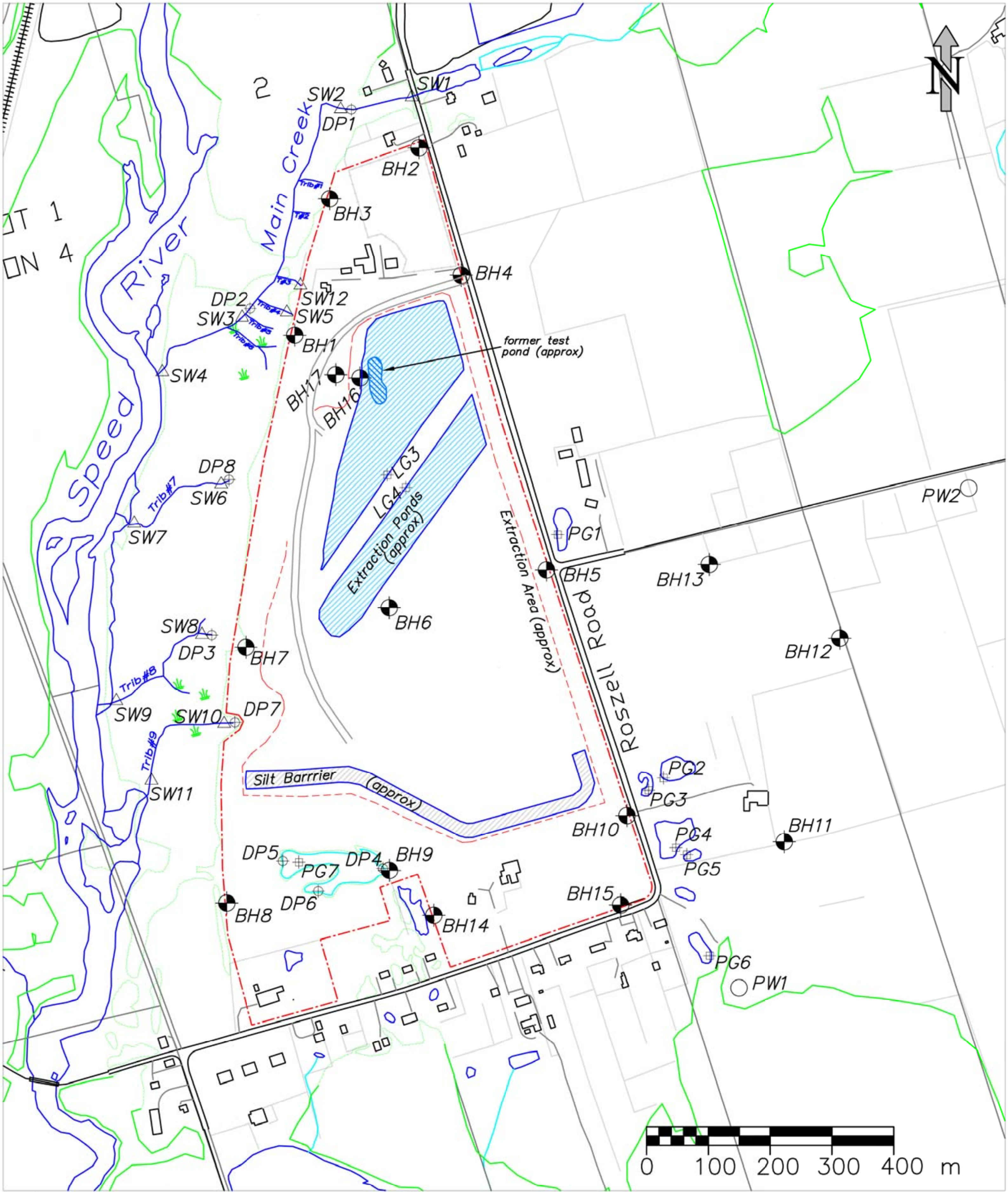
Senior Hydrogeologist
Groundwater Science Corp.

Figures



◐	existing monitoring well (or well nest)		
⊕	drive-point piezometer		
△	surface water flow/temperature		
⊞	pond/Lake gauge	○	private well

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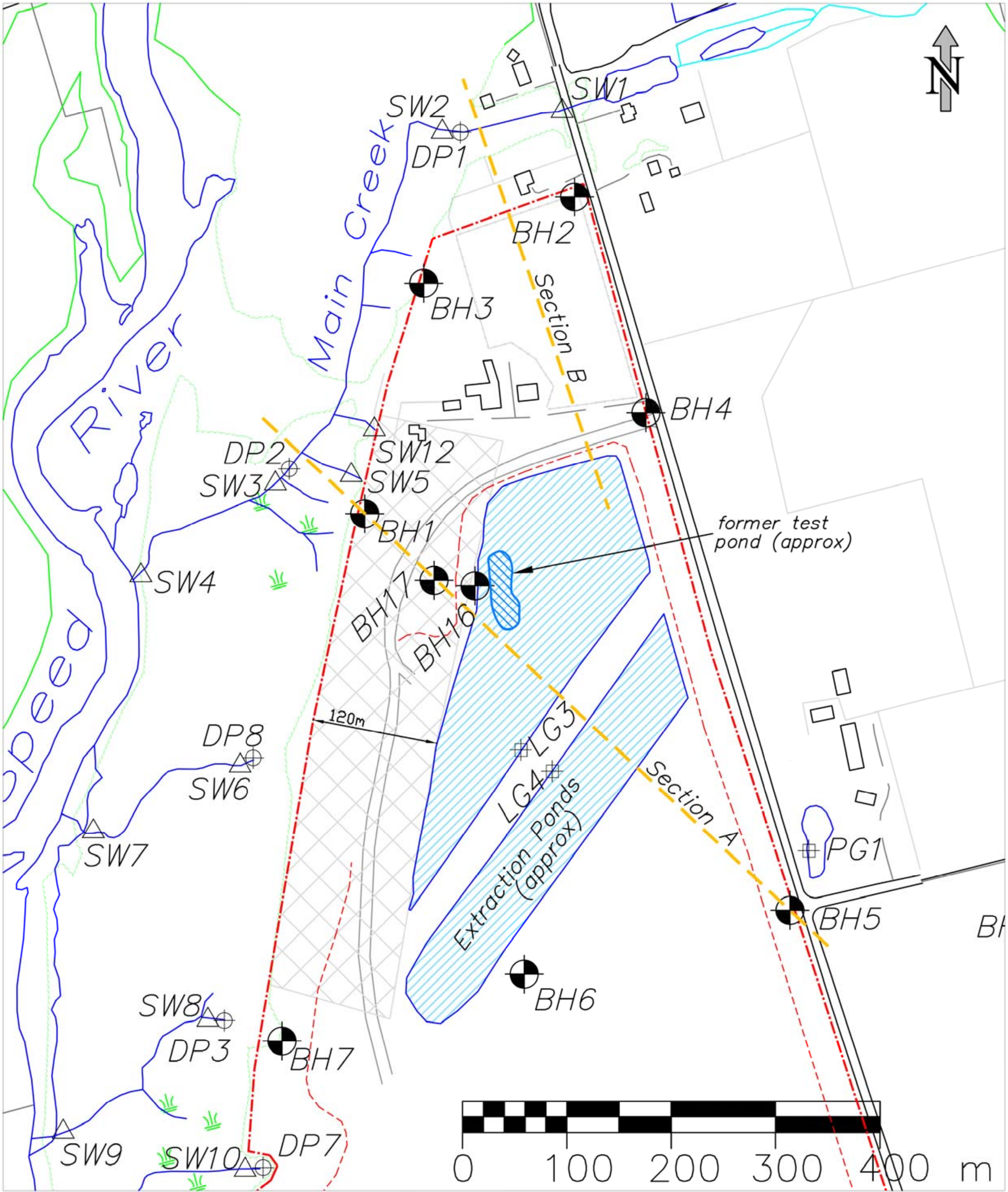
Figure 1: Site Details (2017), Monitor Locations

March 2018 Scale: as shown modified from: 1:10,000 OBM	Groundwater Monitoring Program	CBM Aggregates Roszell Pit	Part Lots 1 & 2, Concessions 3 & 4 Township of Puslinch, County of Wellington



◐	existing monitoring well (or well nest)
⊕	drive-point piezometer
△	surface water flow/temperature
⊞	pond/Lake gauge
▨	thermal "set-back" (approximate)

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Figure 2: Cross-Section Locations

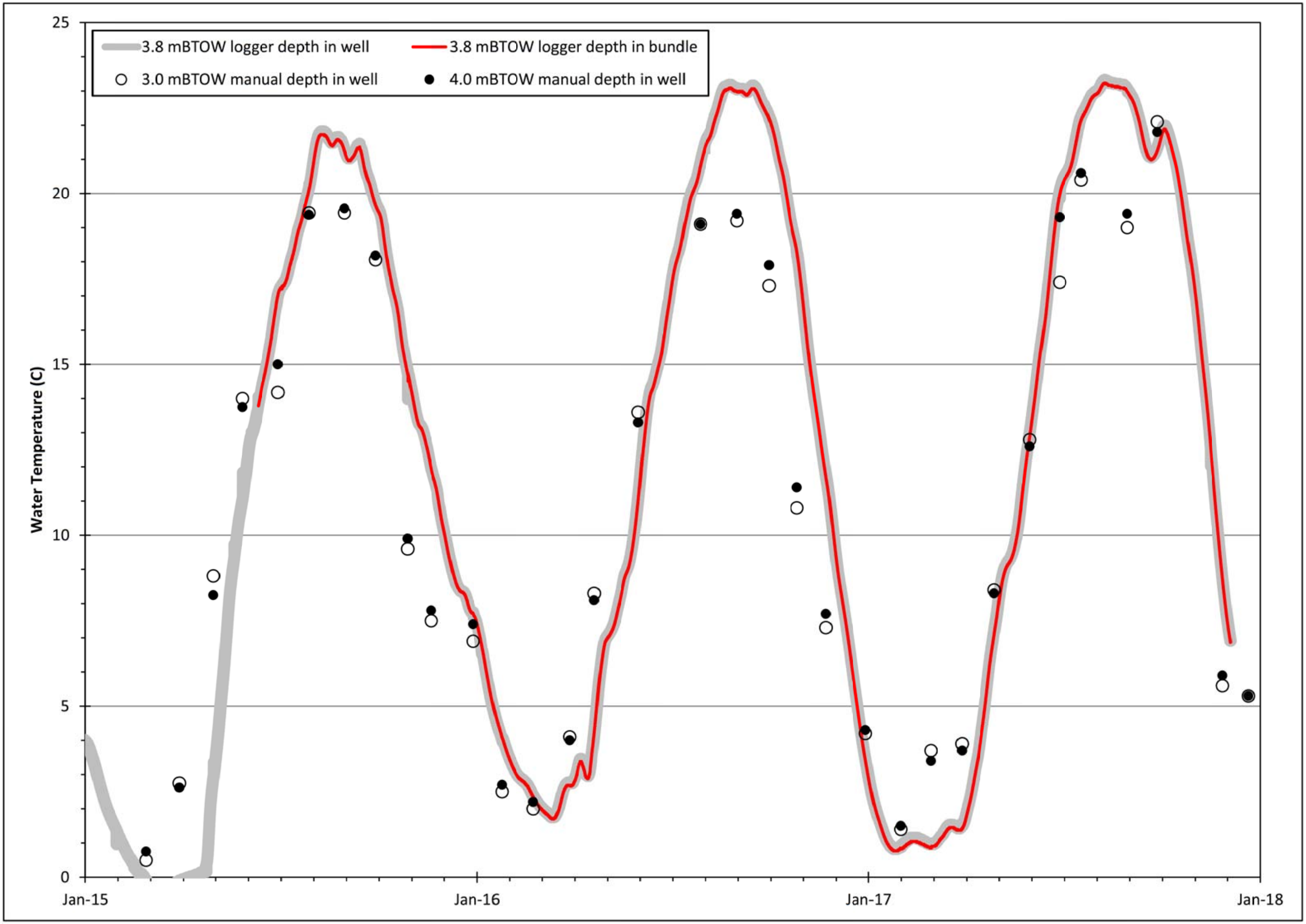
March 2018
Scale: as shown
modified from:
1:10,000 OBM

Groundwater
Monitoring
Program

CBM Aggregates
Roszell Pit

Part Lots 1 & 2, Concessions 3 & 4
Township of Puslinch,
County of Wellington

Appendix A
Profile Methodology Comparison



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Roszell Road Pit

Figure A1: BH16 Temperature Comparison at 3.8 m Depth

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Monitoring Program

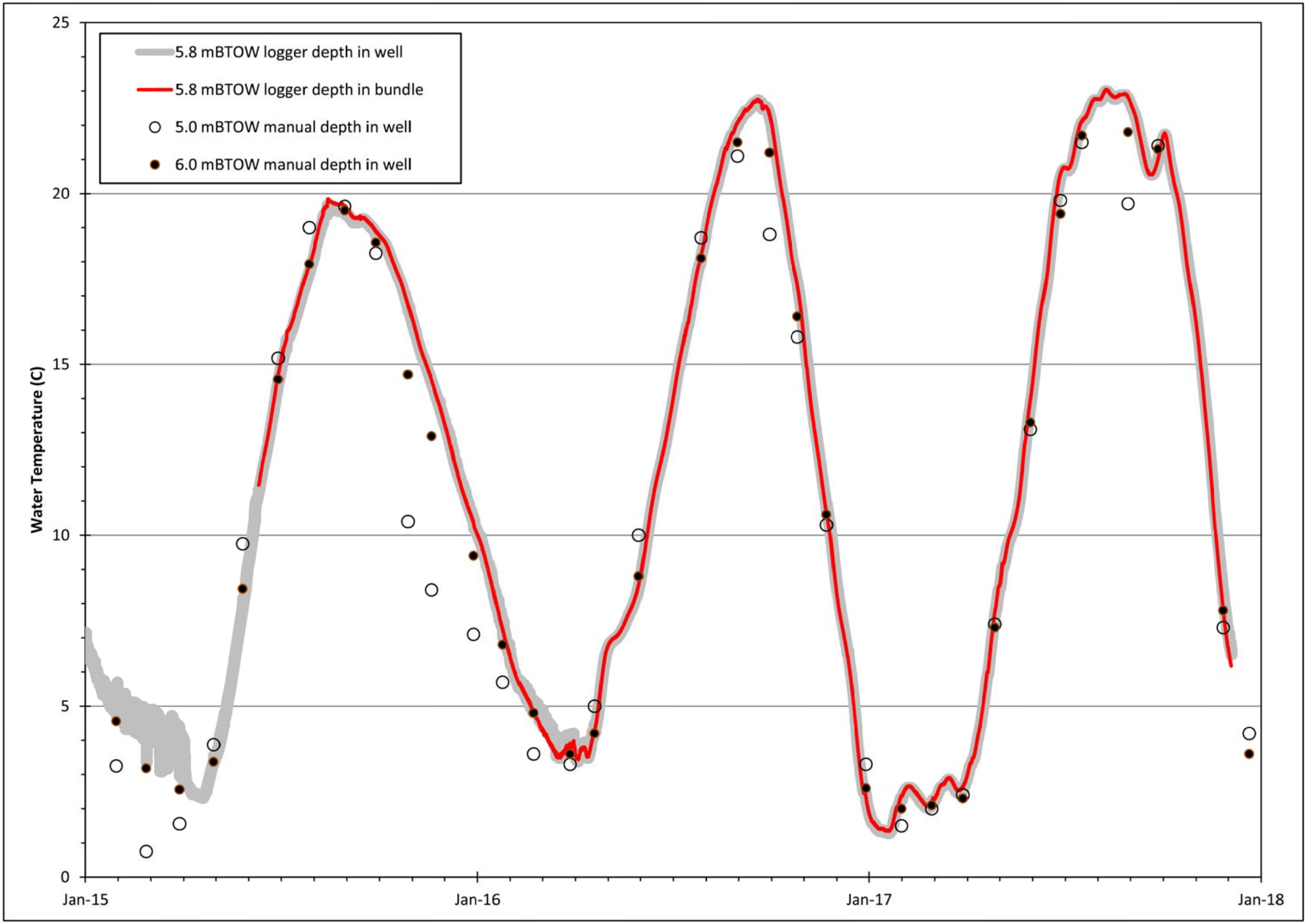

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Figure A2: BH16 Temperature Comparison at 5.8 m Depth

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Monitoring Program

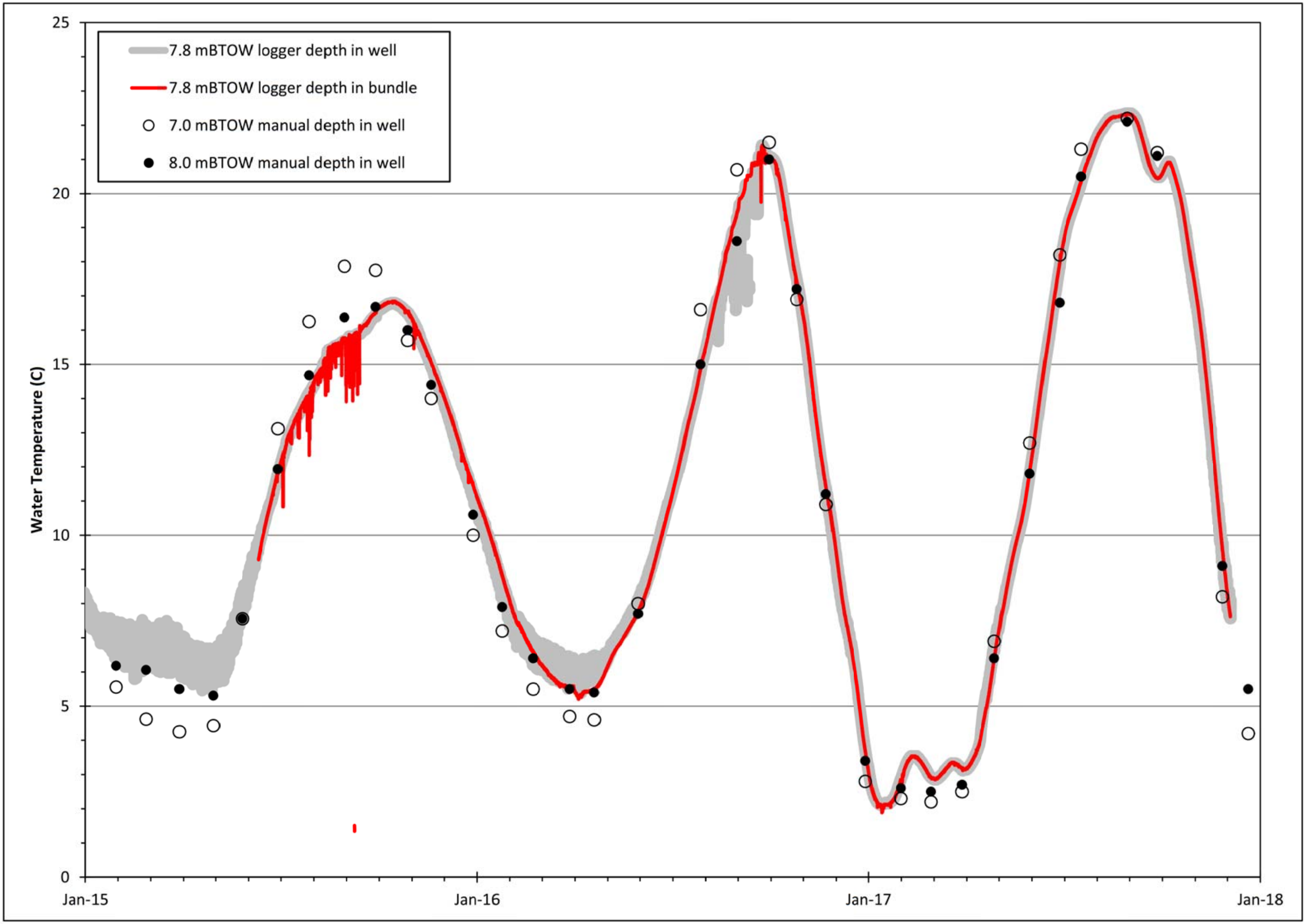

Figure A3: BH16 Temperature Comparison at 7.8 m Depth

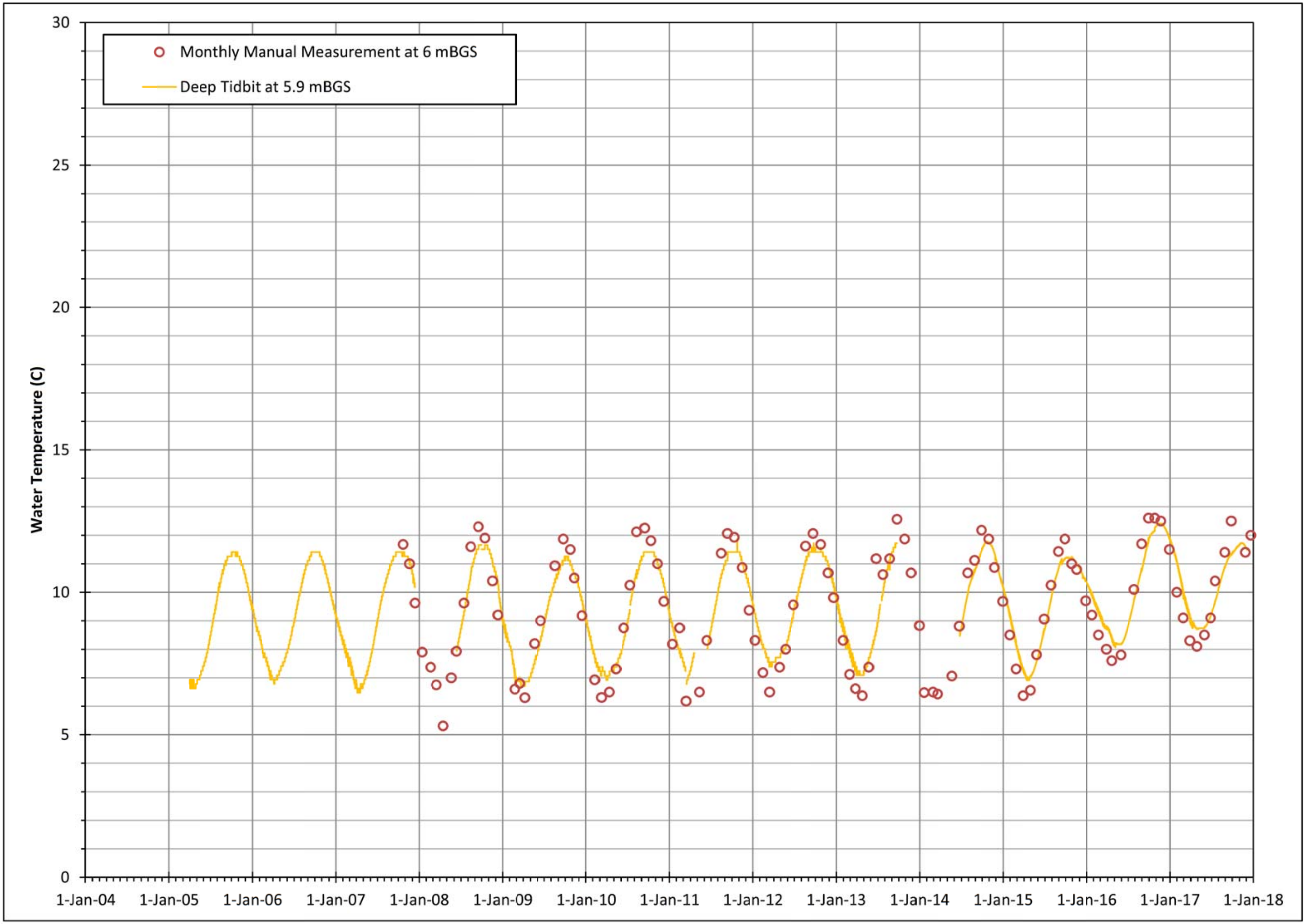

Figure A4: BH1 Datalogger and Manual Measurement Comparison

Appendix B
Surface Water Temperature Plots

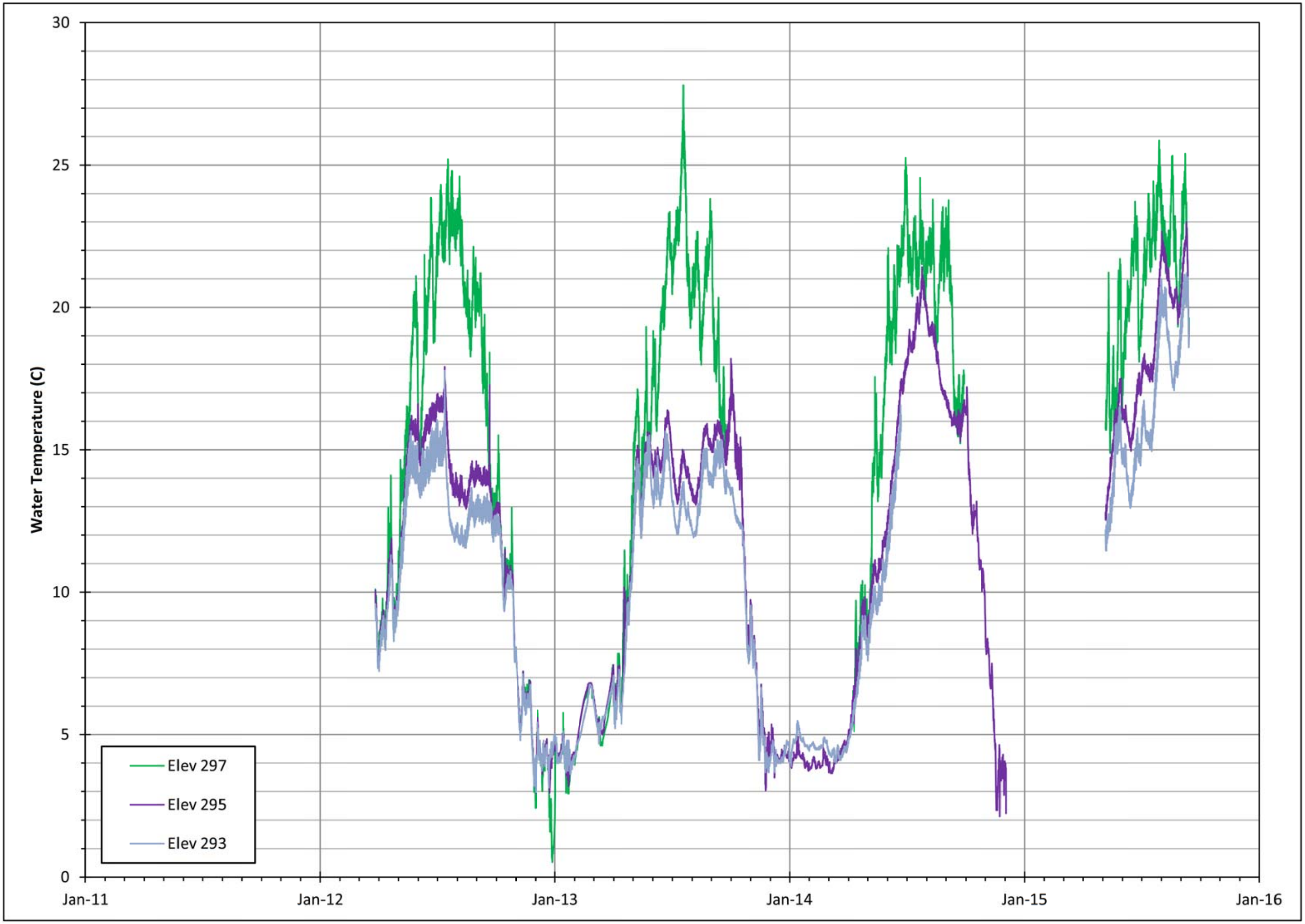

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Figure B1: LG2 (Test Pond) Temperature Plot

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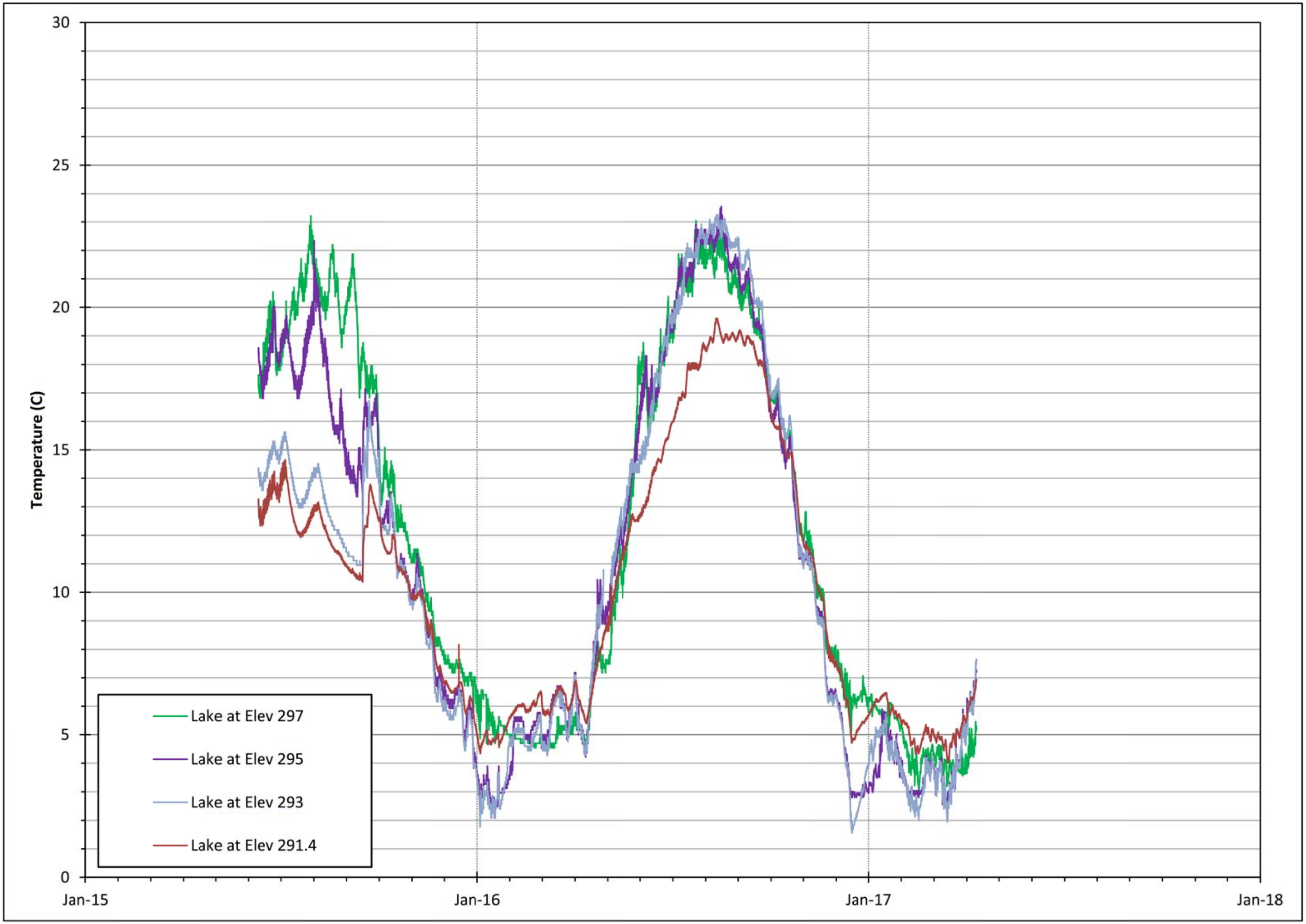

Figure B2: LG3 (Lake #1)
Water Temperature

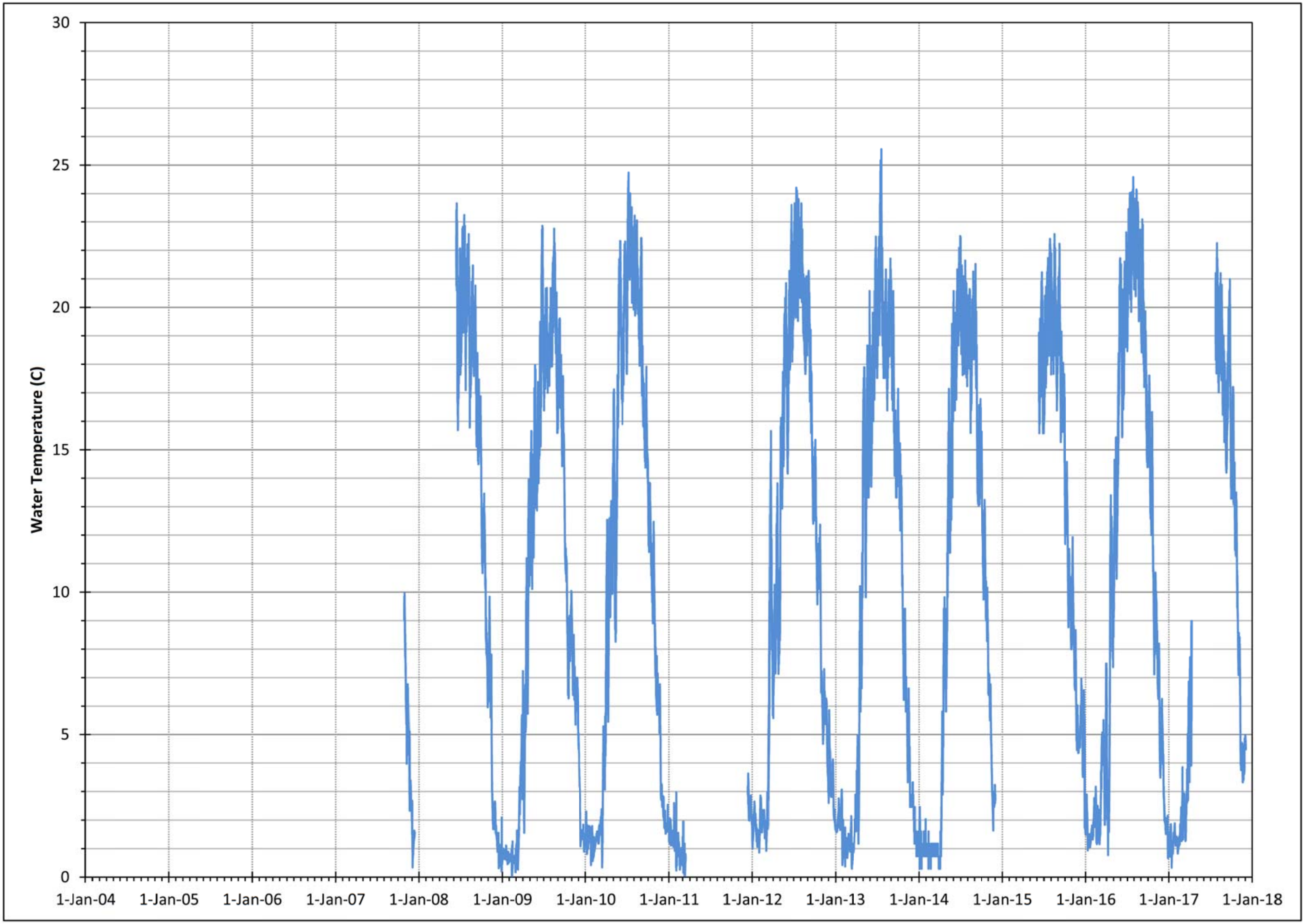

Figure B3: SW1 Temperature Plot

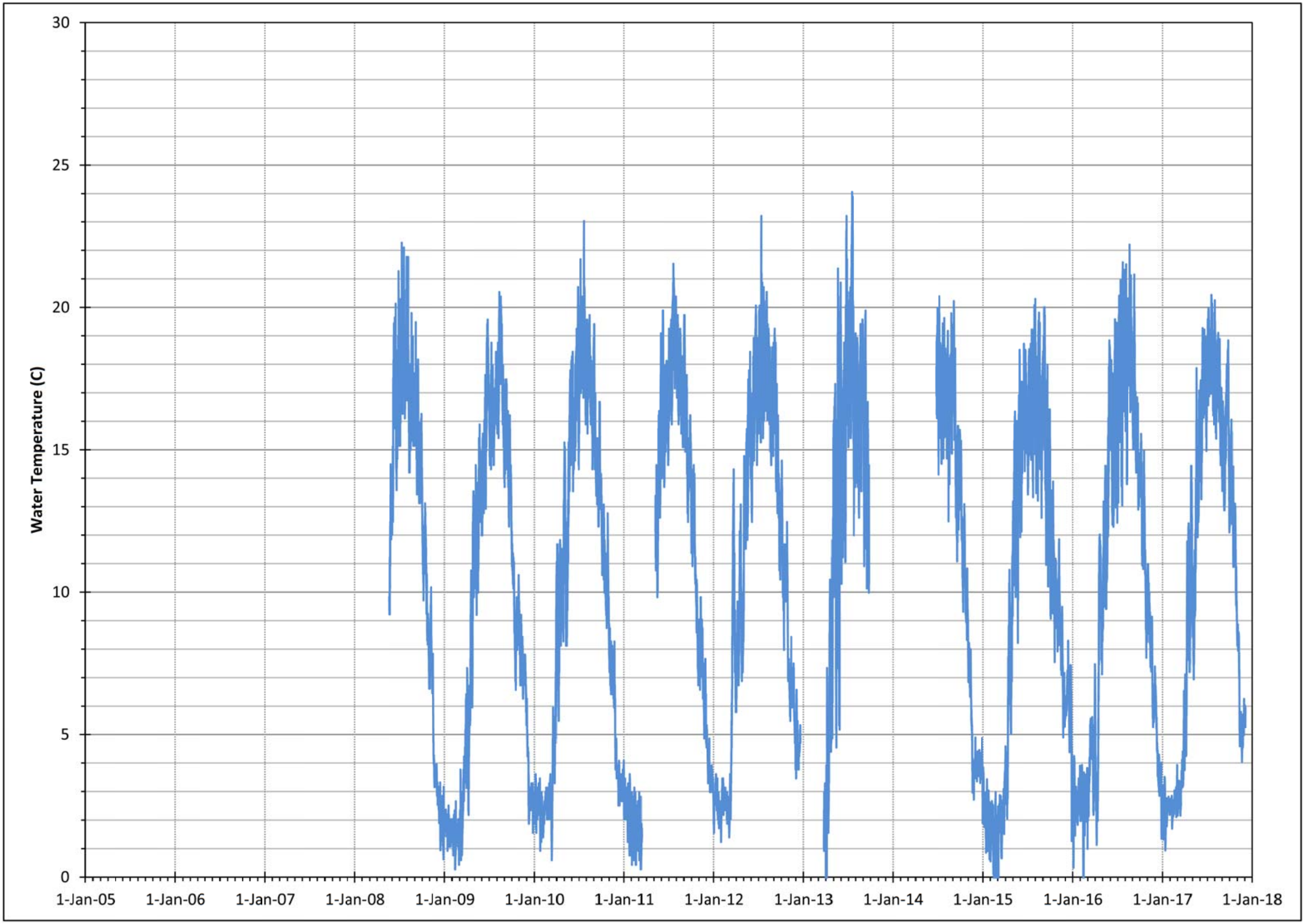

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Figure B4: SW2 Temperature Plot

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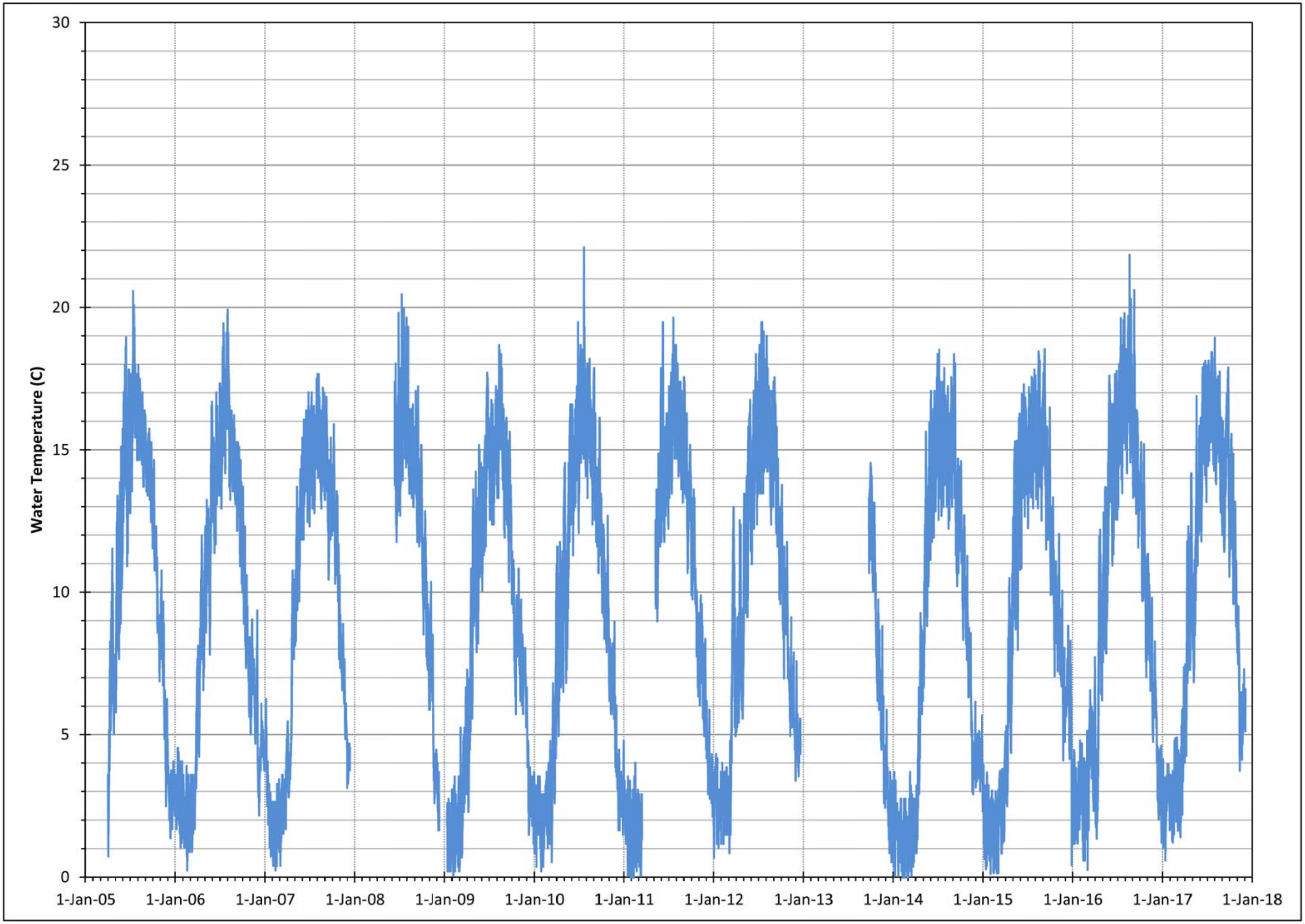

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Figure B5: SW3 Temperature Plot

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Monitoring Program

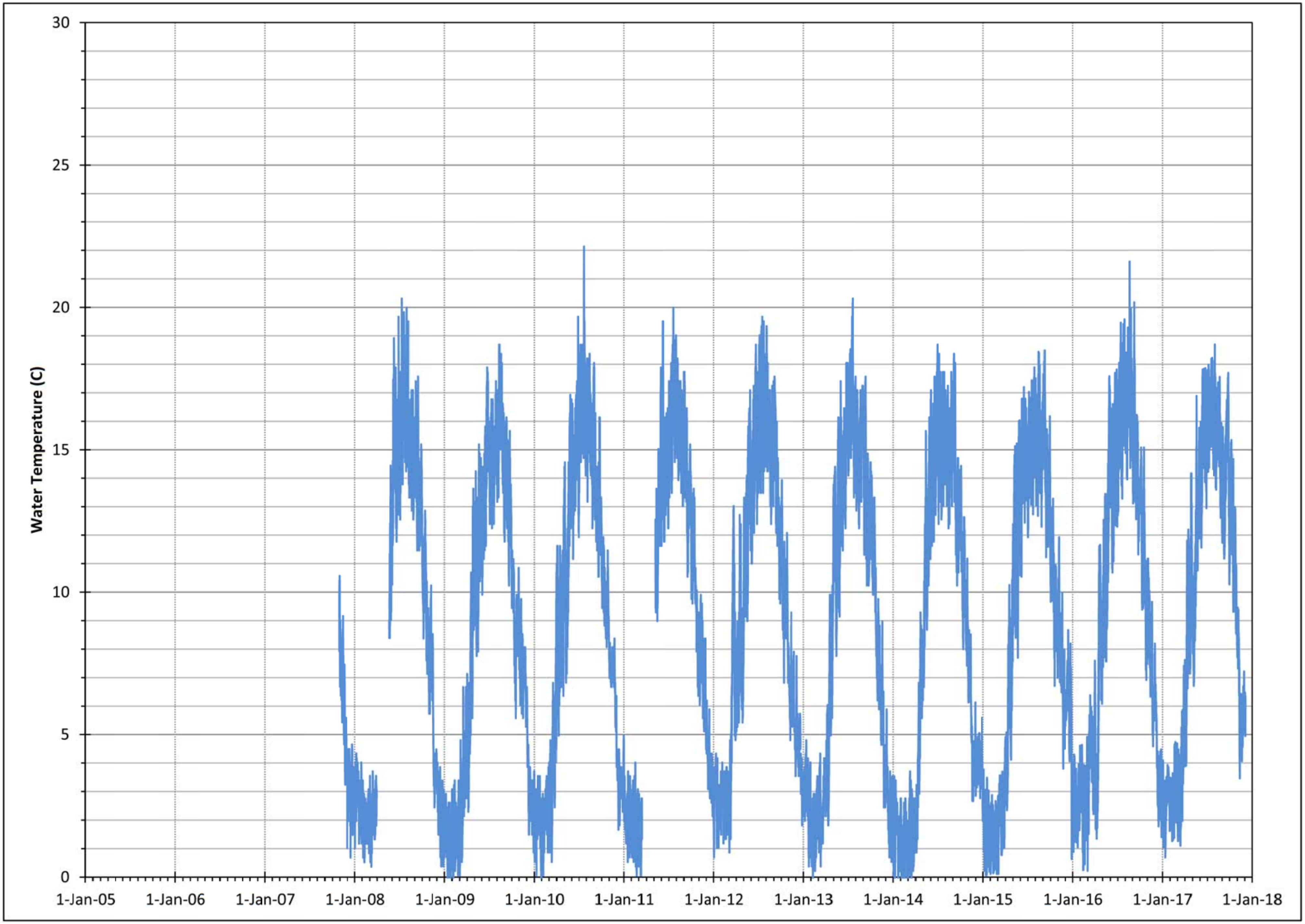

Figure B6: SW4 Temperature Plot

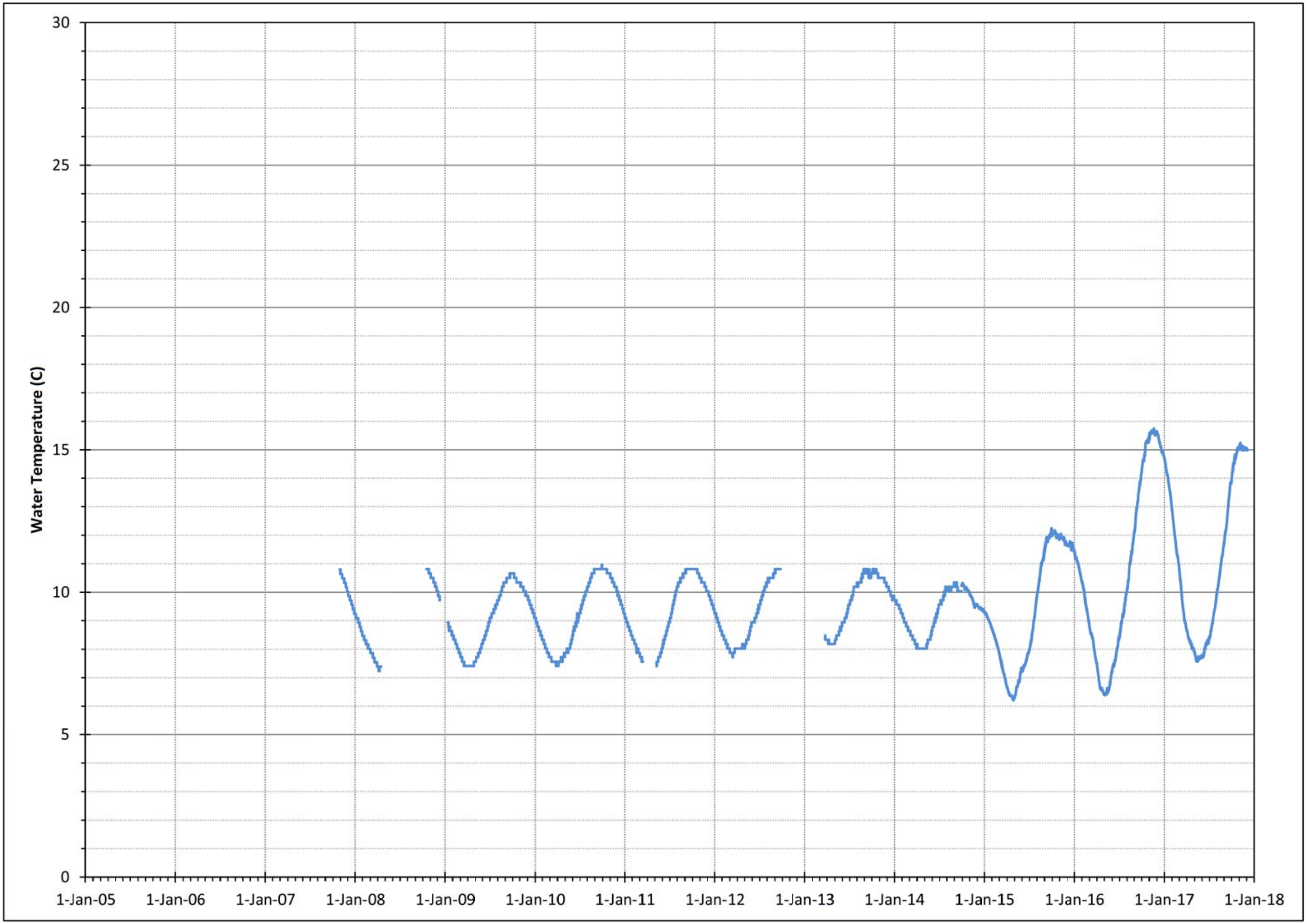

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Figure B7: SW12 Temperature Plot

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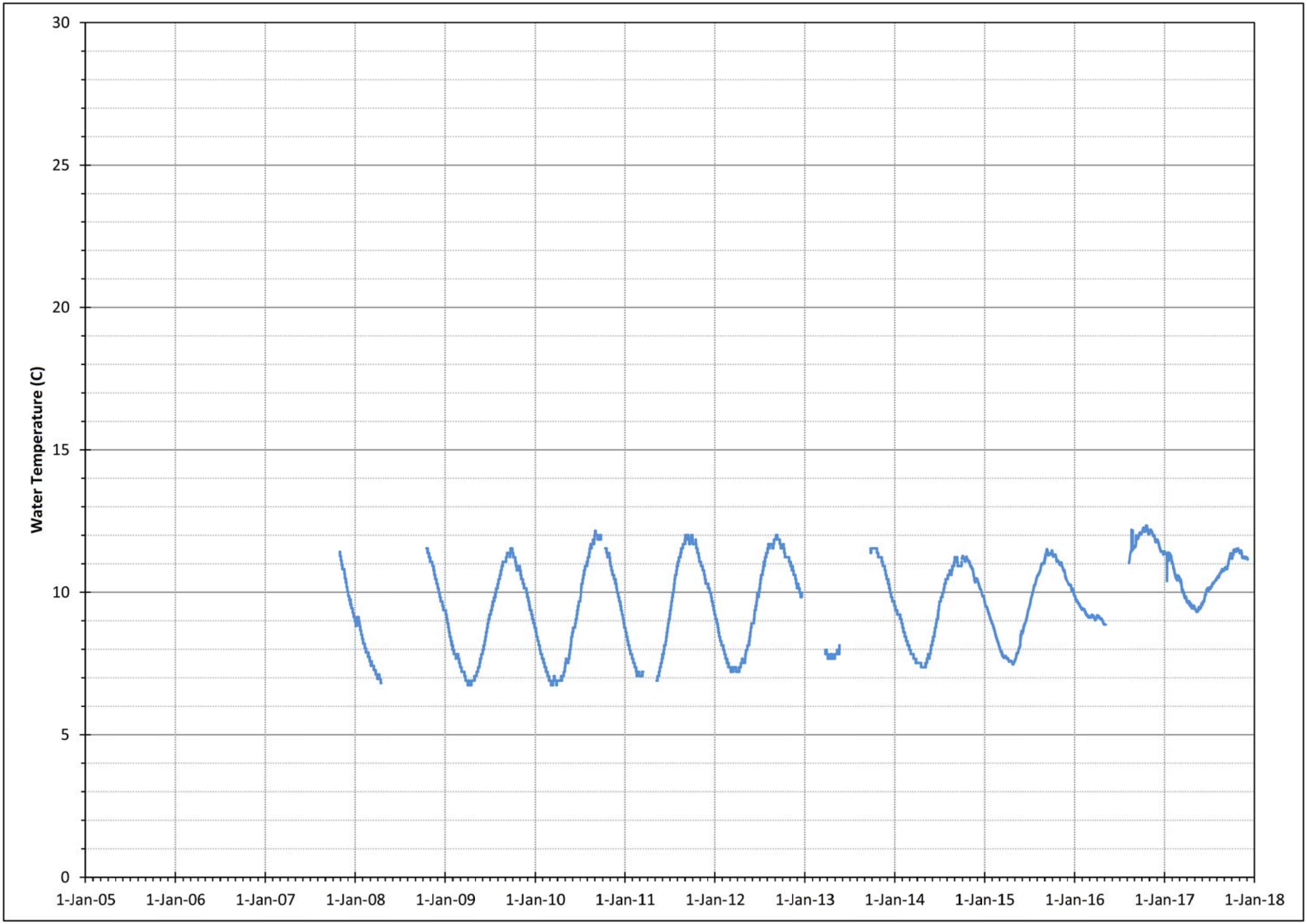

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Figure B8: SW5 Temperature Plot

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Monitoring Program

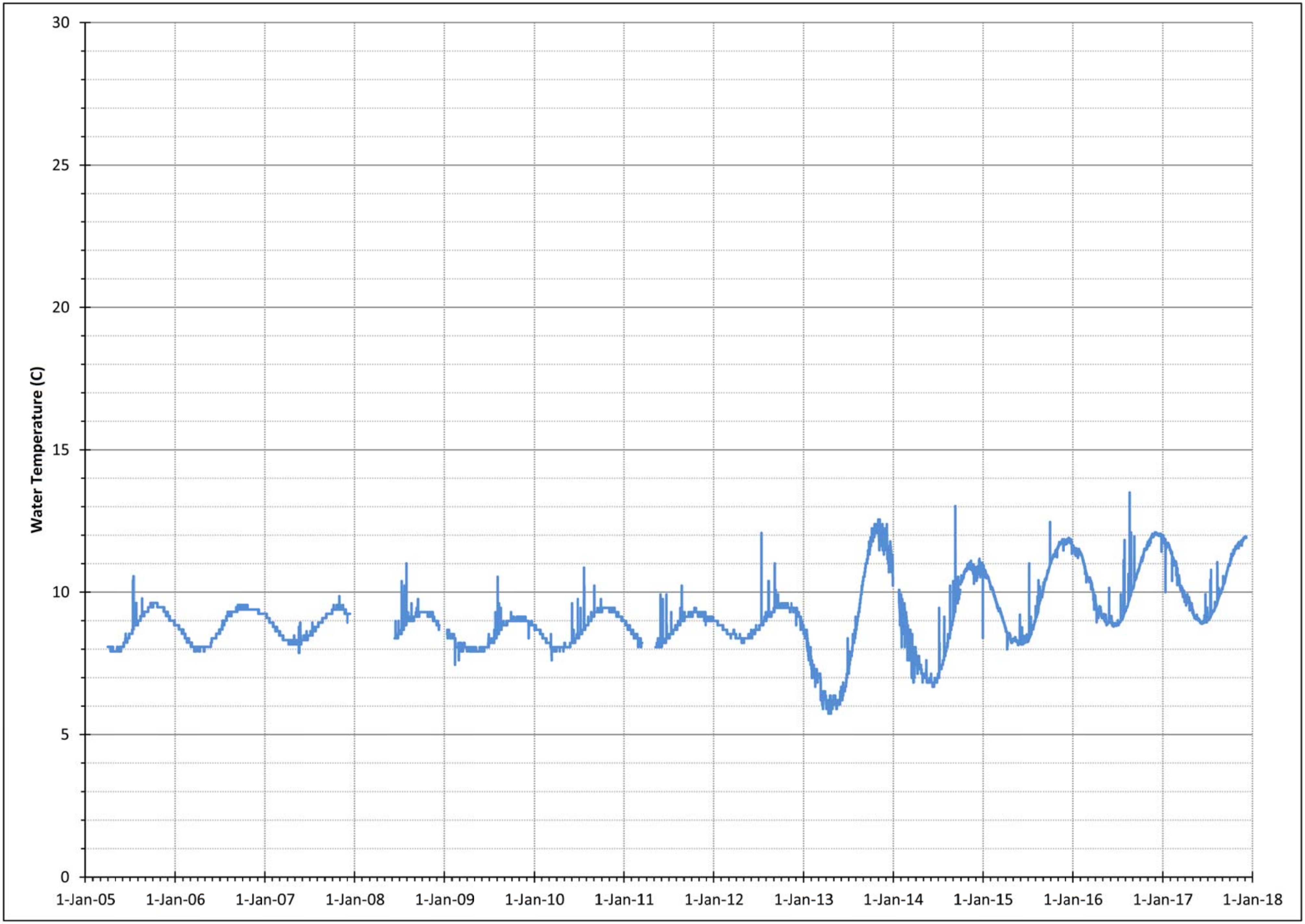

Figure B9: SW6 Temperature Plot

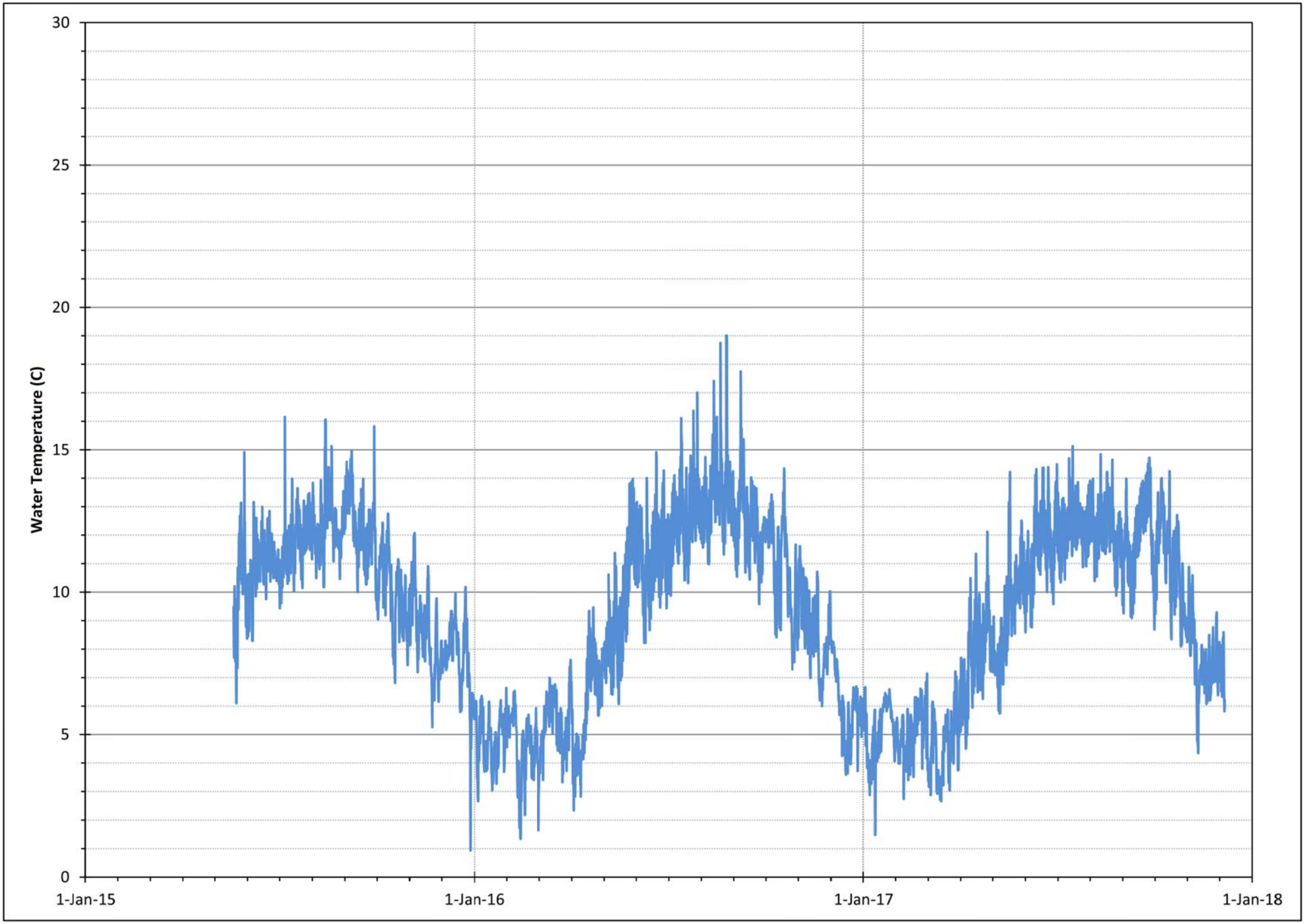

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Figure B10: SW7 Temperature Plot

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Monitoring Program

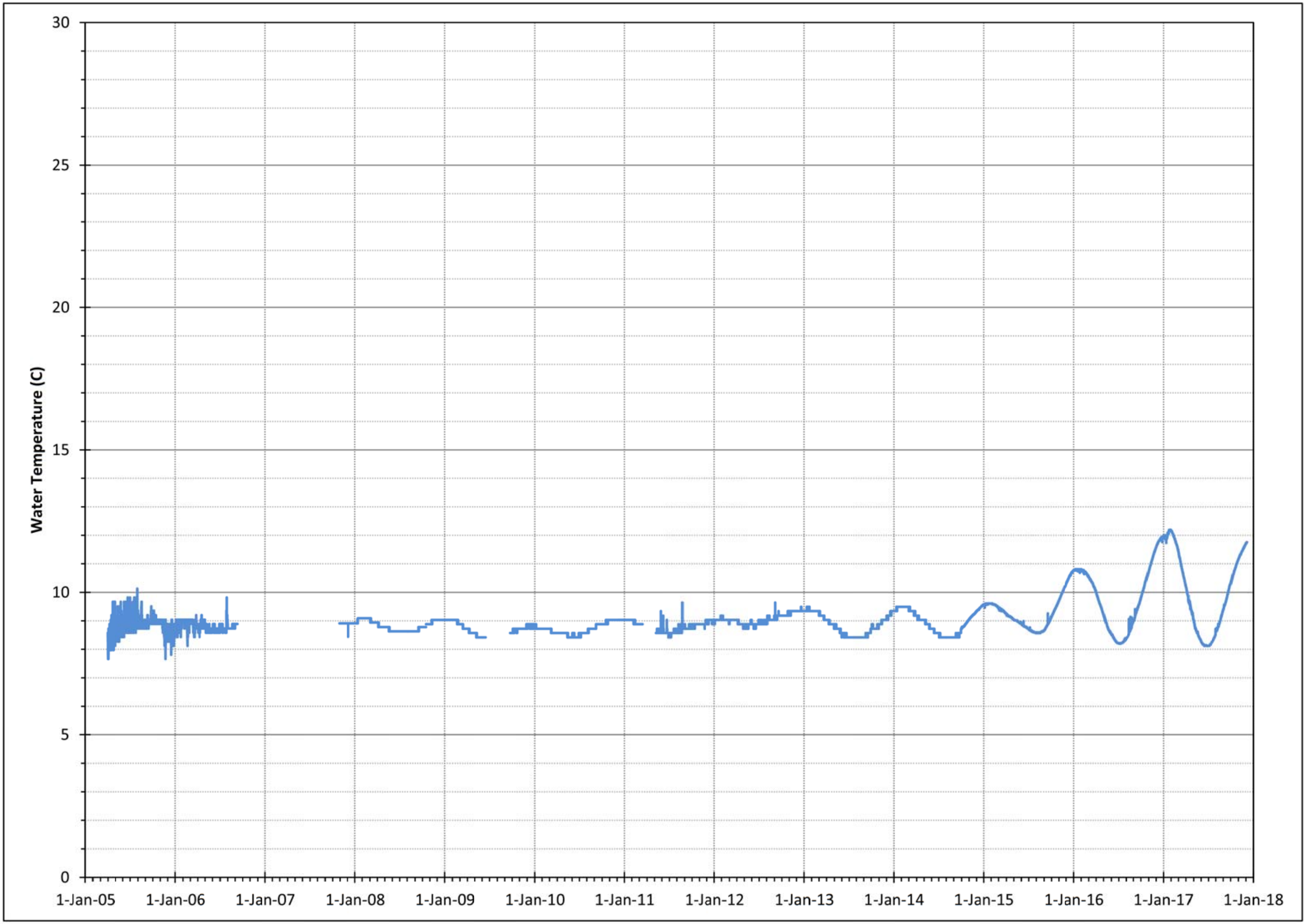

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Figure B11: SW8 Temperature Plot

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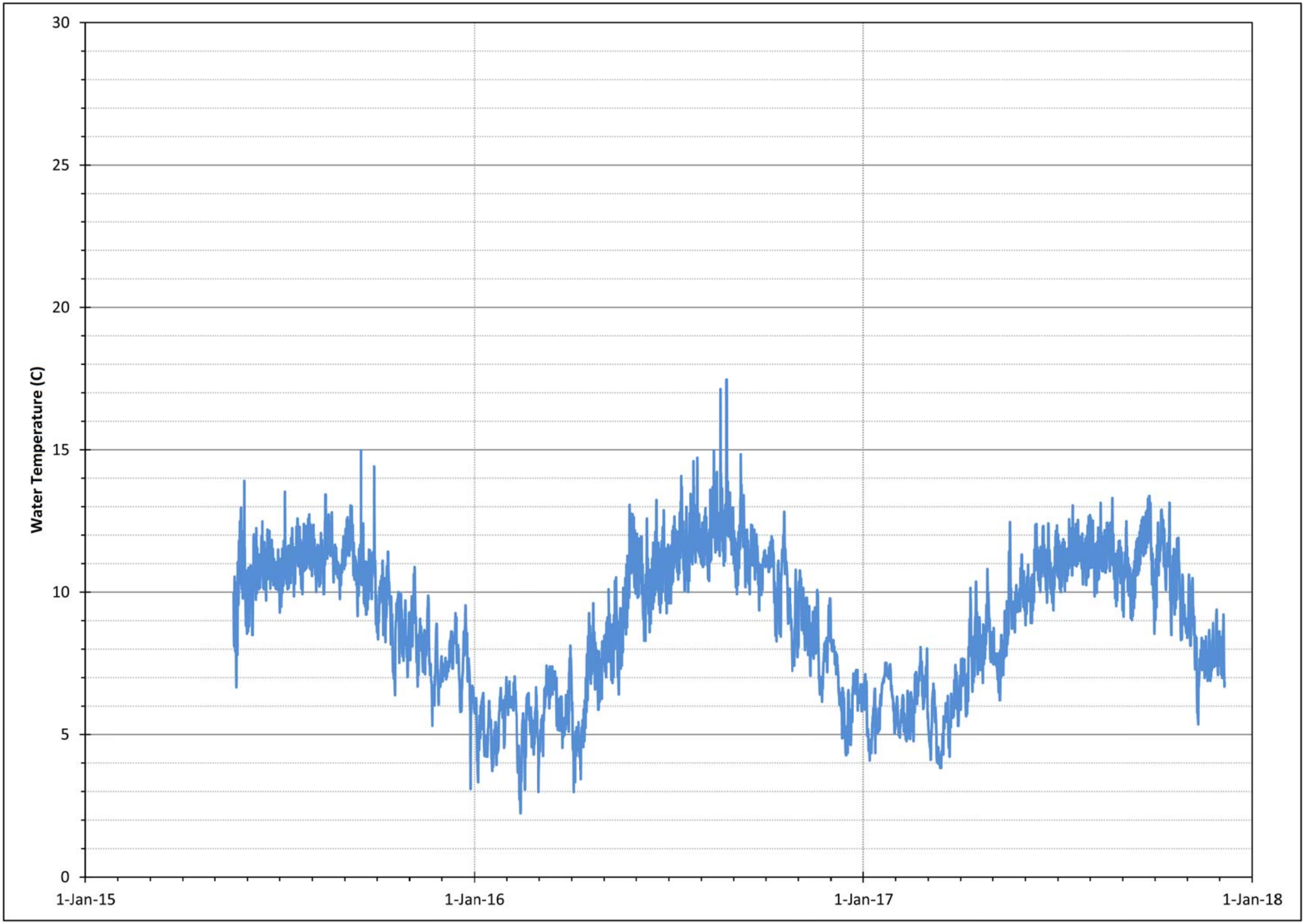
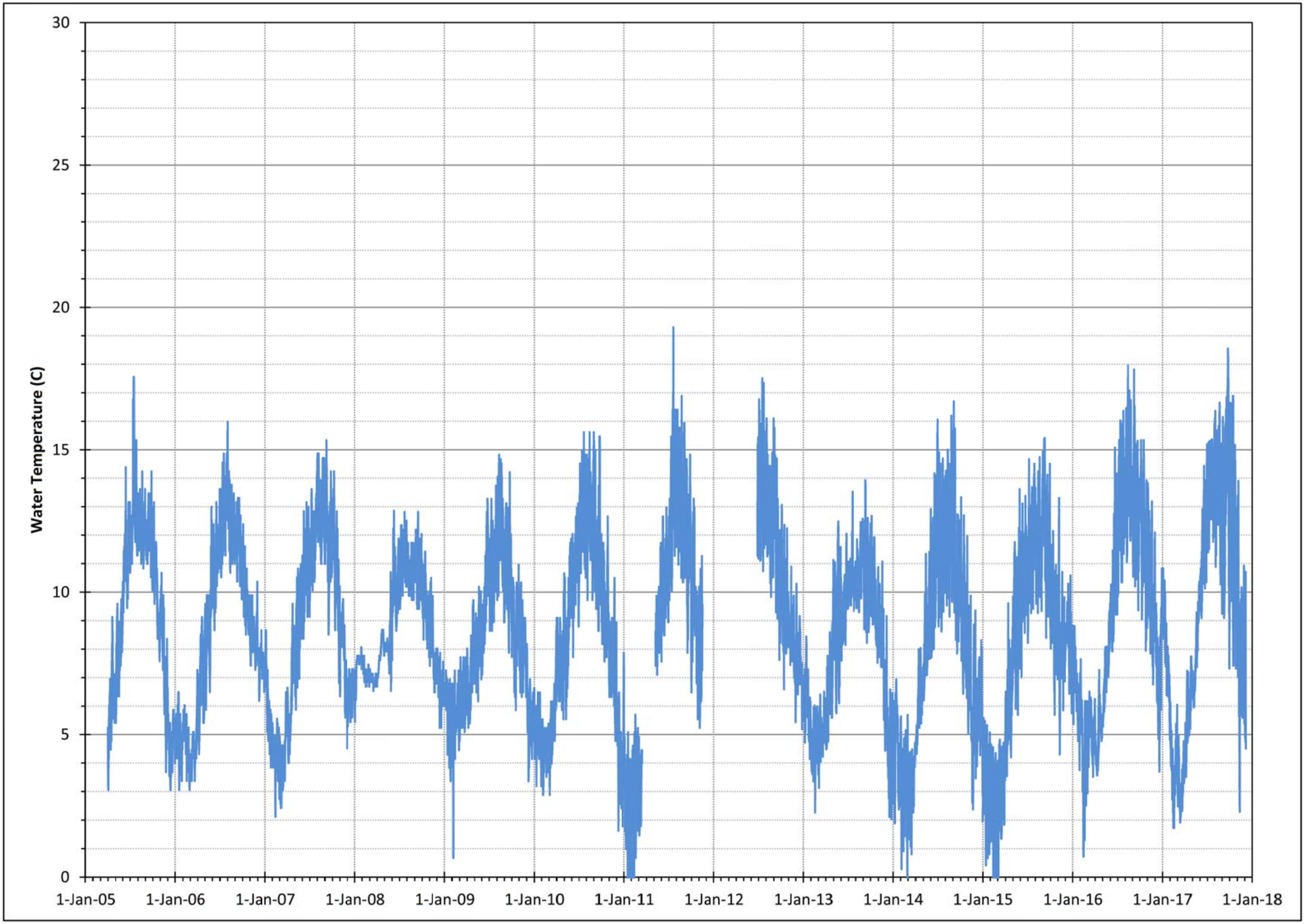
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure B12: SW9 Temperature Plot

Groundwater Science Corp.
Monitoring Program



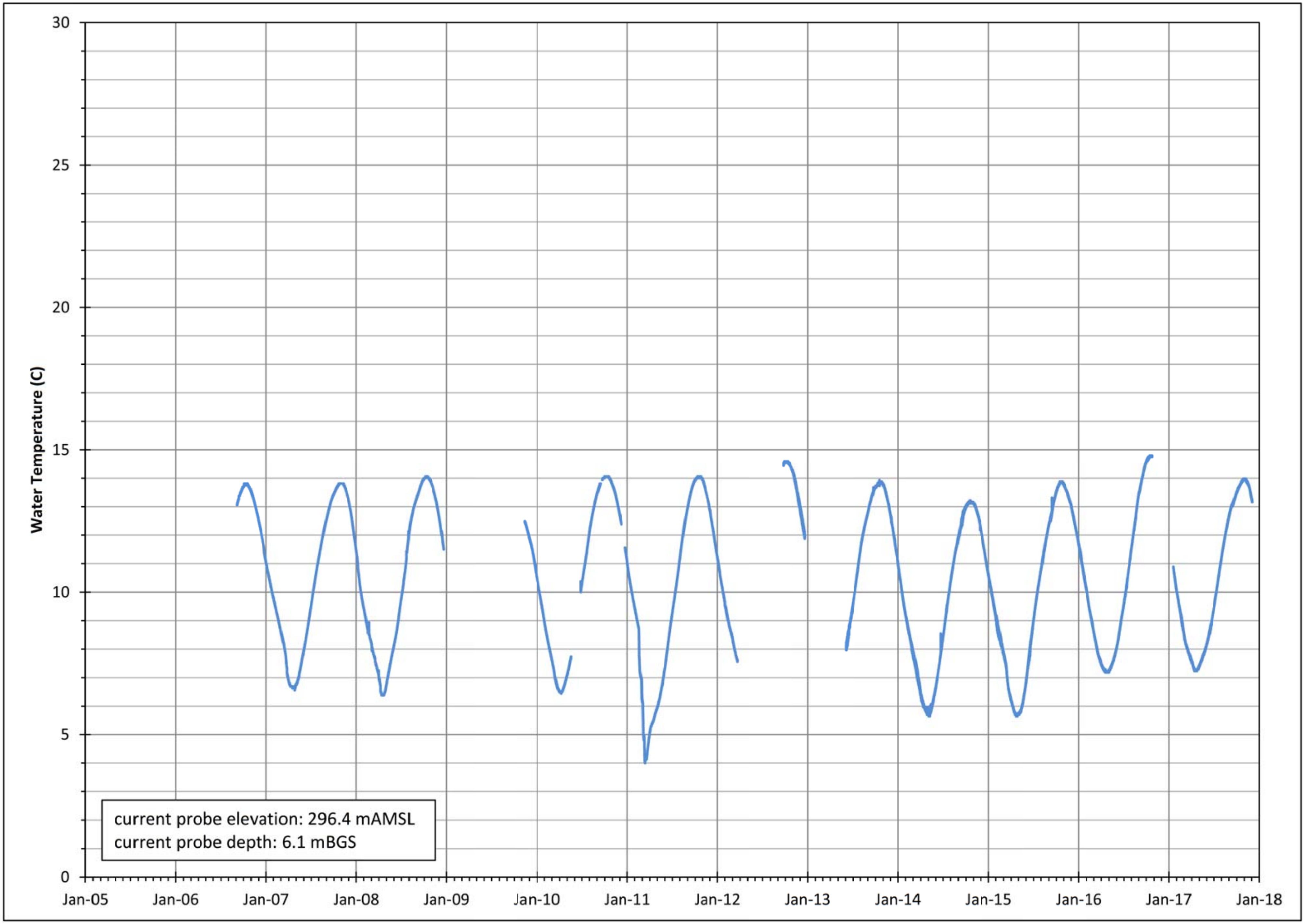
CBM Aggregates
Roszell Road Pit

Figure B13: SW10 Temperature Plot

Groundwater Science Corp.
Monitoring Program

Appendix C

Groundwater Temperature Plots



CBM Aggregates
Roszell Road Pit

Figure C1: BH5 Temperature Plot

Groundwater Science Corp.
Monitoring Program

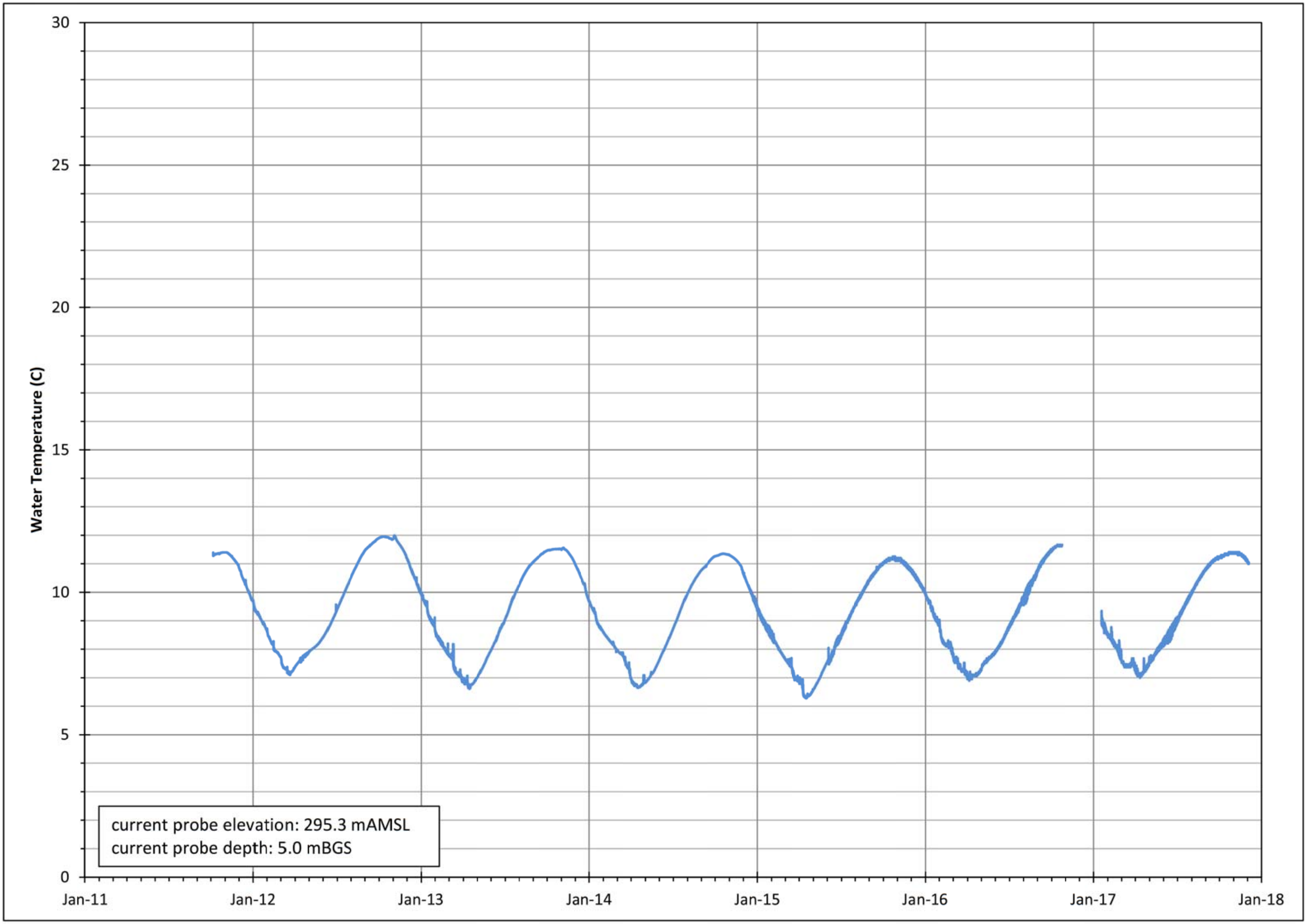


Figure C2: BH8 Groundwater Temperature Within Well Screen

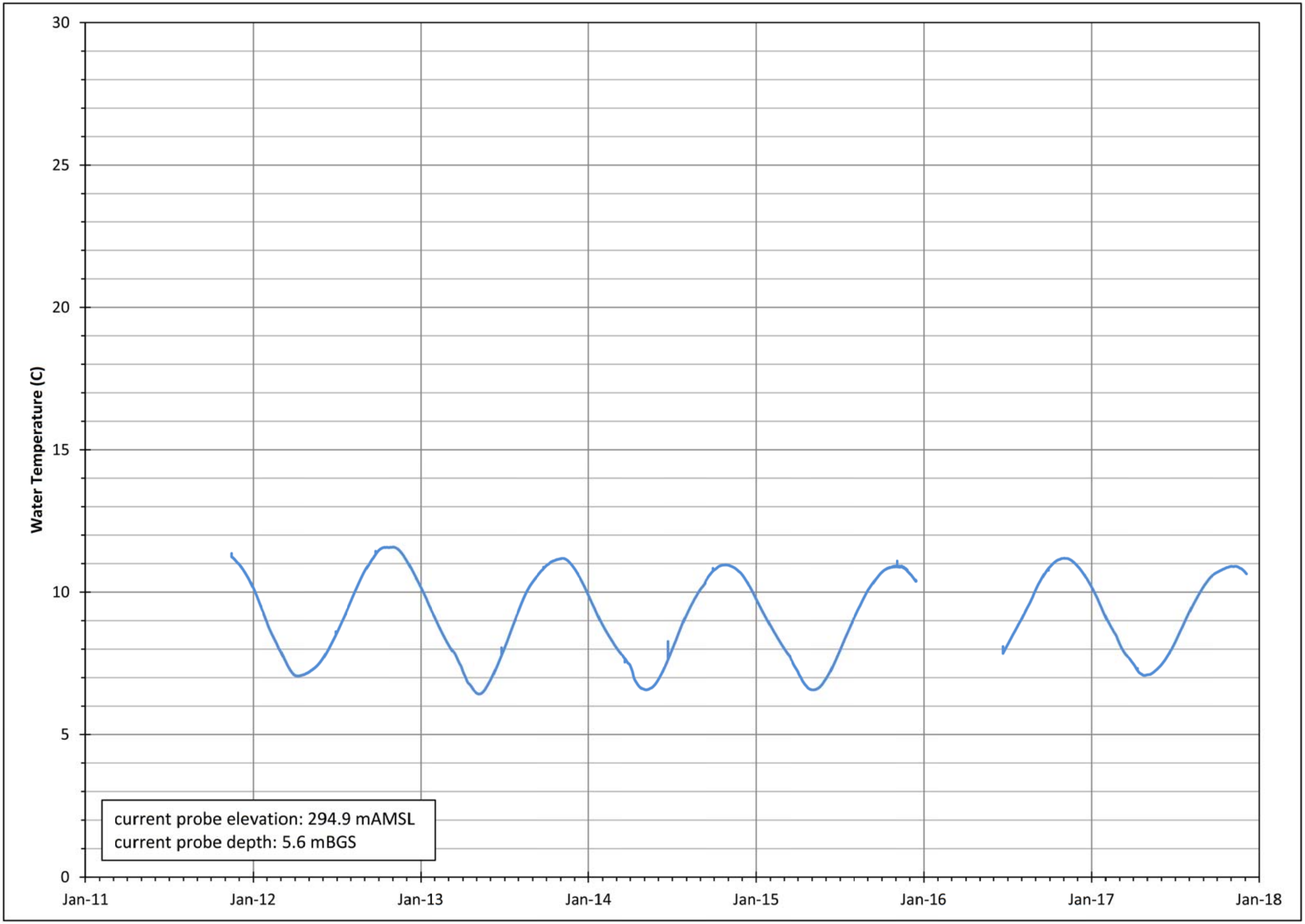
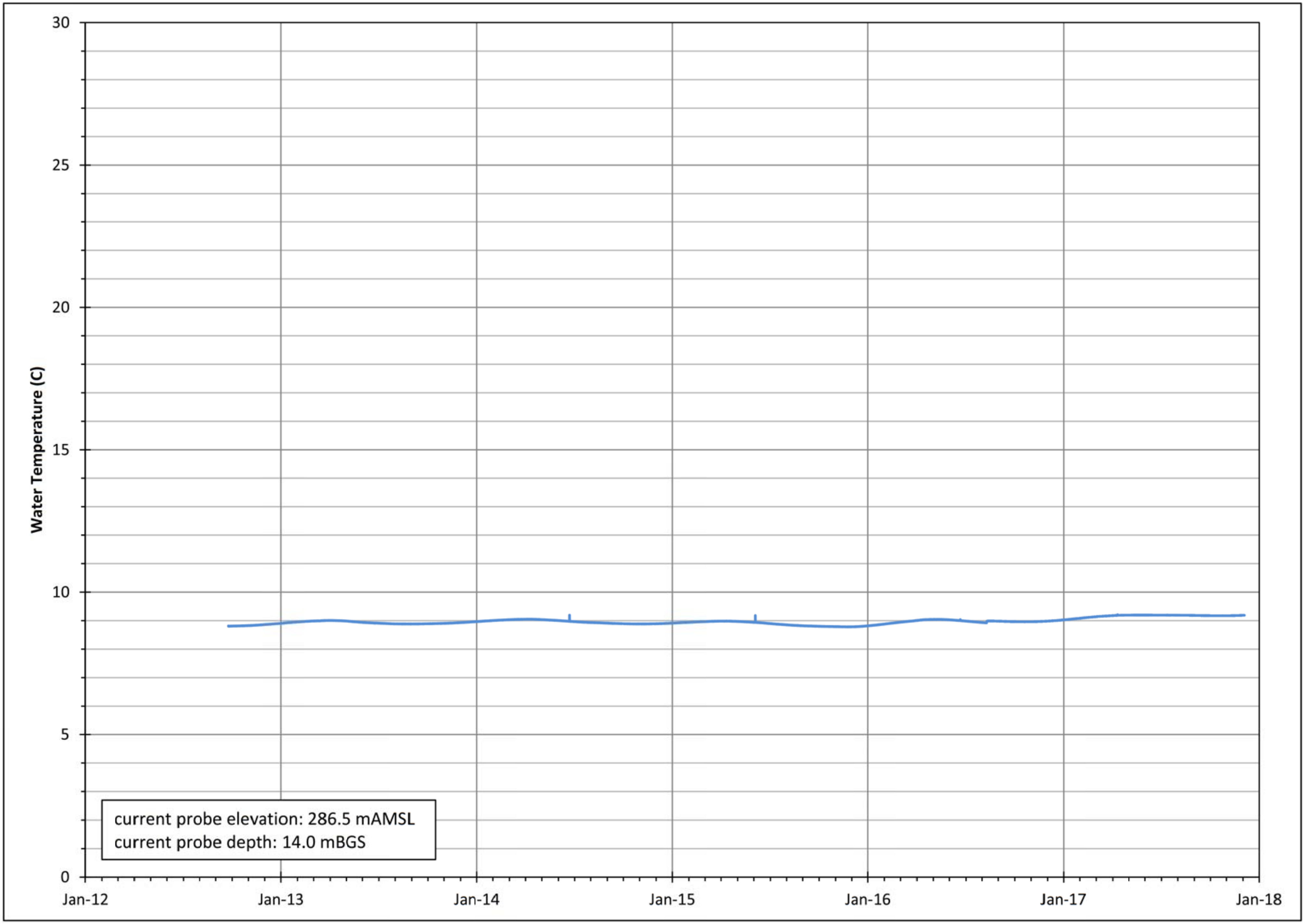
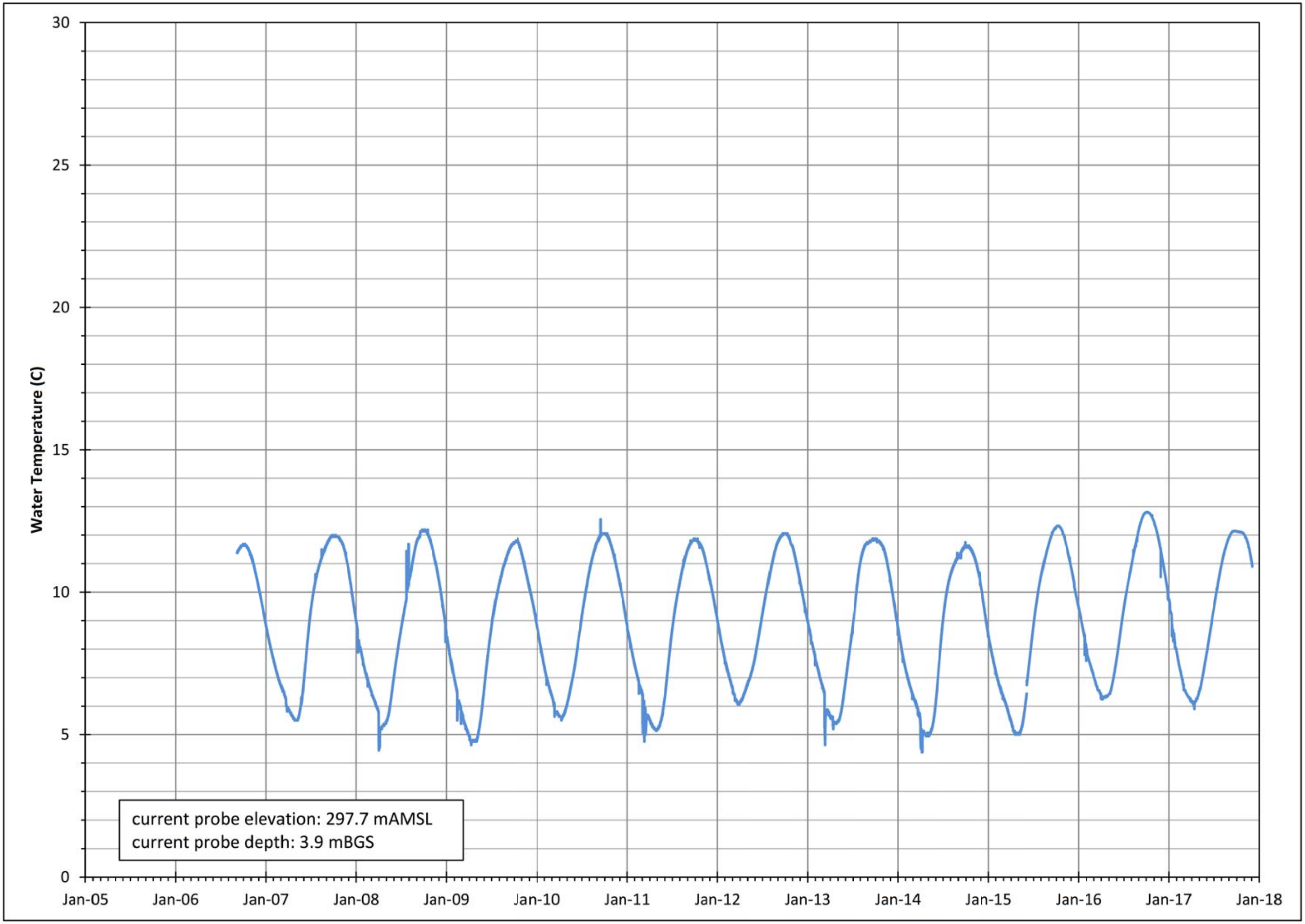


Figure C3: BH9-S Temperature Plot



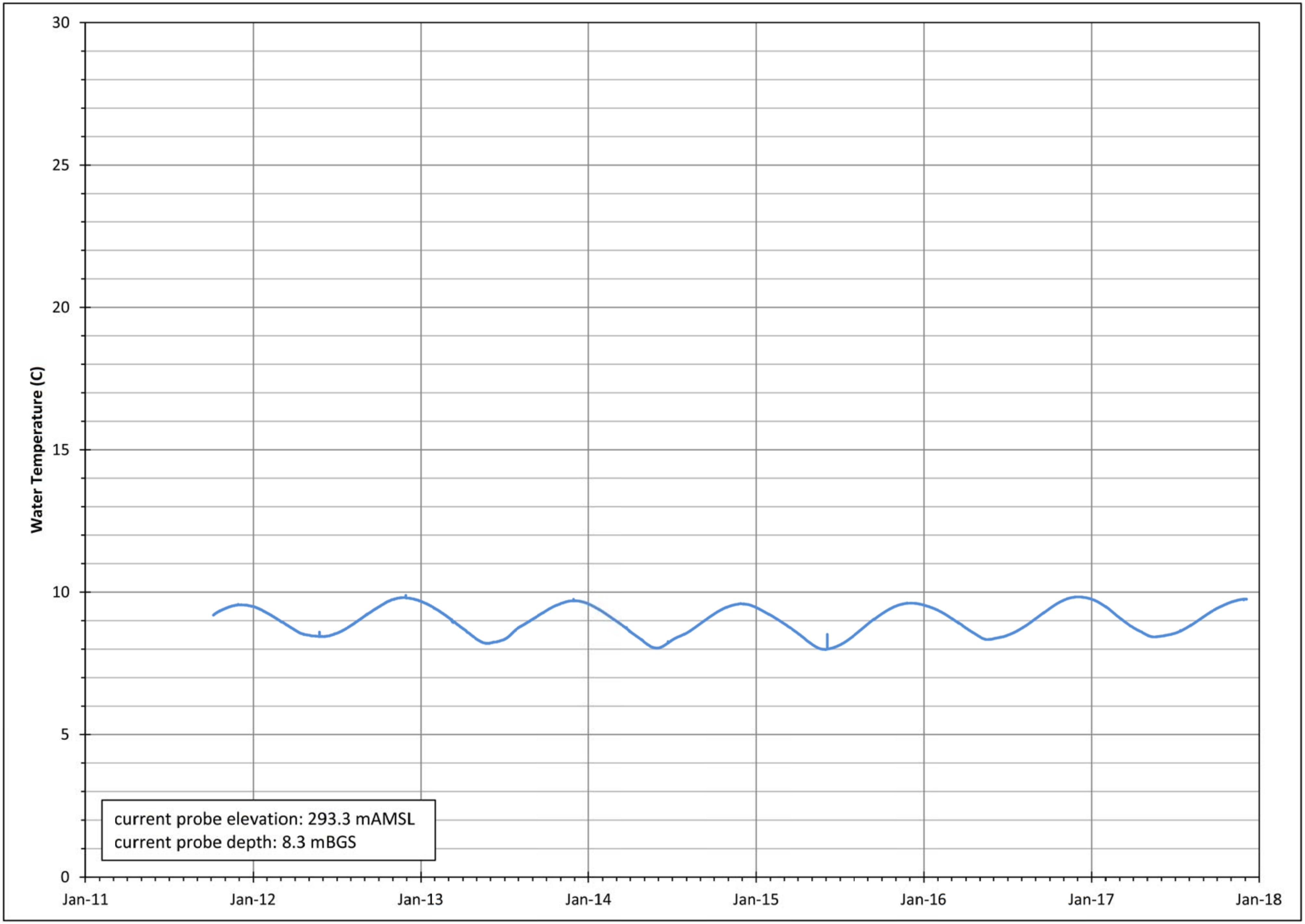
current probe elevation: 286.5 mAMSL
current probe depth: 14.0 mBGS

Figure C4: BH9-D Temperature Plot



current probe elevation: 297.7 mAMSL
current probe depth: 3.9 mBGS

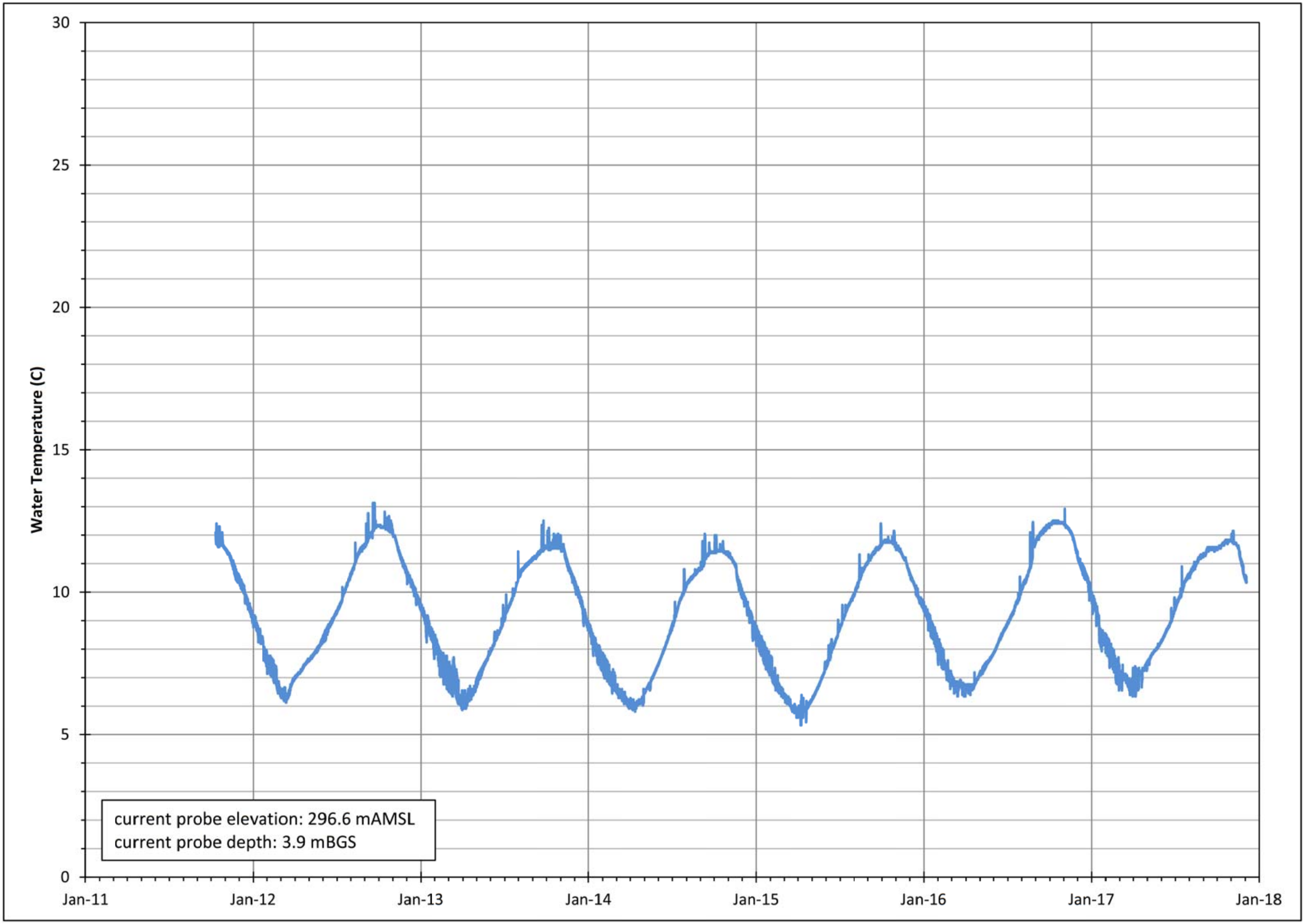
Figure C5: BH10-S Temperature Plot



CBM Aggregates
Roszell Road Pit

Figure C6: BH10-D Temperature Plot

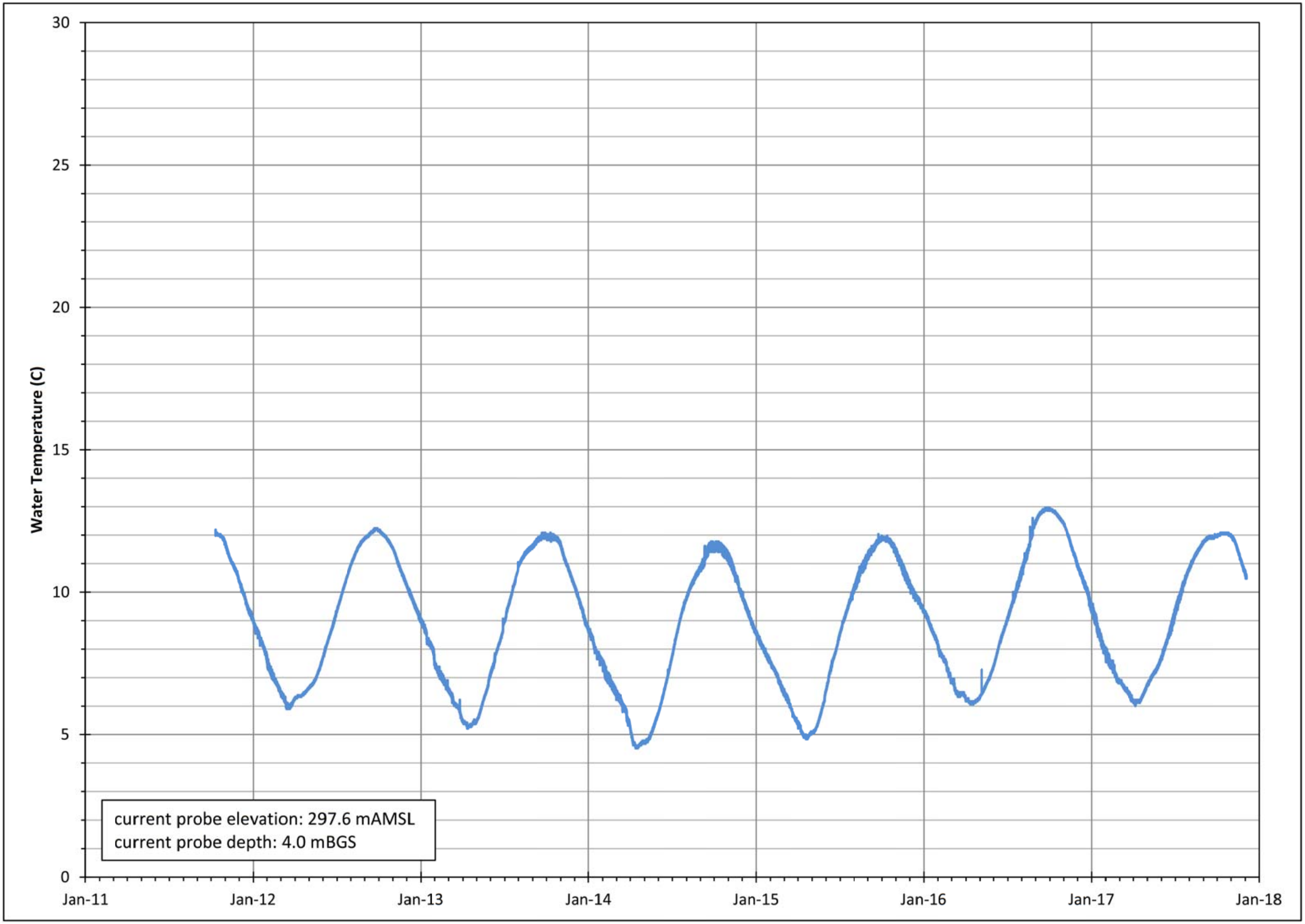
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C7: BH14 Temperature Plot

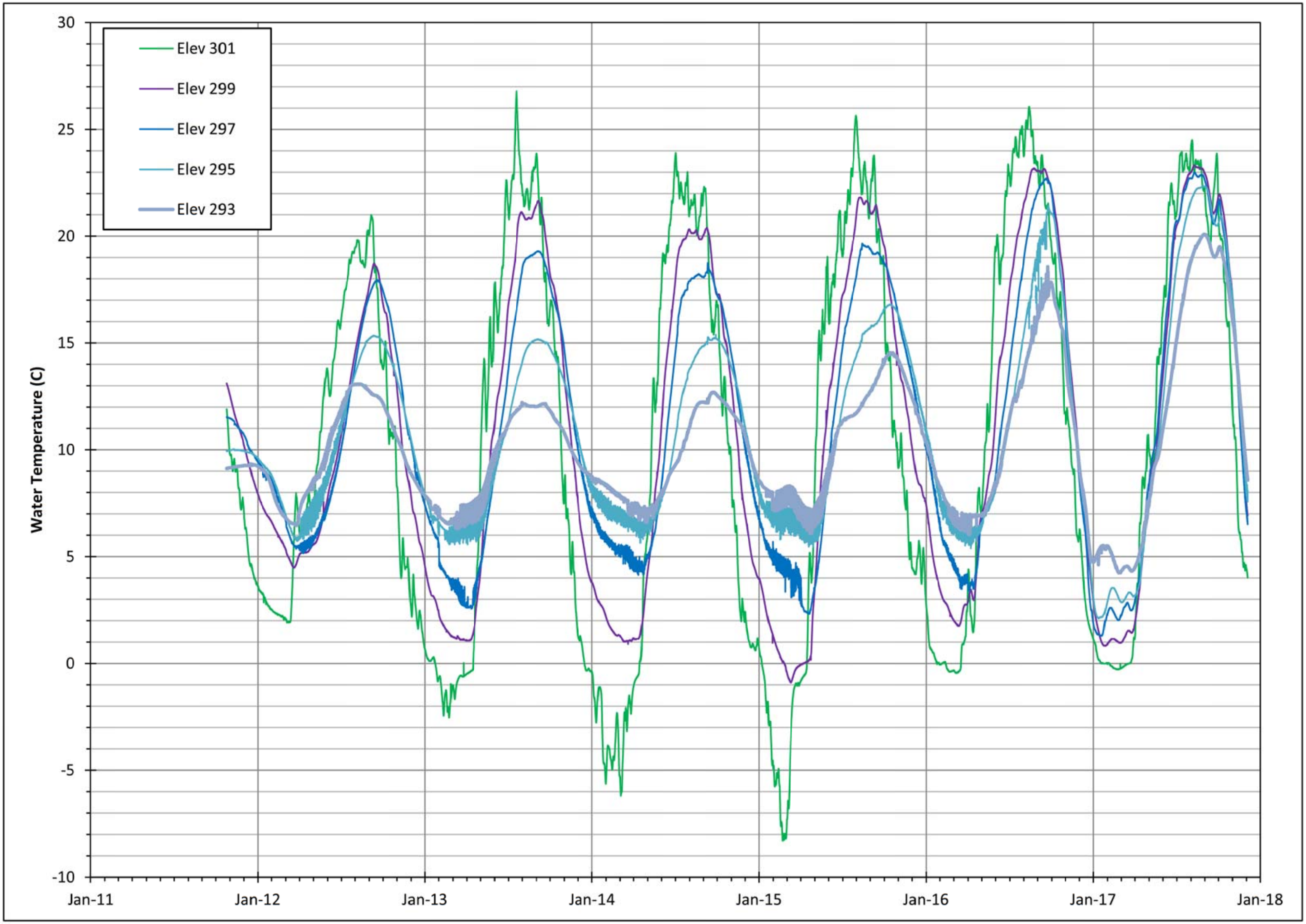
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C8: BH15 Temperature Plot

Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C9: BH16 Temperature Plot

Groundwater Science Corp.
Monitoring Program

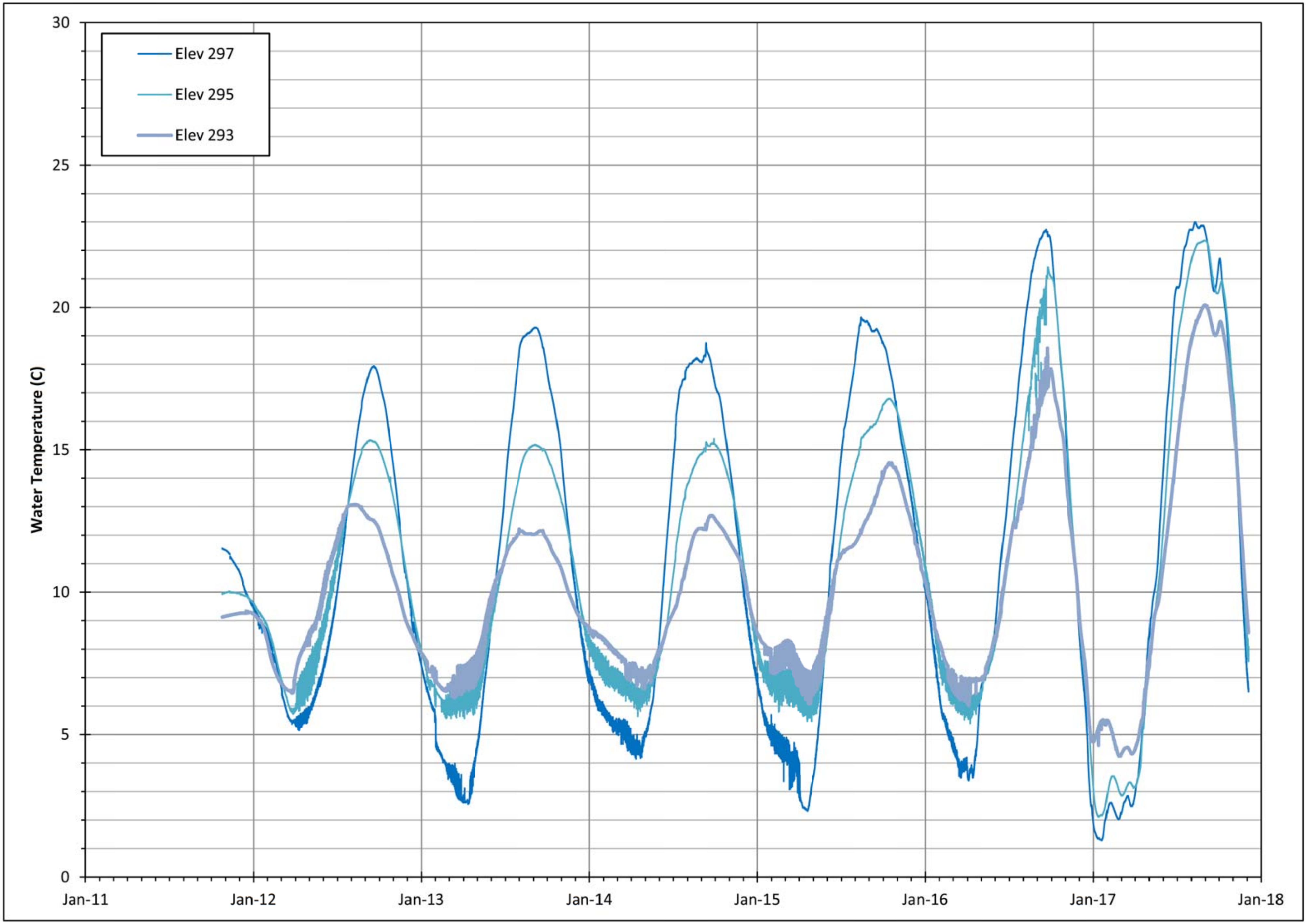
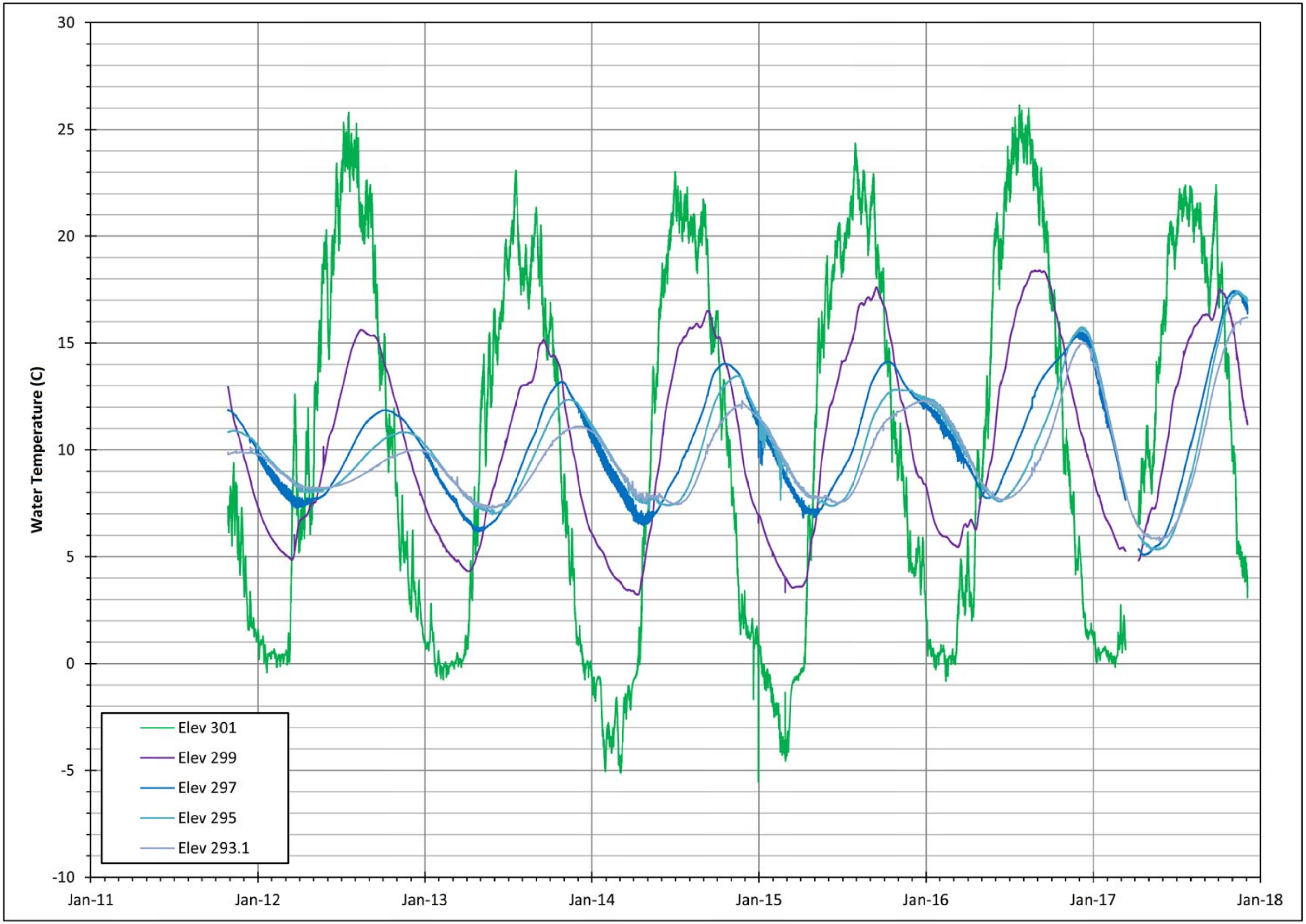


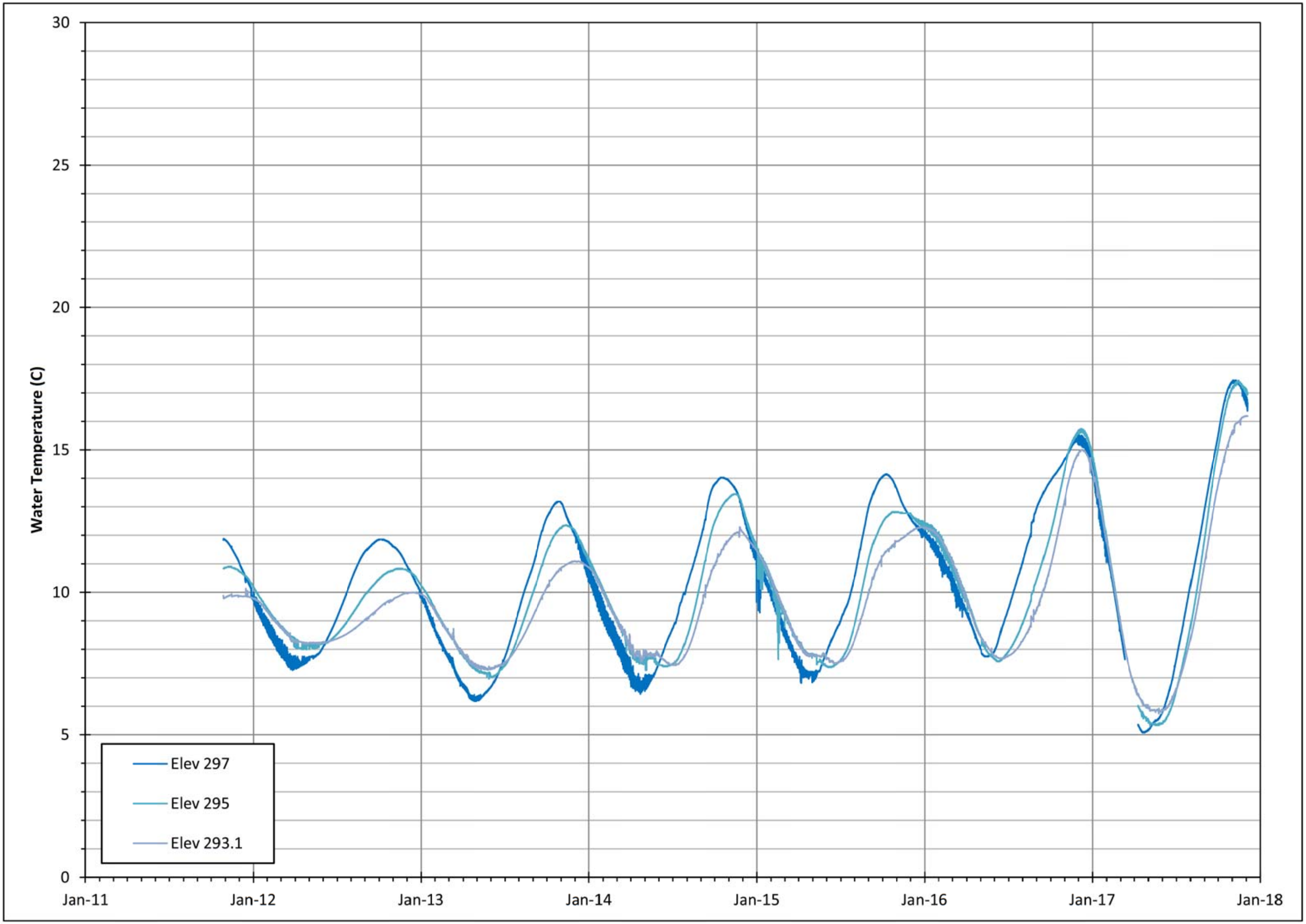
Figure C10: BH16 Groundwater Temperature Plot



CBM Aggregates
Roszell Road Pit

Figure C11: BH17 Temperature Plot

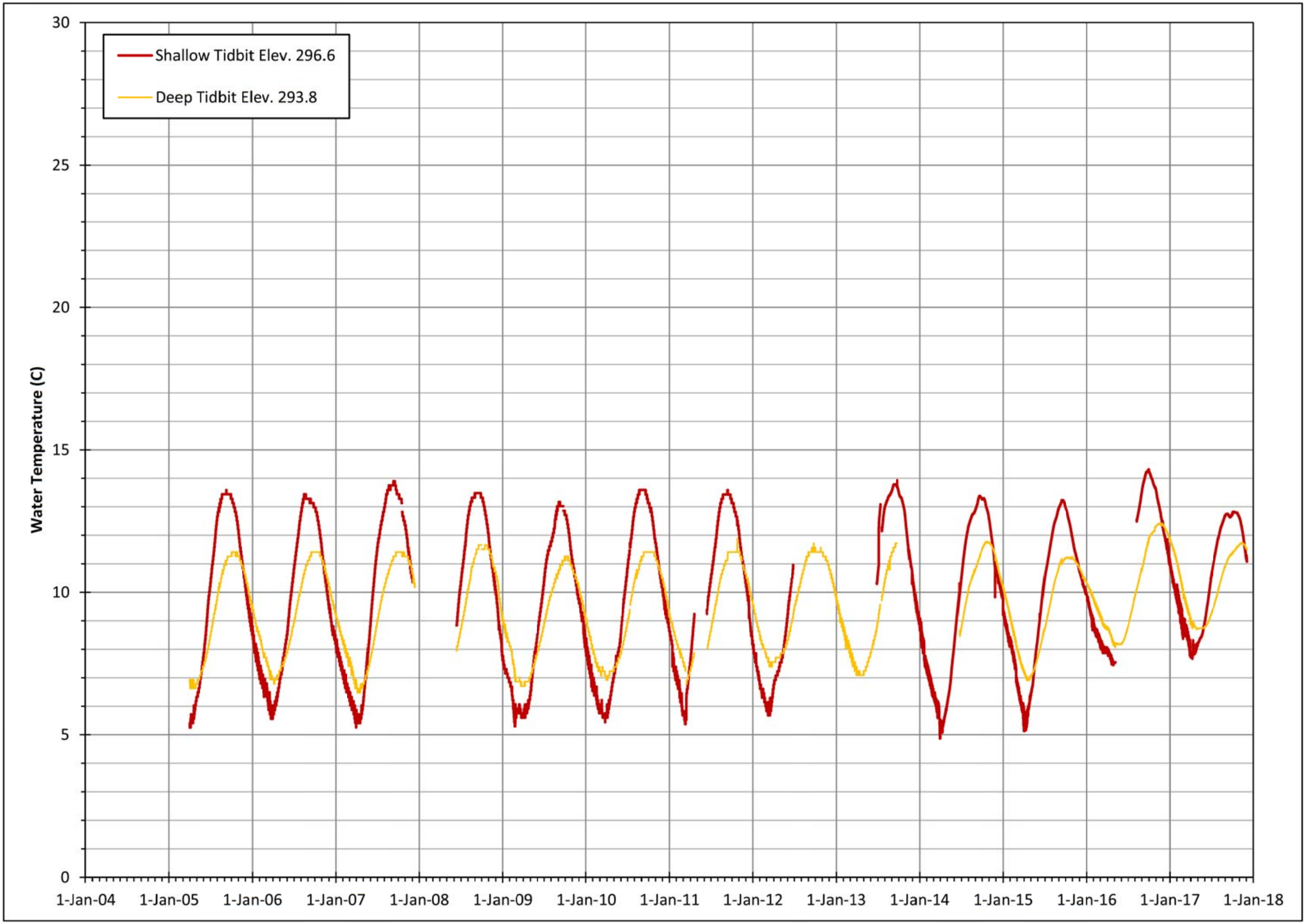
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C12: BH17 Groundwater Temperature Plot

Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C13: BH1 Long-Term Groundwater Temperature Plot

Groundwater Science Corp.
Monitoring Program

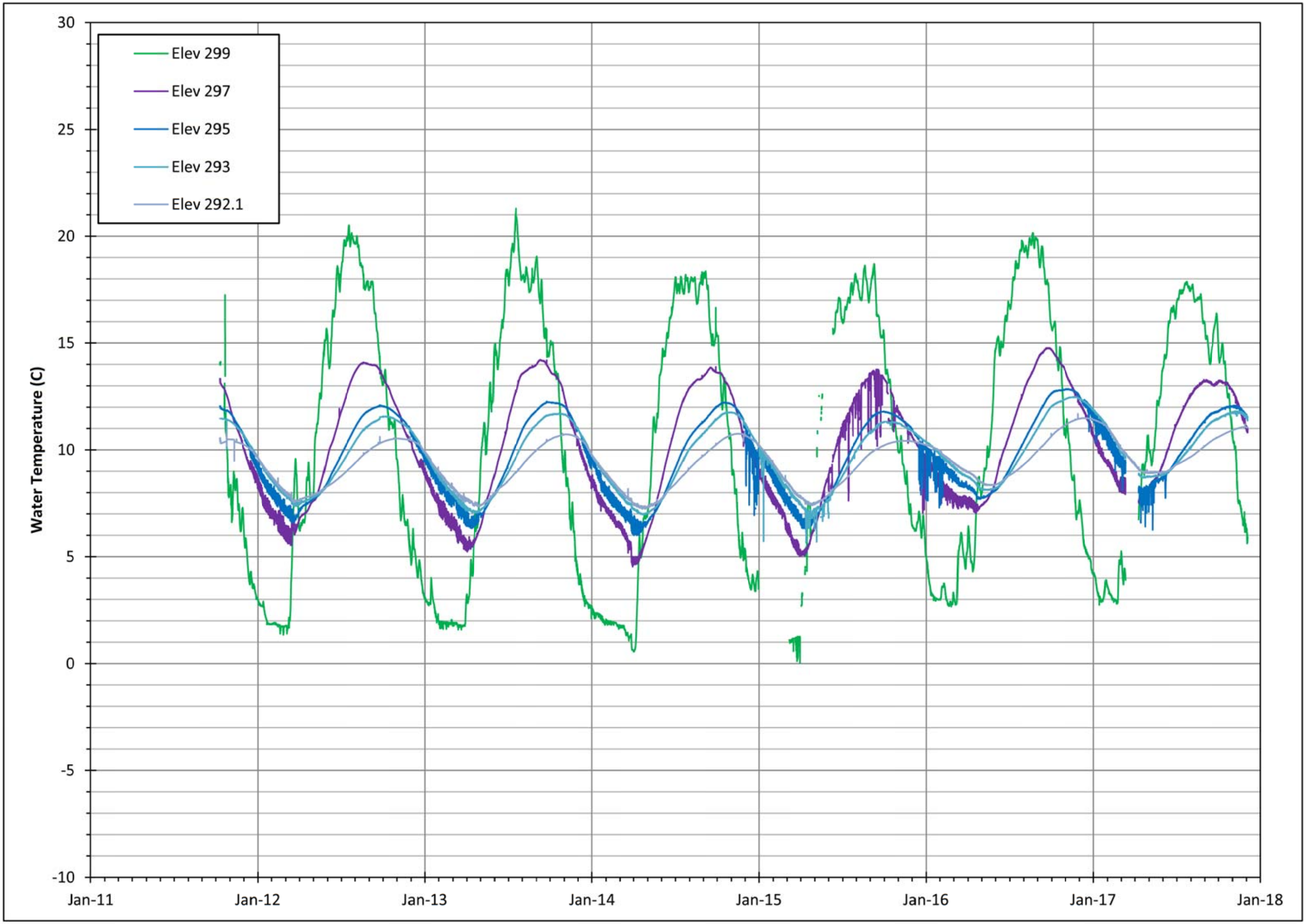
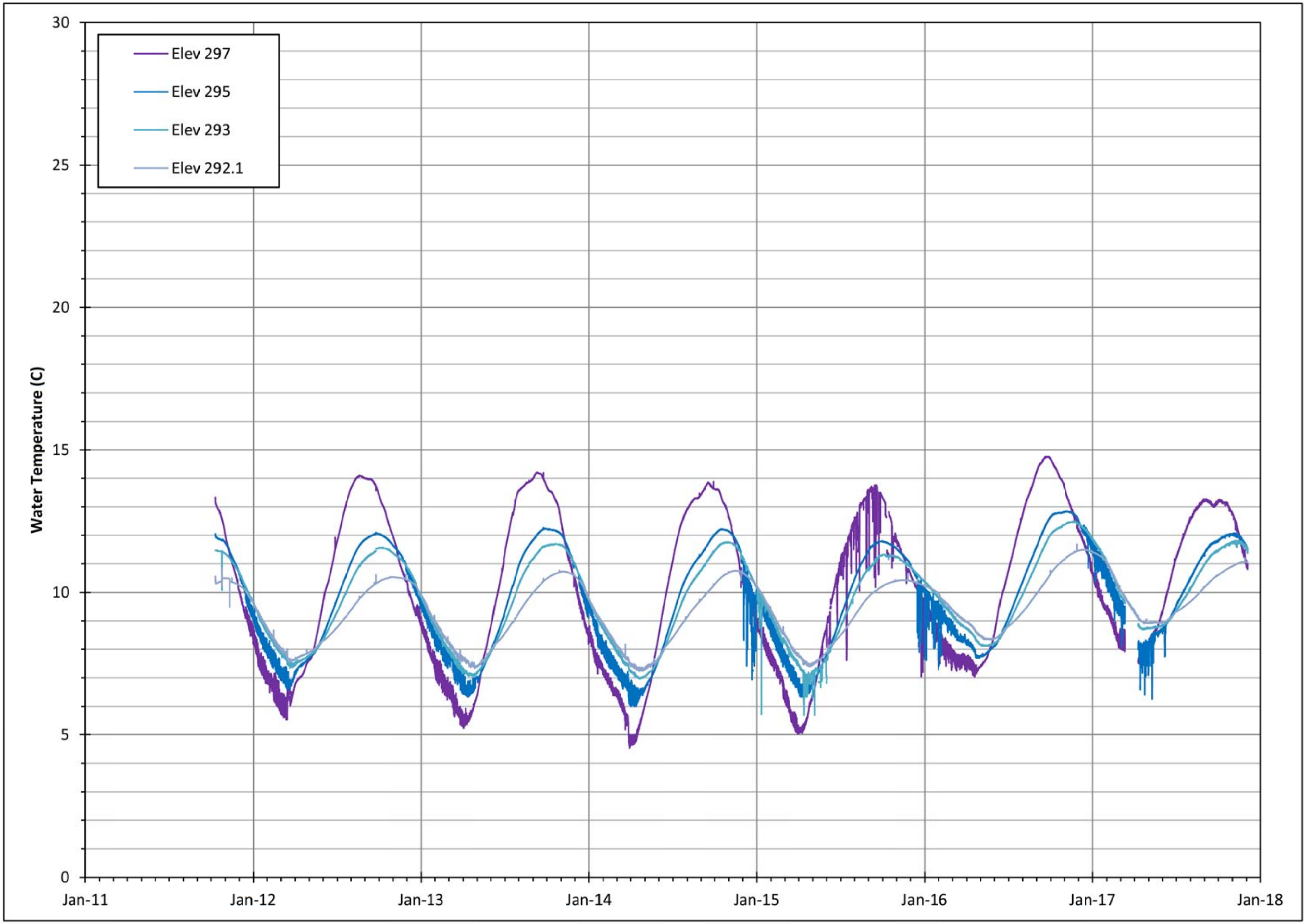


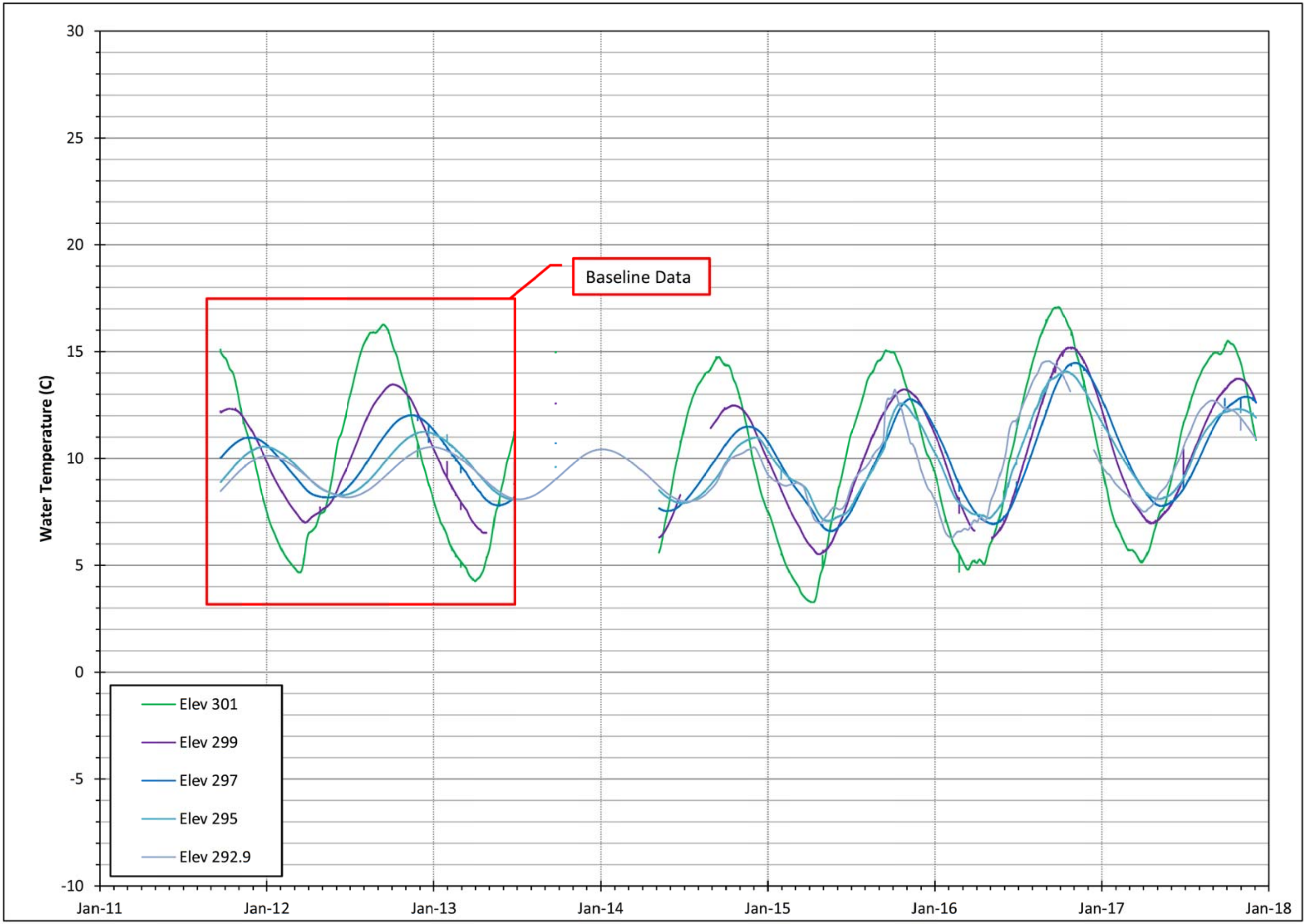
Figure C14: BH1 Temperature Plot



CBM Aggregates
Roszell Road Pit

Figure C15: BH1 Groundwater Temperature Plot

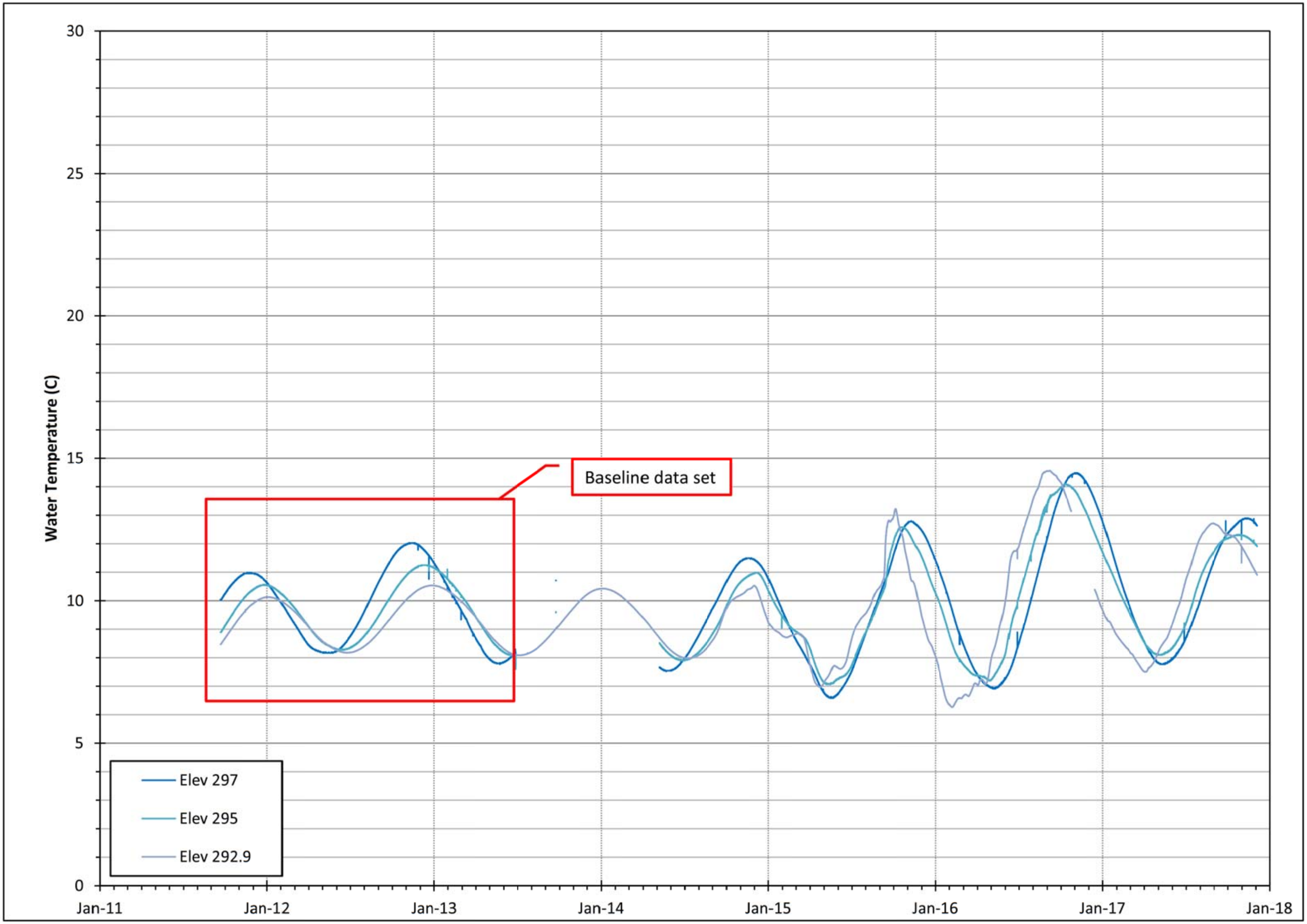
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C16: BH4-D Temperature Plot

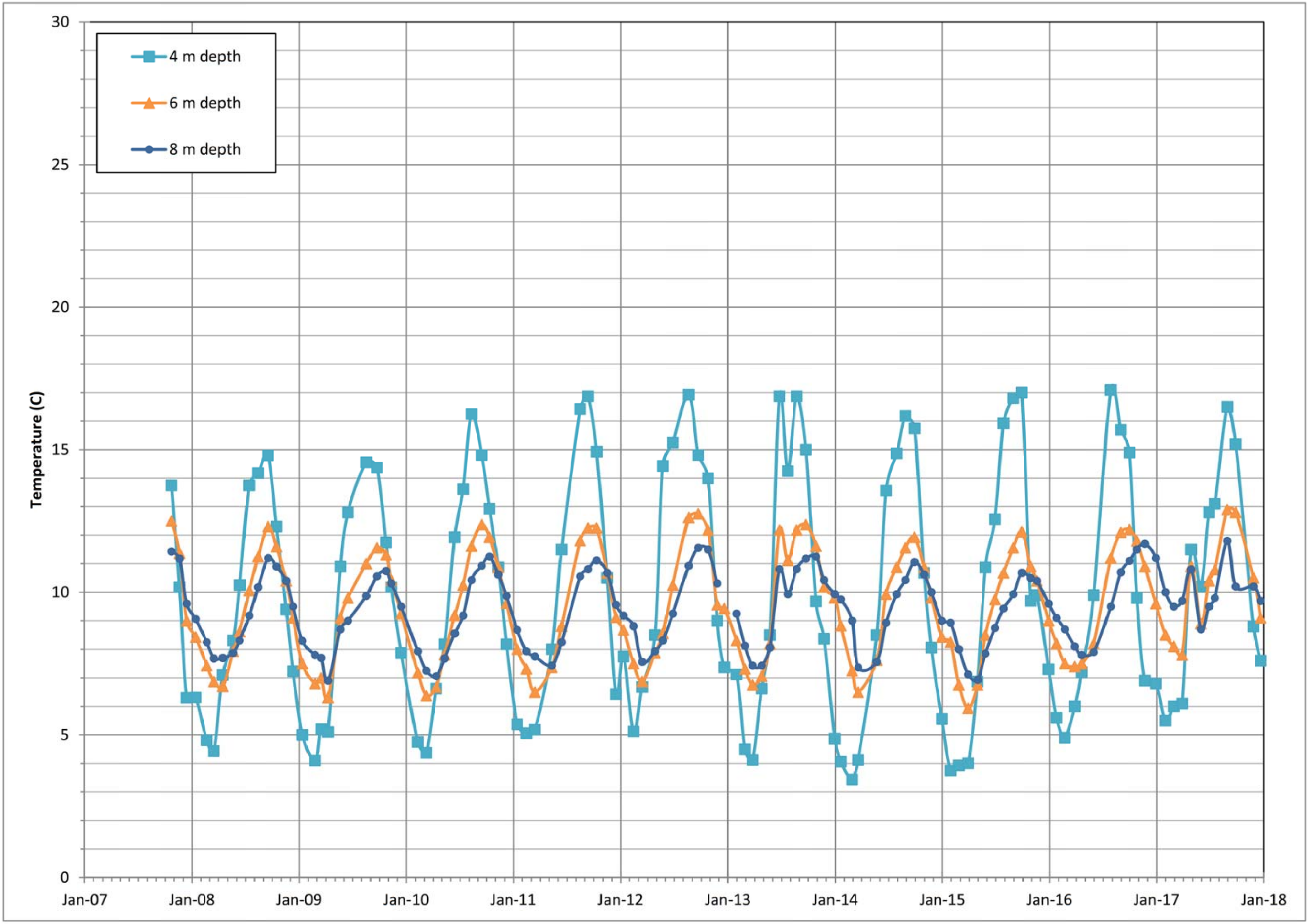
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C17: BH4-D Groundwater Temperature Plot

Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C18: BH2-D Upper Zone Manual Profile Measurements

Groundwater Science Corp
Monitoring Program

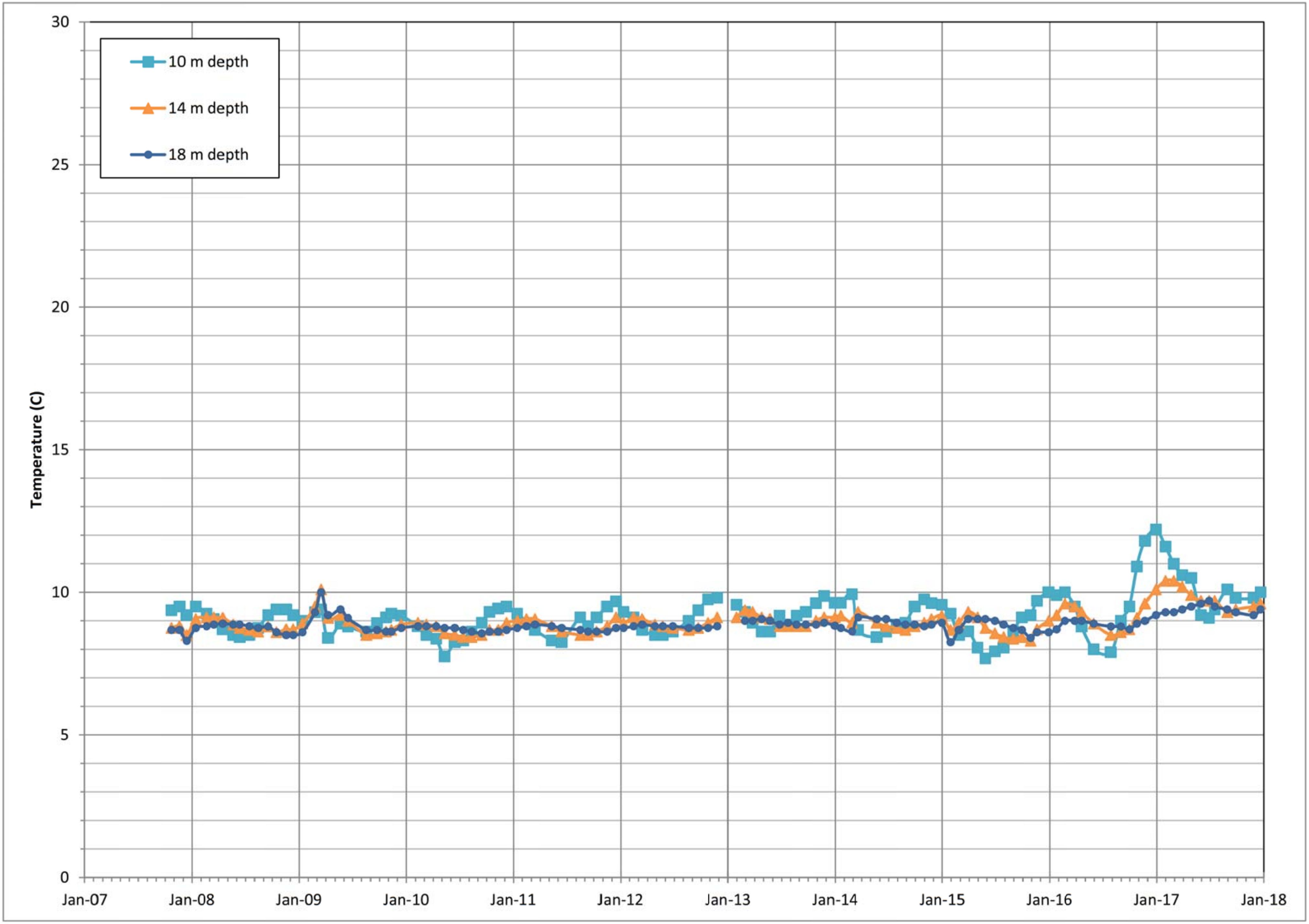
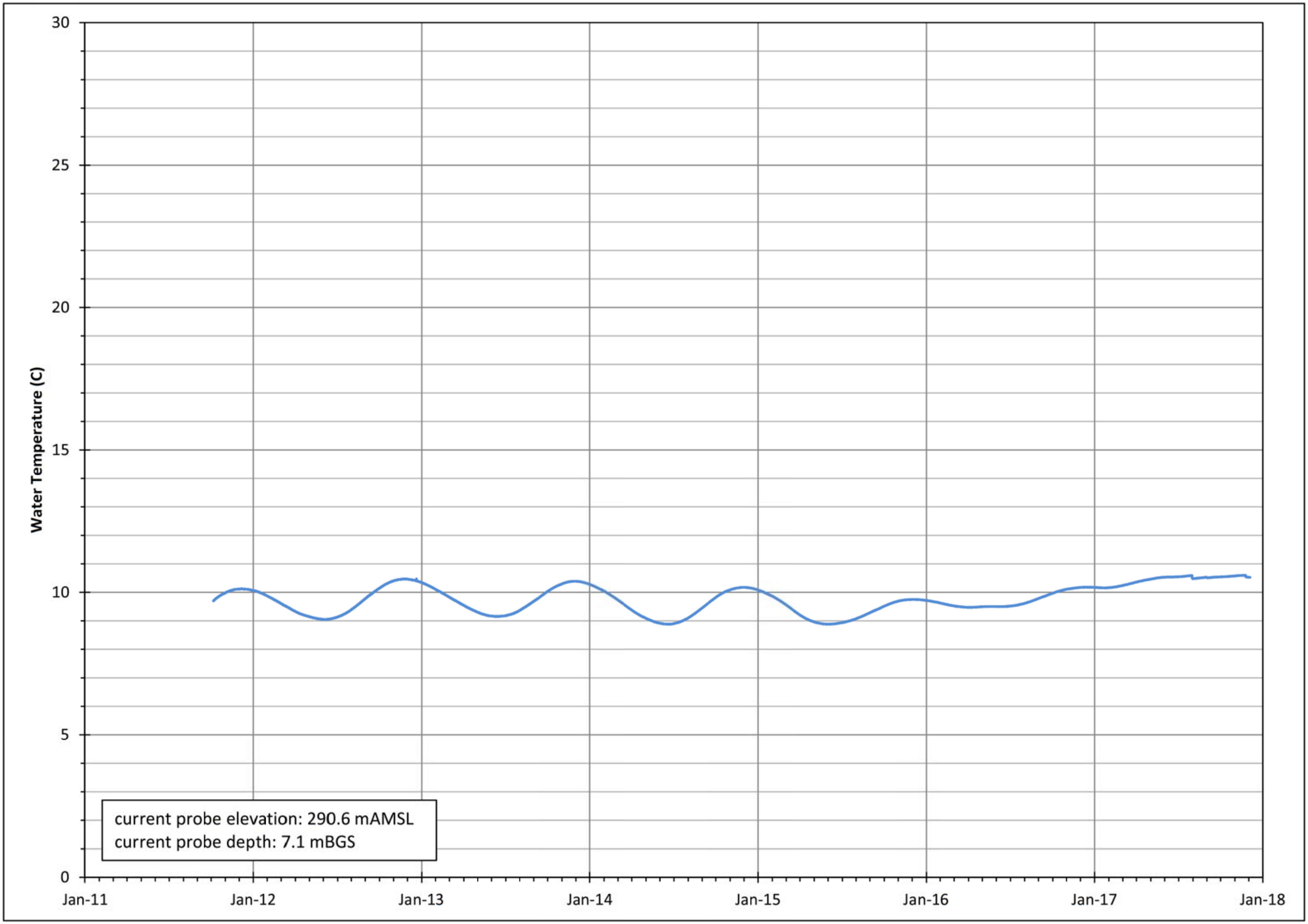


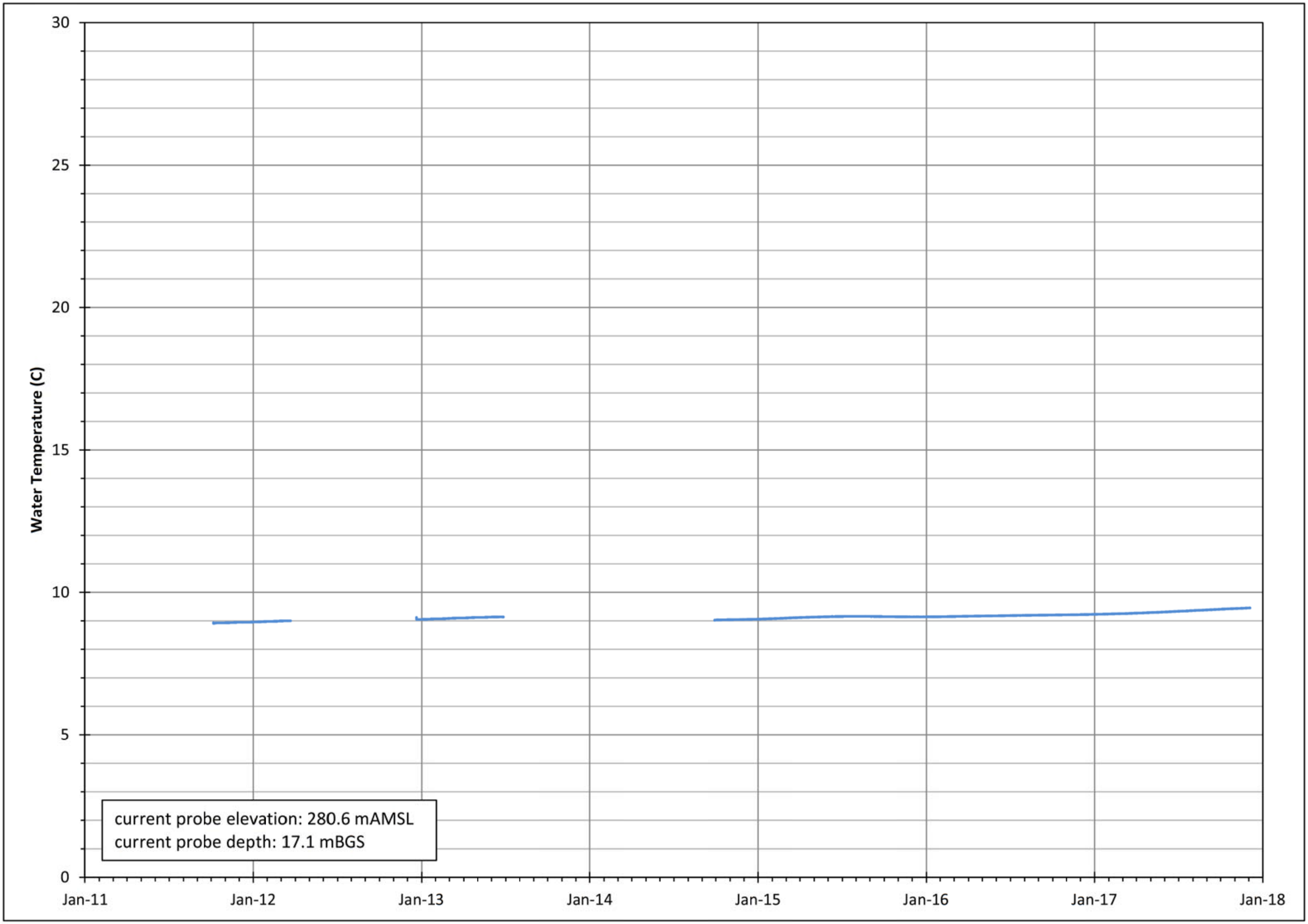
Figure C19: BH2-D Deep Zone Manual Profile Measurements



CBM Aggregates
Roszell Road Pit

Figure C20: BH3-S Temperature Plot

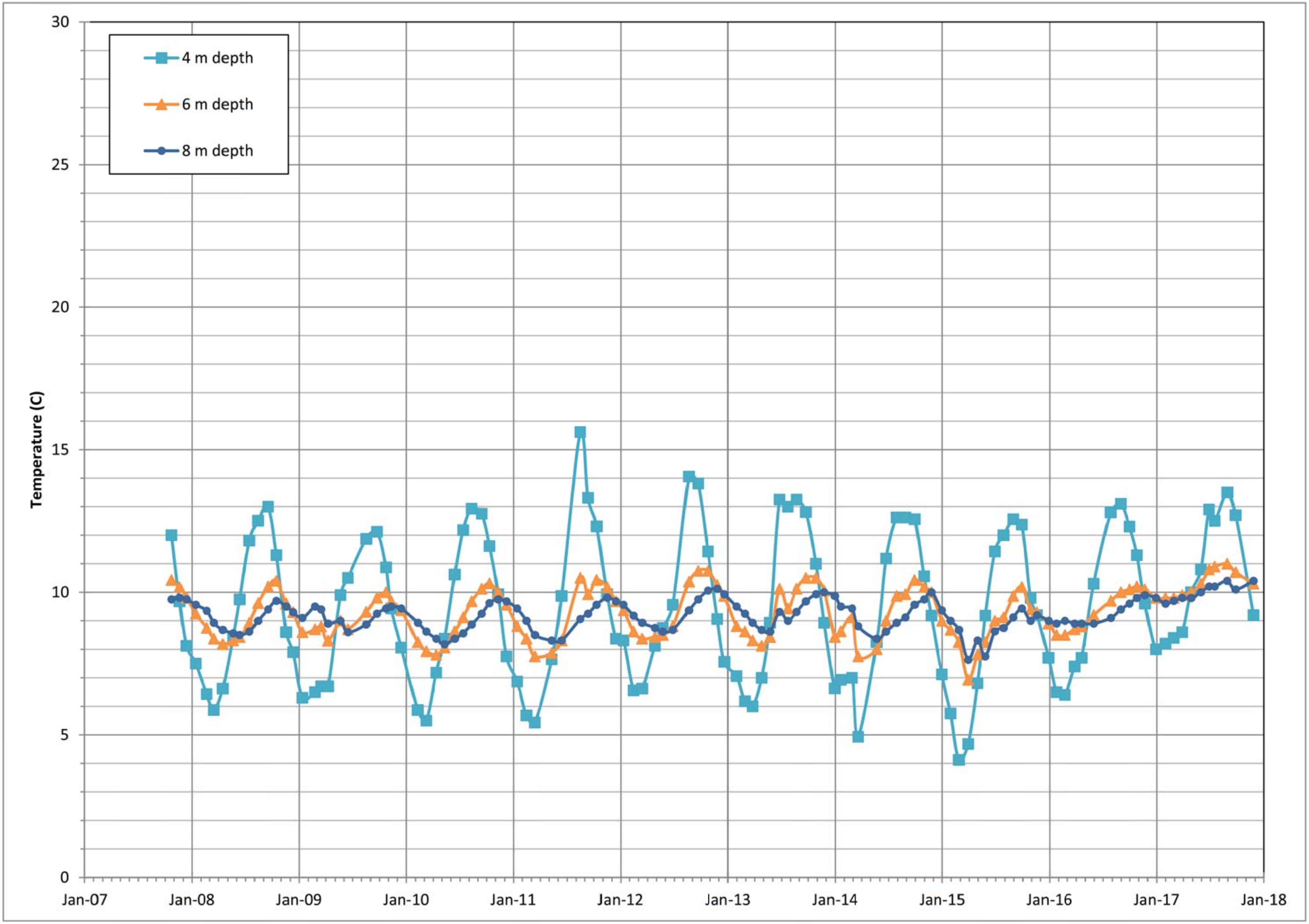
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C21: BH3-D Temperature Plot

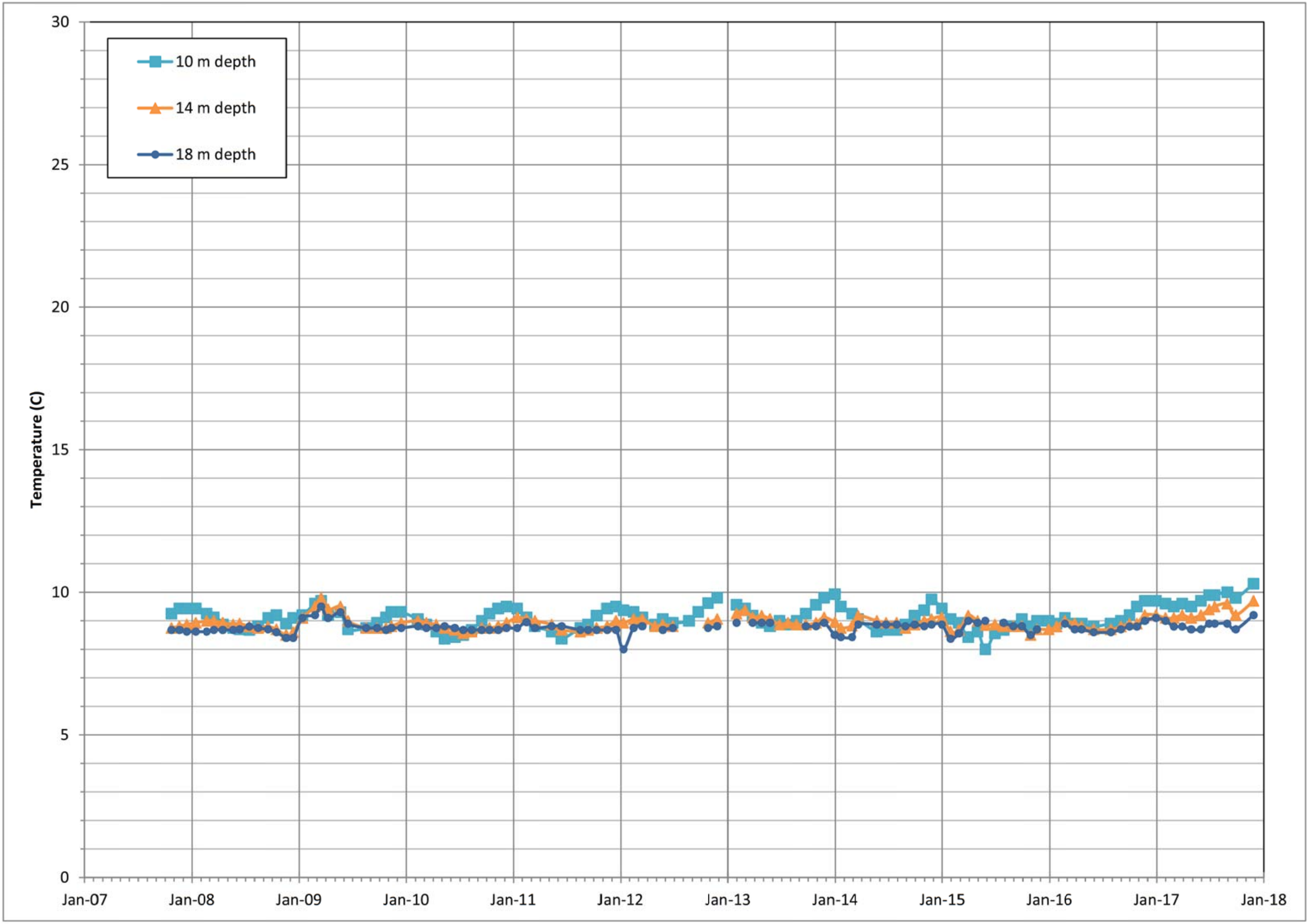
Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C22: BH3-D Shallow Zone Manual Profile Measurements

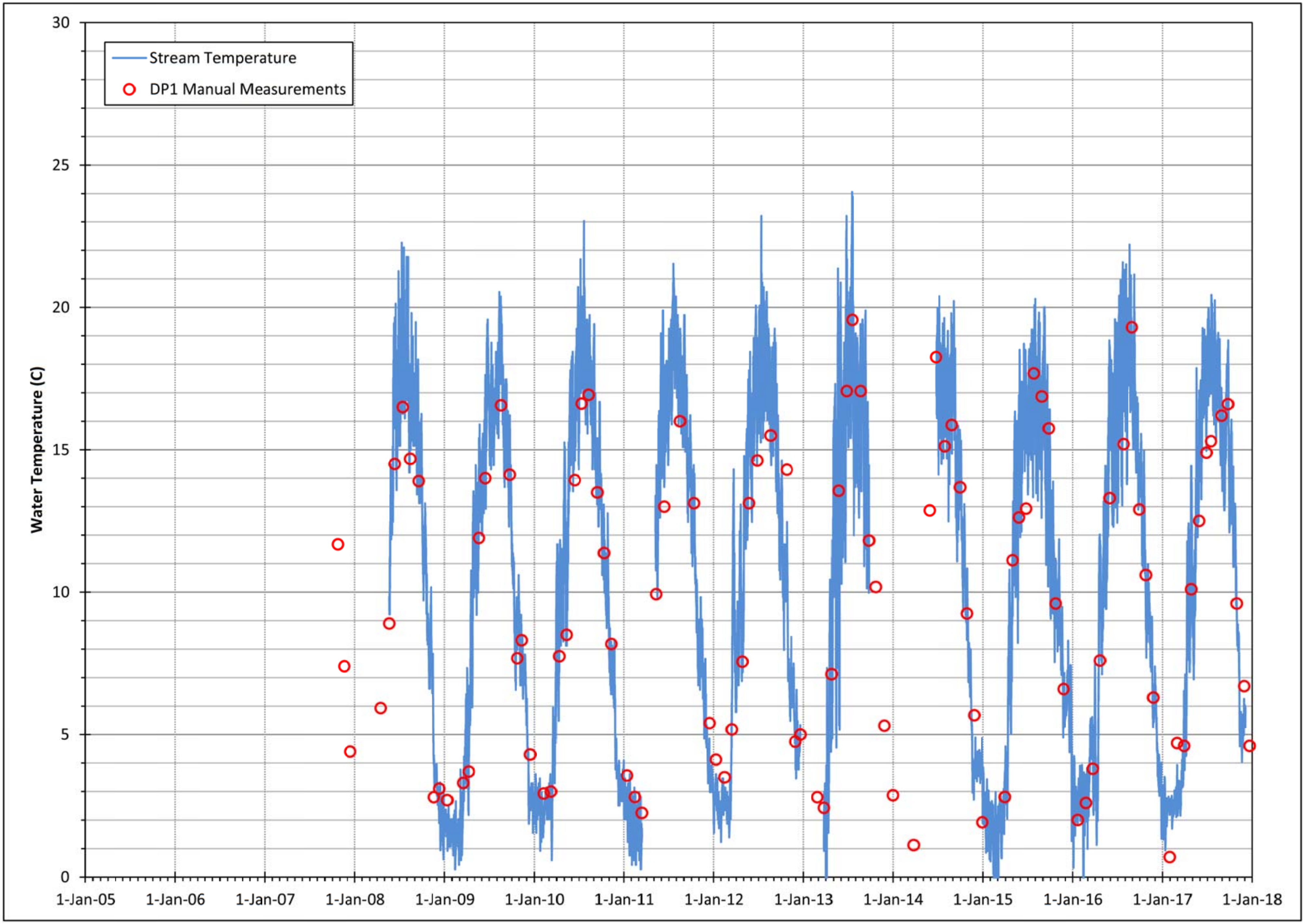
Groundwater Science Corp
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C23: BH3-D Deep Zone Manual Profile Measurements

Groundwater Science Corp
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure C24: DP1 Manual Measurements vs SW2 Stream Temperature Measurements

Groundwater Science Corp.
Monitoring Program

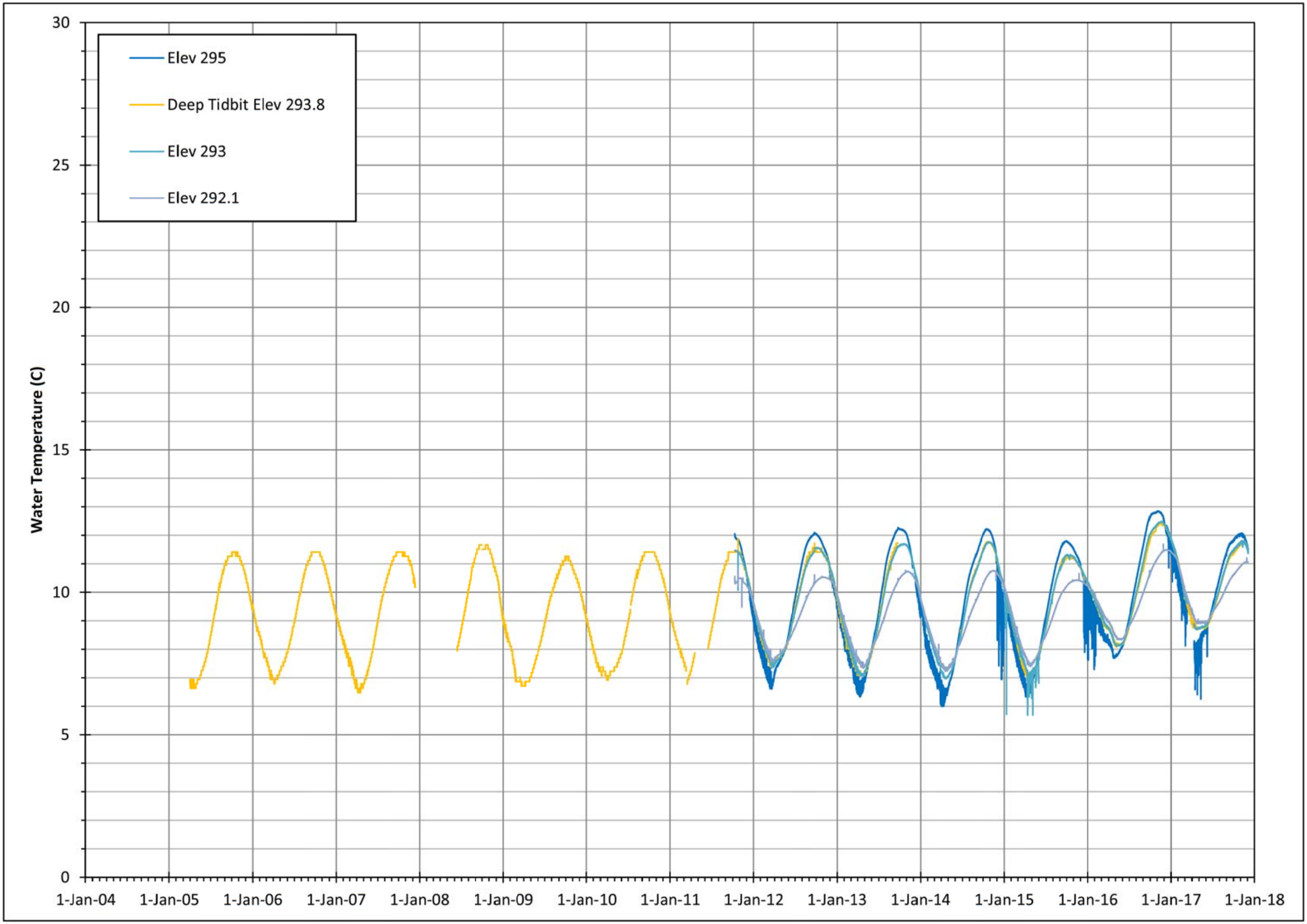


Figure C25: BH1 Groundwater Temperature Within Well Screen

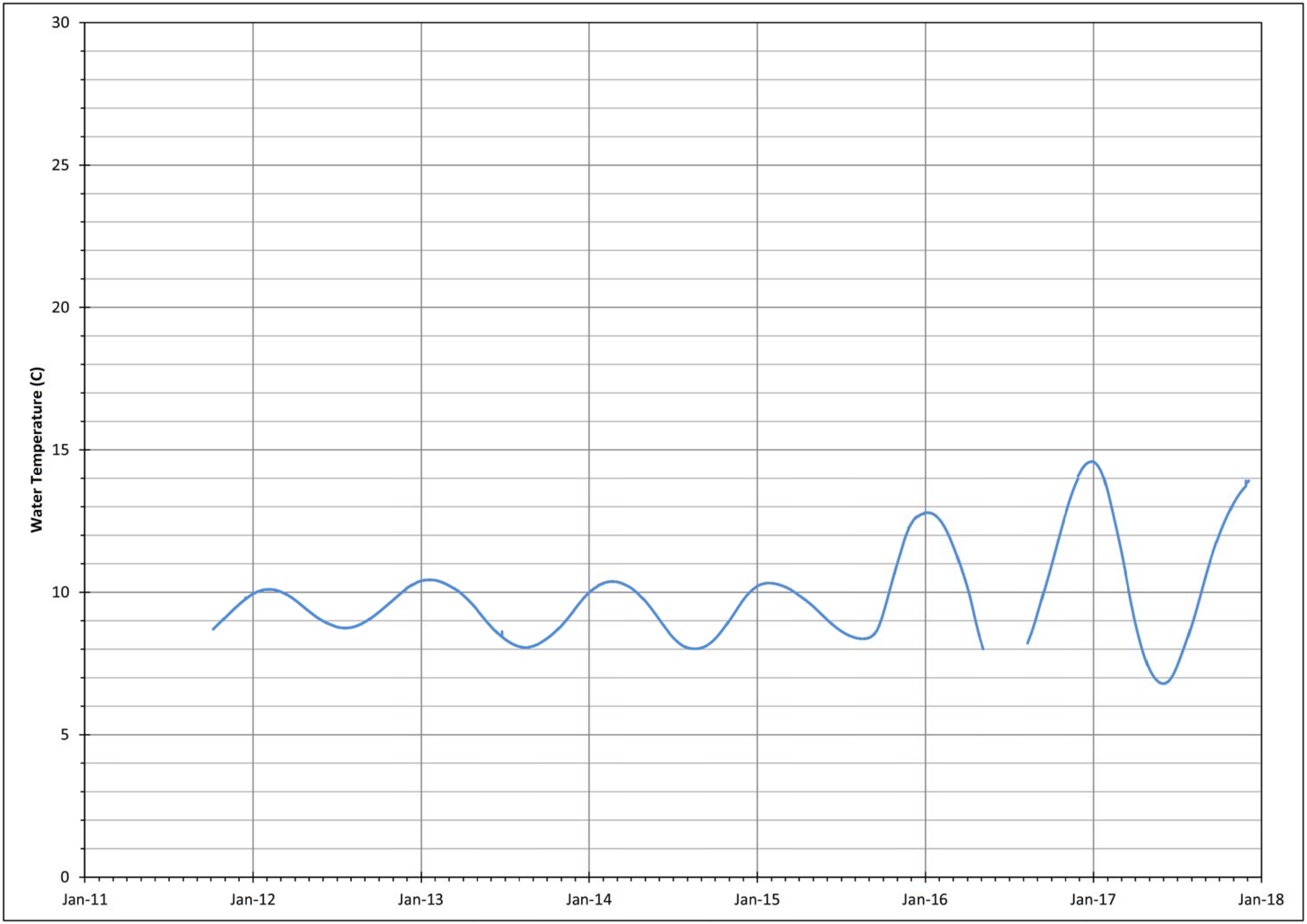


Figure C26: BH7-D Groundwater Temperature Within Well Screen

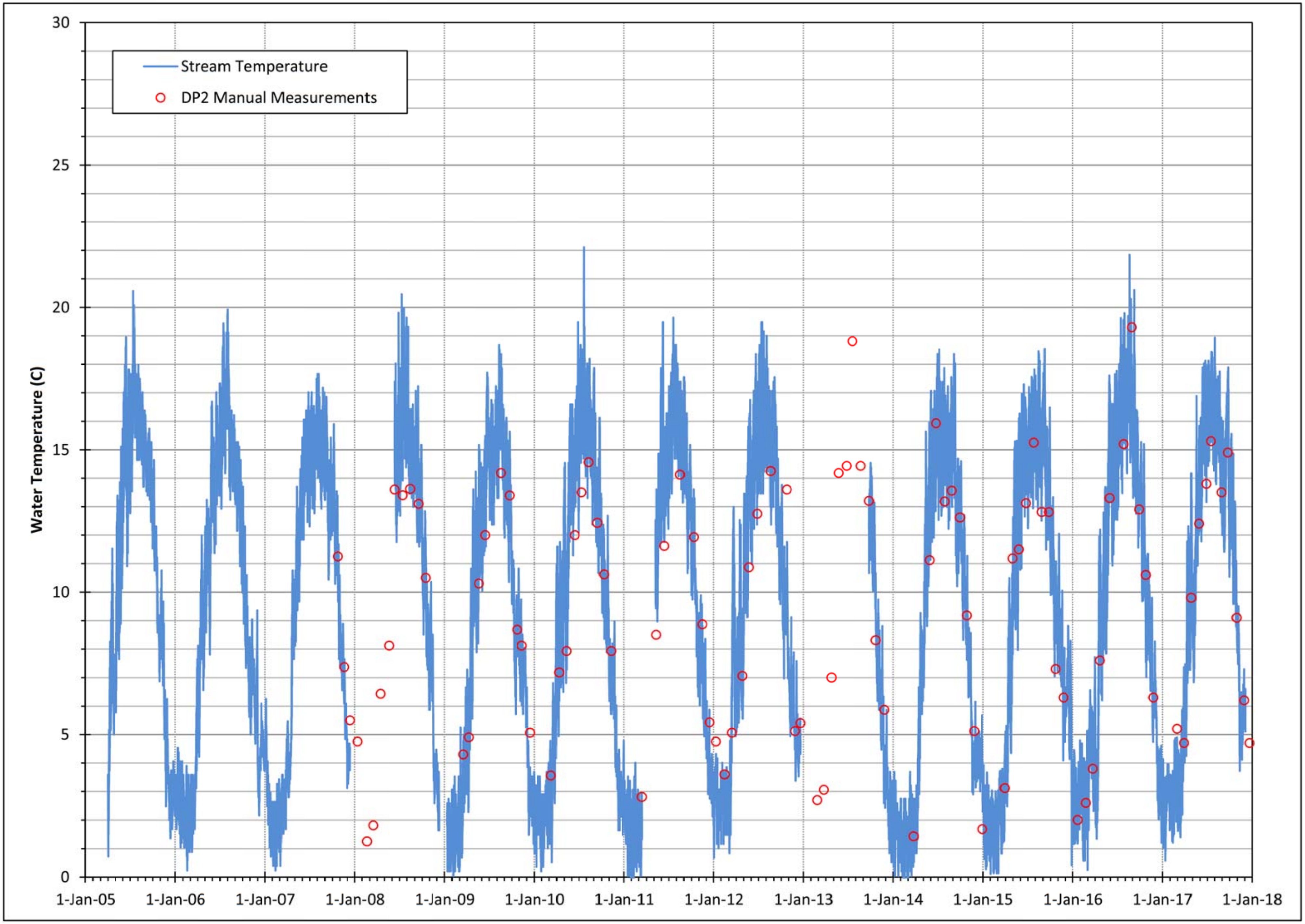


Figure C27: SW3 and DP2 Temperature Plot

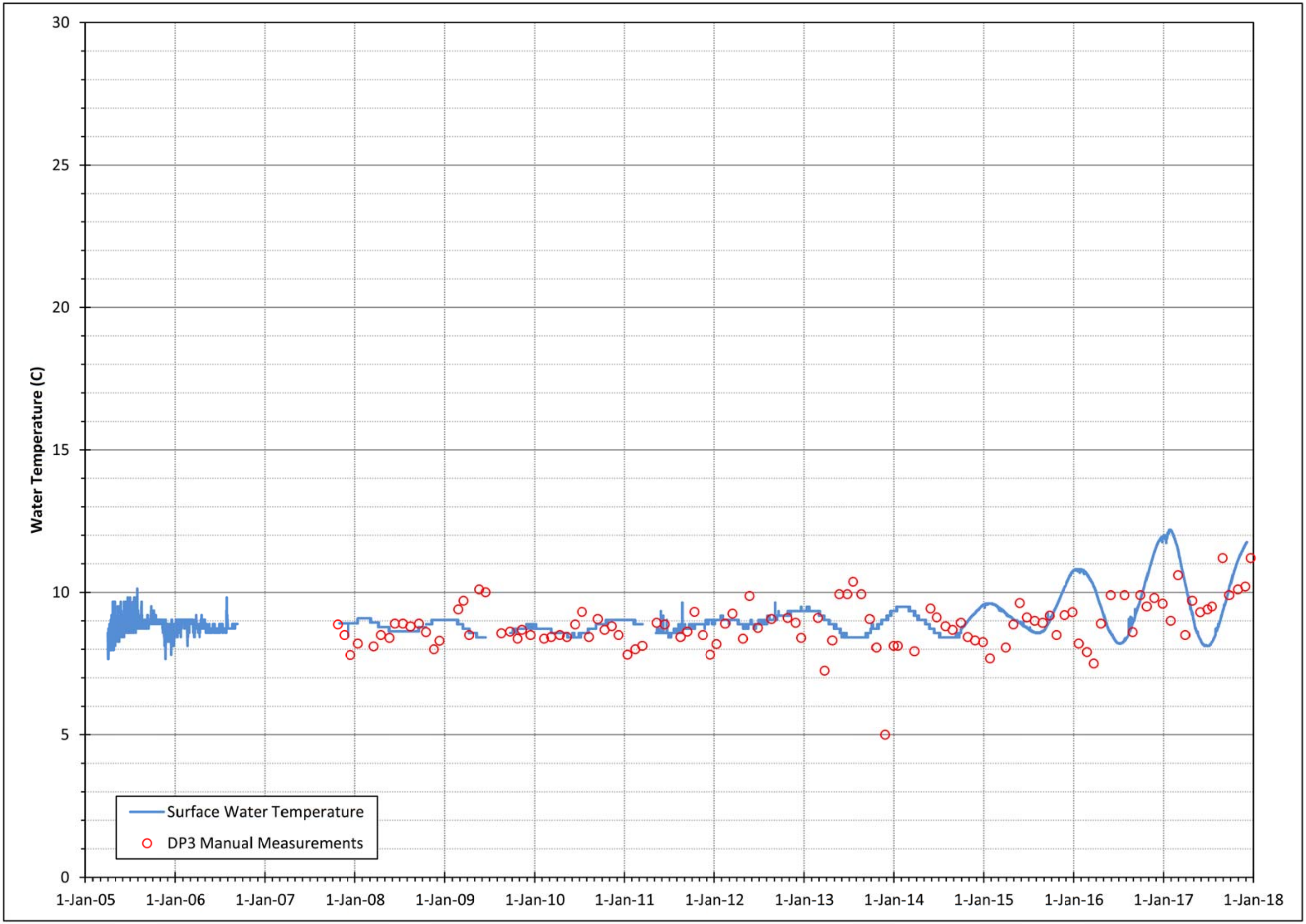
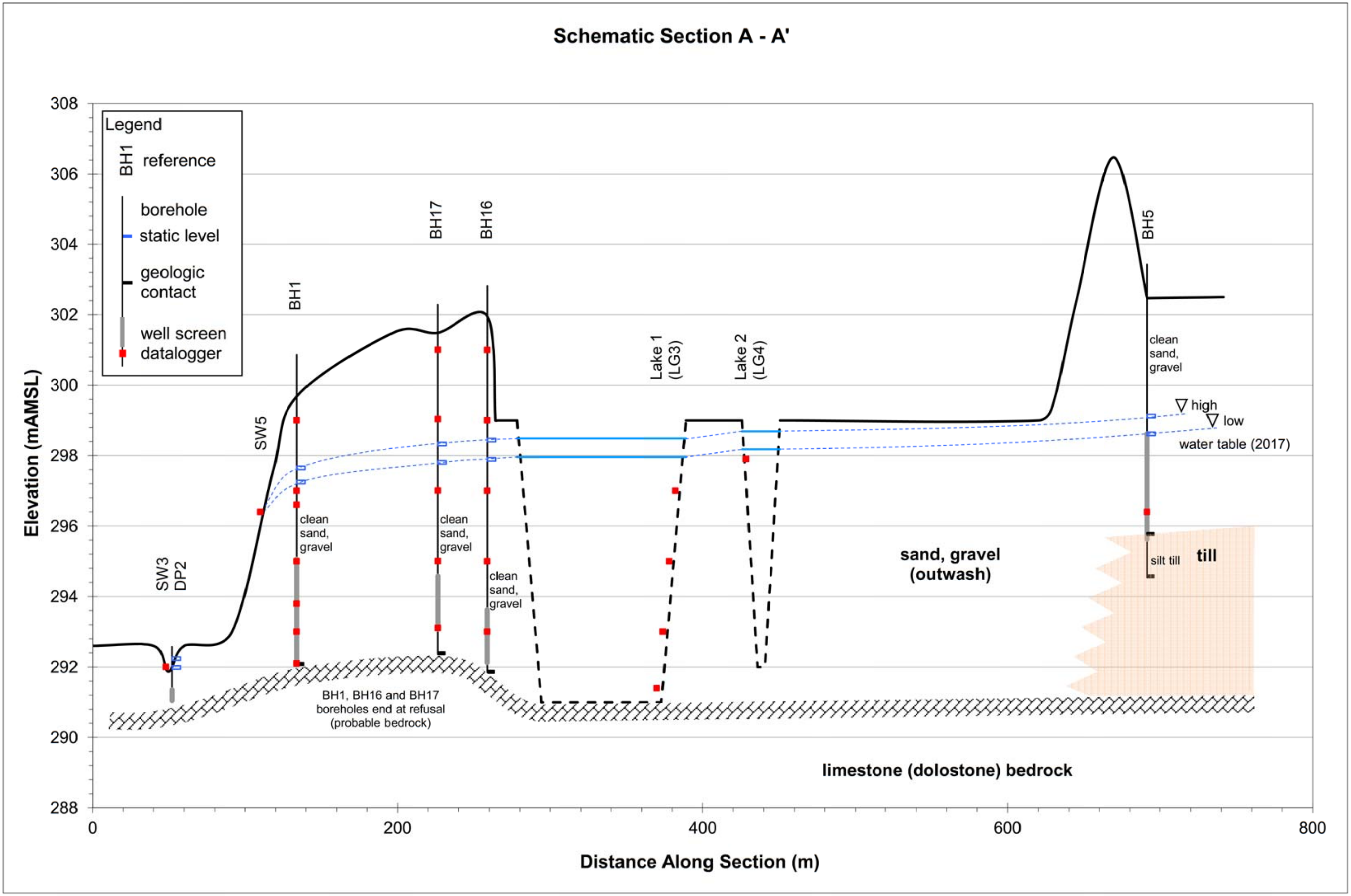


Figure C28: SW8 and DP3 Temperature Plot

Appendix D

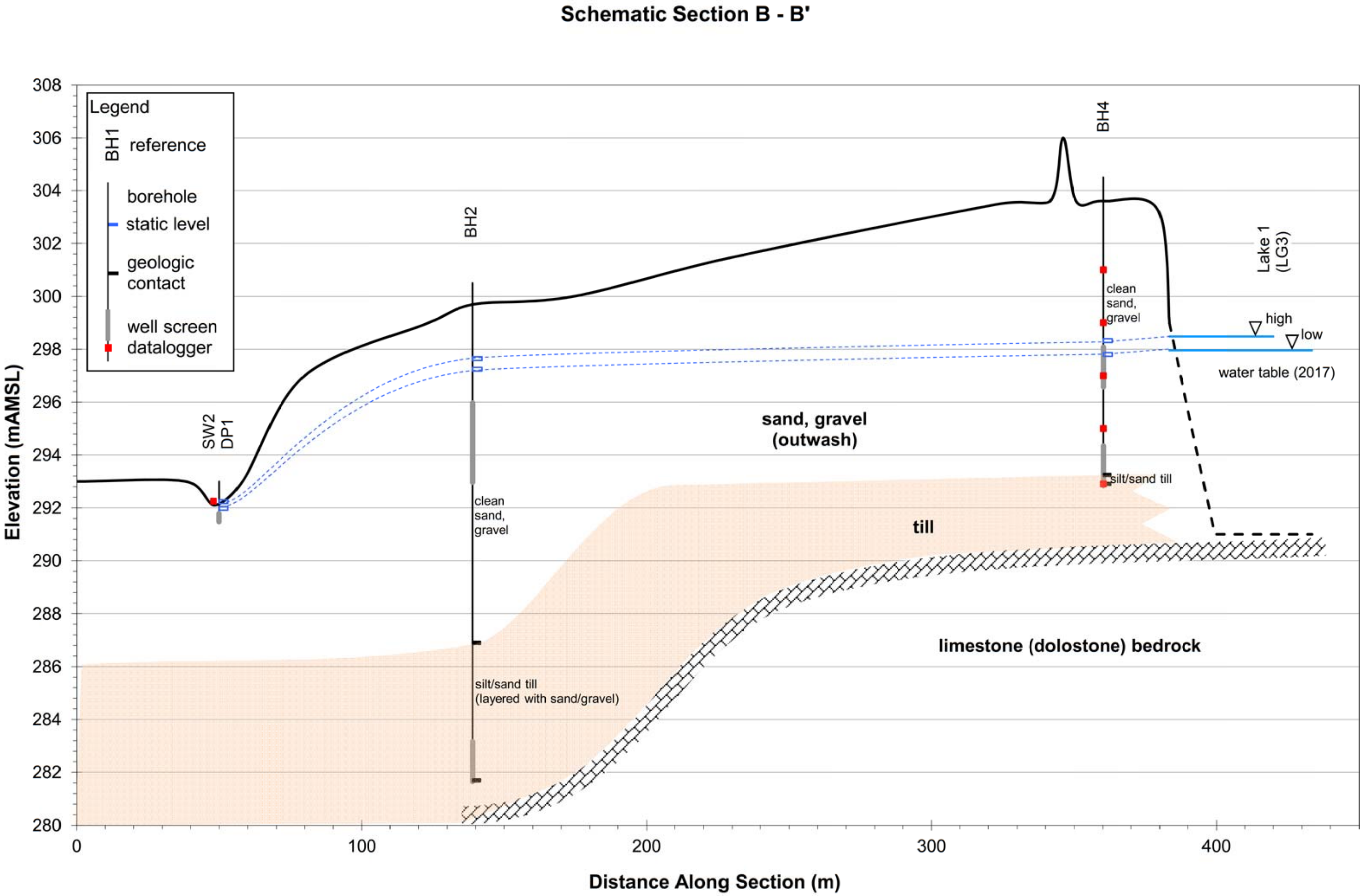
Cross-Sections and Borehole Logs



CBM Aggregates
Roszell Road Pit

Figure D1: Schematic Section A-A'

Groundwater Science Corp.
Monitoring Program



CBM Aggregates
Roszell Road Pit

Figure D-2: Schematic Section B-B'

Groundwater Science Corp.
Monitoring Program

BOREHOLE LOG

Borehole: BH1

Project: Roszell Road Property
Location: pasture south of house, near west edge of field
Method: Hollow Stem Auger
Samples: Auger Cuttings and Split Spoon Samples

Date: March 17, 2004
Supervisor: A.H.P.
Elevations TOC: 300.86 mAMSL
GS: 299.68 mAMSL

Depth		Sample			Description
Ft.	m.	No.	Type	Rec.	
					Sand and Gravel
			AC		- brown clean sand and gravel, stones
			AC		- as above, grey
			AC		- as above
		1	SS	0%	- auger and sample refusal (bedrock?) at 7.6 m
					End of Hole at 7.6 m

Monitor Installation

bentonite (holeplug) seal to surface

water level at 2.0 m depth Mar. 22, 2004

screen length 3.0 m

silica sand-pack

nominal 5 cm diameter PVC riser pipe and machine slotted screen

BOREHOLE LOG

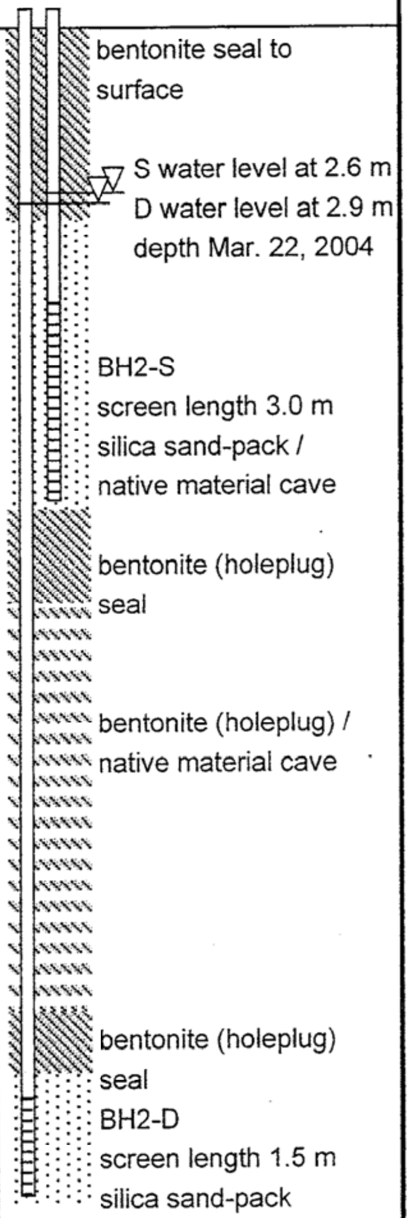
Borehole: BH2

Project: Roszell Road Property
Location: pasture north of house, NE corner of property
Method: Hollow Stem Auger
Samples: Auger Cuttings and Split Spoon Samples

Date: March 18, 2004
Supervisor: A.H.P.
Elevations TOC: 300.50 mAMSL
GS: 299.69 mAMSL

Depth Ft.	Depth m.	Sample No.	Sample Type	Sample Rec.	Description
0	0				
					Sand and Gravel
			AC		- brown fine to medium sand, medium gravel, stones, minor silt
	2				
10			AC		- grey, increasing stone content
	4				
			AC		
20	6				
			AC		- as above
	8				
		1	SS	50%	- grey fine to medium sand, some silt, some gravel
30					
	10				
		2	SS	75%	- grey fine to medium sand, medium to coarse gravel, clean
40	12				
					Layered Till / Gravel
		3	SS	25%	- tan / light brown silty sand and gravel with stones, till-like
	14				
50					
		4	SS	75%	- layered: sand gravel layers, clayey silt to silty clay layers, silt/sand till layers
	16				
		5	SS	50%	- sandy silt/clay till
60	18				
					End of Hole at 18.0 m
	20				
70					
	22				
	24				
80					

Monitor Installation



nominal 2.5 cm diameter PVC riser pipes and machine slotted screens

BOREHOLE LOG

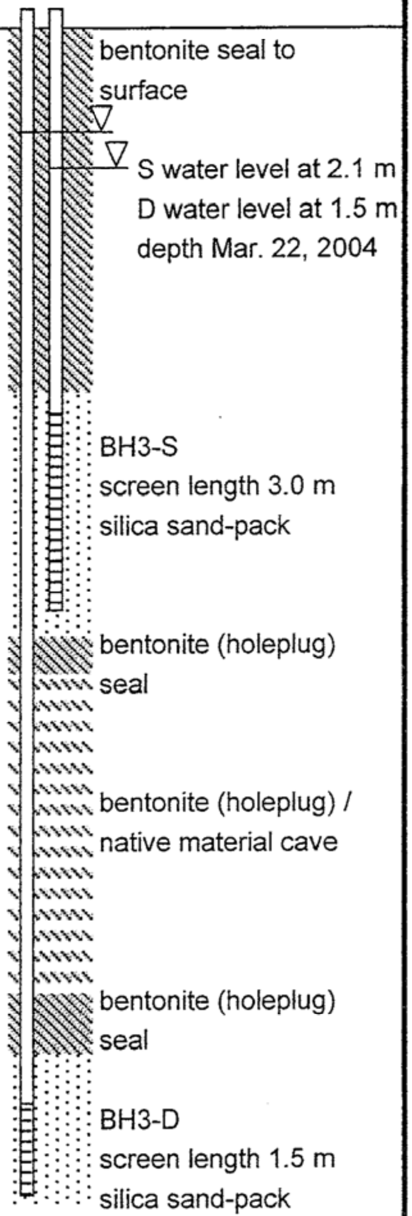
Borehole: BH3

Project: Roszell Road Property
Location: pasture north of house, near west edge of field
Method: Hollow Stem Auger
Samples: Auger Cuttings and Split Spoon Samples

Date: March 19, 2004
Supervisor: A.H.P.
Elevations TOC: 298.52 mAMSL
GS: 297.66 mAMSL

Depth		Sample			Description
Ft.	m.	No.	Type	Rec.	
0	0				**Sand and Gravel**
			AC		- brown fine sand / gravel / stones
	2				
10			AC		- grey, as above
	4				
			AC		-as above
20	6				
		1	SS	75%	**Till** - brown clayey silt till, minor fine gravel, medium dense
	8	2	SS	75%	- brown sandy silt till, minor clay and fine gravel, medium dense
30					
	10	3	SS	100%	- brown silty sand till with fine gravel and minor clay, medium dense
					- drilling variable, indicates alternating "harder" and "softer layers"
40	12				
	14	4	SS	100%	- upper 5 cm of sampe dense grey clay / silt till, remainder of sample grey fine to medium sand some gravel
50	16				
		5	SS	50%	- dark grey sandy silt till, some fine gravel, dense
60	18				End of Hole at 18.1 m
	20				
70	22				
80	24				

Monitor Installation



nominal 2.5 cm diameter PVC riser pipes and machine slotted screens

BOREHOLE LOG

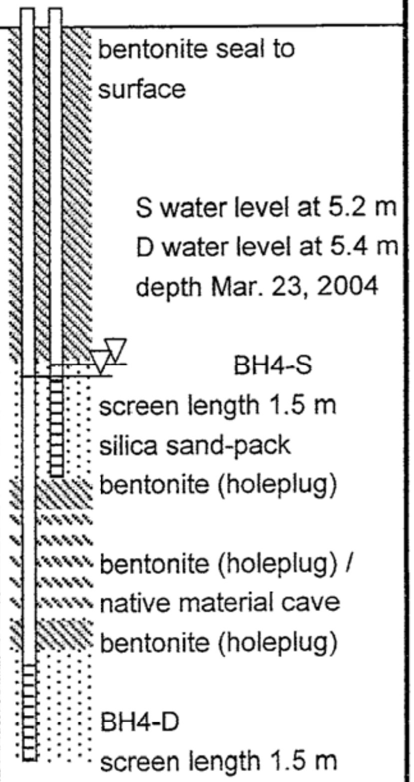
Borehole: BH4

Project: Roszell Road Property
Location: east edge of property, near driveway
Method: Hollow Stem Auger
Samples: Auger Cuttings and Split Spoon Samples

Date: March 22, 2004
Supervisor: A.H.P.
Elevations TOC: 304.50 mAMSL
GS: 303.60 mAMSL

Depth Ft.	Depth m.	Sample No.	Sample Type	Sample Rec.	Description
0	0				
					Sand and Gravel
			AC		- brown fine sand / gravel / stones
	2				
			AC		- grey, as above
10					
	4				
			AC		-as above
20	6				
		1	SS	50%	- grey fine to medium sand, fine to medium gravel, with stones, some silt
	8				
30					
		2	SS	50%	- as above, silt content increasing
	10				
					Till
		3	SS	25%	- light brown / tan silty sand till, with gravel and stones, some clay - drilling variable, indicates alternating "harder" and "softer layers"
40	12				
					End of Hole at 10.7 m
	14				
50					
	16				
	18				
60					
	20				
70					
	22				
	24				
80					

Monitor Installation



nominal 2.5 cm diameter PVC riser pipes and machine slotted screens

BOREHOLE LOG

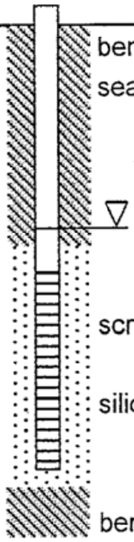
Borehole: BH5

Project: Roszell Road Property
Location: near Roszell Road, at property mid-point
Method: Hollow Stem Auger
Samples: Auger Cuttings and Split Spoon Samples

Date: March 23, 2004
Supervisor: A.H.P.
Elevations TOC: 303.42 mAMSL
GS: 302.47 mAMSL

Depth		Sample			Description
Ft.	m.	No.	Type	Rec.	
0	0				**Sand and Gravel**
			AC		- brown clean sand and gravel, stones
	2				
10					
			AC		- grey, as above
	4				
20	6				
			AC		- as above / change in drilling at 6.7 m
					Till
		1	SS	100%	- dark grey silt till, some clay, dense
	8				
					End of Hole at 7.9 m
30					
	10				
40	12				
	14				
50					
	16				
60	18				
	20				
70					
	22				
80	24				

Monitor Installation



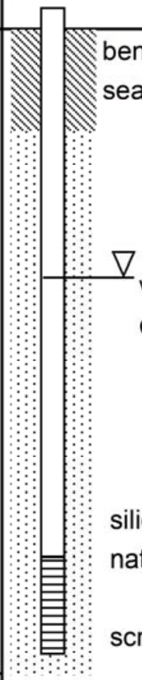
nominal 5 cm diameter PVC riser pipe and machine slotted screen

BOREHOLE LOG

Borehole: BH16

Project: Roszell Road Pit
Location: 20 m west of test pond
Method: Hollow Stem Auger
Samples: Auger Cuttings

Date: October 11, 2011
Supervisor: AP
Elevations TOC: 302.82 mAMSL
GS: 301.96 mAMSL

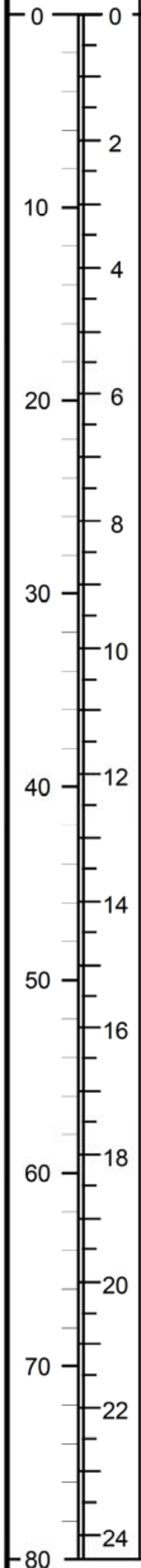
Depth Ft.	Depth m.	Sample No.	Sample Type	Sample Rec.	Description	Monitor Installation
0	0		AC		**Sand and Gravel**	 bentonite (holeplug) seal to surface water level at 3.92 m depth Oct. 12, 2011 silica sand-pack and native material cave screen length 1.5 m
					End of Hole (Bedrock) at 10.1 m	nominal 5 cm diameter PVC riser pipe and machine slotted screen 1.6 cm OD diameter polyethylene tubing "bundle" tips installed on exterior of PVC well casing at depth of 2.3, 4.2, 6.3 and 8.2 mBGS

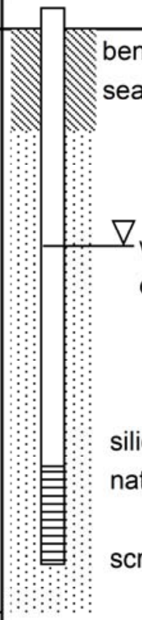
BOREHOLE LOG	**Borehole: BH17**

Project: Roszell Road Pit
Location: 20 m west of test pond
Method: Hollow Stem Auger
Samples: Auger Cuttings

Date: October 11, 2011
Supervisor: AP
Elevations TOC: 302.29 mAMSL
GS: 301.49 mAMSL

Depth		Sample			Description	Monitor Installation
Ft.	m.	No.	Type	Rec.		
0	0		AC		**Sand and Gravel**	
30	9.1				End of Hole (Bedrock) at 9.1 m	





bentonite (holeplug) seal to surface

water level at 3.54 m depth Oct. 12, 2011

silica sand-pack and native material cave

screen length 1.5 m

nominal 5 cm diameter PVC riser pipe and machine slotted screen

1.6 cm OD diameter polyethylene tubing "bundle" tips installed on exterior of PVC well casing at depth of 1.1, 3.0 and 5.03 mBGS

DANCE
ENVIRONMENTAL
INC.

2017
Ecological and Aquatic Monitoring Report Roszell Pit, Puslinch Township. ARA Licence No. 625189.

Prepared for:
CBM Aggregates
55 Industrial Street
Toronto, ON
M4G 3W9
Attn: Colin Evans

RECEIVED
DEC 27 2017
Township of Puslinch

Prepared by:
Dance Environmental Inc.
807566 Oxford Rd. 29
R.R. #1
Drumbo, ON
N0J 1G0

December 19, 2017.
DE-382

1.0 BACKGROUND

Dance Environmental Inc. was retained on September 7, 2012 by CBM Aggregates to begin initial data collection on wetland vegetation, fish spawning, and sediment and erosion control monitoring in accordance with the site plans for the Roszell Pit, Puslinch Township.

The Roszell pit was approved for aggregate extraction prior to 2012. The Roszell Pit is licenced for extraction into the water table.

The Summer of 2012 was characterized as a hot dry summer with lower than average precipitation, resulting in low water levels in streams and rivers throughout much of Ontario.

Aggregate extraction started to take place at the Roszell Pit in 2013, so the 2014 to 2017 monitoring data therefore provides data during aggregate extraction from the pit.

2.0 PURPOSE OF MONITORING

The monitoring which was conducted during the Fall of 2012, and during the Spring and yearly from Fall 2013 to 2017, was conducted in order to meet ecological mitigation measures and ecological and aquatic monitoring requirements laid out in the site plan conditions for the Roszell Pit.

The ecological mitigation measures include:

1. The dripline of all forest systems of the pit should be flagged in the field, confirmed by relevant staff, surveyed and shown on the site plans (completely previously).
2. The limits of all wetland systems in proximity to the pit should be flagged in the field, confirmed by relevant staff, surveyed and shown on the site plans (completed previously).
3. The setback (for extraction above the water table) from the wetland system to the west of the site, i.e. lands associated with the Speed River Wetland Complex should be 30m from the limits of the wetland.
4. The setback (for extraction above the water table) from the dripline of the forest system to the west of the site should be 30m.
5. Sediment and erosion control measures should be established along the western limits of the site in areas adjacent to forest and wetland systems on and adjacent to the site. Sediment and erosion control measures should be established prior to soil stripping and berm construction in areas close to these natural features. Sediment and erosion control measures, i.e. silt fencing should be regularly inspected and maintained over the life of the pit. Siltation barriers will be inspected immediately after a significant rainfall event until such time as adequate vegetation has become established on berms or other features which could cause sediment to be introduced into the forest or wetland system adjacent to the site. The status of sediment and erosion control measures should be documented in the annual compliance assessment report.

6. Prior to final rehabilitation of the site, including final wetland rehabilitation, a Vegetation Management Plan will be prepared and submitted to the Ministry of Natural Resources, GRCA, and the Township of Puslinch. This report should provide details on the type, size, and location of native trees, shrubs and ground cover to be planted in selected areas of the site. On an annual basis, the health of the re-forestation project along the western portion of the site should be documented and submitted to the MNR as part of the annual compliance assessment report.
7. The ecological and aquatic monitoring, as determined by consultation with the MNR, will be implemented upon receipt of the licence.

Ecological and Aquatic Monitoring:

1. Frog call surveys will be undertaken in general accordance with the Canadian Wildlife Service's Marsh Monitoring Program at the Roszell wetland on an annual basis. Three evening visits will be completed when temperatures first exceed 6, 10 and 17°C. The results of these surveys will be provided to the MNR, GRCA and County of Wellington and Township of Puslinch as part of the annual compliance assessment report.
2. Salamander egg mass surveys will be conducted annually at the Roszell wetland. The results of this survey will be provided to the MNR, GRCA and County of Wellington and Township of Puslinch as part of the annual compliance assessment report.
3. During the spring high water period and the summer period, ecological inspections of the Roszell wetland and seepage areas of the Speed River Wetland Complex will be completed, focused on the wetland vegetation and flora. As part of these site inspections, photomonitoring (fixed point photography stations) and permanent 10X10 m vegetation monitoring plots will be established. Staff gauges may be established at some of the monitoring stations. Photo monitoring stations and vegetation monitoring plots will allow for repeated monitoring of events during baseline (pre-extraction), extraction and post-extraction conditions. The results of this survey will be provided to the MNR, GRCA and County of Wellington and Township of Puslinch as part of the annual compliance assessment report.
4. Prior to the initiation of below water table extraction at the site, a comprehensive report documenting existing baseline conditions of the Roszell wetland and seepage areas of the Speed River Wetland Complex will be completed, focused on wetland vegetation, flora, and amphibian breeding habitat. The results of this survey will be provided to the MNR, GRCA and County of Wellington and Township of Puslinch as part of the annual compliance assessment report.
5. Prior to initiation of below water table extraction at Lake 3, (i.e., after Lakes 1 and 2 are in place), a comprehensive report documenting the Roszell wetland and seepage areas of the Speed River Wetland Complex will be completed, focused on wetland vegetation, flora, and amphibian breeding habitat. The results of this survey will be provided to the MNR, GRCA and County of Wellington and Township of Puslinch as part of the annual compliance assessment report.

6. Should significant changes in wetland vegetation (composition and/or structure) and/or use by amphibian breeding (including population estimates) be detected at any phase of operations at the Roszell Pit, the licensee will contact the MNR immediately to discuss implications and to activate the contingency program, as set out in the hydrogeological recommendations. If changes are observed, then it will be important to establish whether or not any documented changes are directly related to the pit operation versus other potential causes.
7. Annual spawning surveys of Main Creek and Tributaries 7, 8, and 9 will be undertaken to record spawning activity. The results of these spawning surveys will be provided to the MNR, GRCA and County of Wellington and Township of Puslinch as part of the annual compliance assessment report.
8. Prior to opening the pit, the licensee will contact landowners south of Roszell Road to ask permission to access their lands for the purpose of documenting the wetland boundary and characterizing the condition of existing aquatic resource features, i.e. pond, wetland, watercourses. Documentation of these features will be done using methods which can be repeated in the future to assess the impact, if any, of adjacent extraction activities on these features.
9. If the licensee is denied access by these land owners, prior to opening Lake 3, the licensee will again ask permission to access these same lands and monitor as deemed necessary.

3.0 MONITORING METHODS

3.1 Erosion/Sediment Control Monitoring

As a result of the proximity of aggregate extraction to the Speed River Wetland Complex and the topographic relief to the west of the aggregate extraction area, sediment control measures were recommended in the site plans, during establishment of the pit.

Monitoring for the establishment and maintenance of sediment control measures was to be conducted immediately after significant rainfall events. Photos were to be taken of any significant sedimentation found. No erosion sediment control monitoring occurred in 2014, 2015, 2016, or 2017 because the pit berms were well established.

3.2 Vegetation Monitoring

Wetland Vegetation Quadrat Sampling

Objective: The objective of the vegetation quadrat sampling was to document the vegetation composition (species and relative abundance) and structure (vertical structure within the wetland) before extensive extraction had occurred, to record the baseline vegetation community conditions.

Baseline data was collected in 2012, to provide a basis for comparison as the extraction progresses both above and below the water table. As noted previously, Fall is not an ideal time for monitoring of flowering herbaceous vegetation, and therefore in successive years (2013 to 2017) monitoring was conducted in Spring and Summer.

Data Collection Methods:
The locations of the six 10x10 m quadrats which were established in 2012 are shown on Figure 1. The exact locations of the 10x10 m quadrats were randomly selected, but were generally placed near the upslope seepage areas of some of the tributaries within the Speed River Wetland Complex adjacent to the Roszell Pit, and were sited near existing piezometer locations. The location of quadrat placement was selected to specifically document vegetation and conditions around significant groundwater seepage features that the hydrogeology consultants had identified and monitored along the eastern margin of the wetland, to the west of the extraction area. Quadrats were placed in these locations since this is where any change in groundwater discharge might be first observed and subsequently where vegetation changes could be first observed.

The centre of each quadrat was marked by a steel T-bar with the top sprayed white. The outer margins of each quadrat were marked by wooden stakes which had the tops sprayed orange. The ground vegetation was to be monitored during early Fall 2012 and in successive years will be monitored in both Spring and late Summer to ensure accurate identification of species and to capture plants blooming at different times throughout the season (CVC 2010).

Collection of Herbaceous vegetation Information:
Four 1x1 m quadrats were then set-up to record the herbaceous species and their relative abundance within each of the 10x10 m quadrats. The 1x1 m quadrats were set-up so that the one corner of the quadrat was on the ordinal direction stake, with the quadrat being entirely inside the 10x10 m quadrat, see Figure 2. The percent cover that each species within the 1x1 m quadrat occupied, was recorded. The percent cover within each 1x1 m quadrat that roots, deadfall, or mosses occupied were also recorded. The water depth within each 1x1 quadrant was recorded. These steps were repeated for each of the 4 quadrats within each of the six 10x10 m quadrats. An example of a completed data sheet from 2012, with data from a vegetation plot at the Roszell Pit, is contained in Appendix 1.

Collection of tree and shrub Information within vegetation plots:
As changes to shrubs and trees happens more in the long-term, data was to be collected on trees and shrubs within the vegetation plots only during the late summer inventory.

Information on the trees and shrubs within the vegetation plots was modified from the 2012 baseline data collection year, based on Greg Scheifele's comments on the 2012 vegetation monitoring. In order to capture trends/changes in the higher strata within the 10x10 m quadrat, two transect lines were surveyed within each 10x10 m quadrat. The transect lines were conducted to record information about trees and shrubs including density, species composition, and strata (sub-canopy or understory) in which they are present within each of the six 10x10 m quadrats.

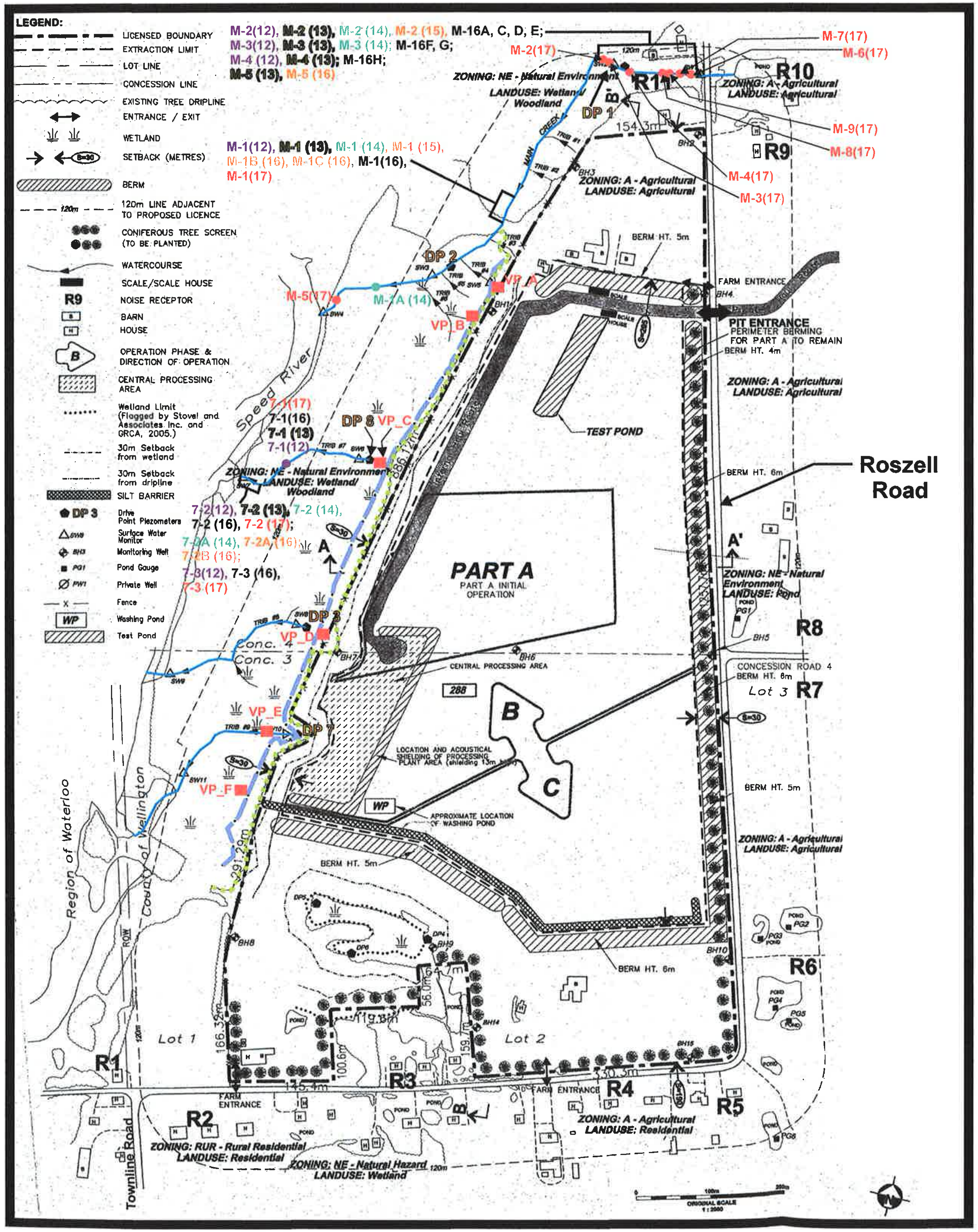


Figure 1. Location of Vegetation Plots and Creeks Surveyed and Locations of Trout Redds, 2012 to 2017, Roszell Pit.

LEGEND

🟥 VP_A	= Vegetation Plot & Photomonitoring Locations
—	= Watercourse in Which Spawning Surveys Were Conducted
– – –	= Wetland Limit (Flagged by Stovel & Associates Inc. and GRCA, 2005)
■ ■ ■ ■	= Existing Tree Dripline
● M-1(12)	= Trout Redd Location, 2012
M-1 (13)	= Trout Redd Location, 2013
● 7-2 (14)	= Trout Redd Location, 2014
M-1(15)	= Trout Redd Location, December2015 or January 2016
M-1(16)	= Trout Redd Location, December 2016
● M-1(17)	= Trout Redd Location, 2017

Base Map Source: Operational Plan Page 2 of 6.
Stovel and Associates Inc. 2010.

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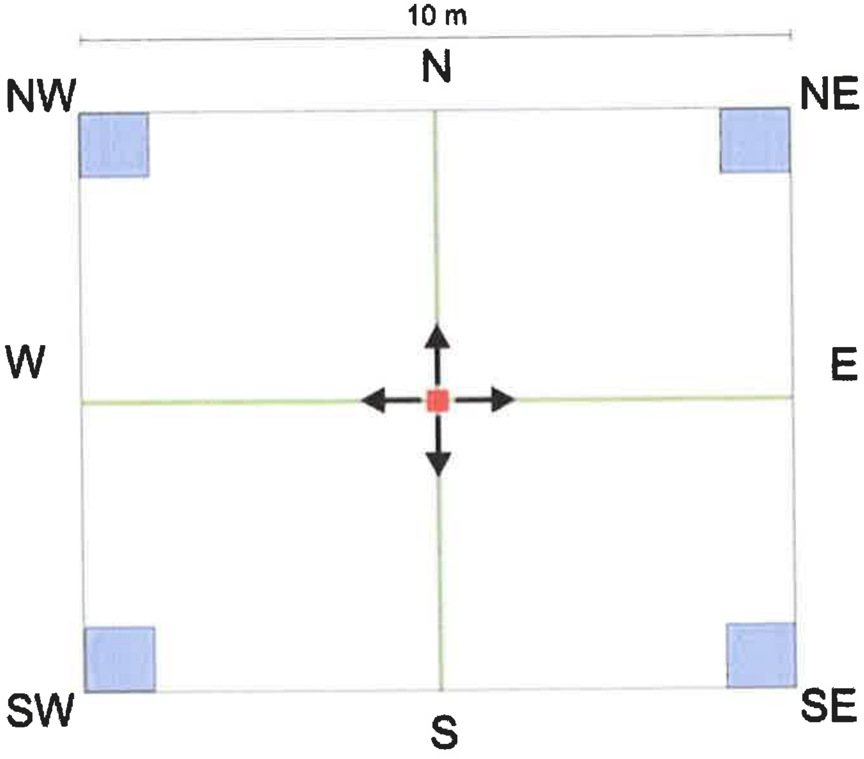
December 18, 2017

Trees or shrubs which were <10cm DBH were identified as being within the understory category for height class. For consistency between all six 10x10 m quadrats, the one transect line that was sampled ran north-south and the other ran east-west across each 10x10 m quadrat. Along each of the tree and shrub transect lines data was collected for a 1 m wide area centered along the entire transect. Standing dead trees were also recorded, along with the strata in which they occurred. An example of a completed data sheet from 2013, with data from the tree and shrub transect, is contained in Appendix 2.

Figure 2. Vegetation Monitoring Plot Layout and Position and Direction of Photomonitoring.



LEGEND

— =Tree and Shrub Monitoring Transect

🟦 = 1x1 m Vegetation Monitoring Sub-plot

☐ = 10x10 m Monitoring Plot

🟥 = Metal T-bar in Center of Quadrat

→ = Direction in which Photomonitoring Photos are Taken

A digital soil moisture meter (Vegetronics VG-METER-200 and VH-400 soil moisture sensor) was used to provide volumetric water content for soils in each of the six vegetation plots. The soil moisture probe was pressed into the soil until the entire probe was in the soil, and then a reading was taken. Soil moisture content was to be recorded as a percent and was recorded at the north, east, south and west corners of each vegetation monitoring plot, providing 4 soil moisture values from across the plot.

Starting in 2013, the health of each tree or shrub stem encountered along the east-west and north-south transect lines were to be recorded as dead, poor, or good.

It was also recommended by Greg Scheifele that tree health of all trees of >10cm dbh within the entire vegetation plot be recorded. For each tree >10cm dbh within the entire vegetation plot, the tree's health and whether it was a canopy or sub-canopy tree were recorded. We also recorded the same information for standing dead trees.

Photomonitoring:

As outlined in the site plans for the Roszell Pit, photomonitoring was to take place at fixed point locations so that photos can document potential changes to the vegetative conditions within the Speed River Wetland Complex adjacent to the Roszell pit.

Photomonitoring locations were to be located at the steel T-bar in the center of each of the 10x10 m vegetation quadrats. A total of six fixed point photo monitoring locations were set-up in 2012 with photos taken from the steel T-bar facing north, east, south and west, see Figure 2.

3.3 Spawning Surveys

The spawning surveys were to be conducted along Main Creek and Tributaries 7, 8, and 9 located within the Speed River Wetland Complex, to the west of the extraction area of the Roszell Pit. Surveyors wore polarized glasses and walked along each of the streams to be surveyed.

The location, number, size and species of redds were mapped and described on data sheets. Trout redds are the particular focus of the spawning surveys. Weather conditions including wind speed, percent cloud cover, precipitation, and air temperature were recorded during each survey visit and water temperatures were recorded for each of the streams or tributaries which were surveyed.

Observations of trout and their activities were recorded. Substrate conditions and water depth where spawning was observed were to be noted.

Spawning surveys were conducted on four dates: November 26 and 27, 2017 and December 14 and 15, 2017 to document the range of spawning dates and locations.

The following approach will be followed in the future to determine whether the pit operation has affected fish habitat in a measureable way:

- Evaluate what the groundwater/hydrology consultant has determined about any significant changes in stream temperature, stream flow, ground water flux relative to meteorological conditions during the study period;
- Determine geographically where ground water/surface water changes have occurred relative to the aggregate pit margins and predicted impact zones;
- Where groundwater/ surface water data show significant changes the potential effects on fisheries data will be carefully inspected for any evidence of changes
- In turn, any significant changes in trout red number and location shifts would be compared with groundwater/surface water data trends.

3.4 Salamander Egg Mass Surveys

As part of the monitoring plan for the pit, annual surveys for salamander egg masses were to be undertaken. Spring 2013 was the first year that salamander egg mass surveys were conducted.

Salamander egg mass surveys were to focus on searching the wetland located in the southwestern end of the Roszell pit property. A survey was to be undertaken at the wetland in the spring once the salamanders have laid their egg masses some time between April to May, as egg laying times are dependent upon weather conditions for each given year. At the beginning of the survey weather conditions including temperature, wind speed, water temperature, and water temperature were to be recorded.

To find and estimate numbers of egg masses of salamanders area searches throughout the wetland were to be conducted. Areas searches involved the searcher wearing chest waiters, and walking throughout the wetland wearing polarized sun glasses, scanning into the water for egg masses. When egg masses were found they were to be identified to species along with number of eggs/egg masses, vegetation egg masses were attached to and any other details worth noting.

3.5 Amphibian Call Surveys

As outlined in the ecological and aquatic monitoring plan amphibian call surveys were to be undertaken once extraction begins, so surveys began in 2013. Amphibian call surveys were undertaken in general accordance with the Marsh Monitoring Program Protocols. Surveys were to be undertaken at the wetland south of the southern most extraction limit for the pit, and at any adjacent properties (with ponds) where landowners provide permission to survey for frogs.

Surveys are to be conducted on three dates from April to June, at least 15 days apart. Night-time air temperature should be greater than 5°C (41°F) for the first survey, 10°C (50°F) for the second survey and 17°C (63°F) for the third survey (MMP 2008). Surveys are to be conducted between one half hour after sunset and no later than midnight (MMP 2008).

Weather conditions will be recorded for each of the surveys conducted, including wind speed, air and water temeprature, cloud cover, and precipitation. Each survey station will be monitored for 3 minutes. Surveys are to be conducted only when wind strength is between 0 and 3 on the Beaufort Scale (MMP 2008).

4.0 MONITORING RESULTS

4.1 Vegetation Monitoring

A total of six permanent vegetation monitoring plots were set up near the eastern edge of the Speed River Wetland Complex, adjacent to extraction area of the Roszell Pit. Vegetation monitoring quadrats were set up on September 28, 2012 (Plots A, B, and C) and October 1, 2012 (Plots D, E, and F).

The UTM co-ordinates (obtained with a hand-held GPS) for vegetation monitoring plots A to F, are shown in Table 1.

Table 1. UTM Co-ordinates for the Center of Vegetation Monitoring Plots and Photo Monitoring Locations

Plot Name	UTM Co-ordinates
Plot A	17T 0557139 4812349
Plot B	17T 0557132 4812259
Plot C	17T 0557057 4811973
Plot D	17T 0557042 4811849
Plot E	17T 0557005 4811745
Plot F	17T 0557017 4811664

As outlined in the ecological and aquatic monitoring site plans, vegetation monitoring was to be conducted in the spring and late summer. The first late summer vegetation information was conducted on September 28 and October 1, 2012, while the first set of spring vegetation information was collected on May 30, 2013. The 2013 late summer vegetation inventory was conducted on September 20th.

It was noted when setting up the vegetation plots that cattle from the farm to the north of the Roszell Pit had access to the Speed River Wetland Complex in the area of vegetation plots A and B. It was evident during the spring and fall 2017 monitoring that the cattle still had access to the areas of vegetation plots A and B.

The dominant taxa, their percent cover, and total number of species for each sub-plot for vegetation plots A to F during Spring 2013 to 2017 is summarized in Appendix 3. The late summer vegetation survey results showing dominant taxa, their percent cover, and total number of species for each sub-plot for vegetation plots A to F from 2012 to 2017 are provided in Appendix 4.

Tree and shrub data within the vegetation plots collected during the late summer vegetation monitoring, at each of the six monitoring plots are summarized below.

2017 Survey Results:

The 2017 Spring vegetation plot survey was conducted on May 29, 2017 and the Fall survey was conducted on September 12, 2017. The data from vegetation plots A to F are summarized below. A summary by species and sub-plot of the percent cover by certain species in Spring from 2013 to 2017 is provided in Appendix 3, and the data from the Fall 2012 to 2017 surveys is summarized in Appendix 4.

The tree and shrub transects are summarized in the following text for each vegetation plot with the numbers found in 2017 listed, and for reference the 2016 values are provided in brackets after the 2017 survey values.

Vegetation Plot A:

Vegetation plot A was located in the upslope area where seepage begins which becomes Tributary #4, see Figure 1. Extensive areas of rutted soils within vegetation Plot A were evident again in 2017 throughout the area as a result of cattle foraging within the vegetation plot area. In Spring 2017 surface water was present in all sub-plots and in Fall 2017 standing water was also present. In Spring water was present from 1-6cm (8-13.5cm in ruts made by cattle) in depth and 1-3cm in Fall 2017 in depth.

The tree and shrub transect data:

A generally limited abundance of trees and shrubs are present within vegetation Plot A. Using the revised 2013 methodology the east-west transect had three species: Glossy Buckthorn 4(1), Yellow Birch 1(1) and Eastern White Cedar 4(3) were recorded in 2017.

The north-south transect had a Chokecherry 1(1) (same as in 2013, 2014, 2015) and Yellow Birch 1(1) and Easter White Cedar 4 (3), the additional cedar counted in 2017 was due to it being just large enough to count on the transect this year. All understory trees and shrubs were identified to be in good health (same as in previous 4 years). There were no trees (>10 cm dbh) within the entire vegetation plot in 2017, same as in 2016.

Vegetation Plot B:

Vegetation Plot B was located approximately 33m to the southwest of Plot A, near the eastern wetland edge of the Speed River Wetland Complex. Vegetation Plot B was located in the upstream seepage area of Tributary #6, see Figure 1.

It was noted in Spring that the top of an Ash tree which had been cut down was thrown down over the area of the Northeast sub-plot. Surface water was present in only the Northeast sub-plot in Spring 2017 (NW and SE plot soils were damp but not saturated and the SW plots soils were saturated). No surface water was present in any of the sub-plots in Fall 2017, soils were noted to be saturated at the SW, NW and NE plots (contrasting with 2016 when these same areas were described as damp but not saturated with water), suggesting moister soils in Fall 2017 than in 2016.

In Spring, water was present at <1cm (but in 2016 was estimated at 1-4cm) and 0cm in Fall 2017 (same as in 2016).

The tree and shrub transect data:
Tree and shrub transect data indicates Plot B contains slightly more trees and shrubs than Plot A (and similar in that they were all in the understory), but it is still a generally open habitat of predominantly herbaceous vegetation.
Species present within the east-west transect included Glossy Buckthorn 10(12), Eastern White Cedar 9(9), and Yellow Birch 2(3); in the north-south transect Glossy Buckthorn 11(11), Yellow Birch 4(4), Eastern White Cedar 4(9), and Alternate–leaved Dogwood 0(1). A single Alternate-leaved Dogwood was noted in 2016 but not recorded during 2017. It was noted in 2016 that the Alternate-leaved Dogwood and two Glossy Buckthorn were in poor condition, these were not found in 2017, suggesting they died and or/fell down and are no longer present.

Within the entire vegetation plot there were no trees that were >10 cm dbh. No dead trees or shrubs were located within the north-south or the east-west transects. Cattle grazing in the vegetation plot is believed to still account for some of the variance between years in the vegetation sub-plots, and significant ruts and upturned bare soil patches created by cattle still persist in 2017.

Vegetation Plot C:

The vegetation Plot C was located in fresh-moist cedar swamp. Vegetation Plot C was located in the upstream seepage area of Tributary #7 and near drive point piezometer DP8, see Figure 1. The vegetation plot is on a slope with scattered seeps which flow downslope towards the cedar swamp. Surface water was present in only 1 of 4 sub-plots (Southeast) in the Spring 2017 at 1-2 cm (same as in 2016) and in the same sub-plot 2 cm of flowing water was observed in the Fall 2017 (similar to that in 2016). In Spring 2017 sub-plots NE, NW and SW were noted to have damp soil not saturated soils.

Tree and shrub diversity within the transects continues to be limited, with only two species being present, Glossy Buckthorn and Eastern White Cedar. In the understory along the east-west transect Glossy Buckthorn 3(3) and Eastern White Cedar 3(2) were recorded to be present and in good health. Along the north-south transect line in 2017 Eastern White Cedar 7 (7) were recorded. Eastern White Cedar was the only tree species present at >10cm dbh, with trees found in good health 18(14), fair health 7(7), and none in poor health.

Vegetation Plot D:

The vegetation Plot D was located in wet cedar swamp located in the upstream seepage area which enters Tributary #8 near the eastern edge of the wetland. Vegetation Plot D was located just east of drive point piezometer DP3. This vegetation plot is on a slope with scattered seeps with marl deposits. No surface water was present in any of the sub-plots in Spring and Fall 2017 or in 2016. In 2017 only the NE sub-plot had saturated soils in Spring while the SE and NW sub-plots soils had saturated soils in Fall. In contrast only the SE sub-plot was noted to have saturated soils in 2016 (in both Spring and Fall). This is suggestive of overall wetter soils being present in Plot D in 2017.

Within vegetation Plot D no tree or shrub species were encountered along the north-south or east-west transects in 2016 or 2015. This vegetation plot is located within cedar swamp, with Eastern White Cedar and Yellow Birch as the tree species of >10 cm dbh which were present within the entire plot. Eastern White Cedar was present in good health 19(23) and standing dead 0(1), and Yellow Birch 2 (2) were recorded in good health since 2015. The reason that fewer Eastern White Cedars were recorded in 2017 is likely not due to die out of trees but from some trees not being counted in 2017 since some trees in the plot are at the cusp of being at the 10cm dbh size.

Vegetation Plot E:
The vegetation Plot E was located in fresh-moist cedar swamp. Vegetation Plot E was located in a seepage area approximately 30m downslope of the trail along the Speed River, in the bottomlands of the cedar swamp. The seepage area in which vegetation plot E was located is part of Tributary #9 and is located downslope of drive point piezometer DP7, see Figure 1. In 2017 surface water was only recorded in the Spring at the NW sub-plot (the NE and SW had damp soils and SE sub-plot had saturated soils). No surface water was present in any of the sub-plots in 2016, and saturated soils were noted at the NW sub-plot (Spring and Fall) and SE sub-plot (Fall). Similar to 2016 the NW subplot was noted to have saturated soils in Fall but all others only had damp soils.

Tree and shrub species along the north-south and east-west transects at >1m in height were very limited in this vegetation plot. Along the east-west transect Glossy Buckthorn 3 (3) were present in good health, 1 (1) Glossy Buckthorn was recorded as dead (same as in 2014, 2015, and 2016). There were no shrubs recorded along the north-south transect in 2017, similar to the 2014, 2015 and 2016 findings.

There were four species of trees and shrubs of >10cm dbh found within the entire vegetation plot, including: Eastern White Cedar, Yellow Birch, Speckled Alder, and Black Ash. Within the entire vegetation Plot E there were 14(15) Eastern White Cedar found in good health, 6(8) Yellow Birch were found in good health, 1(1) Speckled Alder was in good health, and 1 (1) Black Ash was found in poor health in 2017.

Vegetation Plot F:
The vegetation Plot F was located in the bottomlands of a fresh-moist cedar swamp, dense with Eastern White Cedar. Vegetation Plot F was located in a seepage area downslope of the trail along the Speed River, to the west of the southeastern corner of the extraction area of the Roszell Pit. The closest drive point piezometer is DP7, to the northeast. Vegetation plot F is not in a seepage area which contributes to a tributary through surface water flow, Tributary #9 is the closest tributary to this vegetation plot and is located to the west of it.

In Spring 2017 the southeast sub-plot had flowing water at 3-4cm deep in (same as in 2016). In Spring 2017 surface water was also present in the Northwest sub-plot at 2-3cm deep (1-2cm deep in Spring 2016). The NW sub-plot had 4-6cm deep water in Fall 2017, compared to 1cm in depth in Fall 2016. In Fall the southeast sub-plot had flowing water at 2-4cm in depth in 2017, compared to 2-5 cm in depth in 2016. The other sub-plots had no surface water noted during either Spring or Fall.

The tree and shrub transect data from vegetation plot F indicates a limited understory, as no tree or shrub species were present along the east-west or north-south transects in all survey years to date(young Eastern White cedar are present but are all <10cm dbh at this time). Tree and shrubs species within the entire vegetation plot of >10cm dbh include Eastern White Cedar, Glossy Buckthorn, Tamarack, and White Birch. Eastern White Cedar was present in good health 19(28), and standing dead 0(1), one Glossy Buckthorn was present in good health (no change since 2014), and one White Birch in good health (no change since 2014). There were 2 standing dead Tamarack noted in 2017 (lower trunks still standing same since 2013).

Photo Monitoring Stations:
A total of six fixed point photo monitoring stations were established in 2012, which provide baseline photos of the Speed River Wetland Complex located to the west of the Roszell pit. Photos were taken at each photo monitoring station facing north, east, south and west, from the center T-bar of the 10x10 m plots. Photos were taken at all of the photo monitoring stations in the Spring on May 28, 2015. A photo from each of the six vegetation plots in Spring 2017 is shown in Appendix 5. A photo from each of the six vegetation plots in Fall 2017 is shown in Appendix 6.

4.3 Trout Spawning Surveys

Two surveyors, Kevin Dance and Ken Dance, undertook the trout spawning surveys in 2012, 2013, and 2014. The Main Creek and Tributaries #7 & 8 were surveyed on November 7th and December 5th in 2012. Tributary 9 was surveyed on November 9th and December 6th in 2012. During the 2013 spawning period the Main Creek and tributaries #7, 8, and 9 were surveyed for trout redds on November 27th and December 10th, 2013. A summary of the survey dates and weather conditions during searches for trout redds from 2014 to 2017 are shown in Table 2.

In 2015 spawning surveys were conducted on two separate dates for each of the creeks surveyed. With fewer trout redds being found over the two separate surveys for each creek, in December 2015, an additional survey was conducted in January 2016. The January 2016 survey was to identify whether any additional trout redds were present in the creeks being surveyed once the temperatures became cooler in case this had triggered Brook Trout spawning.

The locations of the Main Creek and Tributary #7, 8 and 9, are all shown on Figure 1. Brook Trout redds have been found annually from 2012 to 2017 in both Tributary 7 and the Main Creek channel, the approximate locations of Brook Trout redds are shown on Figure 1. In 2015 fewer than normal trout redds were found in the Main Creek and none were found in Tributary #7 like previous years, but by January 2016 7-9 redds were found in total in the Main Creek and 2 redds were present in Tributary #7. Previous years field data sheets have been archived for future reference.

The results of the 2012 and 2013 trout spawning surveys are summarized in Table 3 (considered pre-extraction survey years), and the 2014 to 2017 survey results are provided in Table 4. Table 3 and 4 both list the redd numbers by watercourse for each year. The 2013 trout spawning survey was the first data collected after part of a year of aggregate extraction occurred at the Roszell Pit.

Table 2. Summary of Dates and Weather Conditions for Trout Redd Surveys on the Main Creek, and Tributaries #7, 8, and 9 from 2014 to 2017.

Year	Survey Date	Weather Conditions
2014	December 2	Air Temp. = -1^{0}C; Wind = 2-6 km/hr; Percent Cloud = 40-60%; No Precip.; Water Temperature: Main Creek & Trib #7 = 4^{0}C, Trib #8 = 5.5^{0}C & #9 = 5^{0}C
	December 19	Air Temp. = -2^{0}C; Wind = 3 km/hr; Percent Cloud = 30-50%; No Precip.; Water Temperature: Main Creek & Trib #7 = 4^{0}C, Trib #8 & 9 = 6^{0}C
2015	December 3	Air Temp. = 2^{0}C; Wind = 10-20 km/hr; Percent Cloud = 100%; No Precip.; Water Temperature: Main Creek & Trib #8 & 9 = 9^{0}C
	December 4	Air Temp. = 5^{0}C; Wind = 5-10 km/hr; Percent Cloud = 100%; No Precip.; Water Temperature: Main Creek = 7^{0}C, Trib #7 = 8^{0}C
	December 17	Air Temp. = 5^{0}C; Wind = 5-10 km/hr; Percent Cloud = 20-40%; No Precip.; Water Temperature: Main Creek, Trib# 8 & 9 = 8^{0}C, Trib #7 = 10^{0}C
2016	January 28	Air Temp. = -1^{0}C; Wind = 5-10 km/hr; Percent Cloud = 100%; light snowfall.; Water Temperature: Main Creek = 4^{0}C, Trib #7 = 6^{0}C
	December 7	Air Temp. = 1.5^{0}C; Wind = <10 km/hr; Percent Cloud = 40%; no precip..; Water Temperature: Main Creek = 5.5^{0}C
	December 9	Air Temp. = 2^{0}C; Wind = 6-8 km/hr; Percent Cloud = 40%; no precip.; Water Temperature: Main Creek = 5^{0}C, Trib #7 = 8^{0}C; Trib#8 & 9 = 7^{0}C
2017	November 26	Air Temp. = 0^{0}C; Wind = 5-10 km/hr; Percent Cloud = 90%; no precip.; Water Temperature: Main Creek = 5^{0}C,
	November 27	Air Temp. = 2^{0}C; Wind = 3-5 km/hr; Percent Cloud = 40%; no precip.; Water Temperature: Main Creek = 5^{0}C, Trib #7 = 8.8^{0}C,Trib.#8 & 9 = 8.1^{0}C
	December 14	Air Temp. = -12^{0}C; Wind = 0 km/hr; Percent Cloud = 20%; no precip.; Water Temperature: Main Creek =1.2^{0}C, Trib #7 = 8.8^{0}C,Trib.#8 =5.9^{0}C & Trib.#9 = 5.4^{0}C
	December 15	Air Temp. = -7^{0}C; Wind = 1-5 km/hr; Percent Cloud = 90%; light snow; Water Temperature: Main Creek =3.2^{0}C

Table 3. Summary of 2012 and 2013, Pre-extraction, Brook Trout Spawning Surveys, Roszell Pit.

	Tributary Name	Station Location	Number of Redds	Total Number of Redds
2012	**Main Creek**	M-1	2 to 3	**8 to 9 redds**
		M-2	2	
		M-3	1	
		M-4	3	
	Tributary 7	7-1	2	**5 redds**
		7-2	2	
		7-3	1	
	Tributary 8 and 9		No redds	**0**
2013	**Main Creek**	M-1 (13)	3	**19 redds**
		M-2 (13)	3	
		M-3 (13)	6	
		M-4 (13)	5	
		M-5 (13)	2	
	Tributary 7	7-1	1	**5 redds**
		7-2	4	
		7-3	0	
	Tributary 8 & 9	No redds	No redds	**0**

The Main Creek has consistently had the most redds present each year for all the creeks surveyed. The numbers of redds present in the Main Creek in 2013 was double that of 2012. In 2014, a total of 9-10 redds were identified at 4 different locations on the Main Creek. The reduced number in trout redds found in 2015 is believed to be the result of the unusually warm temperatures in December 2015, when temperatures rarely went below freezing, the warm weather was reflected in the warmer water temperatures recorded in December 2015 in all of the creeks sampled, when compared with previous monitoring years. The warm air and water temperatures in December 2015 were believed to have resulted in limited spawning of Brook Trout in the creeks that were surveyed. The January surveys indicated more spawning occurred after the December survey dates but still a reduced amount of spawning occurred overall. In December 2016 the Main Creek had the second highest number of fish redds found over all of the study years, with 15-16 redds being found.

The 2017 November and December surveys indicate that another good spawning season took place in the Main Creek. The November and December 2017 trout redd surveys identified a total of 13 Brook Trout redds in the Main Creek at nine different locations along the creek, in typical places where redds had been found previous years. Like previous years most of the trout redds were found in the northern half of the Main Creek. One Brook Trout redd was found in the southern portion of the Main Creek on the December 14, 2017 survey visit. The only other trout redd that has been found in that portion of the creek was recorded in 2014 (M-1A(14)), see Figure 1.

Table 4. Summary of 2014 and 2017, Extraction Years, Brook Trout Spawning Surveys, Roszell Pit.

	Tributary Name	Station Location	Number of Redds	Total Number of Redds
2014	**Main Creek**	M-1	2 to 3	**9-10 redds**
		M-1A (14)	1	
		M-2 (14)	2	
		M-3 (14)	4	
	Tributary 7	7-2(14)	2	**4 redds**
		7-2A (14)	2	
2015	**Main Creek**	M-1(15)	1	**2-3 redds**
		M-2(15)	1 to 2	
	Tributary 7	No redds	No redds	**0**
Jan. 2016	**Main Creek**	M-1B(16)	1	**5-6 redds**
		M-1C(16)	3	
		M-5(16)	1 to 2	
	Tributary 7	7-2A(16)	1	**2 redds**
		7-2B(16)	1	
Dec. 2016	**Main Creek**	M-16A	1	**15-16 redds**
		M-16C	1	
		M-16D	3-4	
		M-16E	4	
		M-16F	1	
		M-16G	1	
		M-16H	1	
		M-16I	3	
	Tributary 7	7-1(16)	1	**6 redds**
		7-2(16)	2	
		7-3(16)	3	
Nov/ Dec. 2017	**Main Creek**	M-1(17)	1	**13 redds**
		M-2(17)	1	
		M-3(17)	1	
		M-4(17)	5	
		M-5(17)	1	
		M-6(17)	1	
		M-7(17)	1	
		M-8(17)	1	
		M-9(17)	1	
	Tributary 7	7-1(17)	1	**4-5 redds**
		7-2(17)	2	
		7-3(17)	1-2	

In total 4-5 Brook trout redds were found in 2017 in Tributary #7 during the November and December surveys. The Trout redds found in Tributary #7 were found in three different locations. Tributary #7 had 5 redds distributed over 3 locations in 2012, 5 redds distributed over 2 locations in 2013, and 4 redds distributed over 2 locations in

2014. In December 2015 no trout redds were found in Tributary #7 but 2 redds were present by the January 28, 2016 survey. In December 2016 the greatest number of trout redds on Tributary #7 were found, with 6 redds being present.

The trout spawning surveys conducted over the last 6 years has resulted in no trout redds being found in either tributaries #8 or #9. Based on comparison to the findings in previous years, both pre-extraction and during extraction, the 2017 findings indicate there is continued spawning in the creeks, and at what appears to be typical levels of spawning in the Main Creek and Tributary #7.

4.4 Salamander Egg Mass Survey

Salamander egg mass surveys were conducted in 2017, making it the fifth year of salamander egg mass surveys conducted within the southwestern wetland on the Rozell Pit property. The salamander egg mass survey dates and weather details for the salamander surveys for all of the years of monitoring are provided in Table 5.

Table 5. Salamander Egg Mass Survey Details 2013 to 2017.

Survey Date	Survey Details (Weather)
April 30, 2013	12:00 hrs to 15:25 hrs temperature: 19°C; wind: 8 km/hr; water temperature: 15.4°C; cloud <70%; no precipitation, and water pH: 8.0
May 9, 2014	11:20 hrs to 14:09 hrs. temperature: 24°C; wind: 6.6 km/hr; water temperature: 18.3°C; cloud 40%; no precipitation, and water pH: 8.4
May 21, 2015	13:57 hrs to 15:21 hrs temperature: 18°C; wind: 3.7 km/hr; water temperature: 16.1°C; cloud 40%; no precipitation, and water pH: 7.8
June 3, 2015	13:55 hrs to 15:32 hrs temperature: 22°C; wind: 5-10 km/hr; water temperature: 21°C; cloud 60%; no precipitation, and water pH: 7.3
March 30, 2016	12:23 to 14:21 hrs temperature: 8°C; wind: 10-15 km/hr; water temperature: 8.6°C; cloud 40%; no precipitation, and water pH: 7.7
March 28, 2017	13:00 to 14:08 hrs temperature: 10°C; wind: 5-15 km/hr; cloud 60%; no precipitation
April 11, 2017	14:19 to 14:40 hrs temperature: 20°C; wind: <5 km/hr; water temperature: 18.1°C; cloud 30-40%; heavy precipitation, and water pH: 7.1
April 12, 2017	11:40 to 14:00 hrs temperature: 10°C; wind: 5-10 km/hr; water temperature: 11°C; cloud 80-90%; no precipitation, and water pH: 7.5

In 2015 there was a later Spring thaw than previous years, and a later survey date was thought to be appropriate but May 21, 2015 survey visit resulted in no salamander egg masses being found within the survey pond. With no salamander eggs/egg masses being found during the May survey visit a second was conducted on June 3, 2015, which also resulted in no salamander eggs or larvae being found.

The 2016 survey was then conducted early in the season to ensure that the salamander egg masses were not missed, as well an early thaw took place in Spring 2016. The survey was conducted on March 30, 2016. Similarly, in 2017 an early survey was conducted on March 28, 2017 to make ensure eggs were not being laid early in 2017.

A total of 12 general areas where salamander egg masses were concentrated were found in the wetland in 2013, and a total of 13 areas were found in 2014. In 2016 a total of 6 main areas with high concentrations of eggs were noted. The 2017surveys noted 9 areas where egg masses were concentrated within the wetland. Many more salamander egg masses were present in 2017 than during any previous year.

For analysis the wetland was divided into three different areas based on the wetlands ecological characteristics, see Figure 3. Wetland area "A" comprises of Reed Canary Grass and Red-osier Dogwood around the wetland edges and willow thicket through the majority of it. Area "B", shown on Figure 3, exhibits the characteristics of a Silver Maple swamp, very limited emergent vegetation, with leaves and sticks being predominant in the water column. Area "C" comprises the southern wetland lobe which extends in a southwesterly direction.

Substrates to which the Blue-spotted Salamander egg masses were on from 2013 to 2016 included Reed Canary Grass, sticks, Woolgrass, Bladder Sedge, Poplar leaves, Bittersweet Nightshade, and Red-osier Dogwood. These substrates were all still present in the wetland in 2017 and egg masses were continuing to be found on these substrates.

A summary of the 2013 to 2017 findings for the Roszell wetland are provided in Table 6. In 2017 Spring Peeper eggs masses were also found in various areas within the wetland, just like in previous years.

The 2017 survey did find Blue-spotted Salamander eggs in wetland area "C", more than has been found in any year previous, and no egg masses were found in area "C" in either 2015 or 2016. It was noted that in 2016 the water levels were low at the time of the survey, despite being earlier in the season than other survey years. The area of the wetland considered area "C" is a shallower part of the wetland and the low water levels may explain why the salamanders avoided laying eggs in that area in 2016. It was noted on the March 28, 2017 survey that water levels in the wetland were dropping based on watermarks on tree trunks and wetland edges. On the March 28, 2017 survey no egg masses were found in the wetland. The possible decrease in numbers of egg masses found in area "B" compared to previous years was due to seemingly lower water levels in that area in 2017 and the salamanders may have laid more eggs in area "A" as a result.

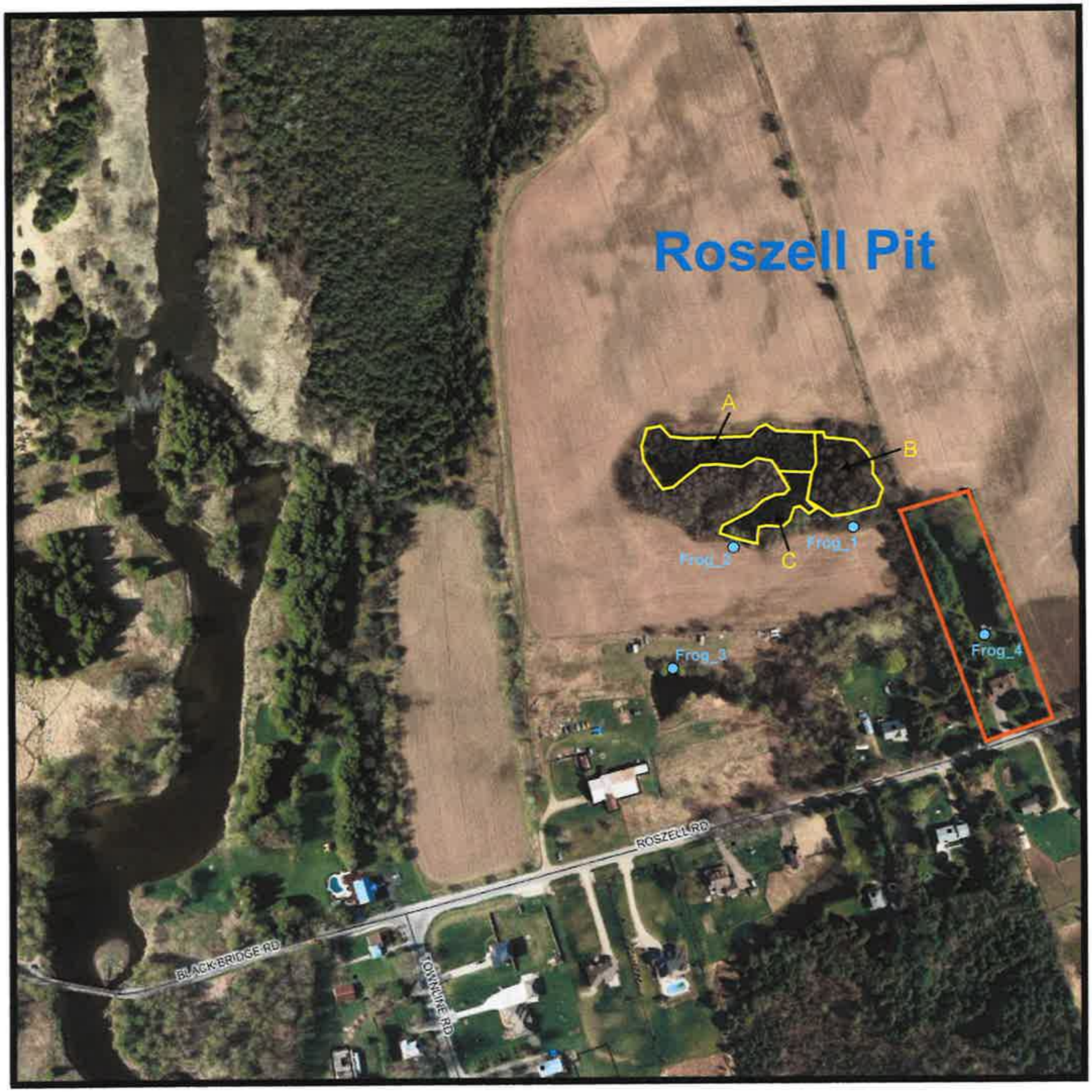


Figure 3. Areas Searched for Salamander Egg Masses, and Amphibian Call Survey Station Locations, Roszell Pit.

LEGEND

Area Searched for Salamander Egg Masses, Areas "A to C" Categorized by Habitat Type

● Frog_2 Approximate Amphibian Call Survey Station Location

▭ Approximate Property Boundary of the Jones Property

Base Map Source: GRCA GRINS mapping 2012

DANCE ENVIRONMENTAL INC.

DE-382

December 18, 2017

0 45 90 135 180 m

NAD 1983, UTM Zone 17

N

Based on the numbers of egg masses observed in 2017 it appears that the wetland is still supporting the Blue-spotted Salamander population and continues to be used for breeding.

Table 6. Summary of Total Number of Salamander Egg Mass Found in 2013 to 2017.

Wetland Area	Species	Number of Egg Masses Counted				
		2013	2014	2015	2016	2017
A	Blue-spotted Salamander	46	147	0	571	1785
B	Blue-spotted Salamander	9	39	0	32	16
C	Blue-spotted Salamander	3	4	0	0	22
Total # Egg Masses	Blue-spotted Salamander	58	190	0	603	1823

4.4 Amphibian Call Surveys

Amphibian call surveys were conducted starting in 2013 at two wetlands, one to the south of the southern extraction limit of the pit (Roszell Wetland) and the other a small wetland to the southwest of the Roszell Wetland (Wetland A). Adjacent landowners with a pond/wetland on their property were also contacted in Spring 2013 by CBM staff to see if any would allow for frog call surveys to be undertaken on their property. One land owner, Denise Jones, gave permission to conduct the amphibian surveys on her property (#6512 Roszell Road), see Figure 2 for its location. Amphibian call surveys were conducted at all of the same locations from 2013 to 2017.

Amphibian call surveys were conducted on April 13 & 19, May 23 and June 28, 2017. Details on the weather conditions and survey dates for each year of amphibian call surveys, from 2013 to 2017, are shown in Table 7.

The results of the 2017 amphibian call surveys for each of the 4 point count stations (including the Jones Property) where data were collected are summarized in Table 8. The results from 2016 to 2013 are shown in Table 9 to 12, respectively. Since 2013 a total of six different species have been heard/observed during the amphibian call surveys, with five species heard/observed in 2013, 2014, 2016, 2017 and four species heard/observed in 2015.

In 2017 at Frog_1, three species of frog were recorded (Spring Peeper, Green Frog and Grey Tree Frog) with Spring Peeper and Grey Tree Frog recoded with maximum call

Table 7. Amphibian Call Survey Dates and Weather Conditions, Roszell Pit 2013 to 2017.

Survey #	Survey Date	Time (hrs)	Weather Conditions
2017			
1	April 13, 2017	20:32 to 20:52	Air Temp. = 10^{0}C; Water Temp. = 7.6^{0}C ; Wind = 0 (Beaufort); Percent Cloud = 20%; No Precip.; Water pH = 7.6 to 7.9
1	April 19, 2017	20:08 to 20:25	Air Temp. = 11.5^{0}C; Water Temp. = 12.7^{0}C ; Wind = 1 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 8.4
2	May 23, 2017	21:02 to 21:32	Air Temp. = 17^{0}C; Water Temp. = 17.3^{0}C ; Wind = 0 (Beaufort); Percent Cloud = 80%; No Precip.; Water pH = 7.3 to 8.1
3	June 28, 2017	21:21 to 22:08	Air Temp. = 20^{0}C; Water Temp. = 21.1^{0}C ; Wind = 0 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 7.5 to 8.5
2016			
1	Mach 30, 2016	20:00 to 20:33	Air Temp. = 13.7^{0}C; Water Temp. = 7.9^{0}C ; Wind = 1 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 7.5 to 8.2
2	May 25, 2016	19:18	Air Temp. = 23.1^{0}C; Water Temp. = 21.8^{0}C ; Wind = 0 (Beaufort); Percent Cloud = 80%; No Precip.; Water pH = 8.4
2	May 26, 2016	21:16 to 21:38	Air Temp. = 22.1^{0}C; Water Temp. = 10.8^{0}C ; Wind = 0 (Beaufort); Percent Cloud = 50%; No Precip.; Water pH = 7.0 to 8.6
4	June 17, 2016	21:35 to 22:16	Air Temp. = 23^{0}C; Water Temp. = 24.2^{0}C ; Wind = 1 (Beaufort); Percent Cloud = 0%; No Precip.; Water pH = 7.7 to 8.3
2015			
1	April 15, 2015	20:35 to 21:20 hrs	Air Temp. = 11^{0}C; Water Temp. = 10.8^{0}C ; Wind = 1 (Beaufort); Percent Cloud = 80%; No Precip.; Water pH = 7.7 to 8.5
2	May 6, 2015	20:42 to 21:31 hrs	Air Temp. = 20^{0}C; Water Temp. = 15.8^{0}C ; Wind = 0 (Beaufort); Percent Cloud = 80%; No Precip.; Water pH = 7.7 to 8.2
3	June 16, 2015	21:19 to 21:52 hrs	Air Temp. = 21.6^{0}C; Water Temp. = 18.2^{0}C ; Wind = 1 (Beaufort); Percent Cloud = 0%; No Precip.; Water pH = 6.8 to 8.1
2014			
1	April 11, 2014	20:05 to 21:05 hrs	Air Temp. = 9^{0}C; Water Temp. = 8.8^{0}C ; Wind = 2 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 7.6 to 8.5;
2	May 21, 2014	21:20 to 22:41 hrs	Air Temp. = 9^{0}C; Water Temp. = 8.8^{0}C ; Wind = 2 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 7.6 to 8.5;
3	June 26, 2014	21:36 to 22:03 hrs	Air Temp. = 9^{0}C; Water Temp. = 8.8^{0}C ; Wind = 2 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 7.6 to 8.5
2013			
1	April 17, 2013	19:40 to 20:35 hrs	Air Temp. = 9^{0}C; Water Temp. = 8.8^{0}C ; Wind = 2 (Beaufort); Percent Cloud = 100%; No Precip.; Water pH = 7.6 to 8.5;
2	May 6, 2013	20:45 to 21:15 hrs	Air Temp. = 19^{0}C; Water Temp. = 18.2^{0}C; Wind = 0 km/hr; Percent Cloud = 10%; No Precip.; Water pH =7.6 to 8.5;
3	June 24, 2013	21:29 to 21:52 hrs	Air Temp. = 26.6^{0}C; Water Temp. = 25.7^{0}C; Wind = 0-1; Percent Cloud = 40%; No Precip.; Water pH =7.7 to 8.8

codes of 3. In 2013, 2015 and 2016 four species were heard at this station, with the missing species in 2017 being Wood Frog, which during the years it was heard had a call code of 3. Wood Frog was also not heard in 2014 at Frog_1, when only two frog species were heard at this station. The 2014 survey results at station Frog_1 were the lowest of all the years to date based on number of species heard and lower call codes heard.

In 2017 at Frog_2, Spring Peeper and Grey Tree Frog, were recorded with a maximum call code of 3, with lower call codes recorded for Wood Frog (2) and Green Frogs (1). At Frog_2 Spring peepers have been heard consistently every year since 2013 at this station and recorded at call code 3. Review of the data at this station form 2013 to 2017, the number of species recorded at this station alternates yearly between 4 and 3 species being heard. Grey Tree Frog call code levels seem to change in an almost three year cycle (where from 2014 call code levels decrease a level each year to call code 1 in 2016, and then rose back to call code 3 in 2017). Call code levels for Green Frog seem to be variable year to year.

At Frog_3 in 2017, four species of frog were heard similar to 2015 and 2013. Spring Peeper was heard at Frog_3 in 2017 but seems to alternate between being present or not present on an annual basis (none were heard in 2014 and 2016), and call codes have never exceed call code 2 at this station. Green Frog also seems to alternate between being present in small numbers (call code 1) and not being present at all (none heard in 2013 or 2014). Grey Tree Frog has been heard each year at this station alternating each year between call level codes of 1 or 2. Northern Leopard Frog has been heard on only two of the five years of survey and only at call level code of 1, the current data set shows it being recorded every 4 years.

At survey station Frog_4 (Jones Property) in 2017 only one species was heard, Green Frog at call level code 2. Green Frog had not been heard at this station prior to 2016 and was heard at call level code 1 in 2016. 2016 has been the only year when more than one species was heard at this station, with Green Frog and Bullfrog both heard at call code 1. In 2015 and 2013 no frog species were recorded calling/observed, and in 2014 only Bullfrog at call level code 1, was recorded.

Overall, the 2017 amphibian survey results compared with the previous 4 years, indicate no significant change other than what appears to be typical yearly variation in amphibian breeding. Wood Frog, Grey Tree Frog and Spring Peeper throughout the five years of monitoring to date, have continued to have call codes of 2 or 3, indicating continued strong breeding populations for those species.

Table 8. Summary of 2017 Amphibian Call Surveys by Species, Call Level Code and Station Number, Roszell Pit, Puslinch.

Species	Survey Visit #	Survey Station Number			
		Frog_1	Frog_2	Frog_3	Frog_4 (Jones Property #6512 Roszell Road)
Spring Pepper	**1**	3	3	1	-
	2	-	-	-	-
	3	-	-	-	-
Wood Frog	**1**	-	2	-	-
	2	-	-	-	-
	3	-	-	-	-
Green Frog	**1**	-	-	-	-
	2		-	1	-
	3	1	1	1	2
Grey Tree Frog	**1**	-	-	-	-
	2	3	3	2	-
	3	-	-	-	-
Northern Leopard Frog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	1	-
Bullfrog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-

LEGEND:

Call level codes (MMP):

1 = calls can be counted; not simultaneous
2 = some simultaneous call; but distinguishable
3 = calls not distinguishable individually, overlapping

Table 9. Summary of 2016 Amphibian Call Surveys by Species, Call Level Code and Station Number, Roszell Pit, Puslinch.

Species	Survey Visit #	Survey Station Number Frog_1	Frog_2	Frog_3	Frog_4 (Jones Property #6512 Roszell Road)
Spring Pepper	**1**	3	3	-	-
	2	1	1	-	-
	3	-	-	-	-
Wood Frog	**1**	3	3	1	-
	2	-	-	-	-
	3	-	-	-	-
Green Frog	**1**	-	-	-	-
	2	1	-	1	-
	3	-	-	1	1
Grey Tree Frog	**1**	-	-	-	-
	2	2	1	-	-
	3	1	1	1	-
Northern Leopard Frog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
Bullfrog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	-	1

LEGEND:

Call level codes (MMP):
1 = calls can be counted; not simultaneous
2 = some simultaneous call; but distinguishable
3= calls not distinguishable individually, overlapping

Table 10. Summary of 2015 Amphibian Call Surveys by Species, Call Level Code and Station Number, Roszell Pit, Puslinch.

Species	Survey Visit #	Survey Station Number			
		Frog_1	Frog_2	Frog_3	Frog_4 (Jones Property #6512 Roszell Road)
Spring Pepper	**1**	3	3	2	-
	2	3	3	2	-
	3	-	-	-	-
Wood Frog	**1**	3	3	1	-
	2	-	-	-	-
	3	-	-	-	-
Green Frog	**1**	-	-	-	-
	2	-	-	-	-
	3	1	3	3	-
Grey Tree Frog	**1**	-	-	-	-
	2	-	-	2	-
	3	2	2	1	-
Northern Leopard Frog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
Bullfrog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-

LEGEND:

Call level codes (MMP):
1 = calls can be counted; not simultaneous
2 = some simultaneous call; but distinguishable
3= calls not distinguishable individually, overlapping

Table 11. Summary of 2014 Amphibian Call Surveys by Species, Call Level Code and Station Number, Roszell Pit, Puslinch.

		Survey Station Number			
Species	Survey Visit #	Frog_1	Frog_2	Frog_3	Frog_4 (Jones Property #6512 Roszell Road)
Spring Pepper	**1**	2	3	1	-
	2	1	1	1	-
	3	-	-	-	-
Wood Frog	**1**	-	1	-	-
	2	-	-	-	-
	3	-	-	-	-
Green Frog	**1**		-	-	-
	2	-	-	1	-
	3	-	-	1	-
Grey Tree Frog	**1**	-	-	-	-
	2	3	3	2	-
	3	-	1	-	-
Bullfrog	**1**	-	-	-	-
	2	-	-	-	-
	3	-	-	-	1

LEGEND:

Call level codes (MMP):
1 = calls can be counted; not simultaneous
2 = some simultaneous call; but distinguishable
3= calls not distinguishable individually, overlapping

Table 12. Summary of 2013 Amphibian Call Surveys by Species, Call Level Code and Station Number, Roszell Pit, Puslinch.

		Survey Station Number			
Species	Survey Visit #	Frog_1	Frog_2	Frog_3	Frog_4 (Jones Property #6512 Roszell Road)
Spring Pepper	1	3	3	-	-
	2	3	3	2	-
	3	-	-	-	-
Wood Frog	1	3	3	-	-
	2	-	-	-	-
	3	-	-	-	-
Green Frog	1	1	-	-	-
	2	-	-	1	-
	3	1	2	1	-
Grey Tree Frog	1	-	-	-	-
	2	-	-	1	-
	3	2	1	-	-
Northern Leopard Frog	1	-	-	-	-
	2	-	-	1	-
	3	-	-	-	-

LEGEND:
Call level codes (MMP):
1 = calls can be counted; not simultaneous
2 = some simultaneous call; but distinguishable
3= calls not distinguishable individually, overlapping

5.0 Discussion

The 2017 survey results indicate there is still a strong population of Blue-spotted Salamanders laying eggs within the wetland being monitored. In fact 2017 had the highest number of salamander eggs counted of all the years of surveys. The 2017 results indicate a greater numbers of egg masses being counted in Area A and C than during any of the other monitoring years. Higher numbers in 2017 in Area A and C may be a result of shallower water depth in area B in Spring 2017 than in some years, making salamanders lay eggs in deeper water in areas A and C.

The 2017 amphibian surveys indicate continued strong presence of breeding Spring Peepers, Grey Tree Frogs, Wood Frog and Green Frog. The Jones Property in 2017 again shows minimal use for breeding amphibians with only call level codes of 1 being recorded for Green frog and Bullfrog on an inconsistent basis from year to year. The lack of frog numbers and variety in the Jones Pond is probably due to the fish population present. The 2015 results, which show similar call code levels to that in

2013 at many of the stations, suggesting yearly fluctuations in the populations of the amphibians in the wetlands being inventoried. The variation between 2013 and 2014 findings was thought to be the result of various freezes and thaws and then very long cold periods, which may have resulted in adult mortality during the winter of 2013/14. Overall the 2017 amphibian survey data continues to show the same species diversity and minimal to no changes in call level codes being recorded at the survey stations compared to other monitoring years.

The Fall vegetation plots showed variation in percent cover of some species between 2013 and 2017 at vegetation Plots A and B, but are the likely result of continued grazing of cattle where the vegetation plots are located. Variations in the percent cover of certain species at the other vegetation plots sampled still typically show changes in only one percent cover category.

At the six vegetation plots the tree and shrub data suggests there has been minimal change in species presence or health between 2016 and 2017, beyond natural yearly changes. There continues to be standing water noted in plots where standing water had been recorded in previous years and at depths similar to what has been recorded historically at the plots (and in some locations slightly more in 2017). Cattle are still allowed access to the areas where vegetation plots A and B are located which continues to influence conditions in those survey plots.

The 2017 trout redd surveys indicate continued Brook Trout breeding in the tributaries adjacent to the Roszell Pit. The Main Creek which had trout redds found in 2012 has continued to have trout redds during the 2013 to 2017 period. The Main Creek channel continues to be the location where the most Brook Trout redds are present. Tributary #7 had shown trout redds to be present from 2012 to 2014, but none were found during the 2015 surveys. The survey data from December 2015 indicates there were lower numbers of fish redds present than all previous years in both Tributary #7 and the Main Creek channel. The unusually warm temperatures throughout December 2015 are believed to be the cause of the reduced numbers of redds found in December. It is believed that Brook Trout spawning had not been completed in December 2015 due to high stream temperatures. Redd checks in January 2016 found more redds present in the Main Creek and Tributary #7 than were present in December 2015. The 2017 surveys showed typical numbers of trout redds being present in the Main Creek and Tributary #7, based on the historical data.

The 2017 November and December trout redd surveys suggest that typical levels of Brook Trout spawning is continuing to take place. There does not appear to be any significant impact on Brook Trout spawning in the coldwater creeks adjacent to the Roszell Pit based on comparison of historical data with the 2017 survey findings.

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APPENDIX 1.

Example of a Completed
Herbaceous Vegetation Data Form
(for a Sub-plot, 2012):
Roszell Pit

Dance Environmental Inc.

Herbaceous Monitoring Plots

SPECIES LIST

Page 4 of 4

Site:	**Roszell Pit**		
Sampling Plot #: F		**Subplot #:** N W	
UTM (centre of Plot):			
Date: Oct. 1/12		**Time:**	**Start**
Surveyor(s): KSD, KWD			**End**
Weather:	Water Depth: 0		

Species	**Solitary**	**<1%**	**1-5%**	**6-15%**	**16-30%**	**31-50%**	**51-75%**	**76-100%**	**Notes**
Canada Mayflower		✓							
Moss sp.				✓					
Glossy Buckthorn		✓							seedlings
Sedge sp.		✓							
Eastern White Cedar	✓								seedling
dead wood		✓							
liverwort sp.	✓								

APPENDIX 2.

Completed Tree and Shrub Inventory Data Forms

(Revised 2013 Data Form):

Roszell Pit

Dance Environmental Inc
Tree Monitoring Inventory

Page 1 of 2

Site: Roszell Pit Plot E			
UTM (centre of Plot):			
Date:		**Time: Start**	11;05
Surveyor(s): KSD		**End**	11:16
Weather: Temp = 22°c ; wind = 0-2 km/hr ; 100% cloud ; light precip off and on			

Transect Name: North -south

Shrubs

Species	Condition (good, fair, poor, dead)	Understorey: Tally
No	Shrubs	at 1m or taller

Notes:

Condition: To assess condition look for:
Sores, Soot
Disease, Fungus
Rot,or damage to Trunk, Roots
Dead main branches, small branches/twigs
Lost/dead foliage

Transect Name: East-West

Shrubs

Species	Condition (good, fair, poor, dead)	Understorey: Tally
Glossy Buckthorn	Good	6 stems

Notes:

Sept, 2015

Pg. 2 of 2

Trees:

all trees >10 dbh

tree health and numbers within entire 10x10 plot

Plot #: E

Layers: 1=canopy 2=sub-canopy

Species	Condition	location	Canopy Layer	
			1	2
E.W. Cedar	Good	NE	|	
		SE	卌	
		SW		
		NW	卌 |	
"	Fair	NE		
		SE		
		SW	| (uprooted and on ground) but alive still	
		NW		
Y. Birch	Good	NE	||||	
		SE		
		SW	|	
		NW	|	
Y. Birch	Fair	NE	|	
		SE		
		SW		
		NW	|	
Bl. Ash	Fair	NE		
		SE	|	
		SW		
		NW		
		NE		
		SE		
		SW		
		NW		
		NE		
		SE		
		SW		
		NW		
		NE		
		SE		
		SW		
		NW		
		NE		
		SE		
		SW		
		NW		
		NE		
		SE		
		SW		
		NW		

Notes: (Note all deadfall in the plots!)

APPENDIX 3.

Summary of 2013 to 2017 Spring Herbaceous Vegetation in each Sub-plot

Appendix 3. Summary of 2013 to 2017 Spring Herbaceous Vegetation in each Sub-plot.

Plot	Sub-plot	Dominant Taxa Species	2013	2014	2015	2016	2017
			Percent Cover for the Taxa				
A	NE	*Gliceria striata*	31-50%	31-50%	6-15%	6-15%	16-30%
		Creeping Buttercup	6-15%	1-5%	1-5%	<1%	1-5%
		Bitter Dock	-	1-5%	1-5%	solitary	solitary
	NW	Moss sp.	31-50%	16-30%	16-30%	16-30%	31-50%
		Bulblet Fern	16-30%	1-5%	6-15%	6-15%	31-50%
		Glyceria striata	16-30%	1-5%	1-5%	1-5%	<1%
	SW	E. White Cedar-seedling	31-50%	-	-	Solitary	-
		Field Horsetail	16-30%	6-15%	16-30%	16-30%	31-50%
		Carex schweinitzii	6-15%	1-5%	1-5%	-	-
	SE	Moss sp.	16-30%	6-15%	16-30%	6-15%	16-30%
		Agrostis stolonifera	16-30%	6-15%	-	-	-
		Watercress	16-30%	-	-	16-30%	6-15%
B	NE	Field Horsetail	31-50%	1-5%	6-15%	16-30%	51-75%
		Carex Schweinitzii	16-30%	16-30%	16-30%	16-30%	6-15%
		Carex flava	6-15%	-	-	-	-
	NW	E. White Cedar –	51-75%	6-15%	-	-	-
		Moss sp.	31-50%	51-75%	31-50%	51-75%	76-100%
		Bulblet Fern	16-30%	6-15%	6-15%	<1%	1-5%
	SW	Kentucky Bluegrass	51-75%	1-5%	-	<1%	-
	SE	*Ranunculus ripens*	6-15%	16-30%	76-100%	51-75%	31-50%
		Creeping Charlie	6-15%	<1%	1-5%	<1%	Solitary
		Kentucky Bluegrass	16-30	51-75%	31-50%	31-50%	51-75%

Appendix 3. Summary of 2013 to 2017 Spring Herbaceous Vegetation in each Sub-plot Cont'd.

Plot	Sub-plot	Dominant Taxa Species	2013	2014	2015	2016	2017
			Percent Cover for the Taxa				
C	NE	*Carex pedunculata*	16-30%	16-30%	6-15%	6-15%	16-30%
		Bulblet Fern	6-15%	1-5%	1-5%	1-5%	1-5%
		Field Horsetail	6-15%	1-5%	1-5%	1-5%	1-5%
	NW	*Carex pedunculata*	6-15%	<1%	1-5%	1-5%	1-5%
		Field horsetail	6-15%	<1%	<1%	-	1-5%
		Canada Mayflower	6-15%	1-5%	1-5%	1-5%	1-5%
	SW	Field Horsetail	16-30%	6-15%	16-30%	1-5%	1-5%
		Three-leaved Solomon Seal	6-15%	-	1-5%	<1%	6-15%
		Bulblet Fern	6-15%	1-5%	1-5%	<1%	1-5%
	SE	Field Horsetail	16-30%	1-5%	6-15%	16-30%	16-30%
		Coltsfoot	6-15%	1-5%	6-15%	1-5%	1-5%
		Bulblet Fern	6-15%	6-15%	6-15%	6-15%	31-50%
D	NE	Bulblet Fern	6-15%	16-30%	16-30%	6-15%	31-50%
		Dwarf Scouring Rush	6-15%	16-30%	16-30%	16-30%	1-5%
		Carex leptalea	1-5%	-	solitary	<1%	-
	NW	Bulblet Fern	31-50%	16-30%	31-50%	6-15%	6-15%
		Field Horsetail	1-5%	1-5%	1-5%	1-5%	-
		Dwarf Scouring Rush	1-5%	1-5%	1-5%	6-15%	16-30%
	SW	*Carex pedunculata*	1-5%	6-15%	1-5%	1-5%	6-15%
		Bulblet Fern	1-5%	1-5%	1-5%	1-5%	1-5%
		Dwarf Scouring Rush	1-5%	<1%	<1%	<1%	-
	SE	Bulblet Fern	31-50%	16-30%	31-50%	31-50%	51-75%
		Field horsetail	<1%	Solitary	Solitary	-	-
		Moss sp.	<1%	<1%	-	1-5%	1-5%

Appendix 3. Summary of 2013 to 2017 Spring Herbaceous Vegetation in each Sub-plot Cont'd.

			2013	2014	2015	2016	2017
Plot	**Sub-plot**	**Dominant Taxa Species**	**Percent Cover for the Taxa**				
E	NE	Cinnamon Fern	6-15%	<1%	1-5%	1-5%	6-15%
		Canada Mayflower	1-5%	1-5%	<1%	<1%	<1%
		Bulblet Fern	<1%	-	<1%	-	solitary
	NW	Moss sp.	51-75%	76-100%	76-100%	76-100%	31-50%
		Agrostis stolinifera	16-30%	-	-	-	-
		Common Toothwort	16-30%	16-30%	6-15%	6-15%	6-15%
	SW	Moss sp.	1-5%	1-5%	1-5%	6-15%	6-15%
		Bulblet Fern	1-5%	-	1-5%	-	-
		Carex pedunculata	1-5%	1-5%	1-5%	<1%	1-5%
		Yellow Birch.	1-5%	<1%	-	solitary	<1%
	SE	*Carex leptalea*	1-5%	-	-	Solitary	-
		Bulblet Fern	<1%	<1%	<1%	<1%	<1%
		Glossy Buckthorn	<1%	<1%	<1%	<1%	<1%
F	NE	Moss sp.	6-15%	16-30%	16-30%	6-15%	6-15%
		Canda Mayflower	1-5%	<1%	-	<1%	<1%
		Marsh Fern	<1%	-	-	-	-
	NW	Moss sp.	6-15%	31-50%	16-30%	31-50%	16-30%
		Canada Mayflower	1-5%	<1%	1-5%	1-5%	<1%
		Common Buckthorn	<1%	<1%	<1%	<1%	solitary
	SW	Moss sp.	31-50%	31-50%	31-50%	51-75%	16-30%
		Dwarf Scouring rush	1-5%	<1%	<1%	<1%	-
		Carex leptalea	1-5%	-	1-5%	<1%	<1%
	SE	Moss sp.	1-5%	-	1-5%	<1%	-
		Canada Mayflower	<1%	-	-	-	-
		Bulblet Fern	-	<1%	<1%	-	<1%

APPENDIX 4.

Summary of 2012 to 2017 Fall Herbaceous Vegetation in each Sub-plot

Appendix 4. Summary of 2012 to 2017 Fall Herbaceous Vegetation in each Sub-plot.

			2012		2013	2014	2015	2016	2017
Plot	Sub-plot	Dominant Taxa Species	Percent Cover for the Taxa	Dominant Taxa Species	Percent Cover for the Taxa				
A	NE	*Carex hystericina*	51-75%	Fowl Mana Grass	16-30%	1-5%	16-30%	31-50%	16-30%
		Common Mint	31-50%	*Juncus articulatus*	6-15%	6-15%	1-5%	-	6-15%
		Poa compressa	6-15%	E. White Cedar -seedling	6-15%	<1%	1-5%	1-5%	1-5%
	NW	Moss sp.	51-75%	Moss sp.	31-50%	51-75%	31-50%	51-75%	51-75%
		Bulblet Fern	6-15%	Fowl Mana Grass	16-30%	31-50%	1-5%	<1%	-
		Agrostis sp.	6-15%	Bulblet Fern	6-15%	6-15%	16-30%	6-15%	16-30%
	SW	Coltsfoot	31-15%	Coltsfoot	6-15%	6-15%	16-30%	31-50%	16-30%
		Carex sp.	6-15%	*Carex schweinitzii*	6-15%	1-5%	-	-	-
		Bulblet Fern	6-15%	Bulblet Fern	6-15%	1-5%	16-30%	16-30%	6-15%
		Field Horsetail	6-15%	Field Horsetail	6-15%	6-15%	31-50%	16-30%	31-50%
	SE	*Carex sp.*	31-50%	*Bidens connata*	6-15%	-	Solitary	<1%	-
		Watercress	31-50%	Watercress	6-15%	<1%	6-15%	31-50%	6-15%
		Bluegrass	16-30%	Fowl Manna Grass	6-15%	6-15%	1-5%	1-5%	6-15%
B	NE	*Carex hystericina*	31-50%	*Carex schweinitzii*	16-30%	16-30%	1-5%	6-15%	16-30%
		Moss sp.	1-5%	Purple Stemmed Aster	16-30%	16-30%	16-30%	6-15%	6-15%
				Field Horsetail	16-30%	6-15%	16-30%	6-15%	16-30%
	NW	Yellow Birch –saplings	51-75%	Moss sp.	51-75%	51-75%	51-75|%	51-75%	76-100%
		Moss Spp.	51-75%	E. White Cedar –seedling	16-30%	1-5%	1-5%	-	<1%
		Glossy Buckthorn – seedlings	31-50%	Bulblet Fern	1-5%	1-5%	6-15%	-	-
	SW	*Poa compressa*	31-50%	*Agrostis stolonifera*	31-50%	-	-	-	-
		Tall Buttercup	6-15%	Tall Buttercup	6-15%	-	-	-	-
				Fowl Mana Grass	1-5%	-	-	-	-
				Pilea Fontana	<1%	6-15%	1-5%	<1%	1-5%
				Common Plantain	1-5%	6-15%	6-15%	-	-
				Spotted Jewelweed	-	1-5%	-	-	-
	SE	Tall Buttercup	76-100%	Tall Buttercup	16-30%	31-50%	51-75%	31-50%	76-100%
		Poa compressa	6-15%	*Agrostis stolonifera*	6-15%	-	-	-	-
		Carex hystericina	6-15%	*Pilea fontana*	1-5%	Solitary	<1%	<1%	1-5%
				Poa compressa	-	16-30%	6-15%	16-30%	16-30%

Appendix 4. Summary of 2012 to 2017 Fall Herbaceous Vegetation in each Sub-plot Cont'd.

Plot	Sub-plot		2012		2013	2014	2015	2016	2017
		Dominant Taxa Species	Percent Cover for the Taxa	Dominant Taxa Species	Percent Cover for the Taxa 20017				
C	NE	*Carex sp.* Bulblet Fern	51-75% 6-15%	*Carex flava* Bulblet Fern Field Horsetail	16-30% 6-15%	31-50% 6-15% 1-5%	16-30% 1-5% 6-15%	- 1-5% 6-15%	- 1-5% 16-30%
	NW	*Carex sp.* Dwarf Scouring Rush Field Horsetail	6-15% 1-5% 1-5%	*Carex flava* Dwarf Scouring Rush Common Buckthorn	6-15% 1-5% 1-5%	6-15% 1-5% 1-5%	6-15% 1-5% <1%	- 6-15% <1%	- 1-5% -
	SW	Field Horsetail Moss Sp. Bulblet Fern Rough-leaved Goldenrod	6-15% 1-5% 6-15% 1-5%	Field Horsetail Moss sp. Bulblet Fern *Carex flava*	31-50% 6-15% 1-5% 1-5%	6-15% 1-5% 1-5% 6-15%	16-30% 1-5% 1-5% <1%	6-15% 1-5% 1-5% <1%	16-30% 6-15% 1-5% -
	SE	Field Horsetail Coltsfoot Bulblet Fern	31-50% 6-15% 1-5%	Field Horsetail Coltsfoot Bulblet Fern	16-30% 6-15% 1-5%	Solitary 6-15% 6-15%	1-5% 6-15% 6-15%	1-5% 1-5% 6-15%	16-30% 1-5% 16-30%
D	NE	Dwarf Scouring Rush Bulblet Fern	51-75% 16-31%	Dwarf Scouring Rush Bulblet Fern	31-50% 6-15%	16-30% 6-15%	31-50% 16-30%	51-75% 6-15%	51-75% 6-15%
	NW	Bulblet Fern Shade Horsetail Dwarf Scouring Rush	31-50% 1-5% 1-5%	Bulblet Fern Field Horsetail Dwarf Scouring Rush	31-50% 6-15% 1-5%	31-50% 1-5% 6-15%	16-30% 6-15% 6-15%	31-50% 6-15% 16-30%	31-50% 6-15% 1-5%
	SW	*Carex sp.* Bulblet Fern	16-30% 1-5%	*Carex pedunculata* Bulblet Fern Dwarf Scouring Rush	6-15% 1-5% 1-5%	6-15% 6-15% 1-5%	6-15% 1-5% 1-5%	16-30% 6-15% <1%	6-15% 1-5% 1-5%
	SE	Bulblet Fern	16-30%	Bulblet Fern Glossy Buckthorn Moss sp.	31-50% Solitary	31-50% Solitary 1-5%	16-30% - 1-5%	31-50% - 1-5%	31-50% - -

Appendix 4. Summary of 2012 to 2017 Fall Herbaceous Vegetation in each Sub-plot Cont'd.

Plot	Sub-plot		2012		2013	2014	2015	2016	2017
		Dominant Taxa Species	**Percent Cover for the Taxa**	**Dominant Taxa Species**	**Percent Cover for the Taxa**				
E	NE	Marsh Fern	<1%	Cinnamon Fern	6-15%	6-15%	6-15%	6-15%	6-15%
		Cinnamon Fern	<1%	Moss sp.	1-5%	1-5%	1-5%	1-5%	1-5%
		Moss sp.	<1%	Bulblet Fern	Solitary	-	-	-	-
	NW	Grass sp.	76-100%	Moss sp.	76-100%	76-100%	76-100%	76-100%	76-100%
		Moss sp.	51-75%	*Agrostis stolinifera*	16-30%	6-15%	-	1-5%	1-5%
		Field Horsetail	6-15%	Dwarf Raspberry	1-5%	1-5%	1-5%	solitary	1-5%
	SW	Moss sp.	1-5%	Moss sp.	1-5%	1-5%	6-15%	1-5%	16-30%
		Marsh Fern	<1%	Bulblet Fern	1-5%	<1%	Solitary	-	-
		Carex sp.	<1%	*Carex pedunculata*	1-5%	1-5%	-	1-5%	1-5%
		Glossy Buckthorn	<1%	Glossy Buckthorn	1-5%	1-5%	1-5%	1-5%	1-5%
	SE	Moss Sp. (6-15%)	6-15%	Moss sp.	16-30%	16-30%	16-30%	16-30%	16-30%
		Bulblet Fern	<1%	Bulblet Fern	1-5%	<1%	<1%	<1%	-
		Buckthorn Sp.	<1%	Glossy Buckthorn	<1%	<1%	<1%	<1%	<1%
F	NE	Moss sp. (1-5%)	1-5%	Moss sp.	6-15%	6-15%	6-15%	16-30%	6-15%
		Bulblet Fern (<1%)	<1%	Marsh Fern	1-5%	-	-	-	1-5%
				Glossy Buckthorn	<1%	<1%	<1%	solitary	-
	NW	Moss Sp. (6-15%)	6-15%	Moss sp.	16-30%	31-50%	16-30%	16-30%	16-30%
		Can. Mayflower	<1%	Comm. Buckthorn	1-5%	1-5%	1-5%	<1%	-
		Carex sp.	<1%	Canada Mayflower	<1%	<1%	1-5%	<1%	<1%
	SW	Dwarf Scouring Rush	31-50%	Moss sp.	31-50%	31-50%	31-50%	31-50%	16-30%
		Moss Sp.	31-50%	Dwarf Sc. Rush	1-5%	<1%	1-5%	1-5%	<1%
				Glossy Buckthorn	1-5%	<1%	<1%	1-5%	<1%
				Showy Ladyslipper	-	1-5%	1-5%	1-5%	Solitary
	SE	Moss Sp.	<1%	Glossy Buckthorn	1-5%	1-5%	Solitary	-	-
		Glossy Buckthorn	<1%	Bulblet Fern	<1%	<1%	<1%	<1%	-

APPENDIX 5.

Photos of Spring Vegetation Monitoring
Plots A-F,
2017

Spring 2017

Photo 1. Vegetation Plot A, facing N from Steel T-bar.

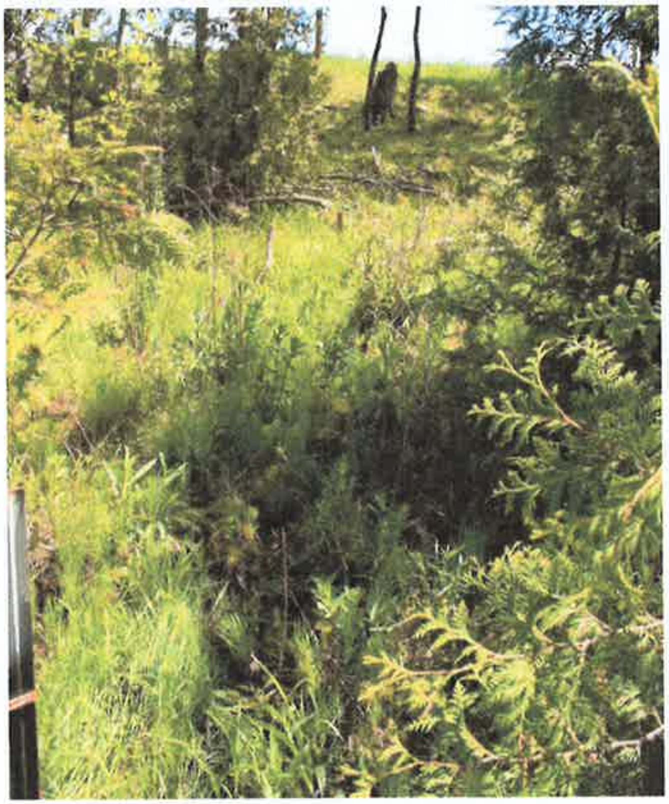

Photo 2. Vegetation Plot B, facing E from Steel T-bar.

Photo 3. Vegetation Plot C, facing E from Steel T-bar.

Photo 4. Vegetation Plot D, facing E from Steel T-bar.

Photo 5. Vegetation Plot E, facing E from Steel T-bar.

Photo 6. Vegetation Plot F, facing E from Steel T-bar.

APPENDIX 6.

Photos of Fall Vegetation Monitoring
Plots A-F,
2017

Fall 2017

Photo 1. Vegetation Plot A, facing N from Steel T-bar.

Photo 2. Vegetation Plot B, facing E from Steel T-bar.

Photo 3. Vegetation Plot C, facing E from Steel T-bar.

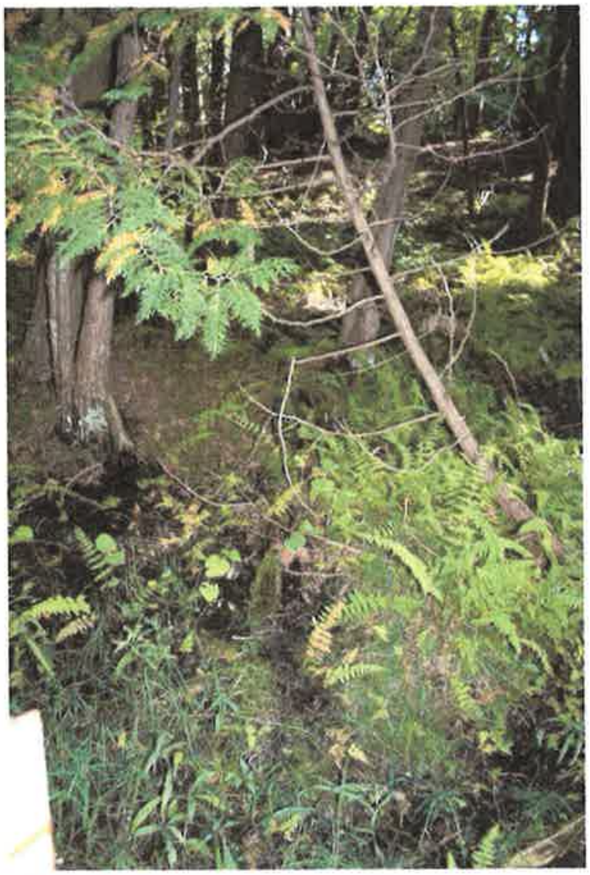

Photo 4. Vegetation Plot D, facing E from Steel T-bar.

Photo 5. Vegetation Plot E, facing E from Steel T-bar.

Photo 6. Vegetation Plot F, facing E from Steel T-bar.

APPENDIX 7.

C.V.s
of
Report Authors.

K.W. Dance, M.Sc.

K.S. Dance, M.E.S.

DANCE
ENVIRONMENTAL
INC.

KEN DANCE
CONSULTING BIOLOGIST

EDUCATION

- M.Sc., Biology, 1977; University of Waterloo
- B.Sc., Honours Biology, 1975; University of Waterloo

COURSES

- Butternut Health Assessment Workshop & Update – OMNR, 2010 & 2013
- Preparation of E.I.S. Reports – OMNR, 1995
- Bioassessments & Biological Criteria for Warmwater Streams – AFS 1993
- Ontario Wetland Evaluation System, 3rd Edition – OMNR, 1993
- Creating and Using Wetlands – University of Wisconsin, 1992
- Fluvial Geomorphology – University of Guelph and AFS, 1992

PROFESSIONAL EXPERIENCE

1991 to date. Consulting Biologist and President, Dance Environmental Inc. The firm has completed over 400 assignments.

Mr. Dance has been consulting for 39 years and has gained extensive experience on the following types of studies: ecological inventory, biological monitoring, environmental planning, Species at Risk Overall Benefit and Management Plans, watershed management, no net loss of fish habitat, tree saving plans, vegetation management, wetland Environmental Impact Studies, non-game wildlife and environmental assessments.

He also has experience in biological resource inventory, impact prediction, management option development and comparison, attendance at public information centres and as an expert witness before boards and tribunals.

1988-1991 Senior Biologist, Ecologistics Limited. As Senior Biologist, Ken was responsible for review of all biological projects. He consulted to private and public sector clients on management of fish, vegetation, and wildlife resources.

1985-1988 Associate and Manager of Biological Services, Gartner Lee Limited. Mr. Dance consulted to industrial and government clients.

1982-1985 Senior Biologist and Project Manager, Gartner Lee Limited.

1977-1982 Biologist and Project Manager, Ecologistics Limited.

1975-1976 Research Technician, University of Waterloo. Mr. Dance acted as a research technician on a PLUARG contract study of two streams.

PROJECT EXAMPLES

E.I.S. Reports

Undertook inventory, site assessments and reporting for over one thousand sites relating to residential, industrial, aggregate and waste management proposals.

Highways and Roads

Examples of Environmental Assessment and highway construction projects, which Mr. Dance has worked on follow.

- Parkhill Road and Bridge, Cambridge – inspection of in-water construction to minimize erosion and sedimentation and construction of fish pool habitat.
- Gordon Street Bridge, Guelph – inspection of in-water construction and placement of fish habitat rock, 2000-2002.
- Highway 60 at Huntsville – inspection of in-water work during replacement of 4 culverts, including trout habitat; inspection of tree and shrub plantings.
- Highway 35 Minden – inspection of stream habitat restoration construction and inspection of tree and shrub plantings.
- Wellington County Roads – fisheries assessments for 3 culvert replacements.

Wastewater Management

- Etobicoke and Mimico Creek Watersheds: Toronto Wet Weather Flow Management Master Plan – ecological consultant addressing fish, wildlife, forests, wetlands and Lake Ontario near shore habitat.
- Thunder Bay Water Pollution Prevention Study – biological consultant addressing fish, wildlife, forests, wetlands and Lake Superior near shore habitat.
- Cincinnati and Cleveland, Ohio – CSO Review Studies: biological consultant addressing existing impacts on aquatic ecosystems and advice regarding solution options.
- Wastewater Treatment Plant Class E.A.s: biological consultant for Ayr, Flesherton, Ingersoll, Keswick, Lambeth, Tavistock and Wellesley plant upgrades/expansions.

Water Supply

Biological/fisheries assessment regarding water taking and/or facility siting for projects in Elmira, Georgetown, Acton, Cambridge, Caledon and Brampton.

Publications

Published chapters in three books. Over forty papers on fish, wildlife, wetland and vegetation management, as well as water quality and fisheries. Articles in publications such as Ontario Birds, Ontario Field Biologist, Newsletter of the Field Botanists of Ontario, Recreation Canada, Landscape Architectural Review and the Water Research Journal of Canada.

04/16

DANCE
ENVIRONMENTAL
INC.

KEVIN DANCE, M.E.S.
TERRESTRIAL BIOLOGIST AND PROJECT MANAGER

EDUCATION

- M.E.S., Masters of Environment and Resource Studies, 2011; University of Waterloo. *Thesis Title: "Raptor Mortality and Behavior at Wind Turbines Along the North Shore of Lake Erie During Autumn Migration 2006-2007"*
- B.E.S., Honours Bachelor of Environment and Resource Studies with Parks Option, 2006; University of Waterloo.

CERTIFICATIONS & PROFESSIONAL ASSOCIATIONS

Workshops/Certifications:

- Bat Survey Solutions LLC. Bat Acoustic Fieldwork and Data Management Workshop. Instructors: Janet D. Tyburec, and Joseph M. Szewezak (creator of SonoBat and professor at Humbolt State University, California). February 2016, Punta Gorda, Florida.
- Wildlife Acoustics: Bat Acoustics Training with Dr. Lori Lausen, February 2015, Miami, Florida
- Butternut Health Assessment Workshop, BHA #486, July 16, 2014.
- Dragonfly and Damselfly Identification Workshop, 2013, Guelph Arboretum.
- OMNR, Ontario Wetland Evaluation System, Northern Manual and Southern Manual. North Bay, 2012
- OMNR Ecological Land Classification for Southern Ontario, Lindsay, 2010
- Diploma of Environmental Assessment, University of Waterloo, 2006
- Transportation of Dangerous Goods, Safety Services Canada, 2008
- Member, Bird Studies Canada (BSC)
- Member, Ontario Field Ornithologists (OFO)
- Member, Kitchener-Waterloo Field Naturalist Club (KWFN)

AREAS OF PROFESSIONAL EXPERIENCE

Kevin Dance has over 7 years of consulting experience on a wide range of projects throughout Ontario. Kevin specializes in inventories, evaluations, research and impact studies of natural resources. He is experienced in identifying important natural features and evaluating the significance and sensitivity of these features. Kevin regularly works with multidisciplinary study teams focusing on the management of terrestrial and wetland ecosystems.

Terrestrial Vegetation and Wildlife Studies

Kevin has worked on various studies investigating a variety of wildlife habitats, determining wildlife populations including numbers and seasonal trends and monitoring of long-term impacts of developments on species. Kevin has conducted a wide range of monitoring surveys and inventories to identify the presence of wildlife on study sites as well as species specific guided surveys for Species at Risk and Species of Conservation Concern including Bobolink, Barn Swallow, Bank Swallow, Eastern Meadowlark, American Badger, Eastern Milksnake, Blanding's Turtle, Jefferson Salamander, Common Nighthawk, Whip-poor-will, Henslow's Sparrow, Short-eared Owl and Least Bittern. He has completed numerous detailed vegetation community mapping inventories and conducted vegetation monitoring at permanent sample plots, as well as transects and random sample quadrats to assess short-term and long-term impacts of developments on vegetation. Kevin is trained and experienced in applying the Ecological Land

Classification System in projects in Southern Ontario to delineate, describe and map vegetation communities.

Kevin's specific terrestrial expertise includes:

- wildlife and vegetation habitat mapping, evaluations, and research.
- surveys of plants, birds, mammals, reptiles, amphibians, dragonflies and butterflies.
- identification of rare and sensitive species and habitats.
- bat acoustic monitoring and data analysis for Ontario bat species
- development of monitoring methodologies for Species at Risk
- preparing Overall Benefit Plans and Management Plans for Species at Risk
- Obtaining permitting from MNR to conduct Jefferson Salamander trapping surveys, and snake coverboard surveys
- over 10 years of bird identification experience
- analysis of potential wildlife corridors.
- short-term and long-term monitoring techniques for fauna

Wetland Studies

Kevin is certified to conduct Ontario Wetland Evaluations and has worked in habitats throughout Ontario using the Ontario Wetland Evaluation System for Wetlands in Southern and Northern Ontario. Kevin has also participated in numerous studies focusing on the impact of development on wetland ecology and function.

Kevin's specific wetland expertise includes:

- inventories and mapping of wetland flora and fauna.
- wetland evaluations using the Ontario Wetland Evaluation System (OWES).
- wetland boundary delineation
- wetland Environmental Impact Studies (EISs).

Aquatic Studies

Kevin has assisted with numerous long-term fish monitoring programs using electrofishing to sample reaches of streams to assess and monitor development impacts to cold water streams. Kevin has experience collecting fish during electrofishing sampling, fish identification, marking and measuring. He also has experience identifying aquatic and wetland vegetation as well as collection of aquatic habitat data including stream depth, temperature, stream bed composition, flow speed and invertebrate sampling. Kevin has assisted with electrofishing surveys and aquatic habitat assessments within Wellington County and the Region of Waterloo.

Renewable Energy Projects: Wind Power / Solar Projects

Kevin has extensive experience conducting and organizing both pre-construction and post-construction studies at wind farms in Ontario, Manitoba and Alberta. Kevin has been involved in a range of roles for post-construction studies including the development of monitoring methodologies for mortality searches, scavenger removal trials and searcher efficiency studies. Kevin has been involved in post-construction studies at four large scale wind farms and has conducted pre-construction studies at over a fifteen wind farms throughout Ontario, Manitoba and Alberta. Kevin has conducted field surveys or records reviews for over a dozen proposed solar parks.

Kevin's specific renewable energy expertise includes:

Wind

- development of mortality search methodologies and conducting mortality searches
- organizing and conducting scavenger removal studies and searcher efficiency trials
- identification of bird and bat fatalities
- incorporation of provincial and federal government policies and guidelines into monitoring

methodologies

- developing study methods for pre-construction wind farm studies, including: migration surveys (dawn and dusk), daytime soaring surveys, waterfowl surveys, shorebird surveys, winter raptor and diurnal owl surveys, walking transect surveys, and driving transect surveys.
- identification of and evaluating habitats of significant wildlife species
- use of marine radar for determining bat passage rates and abundance

Solar

- collection of field data required to complete wetland evaluations
- identification and mapping of wetland boundaries
- evaluation and identification of significant wildlife habitats
- conducting records reviews

EMPLOYMENT HISTORY

Terrestrial Biologist and Project Manager
Dance Environmental Inc., Drumbo, Ontario. 2011 to present

Terrestrial and Wetland Biologist
Natural Resource Solutions Inc., Waterloo, Ontario. 2008 to 2011

Environmental Scientist
Stantec Ltd., Guelph, Ontario. 2006 to 2007

Avian Field Technician –Breeding ecology and impacts of urban development on Wood Thrush in the Region of Waterloo. Bird banding crew leader, nest searcher, nest monitoring.
Canadian Wildlife Service and University of Waterloo, Waterloo, Ontario 2003 to 2005

Terrestrial Biologist
Dance Environmental Inc., Drumbo, Ontario 2001 to 2003

PUBLICATIONS, PRESENTATIONS, AWARDS

Dance, K.W., K.S. Dance, & M.B. Dance. 2012. Giant Ragweed (*Ambrosia trifida*) as a Food Source for Autumn Migrants and Winter Birds in the Grand River Basin. Ontario Birds 30(3):148-164.

Dance, K.S. 2012. Manipulation of Caterpillars for Consumption by Eastern Bluebirds. Ontario Birds 30(2):102-108.

Dance, K.W., K.S. Dance. 2012. Wetlands: What are they Good For? Oral Presentation. Princeton Historical Society. Princeton, Ontario. September 24, 2012.

Dance, K.S. 2011. "Raptors and Wind Farms". Oral Presentation. Ruthven Park 2nd Annual For The Birds Festival. September 17, 2011.

Dance, K. S. 2010. On the Wind: A Discussion of Raptors and the Wind Industry. Oral Presentation. Owen Sound Field Naturalist Club (OSFN). September 9, 2010.

Dance, K. S., Dance, K. W. 2010. "Raptors on the Wind". Oral Presentation. Kitchener-Waterloo Field Naturalist Club (KWFN). March 22, 2010.

Dance, K. S., Dance, K. W. 2010. Review of Raptor and Turbine Interaction Literature: the Case of the Erie Shores Wind Farm. Oral Presentation. RARE Charitable Research Reserve, Cambridge, ON. January 23, 2010.

Dance, K. S. R. James, L. Friesen, S. Murphy. 2009. “Raptor Behavior and Mortality (Erie Shores Wind Farm)”. Poster Presentation. Canadian Wind Energy Association Annual Conference & Exhibition. September 20-23, 2009.

Dance, K. S. R. James, L. Friesen, S. Murphy. 2009. “Migrant Raptor Behavior and Mortality (at the Erie Shores Wind Farm)”. Poster Presentation, 3rd place winner. A.D. Latornell Conservation Symposium. Nottawasaga, Ontario

From: Karen Landry
To: Nina Lecic; Courtenay Hoytfox
Subject: FW: Municipal Delegations at ROMA 2019 Conference
Date: Tuesday, November 13, 2018 4:49:53 PM

From: Delegations (MMA) <Delegations@ontario.ca>
Sent: Tuesday, November 13, 2018 4:47 PM
To: Delegations (MMA) <Delegations@ontario.ca>
Cc: Partanen, Karen (MMAH) <Karen.Partanen@ontario.ca>; Scott, Nadine (MMA) <Nadine.Scott2@ontario.ca>; Agis, Jennifer (MMA) <Jennifer.Agis@ontario.ca>; Lee, Kate (MMA) <Kate.Lee@ontario.ca>
Subject: Municipal Delegations at ROMA 2019 Conference

Hello/ Bonjour,

Please be advised that the Municipal Delegation Request Form for the Rural Ontario Municipal Association 2019 Annual Conference is available online. Information about delegations and a link to the form are available here: http://www.mah.gov.on.ca/Page19881.aspx .The deadline to submit requests is **Monday December 10, 2018**.

Le formulaire pour demander une rencontre avec le ministères pour le Congrès annuel de la ROMA (Rural Ontario Municipal Association) 2019 est disponible en ligne. Pour plus d'information sur les délégations et le formulaire, veuillez suivre le lien suivant : http://www.mah.gov.on.ca/Page20897.aspx . Date limite pour présenter une demande: **lundi 10 décembre 2018**.

Thank you/ Merci

(https://www.facebook.com/ontariogoodroads) (https://twitter.com/ont_good_roads)
(https://www.linkedin.com/company/ontario-good-roads-association)

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CONTACT (HTTP://OGRACONFERENCE.CA/CONTACT/)

OGRA CONFERENCE
(http://ograconference.ca)

search

Municipal Delegations

Delegation Request

Delegates Available *
Agriculture, Food and Rura

Issue to be Discussed *

max 1000 characters.

Have you spoken with the Ministry about this issue previously?
○ Yes ● No

Issue Rationale *

max 2000 characters

Supporting Information
Upload or drag files here.

Allowed files: pdf, doc, docx, jpeg, wpd, txt. Max File Size 2mb. Max number of files: 3

Municipal Contact Name *
First
Last

Municipal Contact email *

Municipal Contact Phone *

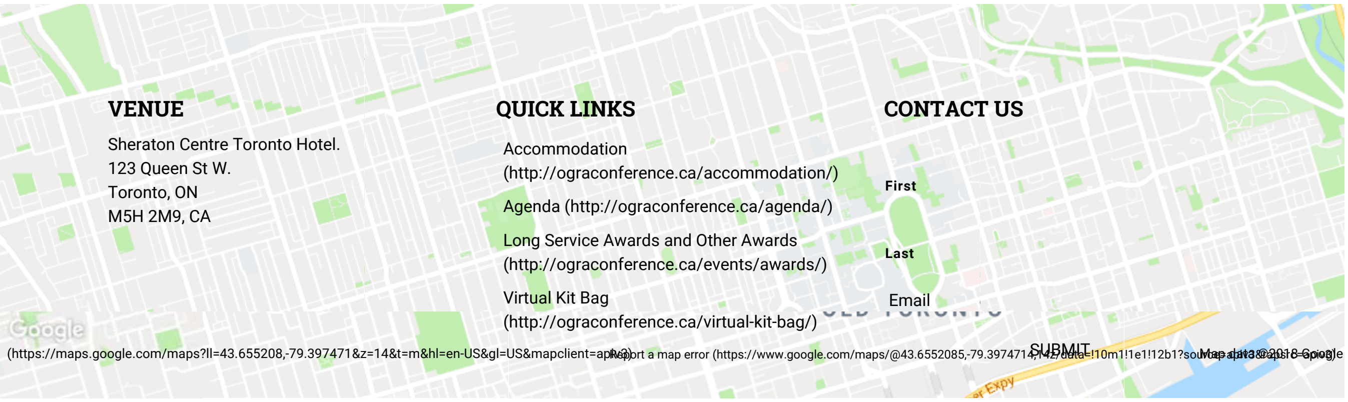
Name of Municipality *

Submit

Deadline to submit a request for delegations is Monday, January 14, 2019. If you have any questions regarding this process please email delegations@ogra.org (mailto:delegations@ogra.org?Subject=Municipal Delegation Request Question)

Agenda

- Workshops (http://ograconference.ca/agenda/workshops/)
- OGRA Shift Disturbers (http://ograconference.ca/agenda/shiftdisturbers/)
- Municipal Delegations (http://ograconference.ca/agenda/municipal-delegations/)
- Keynotes (http://ograconference.ca/agenda/keynotes/)
- Program at a Glance (http://ograconference.ca/agenda/program-at-a-glance/)
- The Last Word (http://ograconference.ca/agenda/question-box/)
- Emerging Municipal Leaders Forum (http://ograconference.ca/agenda/student-forum/)
- Policy Session (http://ograconference.ca/agenda/small-town-forum/)
- Road Building Technical Session: Quality of Asphalt Review (http://ograconference.ca/agenda/technical-session/)



VENUE

Sheraton Centre Toronto Hotel.
123 Queen St W.
Toronto, ON
M5H 2M9, CA

QUICK LINKS

- Accommodation (http://ograconference.ca/accommodation/)
- Agenda (http://ograconference.ca/agenda/)
- Long Service Awards and Other Awards (http://ograconference.ca/events/awards/)
- Virtual Kit Bag (http://ograconference.ca/virtual-kit-bag/)

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SUBMIT

(https://maps.google.com/maps?ll=43.655208,-79.397471&z=14&t=m&hl=en-US&gl=US&mapclient=apiv3) Report a map error (https://www.google.com/maps/@43.6552085,-79.3974714,14z/data=!10m1!1e1!12b1?source=apiv3&rapsrc=apiv3) Map data ©2018 Google

About (http://ograconference.ca/about/) Contact (http://ograconference.ca/contact/)

From: Karen Landry
To: Nina Lecic
Subject: FW: OMERS Comprehensive Plan Review Update
Date: Tuesday, November 20, 2018 9:00:30 AM

From: AMO Communications <communicate@amo.on.ca>
Sent: Monday, November 19, 2018 6:02 PM
To: Karen Landry <KLandry@puslinch.ca>
Subject: OMERS Comprehensive Plan Review Update

November 19, 2019

On November 15, 2018, the OMERS Sponsors Corporation (SC) Board of Directors voted on a number of proposals for OMERS Plan changes as part of its Comprehensive Plan Review (CPR) initiative. It passed two of the six measures put forward through the CPR initiative: 1) eliminating the current 35-year cap for credited service; and 2) to allow paramedics to negotiate NRA 60 participation. These Plan changes will become effective after January 1, 2021.

Increasing benefit enhancements while the Plan is in deficit does not support plan sustainability. The most effective sustainability lever, conditional indexing, was not approved by the SC Board at this time. AMO and MEPCO will continue to advance this important, long-term sustainability measure as a municipal employer priority.

The Plan change allowing paramedics to negotiate NRA 60 participation was not supported by AMO and MEPCO.

The change has the potential effect of increased costs to both municipal employers and employees of paramedic services as NRA 60 status means higher contribution rates. This benefit extension, however, is subject to negotiations through collective bargaining and does not automatically as a benefit as a result the OMERS Plan change.

Under the OMERS Act, 2006, the SC Board has equal representation of employer and employee groups. Plan changes require a two-thirds majority to pass. AMO and MEPCO will continue to work towards an OMERS plan that is sustainable, meaningful and affordable for both employers and employees.

The OMERS update and background information on the CPR is available on the Sponsors Corporation site at www.omerssc.com

To learn more about MEPCO's activities in support of OMERS Plan sustainability and to keep up-to date on further developments, please visit us at www.mepco.ca

For further information please contact Brian Rosborough, 416-971-9856 ext. 362 or by email brosborough@amo.on.ca

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From: Karen Landry
To: Nina Lecic
Subject: Fwd: 2017-2018 Chief Drinking Water Inspector Annual Report Now Available/ Publication du Rapport annuel 2017-2018 de l'inspectrice en chef de l'eau potable
Date: Tuesday, November 27, 2018 6:19:31 PM

---------- Forwarded message ----------
From: "**Water, Drinking (MECP)**" <Drinking.Water@ontario.ca>
Date: Tue, Nov 27, 2018 at 3:11 PM -0500
Subject: 2017-2018 Chief Drinking Water Inspector Annual Report Now Available/ Publication du Rapport annuel 2017-2018 de l'inspectrice en chef de l'eau potable
To: "Karen Landry" <KLandry@puslinch.ca>

The Ministry of the Environment, Conservation and Parks has released the 2017-2018 Chief Drinking Water Inspector Annual Report.

This report highlights efforts to provide the people of Ontario with high quality drinking water that is among the best protected in the world.

Visit Ontario's Open Data Catalogue to see our supporting Drinking Water Quality and Enforcement data.

Le ministère de l'Environnement, de la Protection de la nature et des Parcs a publié le Rapport annuel 2017-2018 de l'inspectrice en chef de l'eau potable.

Ce rapport souligne les efforts qui sont déployés pour fournir à la population de l'Ontario de l'eau potable de grande qualité, l'une des mieux protégées au monde.

Consulter le Catalogue de données ouvertes de l'Ontario pour voir nos données sur la qualité de l'eau potable et l'application des règlements.

November 20, 2018

To the Head & Members of Council:

Pursuant to Policy B-008 of the Ontario Good Roads Association, the Nominating Committee shall report to the Annual Conference its nominations for directors.

The OGRA Board of Directors is committed to achieving a diverse leadership team. We encourage women and individuals from diverse backgrounds to put their names forward for these positions.

The following members will serve on the 2019-2020 Board of Directors in the following capacity:

President	**Rick Kester**, CAO, City of Belleville
1st Vice-President	**Rick Harms**, Project Engineer, City of Thunder Bay
2nd Vice-President	**Dave Burton**, Mayor, Municipality of Highlands East
Immediate Past President	**Chris Traini**, County Engineer, County of Middlesex
Directors	**Paul Ainslie**, Councillor, City of Toronto
	Antoine Boucher, Director of Public Works & Engineering, Municipality of East Ferris
	Steven Kodama, Director, Transportation Services, City of Toronto
	Bryan Lewis, Councillor, Town of Halton Hills
	Paul Schoppmann, Mayor, Municipality of St.-Charles
	Michael Touw, Manager of Operations, County of Peterborough

Those nominated by the Nominating Committee shall be selected from OGRA's municipal or First Nations membership pursuant to the requirements for geographic representation contained in Section 12 of the Constitution, and so far as possible meeting the criteria established in Policy B-008. A full copy of the Constitution can be viewed on the OGRA web-site. **Those elected shall serve for a two (2) year term ending on February 24, 2021.**

The following vacancies need to be filled:

South West Zone	Two (2) Vacancies
South Central Zone	Two (2) Vacancies
Northern Zone	One (1) Vacancy

The Southwest Zone consists of the municipalities in and including the Counties of Brant, Bruce, Elgin, Essex, Haldimand, Huron, Lambton, Middlesex, Norfolk, Oxford, and Perth, the municipality of Chatham-Kent, and municipalities in and including the Regional Municipality of Waterloo.

The South Central Zone consists of the municipalities in and including the Counties of Dufferin, Grey, Simcoe, and Wellington, and municipalities in and including the Regional Municipalities of Durham, Halton, Niagara, Peel and York, and the City of Hamilton.

The Northern Zone consists of the municipalities in the Districts of Algoma, Cochrane, Kenora, Manitoulin Island, Nipissing, Parry Sound, Rainy River, Sudbury, Thunder Bay and Timiskaming; municipalities in and including the District of Muskoka and the City of Greater Sudbury.

Any member of Council or a permanent full time staff from an OGRA member municipality or First Nations interested in being considered as a candidate for a position on the Board of Directors must complete the attached Nomination Consent form and submit it along with their résumé to the attention of the Chair of the Nominating Committee by no later than **December 21, 2018** at 2:00 p.m. Fax your information to 289-291-6477, e-mail to info@ogra.org or mail to OGRA, 1525 Cornwall Road, Unit 22, Oakville, Ontario L6J 0B2

The Nominating Committee will meet in January to recommend a slate of candidates to the membership. The members of the Committee are:

Chair: Ken Lauppé, Immediate Past President
Vice Chair: Robert Burlie, OGRA Past President
Members: Paul Ainslie, OGRA Director
Dave Burton, OGRA 3rd Vice-President
Paul Schoppmann, OGRA Director

Any questions regarding the Nomination process or serving on the Board of Directors can be directed to the undersigned at joe@ogra.org.

Yours truly,

J. W. Tiernay,
Executive Director

c: Ken Lauppé, Chair, Nominating Committee

Ontario Good Roads Association

Board of Directors

Nomination and Consent Form

Working for Municipalities

We hereby nominate the following to the Board of Directors of the Ontario Good Roads Association for the 2019/21 term of office (2 year term):

Name of Candidate

Name:____

Position:____

Municipality:_______________________________________

Moved by:____

Seconded by:______________________________________

(Candidates must be nominated by two eligible members of OGRA. A resolution of Council is acceptable but not mandatory)

Candidate Consent

The candidate nominated above must sign below indicating they consent to the Nomination and agree to let their name stand for office.

I, ________________________________ hereby consent to the Nomination
(Name of Candidate)
to the Board of Directors of the Ontario Good Roads Association.

________________________________ ________________________
Signature Date

Submit completed form and candidate's résumé by fax or e-mail to the attention of Ken Lauppé, Chair, OGRA Nominating Committee
Fax: 289-291-6477
E-mail: info@ogra.org

GRAND Actions
The Grand River watershed newsletter

Grand River Conservation Authority

November/December 2018 • Volume 23, Number 4

What's Inside:

Features
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Road ecology 3

Watershed awards
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Plant trees in spring 7

Calendar 8

Cover photo

Staff from Wells Fargo had fun while they also created a new nesting site for turtles. The company made a donation to the GRCF to support the turtle program and outdoor education.

Photo by Jeff McInenly

Riverfestival Brisbane
Riverprize 2000
For excellence in river management

Conservation ONTARIO

Canadian Heritage Rivers System

Lots of TLC for turtles

By Mary-Anne Cain
GRCA Environmental Education Specialist

Laurel Creek Nature Centre in Waterloo is providing lots of TLC to give turtles their best chance of survival.

Seven of the eight species of native turtles in Ontario are at risk of disappearing. Threats to their survival include habitat loss and degradation, nest predators, road mortality and illegal collecting for the pet trade.

A species that is threatened or at-risk may become extinct if actions to reduce threats aren't taken.

Thanks to a grant from TD Friends of the Environment and funding from companies that participated in work days, volunteers and GRCA staff are giving turtles a better start in life. The approach includes turtle education, creating better nesting sites and nest protectors. Projects such as this are only possible through the Grand River Conservation Foundation.

Helping people understand the habitat and nesting needs of local turtles is the aim of an education program at the nature centre. The staff have been educating students, teachers and parents about the ways to help turtles. This is done through Species at Risk programs that incorporate games and a visit from the GRCA's teaching turtle, Snappy, who lives at Laurel Creek Nature Centre.

In addition to school programs, more than 80 visitors to Elora Gorge and Laurel Creek conservation areas attended two turtle education programs this summer. Education is also an important first step when volunteers come for a work day.

Staff at the nature centre and program participants regularly monitor and record turtle sightings and turtle nests. This will help achieve positive results for turtle survival and increase knowledge about the number and distribution of turtles on this GRCA property.

If you would like to help with turtle monitoring in your area, please report the turtles you see online at **www.inaturalist.org**. Search under the "projects" tab for "Grand River Conservation Authority" to report the time, place and species.

Creating nesting sites

With the help of volunteers from corporate groups, such as Canon and Wells Fargo, as well as community groups such as Blue Dot Waterloo Region, Toronto Zoo Adopt-a-pond and the Waterloo Region Nature teen group, two nesting sites were constructed near Laurel Creek Nature Centre to provide turtles with better nesting locations. Turtle nest success is enhanced by having good nesting sites. Gravelly sand is considered the best nesting material for turtles. For turtle hatching success, the site can't be too wet or too dry and must allow air circulation. Constructing more than one nesting area is important, because it provides micro-climate variation and reduces predator density in nesting sites.

Native plants around nest sites

Over 280 native wildflower and grass plugs were also planted to enhance the surrounding habitats. Native plants provide barrier-free travel for female egg-laying turtles and they protect hatchlings when they emerge in the fall.

Photo by Mary-Anne Cain

Turtle nest cover signs were made by students.

Snappy is a "teacher creature" at Laurel Creek Nature Centre and she tested out the new site as it was being completed.

Helping turtles doesn't end with the nesting grounds. Once the eggs are laid, they need to be protected for better hatching success. Unlike birds, adult turtles don't tend their nests after the eggs are laid, nor do they care for their young once they hatch.

This means nests are easily found and destroyed by predators such as raccoons, skunks and foxes looking for a meal.

Last spring, 15 nest protectors were made to help protect turtle nests from predators at Laurel Creek Nature Centre and some conservation areas. Thanks to Melissa Whiteford's class at Our Lady of Grace School and Serge Vlemmix's class from St. John School (both schools are in Kitchener), each nest cover also has a unique handmade sign. These explain that the nest protectors should be left in place to protect the eggs from predators.

Volunteer work days

This was truly a community effort, with corporate employees and community group members building nest protectors and creating the turtle nesting sites at special corporate volunteer work days.

"It was very satisfying to see the evolution of working on the turtle nest protectors and now helping to create areas for the turtles to lay their eggs," says Christine Pauhl, a corporate volunteer. "It was also really great that we finished the whole project. It was hard work and super awesome to see Snappy the teaching turtle on the nest afterwards."

Eighty-one volunteers spent a total of 175 hours on this project. They learned a great deal about turtles and species-at-risk, because public education is an important part of this project. Corporate groups often match their participation in these events with donations.

"The best part of this was seeing how much people enjoyed team building, while they made an important contribution to local ecology," said Volunteer Program Co-ordinator Bronwen Buck.

For more information on volunteering with the GRCA, please visit **www.grandriver.ca/volunteer**.

43 reptiles and amphibians in our watershed

Some naturalists who enjoy birding also turn their eyes to the ground in search of herpetofauna, sometimes affectionately known as "herps."

More than 300 native birds have been observed in the watershed, but there are only 43 native reptiles and amphibians, so it's easier to complete a herp list than a bird list. The word herpetofauna comes from the Greek word herpetos, which means crawling.

Species such as the American toad are common and widespread in our watershed.

Snapping turtles lay their eggs in gravel, which is often found by the side of the road. There are many ways to help them stay safe from traffic.

The GRCA's checklist of reptiles and amphibians that are known to occur or occurred historically within our watershed is posted online at **www.grandriver.ca/SpeciesChecklists**.

The list includes 23 reptiles and 20 amphibians. Two of the amphibians, seven native turtles and nearly half of the snakes are Species at Risk in Ontario. These species and their habitat are legally protected in the province.

23 reptiles and 20 amphibians live or have lived in our watershed historically.

The GRCA list includes common species such as the American toad and eastern garter snake. The Jefferson salamander and Blanding's turtle are among those species that are considered to be at risk in Ontario and Canada.

There are many reasons why people should care about these animals, says Tony Zammit, the GRCA's Watershed Ecologist.

Frogs, salamanders, turtles and some snakes depend on wetlands and watercourses at some point during their life cycle. But within the Grand River watershed, up to 75 per cent of the original wetlands have been lost, and many others have been altered or degraded by land use activities. Even changes to the upland area next to a wetland can have a negative impact on amphibians and reptiles.

The presence or absence of these creatures can tell us something about the health of the local environment. Amphibians and some reptiles are good indicators of water quality. The queen snake, for example, is a rare snake that spends a lot of time in water and prefers high quality creeks and streams, such as Whitemans Creek. This is because the diet of these snakes is primarily made up of crayfish.

Reports from citizens can provide valuable scientific information that governments, organizations such as the GRCA, and environmental consultants depend on as they work to ensure these species don't disappear from our watershed. If you would like to help with monitoring, sightings can be reported online at **www.inaturalist.org**. Under the "projects" tab, search for Grand River Conservation Authority.

The Ministry of Natural Resources and Forestry (MNRF) plays the lead role in the protection of Species At Risk and other wildlife in the province, and has legal jurisdiction under the Endangered Species Act and the Fish and Wildlife Conservation Act.

The GRCA implements projects to protect and restore habitat for amphibians and reptiles on GRCA land where this is possible.

Ontario Nature's Ontario Reptile and Amphibian Atlas is one way people can learn more about our amphibians and reptiles, including how to identify them, their habitat requirements, and distribution in the watershed and province. The Atlas was created thanks to a volunteer reporting program initiated by the province in 1988. For more information about the atlas, check **www.ontarionature.org/reptile-Amphibian-atlas**.

Road ecology

The emerging science of road ecology focuses on understanding how roadways impact the surrounding natural environment, especially the animals that need to cross roads.

Ecologists that specialize in this area study the number of road mortalities, the species that are killed, where this takes place and the time of year. This research and monitoring can help inform engineers and ecologists who design and build roads. The Species at Risk branch of the Ministry of Natural Resources and Forestry (MNRF) has developed best practices on structures that will help mitigate the negative impact roads have on wildlife.

Integrating solutions

Most people have heard of fish ladders to help fish over dams and most have seen deer crossing signs designed to warn motorists and protect deer from being harmed by vehicles. There are also different ways to help reptiles and amphibians, which often cross roads as they migrate for breeding or to spend the winter in a different type of habitat.

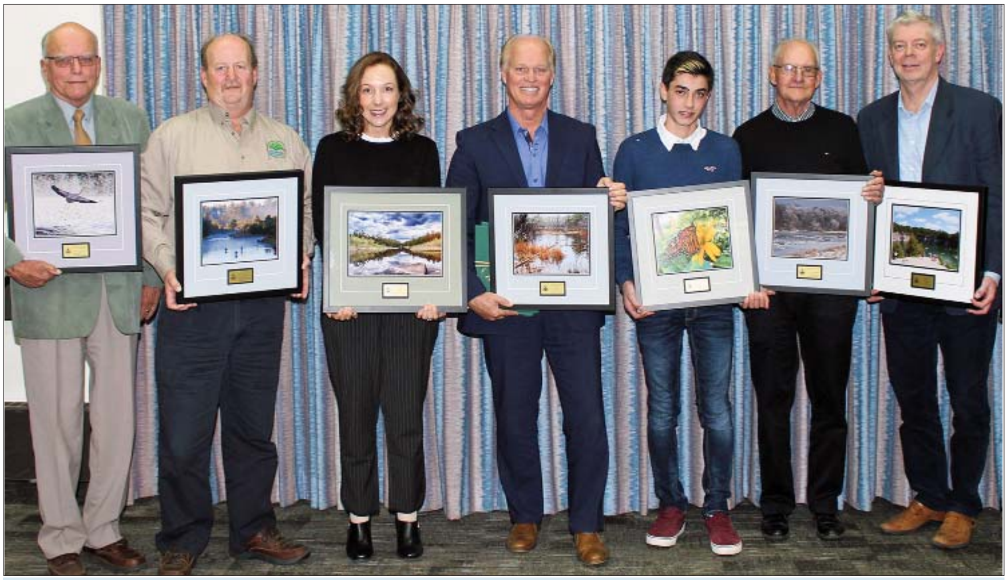
One solution is to integrate wildlife exclusion fencing into road design. Each solution is adjusted to the road and the products themselves are also evolving based on science. The impacts of winter road maintenance, such as snow plowing, also influence the long-term effectiveness of exclusion fencing, so some products are better suited than others.

Reptile and amphibian exclusion fencing was installed along Highway 24 in Brant County by the Ministry of Transportation when significant highway improvements were made. This was required through the Endangered Species Act, because researchers had found Blanding's turtles in the area. This fencing stops the turtles from crossing over the highway. It does this by directing them to a culvert designed and built to carry them under the highway. This way, they can safely cross under the road and get where they want to go. It takes the turtles longer to cross when exclusion fencing is in place, but it is safer.

Another reptile exclusion fence has been constructed in the Upper Blair Creek area of Kitchener in order to stop turtles from leaving natural areas and wandering into new subdivisions. This came about after an Environmental Assessment and consultation with MNRF staff, and was required of the developer.

Some municipalities have also implemented solutions such as reducing speed limits, posting turtle crossing signs, temporary road closures, as well as public education. For example, in recent years, the spring migration of Jefferson salamanders has sparked a temporary closure of Stauffer Drive in Kitchener. In this case, the closure was required by the MNRF, which oversees the endangered species legislation. Jefferson salamanders are one of many species that are protected under Ontario's Endangered Species Act, because their population is in decline.

A researcher measuring a salamander. Monitoring is an important step in finding solutions.



From left, Derek Coleman, Larry McGratton (representing the Grand River Fisheries Management Plan Implementation Committee), Shari Faulkenham (accepting a posthumous Honour Roll Award for her husband John Parish), Philip Holst, Jeff Grant, Jack Benham and Norm Cheesman (representing the Ontario Stone, Sand and Gravel Association).

2018 Award recipients from across the watershed

The Grand River Watershed Awards took place in October and seven awards were given out to recipients from across the watershed.

The GRCA's top award in 2018 was a posthumous Honour Roll award that went to John Parish, a fluvial geomorphologist who understood the complex interactions between water, land and nature. He lived in Erin.

John Parish Honour Roll

John Parish

Sometimes referred to as a river doctor, he assessed rivers and found ways to restore those that had been damaged, so they could flow naturally. He proudly founded Parish Geomorphic Ltd. in 1997, and he was instrumental in developing policies and implementation guidelines for managing watersheds in southern Ontario.

He had passion and a strong work ethic and was involved in many studies and projects for the GRCA. His work related to environmental flow has provided insights that the GRCA considers when making reservoir and flow management decisions. His legacy also includes mentoring a new generation of geomorphologists.

In addition to the Honour Roll award, six Watershed Awards were given out — two to organizations and four to individuals. John's wife and children received this award on his behalf.

Jack Benham

Jack Benham is a resident of Damascus at the northern end of the Grand River watershed. He is a passionate volunteer with the Arthur Trails Group, which has created two trails in Wellington North — the West Luther Trailway and the River Trail along the Conestogo River.

Jack has top-notch woodworking skills, enjoys people and loves nature. Inspired by his enthusiasm, a dedicated team has worked with him to create, maintain and fund the local trails.

Dr. Derek Coleman

The City of Cambridge is very fortunate to have benefitted for many years from the assistance of Dr. Derek Coleman. He shared his ecological expertise as a long-time member and chair of the Cambridge Environmental Advisory Committee and he helped to launch Cambridge Stewardship.

Derek has also provided financial support through the Ages Foundation Fund which is administered by the Cambridge and North Dumfries Community Foundation (CNDCF). Through this he has funded planting events, stewardship initiatives and many other projects.

Grand River Fisheries Management Plan Implementation Committee

The award that went to the Grand River Fisheries Management Plan (GRFMP) Implementation Committee recognizes the many partners on the committee that have been working together to improve local fisheries.

For 20 years, the GRFMP Implementation Committee has worked towards managing the river to realize the potential of the waters and fisheries in their communities throughout the Grand River watershed. This collaborative process has created a unique fisheries management plan and committee, where agencies and community groups are dedicated towards the plan's implementation. For more information about this organization, see the story on page 7.

Jeff Grant

Jeff Grant was the youngest award recipient and he is from St. Agatha. He is a dynamic Grade 10 student who loves butterflies, especially monarchs.

He knows that monarchs are in decline. While there are several contributing factors, one reason is the disappearance of their host plant, milkweed, the only plant the monarch caterpillars eats and where adults lay their eggs.

He plants milkweed and raises hundreds of caterpillars of several species on his family’s farm.

After seeing a thousand milkweed plants destroyed in his township, he began to volunteer at Laurel Creek Nature Centre, where he educates people of all ages about monarchs and their habitat. He also appeared on The Weather Network to talk about butterflies.

Jeff Grant is the youngest Watershed Award recipient.

Philip Holst

Phillip Holst lives on the outskirts of Woodstock and has been working with landowners to steward wetland projects on private land for 10 years. He is vice-chair of Stewardship Oxford and a national director for Ducks Unlimited Canada. As a volunteer, he works behind the scenes with agencies, companies and politicians. He takes an active role in each project that he works on, taking the time to meet with landowners and walk them through the process.

Ontario Stone, Sand and Gravel Association

The Ontario Stone, Sand and Gravel Association (OSSGA) works in partnership with government and the public to promote a safe and responsible aggregate industry, with a focus on environmental stewardship and sustainability.

In recent years, OSSGA has raised $280,000 for the Grand River Conservation Foundation. Members of the association have undertaken numerous environmental projects in the Grand River watershed. The first was a joint project with the GRCA that began in 1979 when gravel was extracted from Snyder’s Flats in order to create shoreline fish habitat. Members have worked hard to restore former quarries and partner with the community to help with creek restoration.

The GRCA has given out Honour Roll awards since 1976 and Watershed Awards since 1983. You can learn more on **www.grandriver.ca/awards**.

Photo by Robert Messier

Mill Creek Rangers visit a rehabilitated gravel pit to see how nature can be brought back to quarries.

Photo by Anne Loeffler

Carl Brubacher uses a combination of management practices to protect his soil from extreme weather. Cover crops are one important management practice he uses.

How one farmer builds healthy soil to confront climate extremes

By Anne Loeffler
GRCA Conservation Specialist

Farming isn't simple. Successfully growing crops while also dealing with climate extremes, such as heavy rains, is a challenge.

Heavy rain can wash away soil, damage crops and impact water quality for downstream water users. To combat unexpected weather events, many farmers use a combination of management practices to protect their soil and their livelihood.

Carl Brubacher is a good example. He's a cash crop and hog producer, who farms with his family near Arthur. He follows a rotation of corn/soybeans/winter wheat, and where possible includes cover crops to prevent soil erosion.

Keeping the soil on the land is extremely important to him. His tillage practices, crop rotation and cover crops all help build better soil structure. Healthy soils are less likely to wash away during severe rain storms, keeping nutrients for his crops.

WHAT'S HAPPENING

Cover crops are planted in the off-season once the main crop has been harvested. They are left on the field during late fall, winter and early spring to enrich the soil and hold it in place. Carl is one of about 235 producers in the Grand River watershed who have taken advantage of the cover crop incentive that is available through the Rural Water Quality Program. The producers are paid $20 to $100 per acre to plant cover crops, which also improve water quality.

Green fields in winter

As you drive through rural areas in fall, winter and early spring, you'll see fields like those of Carl, which are covered with green or brown plants, rather than dark fields where bare soil can be lost to erosion.

Carl believes that cover crops pay for themselves with healthier soil and a reduction of fertilizer. His only piece of tillage equipment is a vertical tillage tool that helps create optimal growing conditions, not only for his crops, but also for soil life.

"You don't see the good soil structure until you take a shovel and dig into it. It's a hidden secret," he says. A visit to his fields confirms that a multitude of earthworms are working at breaking crop residue into organic matter to feed the crops and hold the soil together. He points out that his soil has the consistency of cottage cheese. Even after heavy rain, it's in small clumps, so it is less likely to wash away.

Improved soil structure means his fields are less prone to soil compaction during equipment operations, he says. He uses the Curse Buster vertical tillage tool to create fractures in the soil while minimizing soil disturbance on the surface. This leaves a lot of crop residue on the surface, providing worms with food.

Improved soil resilience

From a distance, no signs of soil life are visible on the surface, but a closer look shows that worms have created middens. These are small piles of worm castings and crop residue that protect worm tunnels and serve as a food reserve. The worms have even been drawing living corn leaves down into the soil as a food source. As a result, soil health and resilience has improved, making the soil less prone to erosion. Carl believes he's losing far less soil and manure into the creek than a few years ago when he was doing more tillage.

Trees are also part of the cropping system. With the assistance of the GRCA's tree planting program, he has planted close to nine kilometres of windbreaks and riparian buffers on his land to protect the crops and adjacent streams.

Carl has succeeded in putting together tillage practices, cover crops, crop rotation and trees into a system that works really well on his farms. The water is clearer downstream because of it.

For more information on best management practices, or to learn more about opportunities for financial assistance, contact the Conservation Services team at 519-621-2761 or visit www.grandriver.ca/rural water.

Anglers provided a lot of input into the fish plan.

20th anniversary of the Grand River Fisheries Management Plan

By Janet Baine
GRCA Communications Specialist

The fish don't know this, but dozens of organizations and hundreds of volunteers have been working on their behalf for 20 years, thanks to the Grand River Fisheries Management Plan (GRFMP). The process of creating the plan was extensive and took time.

"Public meetings were held over two years, and these attracted more than 900 people and many written comments, so people were very invested in the process," explains Crystal Allan, Supervisor of Natural Heritage at the GRCA and co-chair of the plan's Implementation Committee. Al Murray, MNRF, also co-chairs the committee, which meets regularly.

Anglers came and revealed their best fishing spots and also their hopes for the future of local fisheries. Sometimes the agency biologists were surprised by what anglers said about fish locations. When they went to verify this information, the biologists found the anglers were correct. This was the beginning of a true collaboration.

The GRFMP was signed in September, 1998. It includes descriptions of the fish and fish habitat in each reach of the Grand River and its many tributaries. It's the guiding document for managing fish habitat and is important in protecting the ecological health of the local waterways.

The plan identified 42 "best bets" that could be accomplished quickly, resulting in early successes. The actions suggested in the plan are carried out by the Fish Plan Implementation Committee, which is made up of about 30 people who represent a variety of organizations and agencies.

"It's an innovative plan that was not only the first of its kind, but also a model for the province," Crystal says. It helped guide other conservation authorities in developing fish plans. It has received several awards, including local and regional awards that went to partner organizations for their commitment to improving local fisheries. This October, the implementation committee received a 2018 Watershed Award from the GRCA (please see page 5). In 2009, it received a National Recreational Fisheries Award from Fisheries and Oceans Canada.

Diverse projects

The projects are both simple and complex. Annual events, such as planting trees along rivers, stocking brown trout and river cleanups make incremental improvements each year. This work is often carried out by community organizations. Complex projects, such as naturalizing stretches of the streams and rivers, can involve several partners. Another type of project is improving the information that is available about fish so that the best decisions can be made to improve their habitat. For example, fish migration connections between Lake Erie and the southern Grand River are being studied using high-tech fish telemetry to track the fish.

"It's incredible to see the continued commitment of this partnership. I look forward to the work this Implementation Committee will achieve in the next 20 years," says Crystal.

Highlights of completed projects

- Brown trout stocking in the tailwater sections of the Grand River downstream of Shand Dam and the Conestogo River downstream of Conestogo Dam
- Expanding the presence of walleye
- Removing old dams, such as the Lorne Dam in Brantford, Beatty Dam in Fergus and a Marden Creek dam in Guelph, because these prevented fish from reaching their natural habitat
- Improving river access to anglers through signed access points, with parking and boat launches
- Planting trees along creeks and rivers to provide shade and cool the water
- New fishing regulations to protect species in the Exceptional Waters section of the river between Paris and Brantford
- Naturalizing streams such as Mill Creek in the Guelph-Cambridge area and D'Aubigny Creek in Brantford

GRCA making spring tree planting easy

Fall is the best time for rural landowners to start ordering trees from the GRCA for planting next spring. For some of those landowners, help is available to put them in the ground as well.

Landowners with at least two hectares (five acres) of property may be interested in having a GRCA forestry specialist visit their property to develop a custom planting plan, arrange for planting in the spring and help access funding programs to offset the cost of tree planting projects (if applicable).

A minimum order of 1,000 seedlings or 50 tall stock is required for GRCA staff to arrange planting. Site visits are free, but demand is high. Please email **trees@grandriver.ca** or call 519-621-2761 and ask to speak to a forestry specialist.

Landowners in the Grand River watershed who have at least one hectare (2.5 acres) of land are eligible to order trees that they can plant themselves. Online tree orders can be placed between October 1, 2018 and March 1, 2019. Orders can also be placed by mail. Early ordering is advised to ensure the best selection of trees.

All tree orders can be picked up at the GRCA head office in Cambridge next spring. The minimum order is 200 seedlings or 20 tall stock trees (this includes saplings, whips and potted trees).

All watershed residents are welcome to purchase trees at the GRCA's annual tree sale that takes place in May. Details about this event will be posted online at **www.grandriver.ca/events**.

Private landowners own nearly 80 per cent of the land in the watershed and can make an immense contribution toward increasing tree cover through this initiative.

For more information, to order trees and to view the tree availability list, visit the forestry section of the GRCA website at **www.grandriver.ca/Trees**.

The GRCA arranges to have planting done on private land.

THE GRAND CALENDAR

Winter Survival Skills, Shade's Mills, Sunday, Nov. 25

Forget hibernation and learn how to make use of the environment and the gear in your backpack to stay warm, dry and safe. This workshop will cover equipment, how to dress for winter, fire and shelter. It's 10 a.m. to 2:30 p.m. For details and to preregister, visit **www.grandriver.eventbrite.ca**.

PD Day stick play adventure, Guelph Lake, Friday, Nov. 30.

Kids will love spending their PD Days at our nature centres. Campers will take part in nature play activities to explore and spend time outdoors. A cookout campfire lunch is included. For details and to preregister online visit **www.grandriver.eventbrite.ca.**

Festive feeding, Shade's Mills, Saturday, Dec. 15

Make scrumptious gifts for the animals during the festive season – pine cone goop feeders, bread ornaments and fruity wreaths. Suitable for families with school-aged children. Meet at Shade's Mills Nature Centre at 1:30 p.m. This event is free with a Grand River Parks membership and with park admission.

Winter Break Adventure Camps at four nature centres Jan. 2 to Jan. 5.

Get the kids outdoors and enjoying winter during the holidays. Winter Break Adventure Camps will take place at Shade's Mills, Guelph Lake, Apps' Mill and Laurel Creek nature centres. Daily outdoor activities allow kids to explore the fields and forests around the nature centres. For details and to register online visit **www.grandriver.eventbrite.ca**.

Annual Heritage Day Workshop, Sanderson Centre for the Arts, Brantford, Friday, Feb. 15.

The Heritage Day Workshop will include presentations on the theme Brantford: Celebrating our heritage, building our future. The Heritage Working Group organizes this event along with partners, and it takes place in a different part of the watershed each year. The event is 8:30 a.m. to 4:30 p.m. and is free. Find information and preregister online at. **www.-2019heritagedayworkshop.eventbrite.com**

About Grand Actions:

This newsletter is produced several times a year by the Grand River Conservation Authority.

More information:
Current and back issues as well as complete subscription information is available online at **www.grandriver.ca/GrandActions.**

Submissions:
Submissions may be edited for length or style. Photos and event information is also welcome. We do our best to publish items, but we are not able to guarantee publication.

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100%

A gift of nature

Grand River
CONSERVATION FOUNDATION

givegrand

What do you give someone who has everything? A tree, of course! Or how about a metre of nature trail?

Choose to *Give Grand* this holiday season. A gift of $30 will plant and support one local tree, or will help develop one metre of trail.

$30 **Give the gift of trees or trails!**

Each donor receives a thank you letter, tax receipt and a beautiful holiday card for gift giving. If you prefer, we can send the card directly to the recipient so it arrives in time for the holidays.

It's easy to give:

- Go to www.grcf.ca and click Donate Now
- Call 1-877-29-GRAND
- Email the GRCF at dhartley@grandriver.ca

Place orders by December 14, 2018.
Charitable receipts will be issued for donations.

"During this holiday season we are grateful to those who, with grand gestures, support our natural heritage and invest in a bright and sustainable future."

- Max & Lynn Blouw

www.GRCF.ca

Inspector Scott Lawson
Ontario Provincial Police
Detachment Commander

Township of Puslinch Council
05 December 2018

“The New Legalization of Cannabis and how it might affect Policing and the Community”

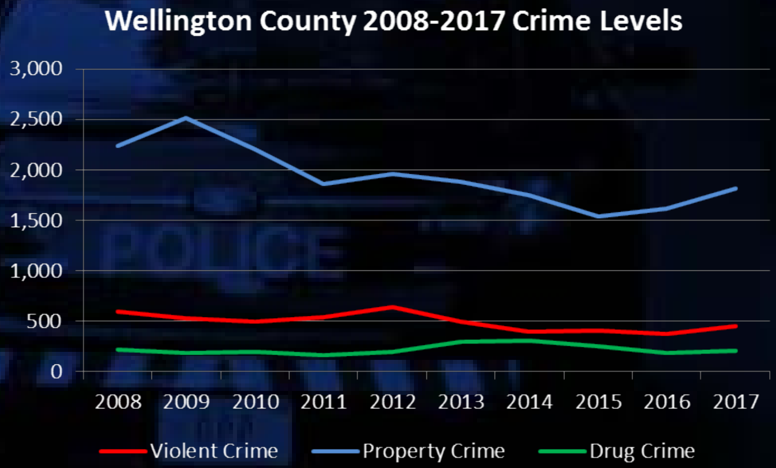
“The OPP recognize that illegal drugs cause grievous harm and threatens community safety,”

Quote
- OPP Commissioner Vince Hawkes

By the numbers….

Over the past 10 years the County of Wellington OPP have responded to over 249,000 occurrences in the County.

Violent crime, property crime, and drug offences account for 11% of all occurrences.



Wellington County 2008-2017 Crime Levels

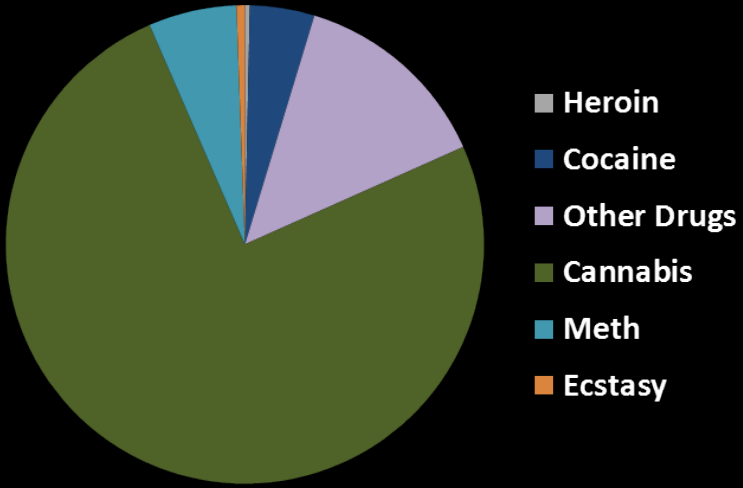
What type of illicit drugs are involved ?

All of Wellington County

Average Annual Possession Incidents

Heroin	1	0%
Cocaine	9	4%
Other Drugs Prescription	29	14%
Cannabis	160	75%
Meth	13	6%
Ecstasy	1	1%

Fentanyl and Carfentanyl is here



What’s Trending ?

- Mental Health/Addiction – I.M.P.A.C.T Team – CMHA Collaboration
  - 72% diverted from ER but increase in patient guarding at hospitals by Police
  - Death by Suicide, self-harm

- Legal Cannabis – Addiction, Illicit drugs, Prescription addiction, fentanyl, Carfentanyl (naloxone), meth

- Social Media - influence by world events - Terrorism, Police negativity, transparency, public confidence

- Cyber Crime – online bullying, sex assault, fraud, Human Trafficking

- B&E, Thefts, Mischief, Assaults, Threatening, Criminal Harassment, Utter Threats, Domestic Violence, Sex Assault (Me Too)

- “Big 4” Collison Causations – Impaired Alcohol/Drug, Distracted, Aggressive, Seatbelt

- Increase police calls for service; complex/lengthy investigations, court demands ie: technology

What is Wellington County OPP doing ?

Community Street Crime – Major Crime Units

Community Mobilization & Engagement

Drug Recognition Experts/SFST

Dedicated School Officers/Youth Resiliency Officer (Human trafficking)

RIDE and Police Effect & Modernization Grants

Wellington Canine – “Timber”

Technology – UAV, ION Scanners, ALPR, Livescan, Bail Video Phone

Partnerships:

- Wellington Guelph Drug Strategy
- Safe Communities
- Crime Stoppers
- I.M.P.A.C.T. Team
- Fire Services, Municipalities (CBO)
- Health Services
- School Boards

Research & Analytical Support-Civilian Analyst

Specialized Patrol Program – MSV, ATV, Bicycle, Marine

School Officer, Mental Health Liaison and Youth Resiliency Officer

Community Street Crime Units

Wellington County Detachment has a Community Street Crime Unit (CSCU) to target community level drug and property crime. This Unit represents a partnership between the Detachment and the Organized Crime Enforcement Bureau (OCEB) and consists of number of plain clothes (undercover) officers deployed strategically across the County.

Property and drug crimes have a tremendous impact on our communities. High crime rates create a sense of fear within society; causing social and economic damage, which in turn leads to more incidents of crime. CSCUs play a key role in the OPP's community-based enforcement strategy by utilizing a targeted, intelligence-led approach that emphasizes harm reduction and community safety.

Integrated Mobile Police and Crisis Team (I.M.P.A.C.T)

In December 2015 the Wellington County OPP IMPACT Team became a fully operational co-response model partnering clinicians with police officers on “live” calls to provide support/assessment for those suffering from Mental Health or Addiction. This successful program represents a partnership between the Wellington County OPP and the Canadian Mental Health Association.

People who are experiencing significant mental health and addiction challenges are able to get immediate assessment and support where and when they need it. This has led to very positive health outcomes for the people involved.

Canadian Mental
Health Association
Mental health for all

Community Mobilization & Engagement

The program emphasizes that crime prevention, citizen engagement and public education are key roles of the Police and it is the cornerstone of any potential success in keeping our communities safe.

Partnership, partnership, partnership!

Analyze crime.

Target enforcement.

Initiate problem-solving.

Support public safety education.

Liaise with community.

Promote situational crime prevention measures.

Identify risks and social disorder.

Connect community agencies.

Support intervention activities.

Engage local leaders.

Support community-led initiatives.

Promote community safety activities.

Drug Recognition Experts (DRE)

With the upcoming decriminalization of cannabis under Bill C-45 the Ontario Provincial Police is working diligently to train additional Drug Recognition Expert (DRE) officers.

As of Nov 2018, OPP has over 136 DREs certified under the OPP Drug Evaluation and Classification Program and more than 900 SFST-trained officers.

Wellington County Detachment has two DRE’s (one is a provincial instructor) and a significant percentage it’s frontline officer compliment SFST trained.

School and Youth Resiliency Officers

Wellington County OPP has a strong and successful School Officer Program.

The program is designed for police to connect with elementary and high school age youth, in the school setting, in an effort to <u>build rapport, reduce stigma, educate, reduce victimization and proactively prevent crimes</u> committed by and amongst young persons.

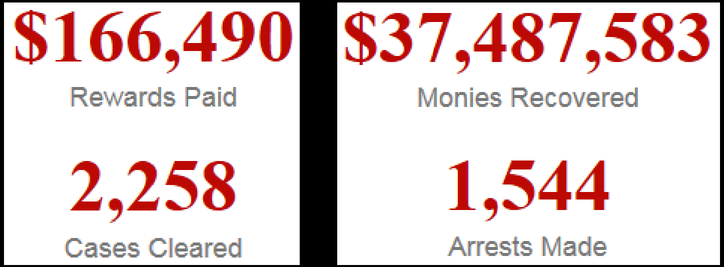
The program includes <u>officers delivering drug and alcohol awareness lectures. Cannabis legalization presentations are underway</u>.

Crime Stoppers

Incorporated in 1988 (30 year Anniversary), Crime Stoppers Guelph Wellington is a non-profit charitable program which combines the best efforts of the media, the community and the police in the fight against crime.

The goal is to promote awareness within the community and to educate students and the public in making communities safer.

Police act on anonymous tip information provided to them by Crime Stoppers.



$166,490	Rewards Paid
$37,487,583	Monies Recovered
2,258	Cases Cleared
1,544	Arrests Made

CRIME STOPPERS
GUELPH WELLINGTON
1-800-222-TIPS (8477)

Wellington Guelph Drug Strategy

Mission:
We take action to prevent and respond to local substance use and addiction issues.

Vision:
We envision communities in Guelph-Wellington free from harm related to substance use.

Partnership:
Dedicated Wellington OPP Detective Sergeant on Steering Committee.

Research & Analytic Support

The OPP's use of sophisticated data analytics enables the organization to use an evidence-based, measurable approach to deploying resources.

Data assists the organization with taking a "strategic patrol" approach to public safety, which places police officers in locations where the needs for enforcement and other services are greatest.

Cannabis ‘Legalization’

Why? Better regulate cannabis to discourage its use by minors and to disrupt our country’s massive illegal cannabis market.

Ontario cannabis - combination of federal and provincial legislation:

- 19 years or older (adult) to <u>use, buy, possess, distribute and cultivate</u>
- Possess up to 30g of legal dried cannabis or equivalent <u>in public</u>
- 4 plants per residence, <u>No limit on how much cannabis can be possessed in the home</u>
- Adult can make cannabis products (e.g Edibles) at home, no organic solvents (oils)
- When transporting cannabis in a vehicle or boat - cannabis must be packaged in a way that it is fastened closed or is <u>not otherwise readily available to any person in the vehicle</u> or boat

Cannabis ‘Legalization’

You will be able to use recreational cannabis in:

- any public place where tobacco is legally permitted, unless prescribed by municipal by-law
- a private residence, including the outdoor space of a home (for example, a porch or back yard)
- your unit or on your balcony, if you live in a multi-unit building like an apartment or condo, but that depends on your building’s rules or your lease agreement

You will <u>not be allowed</u> to use recreational cannabis in:

- Workplaces, vehicles and vessels or where prescribed by municipal by-law

Cannabis 'Legalization' – "Ticketable" Offences

"Ticketable" Offences (short-form wordings for certain offences under the *Cannabis Act, 2017* have been established to enable police to issue tickets in respect of those offences):

Sell cannabis to person who appears to be under 25 years	7(2)	$400
Deliver purchased cannabis to person who appears to be under 25 years	7(2)	$400
Present identification not lawfully issued to holder	7(4)	$150
Knowingly sell cannabis to intoxicated person	8	$400
Knowingly distribute cannabis to intoxicated person	8	$400
Knowingly sell cannabis to apparently intoxicated person	8	$400
Knowingly distribute cannabis to apparently intoxicated person	8	$400
Unlawful purchase of cannabis	9	$150

Cannabis ‘Legalization’ – “Ticketable” Offences

Person under 19 years — possess cannabis	10(1)	$100
Person under 19 years — consume cannabis	10(1)	$100
Person under 19 years — attempt to purchase cannabis	10(1)	$100
Person under 19 years — purchase cannabis	10(1)	$100
Person under 19 years — distribute cannabis	10(1)	$100
Person under 19 years — cultivate cannabis	10(2)	$100
Person under 19 years — propagate cannabis	10(2)	$100
Person under 19 years — harvest cannabis	10(2)	$100
Person under 19 years — offer to cultivate cannabis	10(2)	$100
Person under 19 years — offer to propagate cannabis	10(2)	$100
Person under 19 years — offer to harvest cannabis	10(2)	$100
Drive vehicle or boat with cannabis readily available	12(1)	$175
Have care or control of vehicle or boat with cannabis readily available	12(1)	$175

Cannabis ‘Legalization’

Purchasing Cannabis - Ontario Cannabis Store

Ontario Cannabis Store website will be the only legal option for purchasing recreational cannabis. Also one is able to purchase legal seeds from the online government store.

Private Retail Stores

Government permitting regulated private retail model for cannabis that would launch by April 1, 2019. Opt-in, Opt-out. Private stores would be regulated by the AGCO. Intent to help the province combat the illegal market.

https://www.ontario.ca/page/cannabis-legalization

Drug Impaired Driving

Amendments to the Highway Traffic Act (in force)

- Zero tolerance sanctions for young, novice and commercial drivers
- DRE Drug Recognition Evaluators (DRE) and Standard Field Sobriety Test (SFST)

August 27th, 2018 – Drager Drug Test 5000 listed by the Attorney General;

- Ability to detect THC (cannabis) and cocaine using saliva swab sample
- OPP considering/assessing this equipment and other oral fluid screening devices, recognizing continuous technological improvements

Cannabis Enforcement Challenges

- Local by-laws and corresponding enforcement – By-law enforcement matter
- Police determining quantity – field methods being developed to determine without handling product
- Storage of seized cannabis at police facilities – new rules around disposal that need to be formalized
- Unlimited possession limits per residence; grow-harvest-store, grow-harvest-store….REPEAT
- Increases in mental health calls-for-service Re: psychosis, addiction
- Edibles
- Drug impaired driving

HOME CULTIVATION

- Yield amounts - 4 homegrown plants
- Exposure to youth, pets
- Mould, fire hazards ie: hydroponics
- Cooking/Making concentrates – eg. Shatter
- Police Calls-for-Service – eg. Smell, thefts, B&E, neighbor disputes, assistance to by-law officers
- Prosecution – lack of public and judiciary awareness, Case Law

Cannabis ‘Legalization’

What can Municipalities consider ?

- Public consultation, liaise with community groups and law enforcement regarding issues surrounding drug activity in the community
- As necessary, develop by-laws and <u>corresponding local by-law enforcement program/strategies</u> to address local legislation
- Utilize existing municipal by-laws to deter illegal drug activity in the community (ie noise, trespassing, public area restrictions, derelict properties, etc)
- Encourage reporting of illegal drug activity to authorities – By-Law Enforcement/Crime Stoppers/Police

Human Resource Challenges - Employers

Considerations may include:

- Employees operating vehicles / machinery
- Detection and testing – policies/Unions
- Occupational Health and Safety Act employer/employee provisions
- Decreased work performance
- Disciplinary procedures
- Attendance
- Medical cannabis use in addition to recreational use

- OPP – Fit for Duty

Questions / Discussion

Inspector Scott LAWSON

County of Wellington OPP
470 Wellington Road 18
Fergus, Ontario

519-846-5930

Township of Puslinch
Delegate Request

Meeting Date: *

December 5, 2018

Applicant Information

Last name *	**First name** *
Sangiuliano	Silvana
Mailing address *	**Telephone number** *
[redacted]	[redacted]

Email address *

[redacted]

Purpose of delegation (state position taken on issue, if applicable): *

Impact of Marijuana

Please OPT OUT of hosting retail marijuana outlets before the deadline of January 22, 2019.

Please hold an information session open to the public.

Declare a smoke-free environment in public spaces, prohibiting use of tobacco and marijuana in any form. Implement by-laws prohibiting the growing of cannabis anywhere. Ban edibles.

Stop marijuana retailers and producers from entering our communities.

I am submitting a formal presentation to accompany my delegation: *

☑ Yes

☐ No

I will require the use of audio-visual equipment (power point presentation): *

☐ Yes

☑ No

Note: delegations are permitted to speak for 10 minutes. Your form or letter must be received 24 hours before the preparation of the Council agenda. This usually means at least one week prior to the Council meeting.

Freedom of Information Disclaimer

Personal information collected on this form is collected under the authority of the Municipal Act and will be used only for the purpose of sending correspondence relating to matters before Council and for creating a record that is available to the general public in a hard copy format and on the internet in an electronic format in accordance with the Municipal Freedom of Information and Protection of Privacy Act. Questions regarding the collection of this information may be directed to the Township Clerk's office.

The Township of Puslinch is committed to providing accessible formats and communication supports for people with a disability. If another format would work better for you, please contact the Township Clerk's office for assistance.

Thank You

IMPACT OF MARIJUANA

by Silvana Sangiuliano

November 21, 2018

There are countless reasons why municipalities must **OPT OUT** permanently from allowing private marijuana retailers and producers from entering our communities. By-laws must be immediately established and enforced to protect citizens from the resulting impact of marijuana.

If municipalities don't opt out, they are automatically opted in, forfeiting all rights regarding licensing, and the number and location of retail outlets. The municipalities' hands will be tied: "… any existing by-law passed by a municipality to regulate cannabis retail location is deemed to be of no effect." (Section 42(3), Bill 36 Cannabis Statute Law Amendment Act, 2018).

"Municipal governments will be the first to witness and respond to the impacts of cannabis legalization in our communities." (Association of Municipalities—AMO)

Despite federal and provincial governments hoisting marijuana legalization upon us with blatant disregard to facts and lack of research, **municipalities have the power to say NO before January 22, 2019**, priding themselves in protecting their thriving communities.

No amount of **money** can justify the negative ramifications of marijuana legalization. It does not account for the undertaking of building the framework to support legalization: public health and safety, workplace safety, policing, emergency services, and education.

Some think organized crime and dealers will be curtailed when marijuana sales become legal. This is not true. One of the most important drivers of **black market** sales is the price gap between legal and illegal products. Since the gap is large (up to 50%), black markets will flourish. Is one to believe drug dealers will suddenly develop a conscience because marijuana is legal? Will pushers decide to engage in a new, unscrupulous profession abandoning one that has been lucrative? Certainly not. They will continue to illegally export to other countries. They will push harder to their current clients and underage **children**.

Buyers will stay with who and what they trust. There is no incentive to switch to a private retailer. In a small community, where people know one another, patrons don't want the **stigma** of being seen by their employer or others entering or exiting marijuana stores.

Since the THC content in black market supply is two to four times stronger, one would have to buy the equivalent amount at a greater cost legally to achieve the high they are accustomed to.

With the legal amount of 30 grams yielding approximately **100 joints** and four plants yielding approximately **3000 joints** every three months, and the ability to stock-pile, concerns over increased drug usage, addiction, and dealing will increase.

Explosions caused by using **flammable solvents** in the refining process to obtain oil from home-grown marijuana plants, culminate in demolished houses, serious injury, and **death**. This puts our community and **firefighters** at further risk.

Municipalities can "**specify that the use of residential premises for the growing of [cannabis plants] is prohibited**" (Federation of Canadian Municipalities https://fcm.ca/Documents/issues/Cannabis-Guide-EN.pdf (p.22)

We must consider the safety and protection of everyone, particularly **children**, in environments where marijuana is produced and consumed in various ways, be it smoked, vaped, or as edibles.

Making marijuana legal gives false perception to adolescents of the drug's harmful effects. Allowing smoking normalizes that it is safe and acceptable.

A great deal of time and money is being spent on economic development, beautification, and revitalization of our communities, only to be undone by loitering and crime which will further escalate since marijuana stores will stay open until 11:00 p.m., when other businesses will be closed.

Envision walking down the street and in parking lots, through clouds of second-hand smoke on your way to your favourite restaurant, store, park, or arena.

There is only **one** person in all of Wellington-Dufferin-Guelph Public Health to enforce tobacco laws, now being compounded by adding cannabis. That is **one person for a population of 300,000**. How can this possibly be done effectively?

Municipalities can implement by-laws declaring a smoke-free environment, prohibiting use of tobacco and marijuana in any form.

Municipalities can also ban edibles.

Drinking and driving and distracted driving continue to cause **death**. The problem will be further compounded with **drug impaired driving** and the consumption of **both alcohol and drugs** in combination. A ten-year trend shows **one in four** teens who died in motor vehicle accidents tested positive for cannabis. This impacts the safety of all citizens and puts a tremendous amount of pressure on our **police** forces.

This paper provides a closer look at the impacts of forfeiting rights as a municipality, the black market, impaired driving, emergency services, marijuana edibles, health, second-hand smoke, workplace safety, by-laws and policies, economical impact, environmental, real estate, insurance, entries to the U.S., and pardoning of criminals.

Colorado is used as a model since this state was the first to legalize marijuana for recreational use in 2014. There, the black market is booming. Crime is on the rise. Hospital visits are increasing. Now, its governor won't rule out recriminalizing it.

The following excerpts contain factual and statistical information and can be cross-referenced with accompanying links prefacing summaries.

FORFEITING RIGHTS AS A MUNICIPALITY

https://www.amo.on.ca/AMO-PDFs/Cannabis/What-s-New-with-Bill-36.aspx

If you opt in, you forfeit all rights as a municipality regarding the number and location of retail outlets.

- **"Restrictions on Municipal By-law Making Authority: Section 42(1) of the Act denies municipal governments the authority to pass a business licensing by-law respecting the sale of cannabis or the governance of retail stores. Section 42(2) of the Act denies municipal governments the authority to pass a by-law under the Planning Act that has the effect of distinguishing where cannabis can or cannot be sold. Under section 42(3), any existing by-law passed by a municipality to regulate cannabis retail location is deemed to be of no effect."**
- licenses will be granted by the Alcohol and Gaming Commission of Ontario (AGCO) **NOT** municipalities
- There is no cap on how many stores will be allowed to open in Ontario. In addition, a **single** company will be able to open up to a maximum of **75 stores**. This raises concerns about large corporations setting up shops on every corner.
- Will marijuana retailers be liable for selling to someone who uses the substance, gets in a vehicle, and kills someone? Will municipalities be negligent in allowing this to happen? Do you want this on your conscience?

https://www.ola.org/en/legislative-business/bills/parliament-42/session-1/bill-36#Sched247

Bill 36 of the Cannabis Act outlines that once a retail store is allowed to operate, the decision cannot be reversed.

Lifting of prohibition

- 41(3) A municipality that has prohibited cannabis retail stores under subsection (1) may, by resolution, lift the prohibition and permit cannabis retail stores to be located in the municipality.

Lifted prohibition may not be restored

- 41(4) A resolution passed for the purposes of subsection (3) is final and may not be reversed.

BLACK MARKET

www.cbc.ca/news/world/colorado-marijuana-black-market-1.4647198

Colorado: When recreational marijuana went on sale in 2014, the government's goal was to regulate and tax a drug that was already widely used and to squeeze out dealers and traffickers in the process. But, law enforcement authorities in the state say legalization has done the exact opposite.

- The black market is booming, despite more than 500 recreational marijuana dispensaries in the state.
- It's being driven by criminal organizations that grow marijuana in Colorado and smuggle their crop into states where it is still illegal and can be sold for a much greater profit.
- The black market hasn't gone away within the state, either, because some marijuana users are deterred by the higher dispensary prices and are loyal to their long-time dealers.
- Paul Roach, supervisor for Drug Enforcement Administration (DEA)
  - Drug trafficking organizations move there—disguised as legitimate operations
  - Will exploit Canadian laws to increase profit

- Anonymous drug dealer says legalization hasn't had a big impact on his business because he caters to clients who don't want to be seen going into a dispensary. His clientele also includes a number of truck drivers, who are prohibited from using marijuana under federal transportation laws.
- Users continue to support black market because they've built trust, and the drugs are cheaper.

www.theglobeandmail.com/news/national/ontario-vows-to-give-municipalities-40-million-for-marijuana-law-enforcement/article38260217/

- The elimination of illicit markets won't happen. Dispensaries will still have limits requiring proof of age, set price, potency constraints, and the stigma of being seen at these retailers in a small community. These restrictions are deterrents ensuring others will continue to turn to the streets.

www.cbc.ca/news/canada/british-columbia/legal-marijuana-in-colorado-brought-spike-in-black-market-1.4587048

- In Denver, DEA public information officer Randy Ladd said people sometimes peddle pot right outside legal dispensaries and they'll undercut prices in legitimate stores and skirt taxes.
- Ladd has a warning for Canadians who think legalizing cannabis will snuff out the illegal market and the crime that goes with it, even if all the jurisdictions in Canada legalize the drug at the same time.
- Ladd: "There are people who come to Colorado, and they'll come to Canada if they can — they'll come from the United States and they'll come from around the world to **rob people at gunpoint** for their marijuana. **They'll kill people**," he said. "I can tell you, there's a very dark side to it."

www.teenchallenge.ca/get-help/canadian-drug-crisis

- Canadian Security Intelligence Service (CSIS) estimates there are roughly 950 organized criminal groups active in Canada. About 80% derive revenues from illegal drug sales. *Edmonton Journal, April 4, 2009*
- 23% of Ontario students report that they were offered, sold, or given a drug at school in the last year. That's about 219,000 students. (*Legalization will not prevent this from occurring*).

IMPAIRED DRIVING

https://www150.statcan.gc.ca/n1/pub/85-002-x/2016001/article/14679-eng.htm

- Impaired driving still remains one of the most frequent criminal offences and is among the leading criminal causes of death in Canada.
- In 2015, drug-impaired driving doubled since 2009, when data became available.
- Drug-impaired driving is on the rise (Allen 2016).
- At least 1 out of 6 persons accused in an impaired driving court case in 2014/2015 had been previously accused in another impaired driving case during the preceding 10 years.

EMERGENCY SERVICES

FIRE

https://www.cbc.ca/news/canada/nova-scotia/hrm-fire-anticipates-increased-risks-from-home-grown-marijuana-1.4704155

- Home cultivation has brought increased risks of fires from people growing and smoking pot at home

- Someone takes a home and tries to build a modified greenhouse in a bedroom or room that's not built for that
- Increased risk comes from:
    - compressed carbon dioxide tanks that are used to increase yields
    - high-watt light bulbs that may melt nearby wiring
    - explosions from butane used to extract THC from marijuana
    - wiring issues caused by the theft of electricity to power high-watt lights

https://cafc.ca/page/cannabis

The Canadian Association of Fire Chiefs is concerned the federal government is overlooking the following implications:

- explosion conditions, fumigation, automation sprinkler systems, automatic emergency power systems, hazardous materials, exhaust, fumes, carbon dioxide emission, flammable and combustible liquid extraction systems, inspection, and education

POLICE

https://www.wellingtonadvertiser.com/comments/index.cfm?articleID=41719

Inspector Scott Lawson, Wellington County O.P.P Detachment Commander states:

- “You just have to know that cannabis will impair you. There’s tons of medical evidence to back that up.”
- “When you combine [cannabis and alcohol] and you get behind the wheel of your boat, of your motorcycle, of your vehicle, you’re going to be impaired.”
- “How would we know what 30 grams is because they’re not going to give us all a little scale. We don’t want to open those packages … we’re not handling product”
- “If organized crime is currently what’s supplying cannabis to Canada … they [could] find ways to get into the legal market and start distributing legal cannabis in an illegal way and using the profits to fund what they fund.”
- “With taxes added to the sale of marijuana, there’s a chance people will continue to buy illegal cannabis anyway.”
- “If you have young kids in your home or youth in your home and you’ve got four plants growing and curious kids … they kind of get it. The next thing you know, they’re cutting a bit of bud off it and trying to figure it out and they saw mom and dad rolling it. We won’t have any control over that. We won’t see that; we won’t know that until paramedics get called because the kid’s gone down or is struggling.”

PARAMEDICS

Paramedics are already victims of abuse, assault, and violence. Will this escalate with increased marijuana use?

https://www.theglobeandmail.com/cannabis/article-with-cannabis-legalization-looming-doctors-foresee-uptick-in/

- “Paramedics have seen more marijuana-related calls and are concerned about impaired driving causing collisions, as well as children who accidentally consume cannabis edibles. (Randy Mellow, President of Paramedic Chiefs of Canada).
- It makes it challenging for paramedics to distinguish the cause of the emergency

https://www.cbc.ca/news/health/cannabis-overdose-legalization-edibles-public-education-1.4800118

- Data from the Canadian Institute for Health Information (CIHI) shows that over the past three years the number of emergency room visits because of cannabis overdoses in Ontario has almost tripled — from 449 in 2013-14, to nearly 1,500 in 2017-18.
- Symptoms of cannabis overdose (THC poisoning) include elevated heart rate and blood pressure, anxiety, vomiting and in some cases psychosis, possibly necessitating hospitalization.

MARIJUANA EDIBLES

Edibles, including food and beverages, will be introduced in 2019.

Food and beverage companies are forming alliances with cannabis producers. This is dangerous.

www.nejm.org/doi/full/10.1056/NEJMp1500043

- Implications of edibles:
  - **psychoactive** effects delayed up to 4 hours, but can last more than 8 hours, extending the duration of impaired judgment and coordination that can lead to unsafe driving and accidental injuries
  - higher rates of calls (70%) to **poison**-control centres for unintentional marijuana exposure [edibles] in **children under 9 years of age**
  - increased **hospital** visits
  - cause **death**
- Increase in potency: THC more than 20%; levels in hashish reach up to 90%

HEALTH

www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=1&ContentID=3051

- the rational part of the brain is not fully developed until the age of 25

https://www.cps.ca/en/documents/position/cannabis-children-and-youth

- Structural changes of the brain on MRI have been documented in youth who use cannabis regularly indicating damage by THC.
- The THC content of marijuana available today is two to four times higher than from typical products used 40 years ago (20), a factor likely to magnify impact on the adolescent brain.
- increased neural activity, which means the brain is working harder to perform tasks

www.ncbi.nlm.nih.gov/pmc/articles/PMC3930618/

- marijuana use affects brain development and functioning
- causes deficit in attention and memory
- leads to risky behaviours, including increased marijuana use, aggressive and delinquent behaviour

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4827335/

- long-term marijuana use leads to addiction and increases when used in the teen years or daily

- 2.7 million people aged 12 and older met criteria for dependence
- Cessation is difficult and leads to relapse due to irritability, sleeping difficulties, dysphoria, craving, and anxiety

https://www.drugabuse.gov/publications/research-reports/marijuana/what-are-marijuanas-effects-lung-health

- Marijuana smoke contains carcinogenic combustion products, including about 50% more benzoprene and 75% more benzanthracene (and more phenols, vinyl chlorides, nitrosamines, reactive oxygen species) than cigarette smoke.
- Because of how it is typically smoked (deeper inhale, held for longer), marijuana smoking leads to four times the deposition of tar compared to cigarette smoking.

https://www.drugabuse.gov/publications/research-reports/marijuana/there-link-between-marijuana-use-psychiatric-disorders

- marijuana use increases risk for psychiatric disorders, including psychosis (schizophrenia), depression, anxiety, and substance use disorders

https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-use-affect-school-work-social-life

- marijuana's negative effects on attention, memory, and learning can last for days or weeks after the acute effects of the drug wear off
- someone who smokes marijuana daily functions at a reduced intellectual level most or all of the time
- students who smoke marijuana have poorer educational outcomes than their non-smoking peers, are significantly less likely to finish high school or obtain a degree
- have a much higher chance of developing dependence, using other drugs, and attempting suicide
- heavy marijuana use linked to lower income, greater welfare dependence, unemployment, criminal behavior, and lower life satisfaction

SECOND-HAND SMOKE

www.drugabuse.gov/publications/research-reports/marijuana/what-are-effects-secondhand-exposure-to-marijuana-smoke

- The National Institute on Drug Abuse reports the effects of **second-hand smoke** as being psychoactive, registering in the blood and urine, and affecting the lungs. Concerns raised about vulnerable populations include children and asthmatics.

https://fcm.ca/Documents/issues/Cannabis-Guide-EN.pdf (p.32)

- The understanding that tobacco consumption can be harmful to respiratory health and contribute to cancers, and that second-hand smoke can have similar negative health impacts, has qualified as health-related reasons for municipal restrictions on tobacco consumption. Local governments are likely to be able to draw on a similar approach for cannabis consumption where authorized. (The Federation of Canadian Municipalities)

WORKPLACE SAFETY

Consideration must be given to workplace safety, operation of machinery, detection, disciplinary action, decreased work performance, attendance, and loss of productivity.

https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-use-affect-school-work-social-life

- Increased risk for injury or accidents in the workplace: One study among postal workers found that employees who tested positive for marijuana on a pre-employment urine drug test had 55% more industrial accidents, 85% more injuries, and 75% greater absenteeism compared with those who tested negative for marijuana use.

BY-LAWS AND POLICIES

https://www.cbc.ca/news/canada/kitchener-waterloo/university-of-guelph-cannabis-policy-1.4791679

- University of Guelph—not allowed to smoke marijuana or tobacco anywhere on campus, including residences; no sales or deliveries are permitted

https://www.orangeville.com/news-story/8996509-up-in-smoke-shelburne-council-says-no-to-recreational-cannabis-use-in-public-spaces-/

- Shelburne council voted in favour of a new by-law — based on rules recently adopted in Markham — forbidding the smoking or vaping of recreational cannabis in public spaces.
- That means no lighting up or vaping of recreational cannabis anywhere that is accessible to the public including parks, trails, parking lots, town facilities, sidewalks, roads, shopping malls and other retail, commercial and business establishments.
- Markham (pop. 330,000), Richmond Hill (pop. 200,000), and King Township (pop. 25,000) have all opted out of allowing marijuana stores in their communities.
- **Our municipalities have the power to do the same.**

ECONOMICAL IMPACT

www.cbc.ca/news/business/cannabis-weed-pot-canada-1.4598560

- Economist and policy analyst Rosalie Wyonch, from the Canadian C.D. Howe Institute, says, “The clear economic logic is that so long as there is demand beyond what the legal industry can supply when new legislation takes effect this year, a market supplied by criminals will continue to exist.”
- In the Canadian case, the C.D. Howe investigation indicates that immediately after recreational sales are permitted, illegal suppliers will continue to control about half the market, wiping out roughly $420 million in potential excise tax revenue that would otherwise be collected.

http://research.cibcwm.com/economic_public/download/eijan16.pdf (p.8)

- Avery Shenfeld, CIBC economist, states, “The bottom line is that federal/provincial governments might reap as much as $5 billion from legalization, but only if all the underground sales are effectively curtailed. That’s on the order of 0.25% of GDP, no barnburner.”

www.theglobeandmail.com/news/national/ontario-vows-to-give-municipalities-40-million-for-marijuana-law-enforcement/article38260217/

- $40 million over 2 years shared amongst 444 municipalities in Ontario. This will not be divided equally among municipalities. A minimum of $10,000 will be given only if opting in.
- The federal government's share of the duties is capped at $100 million with only half to be shared with provinces and territories. This could also lessen. In fact, in December, 2017, it was 75%, now it is down to 50%. This is provided on a **per household** basis, which would not equate to much based on the 2016 census of approximately 10,800 households in Centre Wellington, 4,600 in Wellington North, 4,500 in Guelph-Eramosa, 4,000 in Erin, 3,200 in Minto, 3,100 in Mapleton, and 2,700 in Puslinch. The City of Guelph is 52,000.

https://www.amo.on.ca/AMO-Content/Policy-Updates/2018/AMORecommendationsBill36OntarioCannabisStatuteLawA

- The Association of Municipalities Ontario (AMO) remains concerned that the costs related to legalization, from closing illegal dispensaries to road enforcement and other use, will exceed the funds the province receives from the federal government, of which $40 million to be shared with municipal governments.

ENVIRONMENTAL

https://www.mccarthy.ca/en/insights/blogs/canadian-era-perspectives/spotlight-cannabis-part-2-taking-closer-look-environmental-costs-cannabis-cultivation?utm_source=Mondaq&utm_medium=syndication&utm_campaign=inter-article-link

- The primary environmental issues arising from the production of cannabis on a commercial scale include contaminated sites management, water use, effluent and waste management, odours and air quality, energy use and greenhouse gas (GHG) emissions.
- a cannabis plant needs 22 litres of water a day
- impacts on local watersheds as a result of the diversion of water for cannabis production
- generate effluent containing growth nutrients and pesticides, which could have potentially adverse environmental impacts on local ecosystems
- cannabis production generates a significant waste stream
- a significant amount of which is being disposed in landfills rather than being composted, which takes months and a considerable amount of space
- the growth of cannabis plants emits terpenes, which are a type of volatile organic compound (VOC) known for their strong odour
- The cultivation of cannabis is an energy intensive activity, particularly for the indoor production of cannabis which requires high-intensity lighting, air conditioners, and dehumidifiers to regulate humidity and temperature. The Northwest Power and Conservation Council has calculated that it takes approximately 5,000 kWh to produce one kilogram of cannabis product – this is the same amount of energy an average Canadian household would use in 4 months.

https://fcm.ca/Documents/issues/Cannabis-Guide-EN.pdf (p.14)

- As a type of intensive agriculture, cannabis production needs a supply of: water for irrigation, electricity for lighting, and energy for heating.

- Cannabis production has some special impacts in relation to odour emissions and a need for heightened security that can be associated with high-value crops.
- risks of outdoor cultivation to children and domestic pets

REAL ESTATE

https://www.zoocasa.com/blog/cannabis-report-2018/

- In a survey released on October 16, 2018, most Canadians feel that smoking cannabis inside their homes is generally a bad idea.
- 64% of those who indicated they were homeowners felt doing so would harm its resale value, an increase from the 39% who indicated as such in Zoocasa's previous Housing Trends Report.
- Over half of homeowners – 57% – felt that growing even the legal amount of cannabis (up to four plants under the Cannabis Act), would have a negative impact on a home's value.
- This stigma extends to prospective home buyers, too: A total of 52% respondents say they'd be less likely to consider specific houses for sale if they knew even a legal amount of cannabis had been grown in them.
- 42% agree that dispensaries will reduce values of homes in a neighbourhood compared with liquor stores (11%)
- 48% of respondents stated the presence of a dispensary nearby would reduce their desire to purchase a specific property
- 88% of landlords want to ban smoking in their rental units

INSURANCE

https://www.bnnbloomberg.ca/home-auto-insurance-costs-could-rise-after-marijuana-legalized-experts-1.1146073

- Canadians could face rising home and car insurance costs once recreational marijuana is legalized as insurers eye increased risks stemming from a potential increase in people consuming cannabis, according to industry experts.
- "A recent Statistics Canada survey revealed that about **one in seven** cannabis users with a driver's licence report **driving within two hours** of using it. This is an alarming statistic and this road safety risk and uncertainty around it will most likely be reflected in some level of increased auto insurance rates." (Hazel Tan, Intact Financial)
- "Ontario Automobile Policy **excludes coverage** for accidental loss or damage **caused by drivers under the influence** of intoxicating substances. If accidents as a result of cannabis use increase, insurance companies' loss-ratios will increase, and that will ultimately increase individual drivers' premiums." (Alyssa Furtado, CEO of Ratehub.ca)
- Tan also said the insurer would be introducing some **coverage limits** in their home insurance policies to "reflect the risk" once cannabis is legalized.
- "The biggest risks for insurers from people growing cannabis at home are **damages** to a property due to **fire and theft**, even if they're not growing pot at the scale of a grow-op," Furtado said.
- "Cannabis growers often modify the heating and electrical systems on their property, which can increase risks for **fire and electrocution**. Fumes can build up inside the home's ventilation system and cause **mould or fungus** to develop," Furtado said.

ENTRY TO U.S.

https://www.ctvnews.ca/canada/why-investing-in-pot-could-pose-problems-at-the-u-s-border-1.4011813

- Problems at the border could impact thousands of Canadian investors who have put an estimated $25 to $30 billion into Canada's biggest pot production companies—in theory making them financiers of a drug illegal under U.S. federal laws.
- Canadian businesspeople have been denied entry and even banned from investing in U.S. companies.
- includes a business man working for a company making equipment to harvest marijuana who was banned for life

CRIMINALS PARDONED

https://www.cbc.ca/news/politics/tasker-pot-pardons-limitations-1.4866610

https://www.ctvnews.ca/politics/bill-to-pardon-past-pot-convictions-coming-before-the-end-of-2018-1.4137578

- Those with criminal records for possession of marijuana will be pardoned and possibly have records expunged.
- Will they ask for compensation for having been incarcerated, costing taxpayers more money?
- A previous criminal record does not necessarily prohibit someone from obtaining a licence to run a legal cannabis store.

CONCLUSION

Many issues surrounding the legalization of cannabis are counterintuitive, defying common sense.

Municipalities have the power and social responsibility to enact by-laws to protect the health and safety of our citizens. Do the right thing. Be proactive. Protect and prevent erosion of our communities.

Declare a smoke-free environment in public spaces, prohibiting use of tobacco and marijuana in any form. Implement by-laws prohibiting the growing of cannabis anywhere. Ban edibles.

Do not forfeit your rights. Stop private marijuana retailers and producers from entering our communities.

Please OPT OUT before January 22, 2019.

Puslinch Asset Management

Meeting Agenda

- Ontario Regulation 588/17 and Asset Management
- Service Level Policies
- Capital Budget
- Where we are Today
- Questions

UEM and DFA

- **An employee owned Canadian firm with offices in Brantford, Mississauga, and Niagara Falls**
- **UEM is an asset management specialist who's projects were recognized in "Building together – Guide for municipal asset management plans"**
- **UEM has been invited by the ministry of finance to provide presentations in regard to RISK based asset management systems.**
- **DFA international Inc is a specialist in the management of municipal services including asset financing strategy, development charges and cost of service assessments.**

What is Asset Management Overview of O. Reg. 588/17

In December 2017, the Province passed an asset management planning regulation under the Infrastructure for the Jobs and Prosperity Act, 2015.

This presentation provides an overview of:

- Municipal asset management planning in Ontario;
- Development of the Regulation, including incorporation of municipal feedback;
- Regulatory requirements; and
- Next steps/capacity building

Source: Build On Overview of Municipal Asset Management Planning Regulation O. Reg. 588/17

Regulation Overview of Reg. 588/17

Strategic Asset Management Policy
(by July 1, 2019)

Requires municipalities to outline commitments to best practices and continuous improvement

Asset Management Plan: Phase 1
(by July 1, 2021)

For **core assets**:

- **Inventory of assets**
- **Current levels of service** measured by standard metrics
- **Costs to maintain levels of service**

Asset Management Plan: Phase 2
(by July 1, 2023)

Builds out the Phase 1 plan to include **all assets**

Asset Management Plan: Phase 3
(by July 1, 2024)

Builds on Phase 1 and 2 by adding:

- **Proposed levels of service**
- **Lifecycle management and Financial strategy**

Additional Information

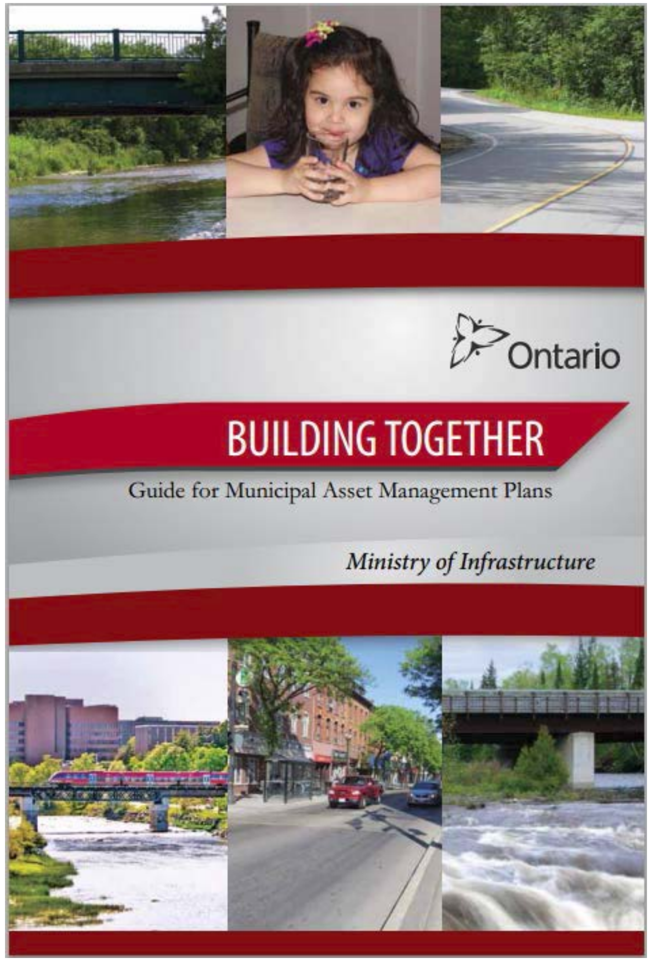
- Municipalities under 25,000 not required to discuss detailed risk analysis or growth.
- Plans would be updated every 5 years; annual progress update given to council.

Source: Build On Overview of Municipal Asset Management Planning Regulation O. Reg. 588/17

The Asset Management Advantage:

- **Making better decisions!**
- **Maintain the Public's Trust**

What is Asset Management ?

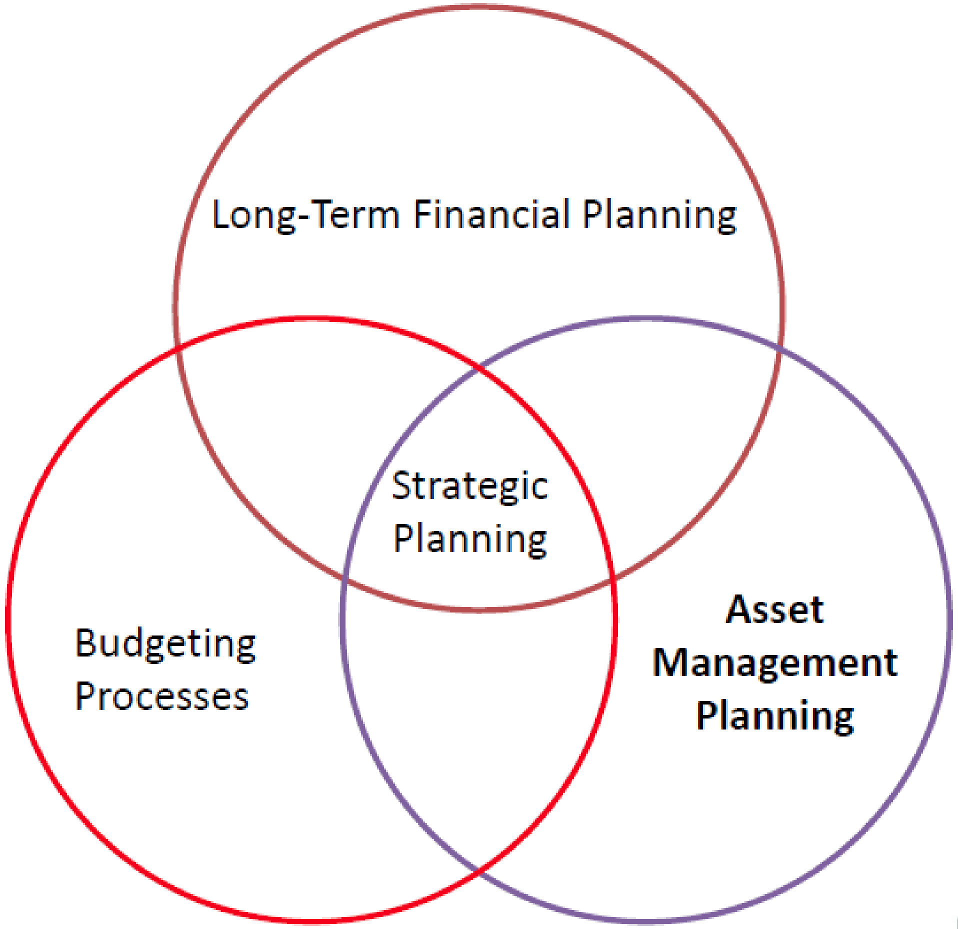


Ontario

BUILDING TOGETHER

Guide for Municipal Asset Management Plans

Ministry of Infrastructure



Long-Term Financial Planning

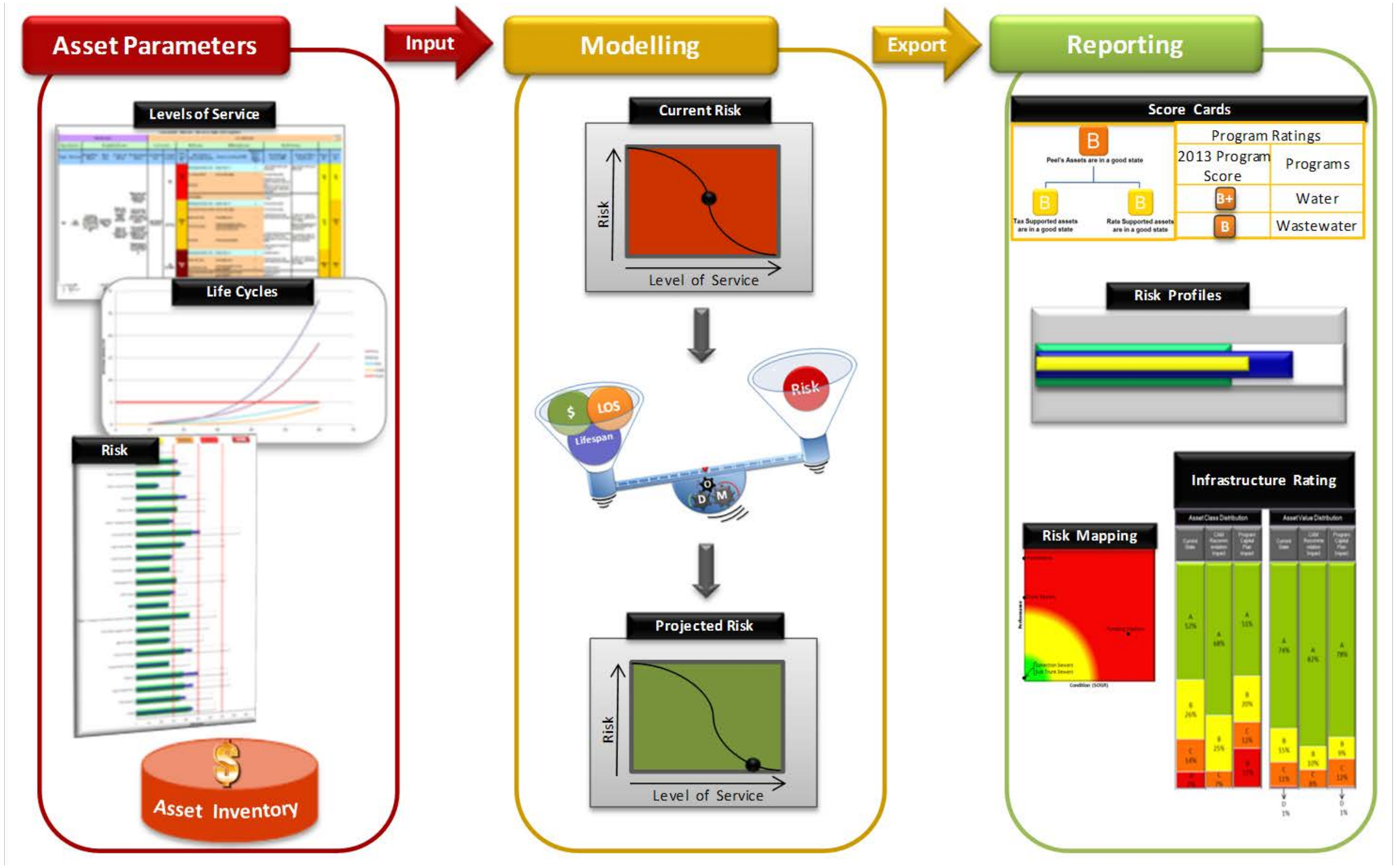
Strategic Planning

Budgeting Processes

Asset Management Planning

Source: Build On Overview of Municipal Asset Management Planning Regulation O. Reg. 588/17

How the Process Works



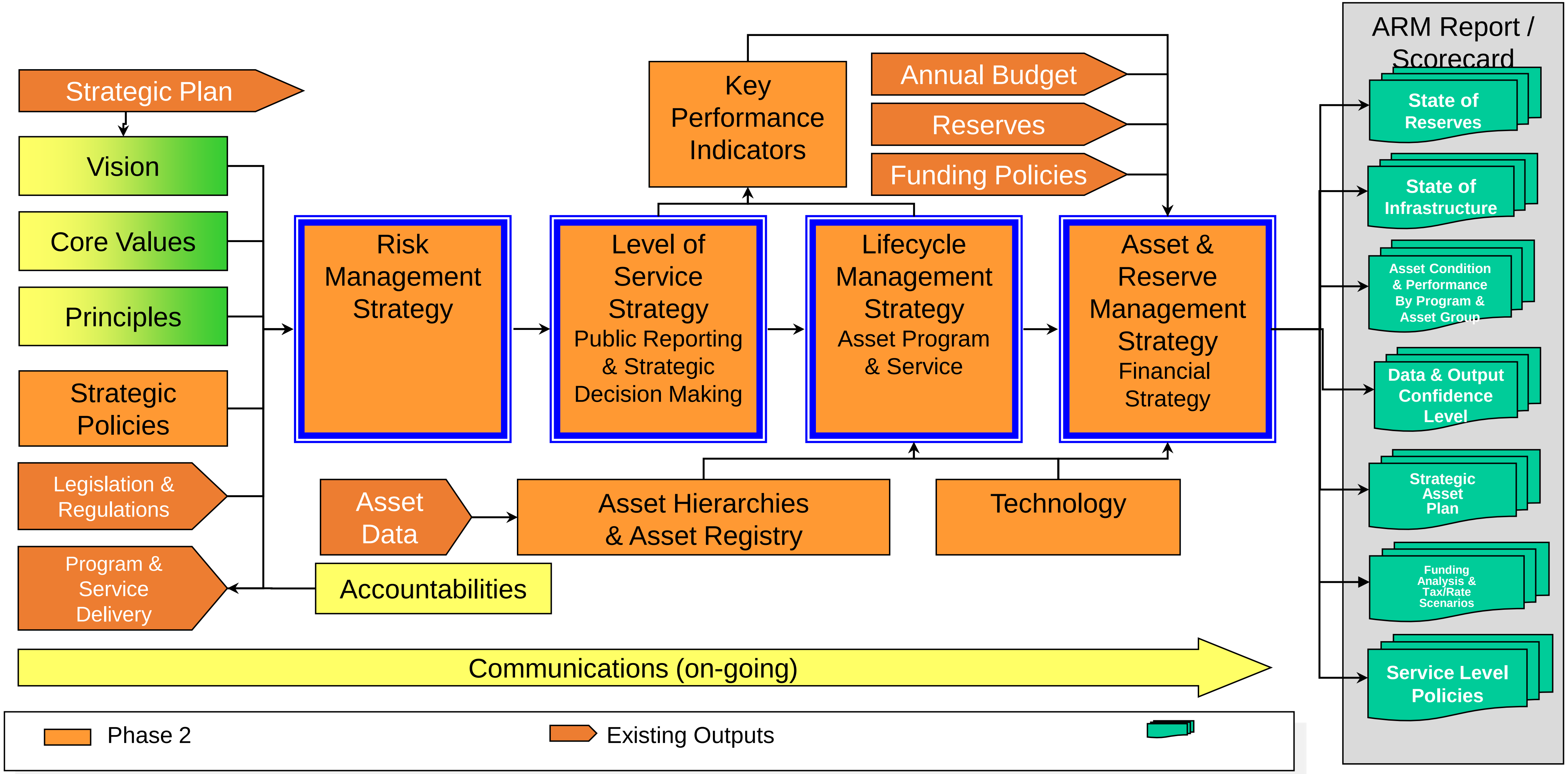
Balance of Presentation

The balance of the presentation is focused on the requirements of Regulation 588/17 in regard to policies and associated financial implications that Council must approve and must solicit public input in regard to such levels of service and funding strategies.

Strategic Asset Management Policy

A strategic asset management policy formalizes the Municipality's commitment to asset management, aligns it's asset management actions with strategic goals and objectives, and provides direction to guide Council, management and staff in carrying out it's business strategies, plans and activities. This policy will support the Municipality in focusing its infrastructure efforts on managing risks, addressing Priorities and meeting short and long-term needs within the bounds of possible funding.

Strategic Asset Management Framework



Strategic Plan

Vision

Core Values

Principles

Strategic Policies

Legislation & Regulations

Program & Service Delivery

Key Performance Indicators

Annual Budget

Reserves

Funding Policies

Risk Management Strategy

Level of Service Strategy
Public Reporting & Strategic Decision Making

Lifecycle Management Strategy
Asset Program & Service

Asset & Reserve Management Strategy
Financial Strategy

Asset Data

Asset Hierarchies & Asset Registry

Technology

Accountabilities

Communications (on-going)

ARM Report / Scorecard

- State of Reserves
- State of Infrastructure
- Asset Condition & Performance By Program & Asset Group
- Data & Output Confidence Level
- Strategic Asset Plan
- Funding Analysis & Tax/Rate Scenarios
- Service Level Policies

🟧 Phase 2

➡ Existing Outputs

Creation of an Asset Registry

- **An evaluation of all assets taking into account descriptors such as:**
- **age,**
- **condition,**
- **remaining life,**
- **replacement value or remediation cost,**
- **risk of failure and**
- **consequence of failure.**

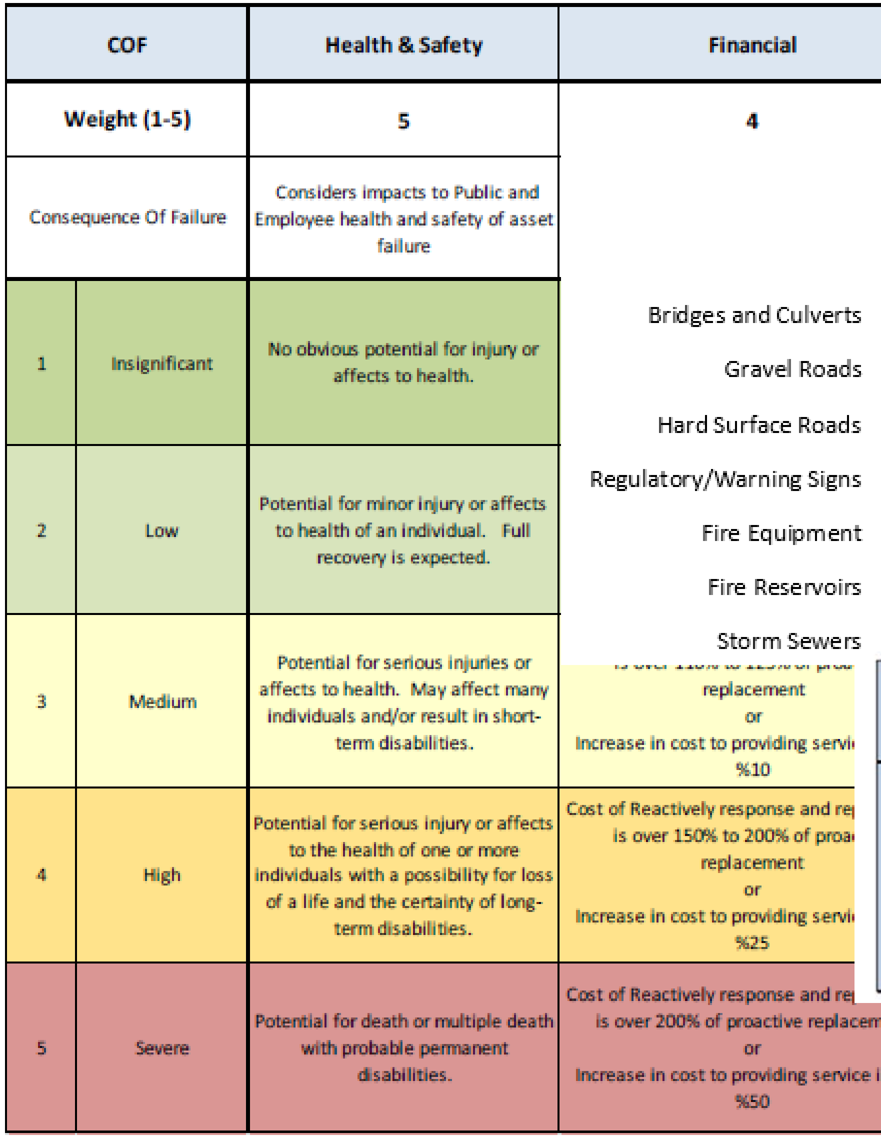
A sample of the asset registry with a limited number of asset classes as is illustrated on the provided handout: **Handout #1: Sample Asset Registry, Puslinch Asset Classes**

Asset Classes in Puslinch

- Roads
  - Gravel Roads
  - Surface Treated
  - Hard Surface Roads
- Bridges
- Culverts
- Sidewalks
- Storm Sewers
- Storm Water Management Ponds
- Regulatory/Warnings Signs
- Street Lights
  - Standard Street Lights
  - Decorative Street Lights
  - Floodlights
- Street Trees
- Public Works
  - Work Licensed Vehicles
  - Work Unlicensed Vehicles

- Buildings and Facilities
  - Municipal Complex
  - Puslinch Community Centre
  - Optimist Recreation Centre
  - Fire Hall
  - Various Storage Buildings
- Parks and Recreation
  - Lights
  - Park Equipment
  - Bleachers
  - Fencing
  - Etc
- Parklands
- Fire Assets
  - Vehicles
  - Fire Equipment
  - Fire Reservoirs

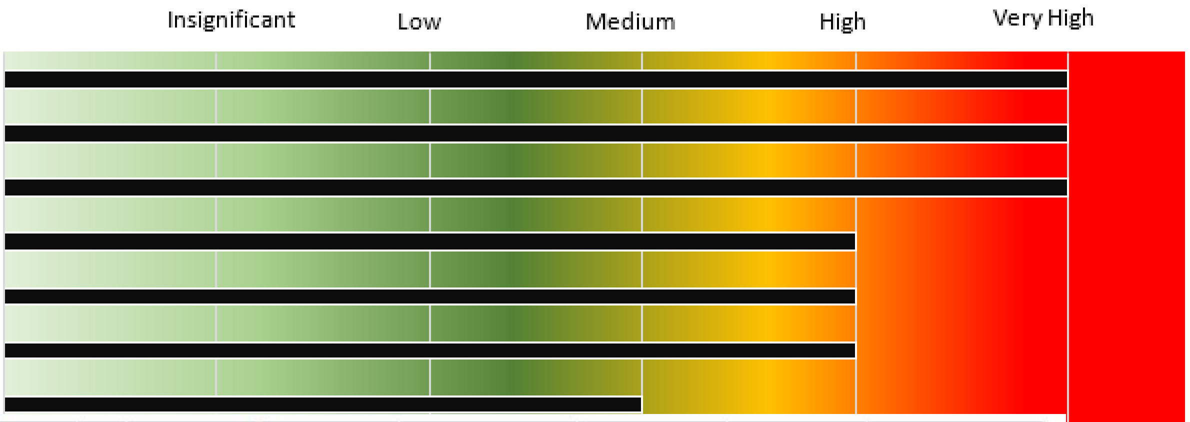
Risk and Consequence of Failure

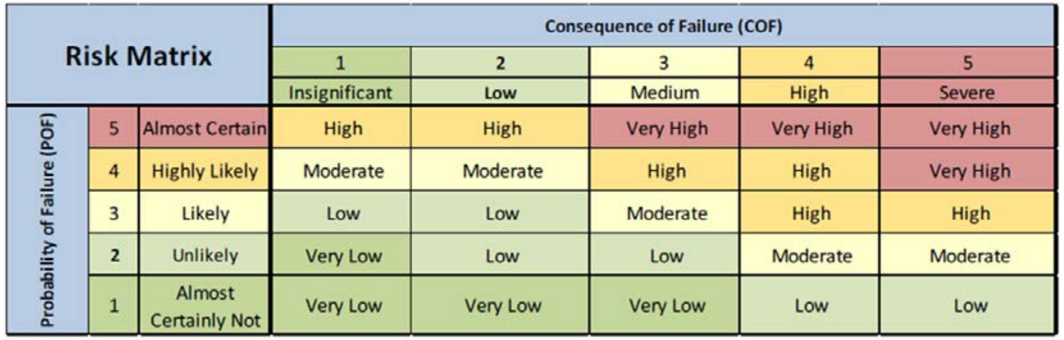


COF		Health & Safety	Financial
Weight (1-5)		5	4
Consequence Of Failure		Considers impacts to Public and Employee health and safety of asset failure	
1	Insignificant	No obvious potential for injury or affects to health.	
2	Low	Potential for minor injury or affects to health of an individual. Full recovery is expected.	
3	Medium	Potential for serious injuries or affects to health. May affect many individuals and/or result in short-term disabilities.	replacement or Increase in cost to providing servi %10
4	High	Potential for serious injury or affects to the health of one or more individuals with a possibility for loss of a life and the certainty of long-term disabilities.	Cost of Reactively response and re is over 150% to 200% of proa replacement or Increase in cost to providing servi %25
5	Severe	Potential for death or multiple death with probable permanent disabilities.	Cost of Reactively response and re is over 200% of proactive replaceme or Increase in cost to providing service is %50

See Handout: Handout #2: Consequence of Failure Logic

Consequence Of Failure: Asset Classes



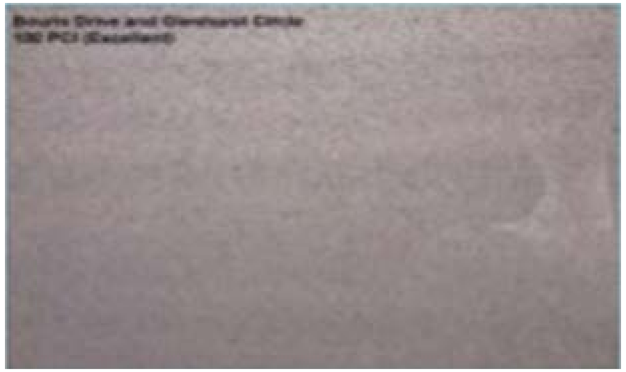


Risk Matrix			Consequence of Failure (COF)				
			1 Insignificant	2 Low	3 Medium	4 High	5 Severe
Probability of Failure (POF)	5	Almost Certain	High	High	Very High	Very High	Very High
	4	Highly Likely	Moderate	Moderate	High	High	Very High
	3	Likely	Low	Low	Moderate	High	High
	2	Unlikely	Very Low	Low	Low	Moderate	Moderate
	1	Almost Certainly Not	Very Low	Very Low	Very Low	Low	Low

Service Level Policies

- Roads are the largest Capital Expenditure
- Road rehabilitation/replacement is determined by Life Cycle and a Pavement Condition Index (PCI) PCI is a range of 1 -100
- These standards are used throughout Ontario by municipalities and supported by the Ontario Good Roads (OGRA)
- Usually a road PCI below 65 is considered for rehabilitation (see slide 15)
- UEM Recommendation and supported by OGRA
- Alternative Scenarios and the financial impact
- Our Service Level Policies
- The Capital Plan

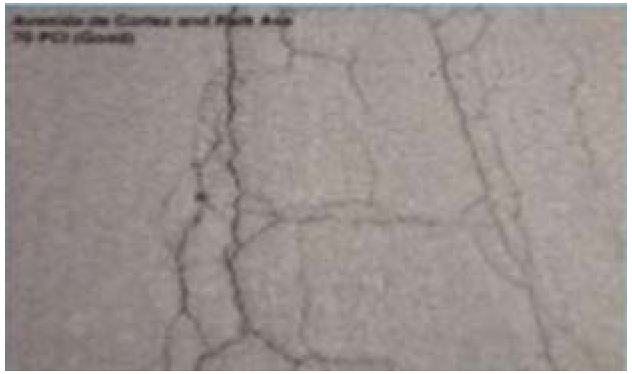
Pavement Condition



100 PCI (Excellent)

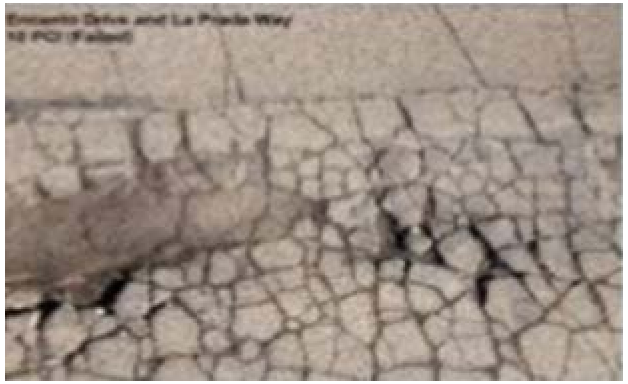
85 PCI (Good)

65 PCI (Fair)



60 PCI (Poor)

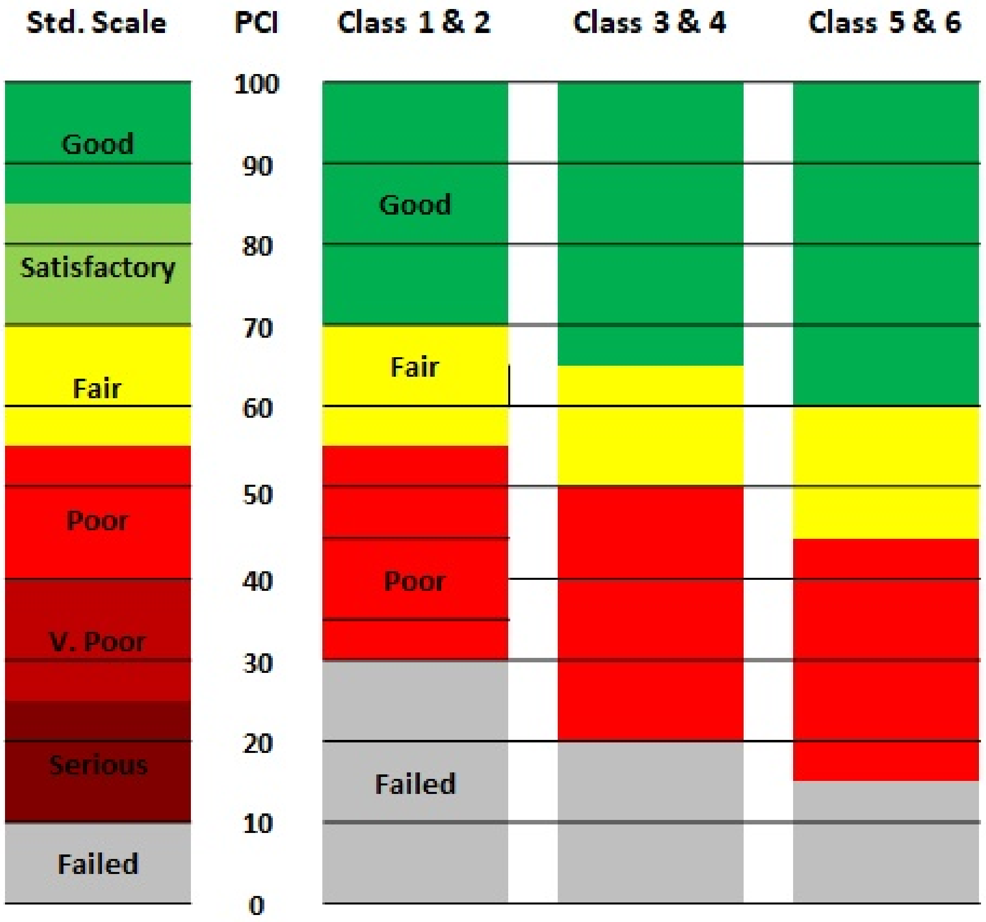
25 PCI (Very Poor)



10 PCI (Failed)

Roads levels of Service recommended by UEM and supported by the OGRA

- **MTO methodology**
- **Based on road classification (Class) or pavement type (asphalt, concrete, surface treated, or gravel)**
- **PCI(avg) weighted upon network distribution**
- **Classes are determined by Average daily Traffic & Speed Limits**

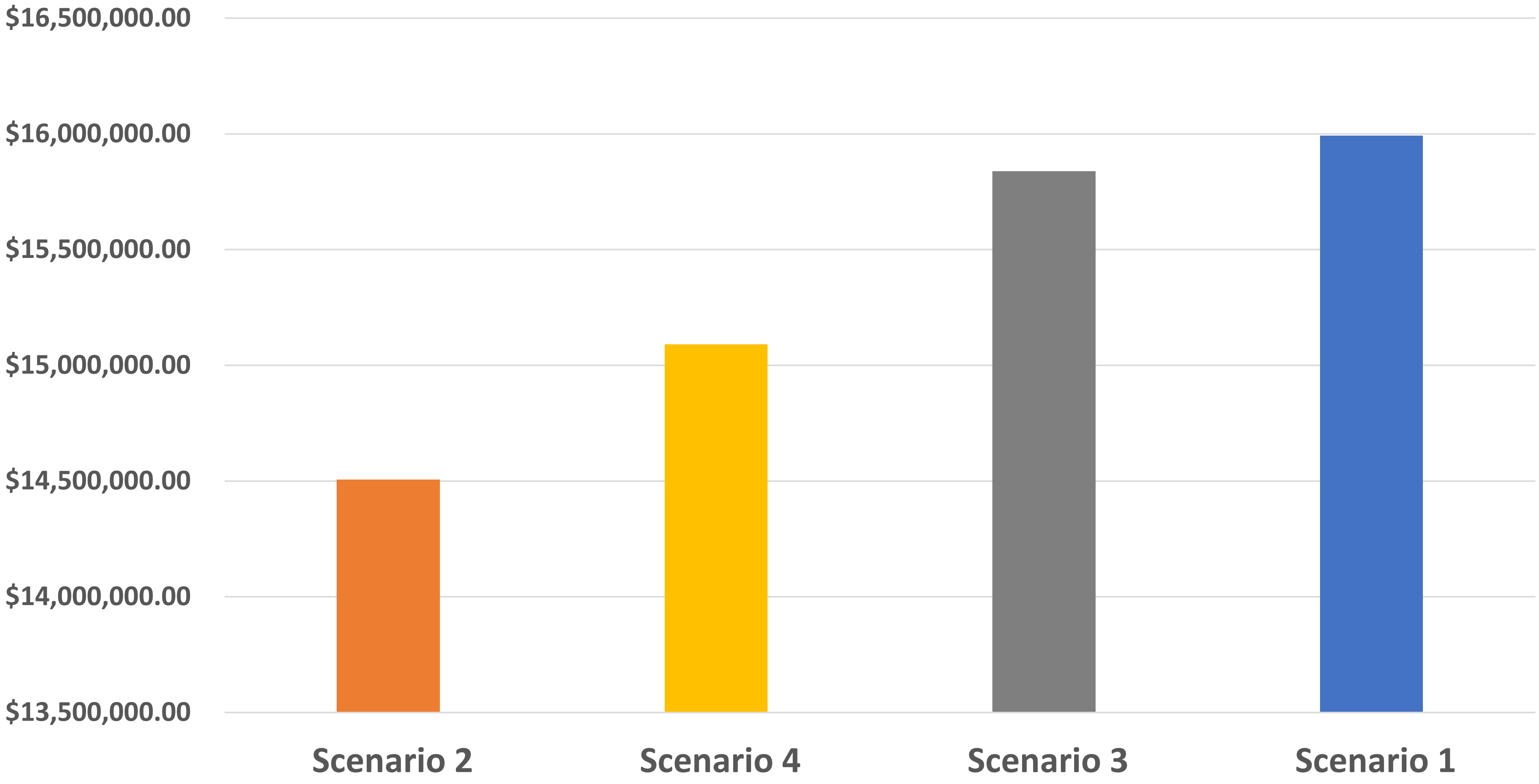


Roads levels of Service recommended by UEM and supported by the OGRA: Scenario 4

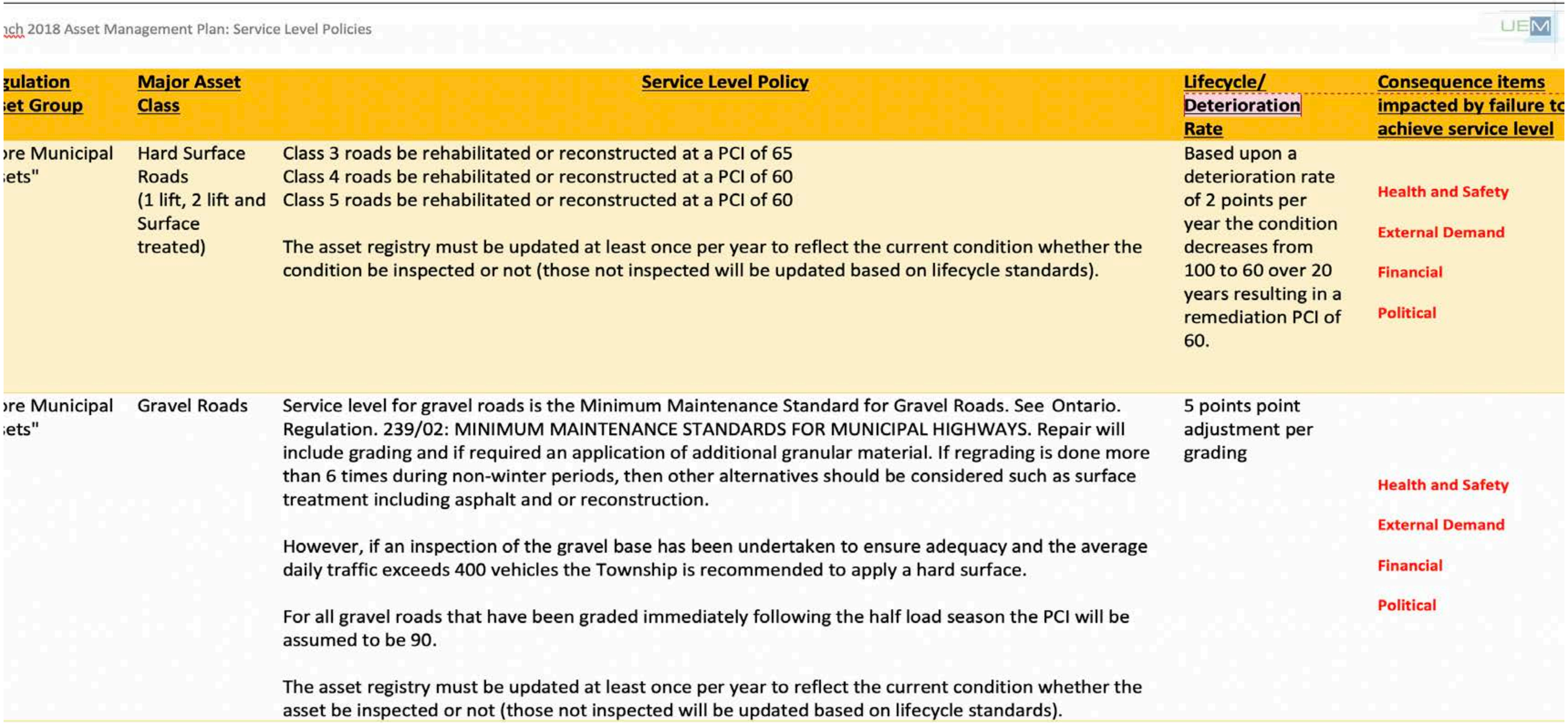
See Handout: Handout #3: Road Classifications

	Road Class		
	3	4	5
	Replacement PCI	Replacement PCI	Replacement PCI
Scenario 1	65	65	65
Scenario 2	60	60	60
Scenario 3	65	65	60
Scenario 4	65	60	60

Township Of Puslinch: 10 Year Capital Needs to support Existing Infrastructure



Service Level Policy for All Asset Classes

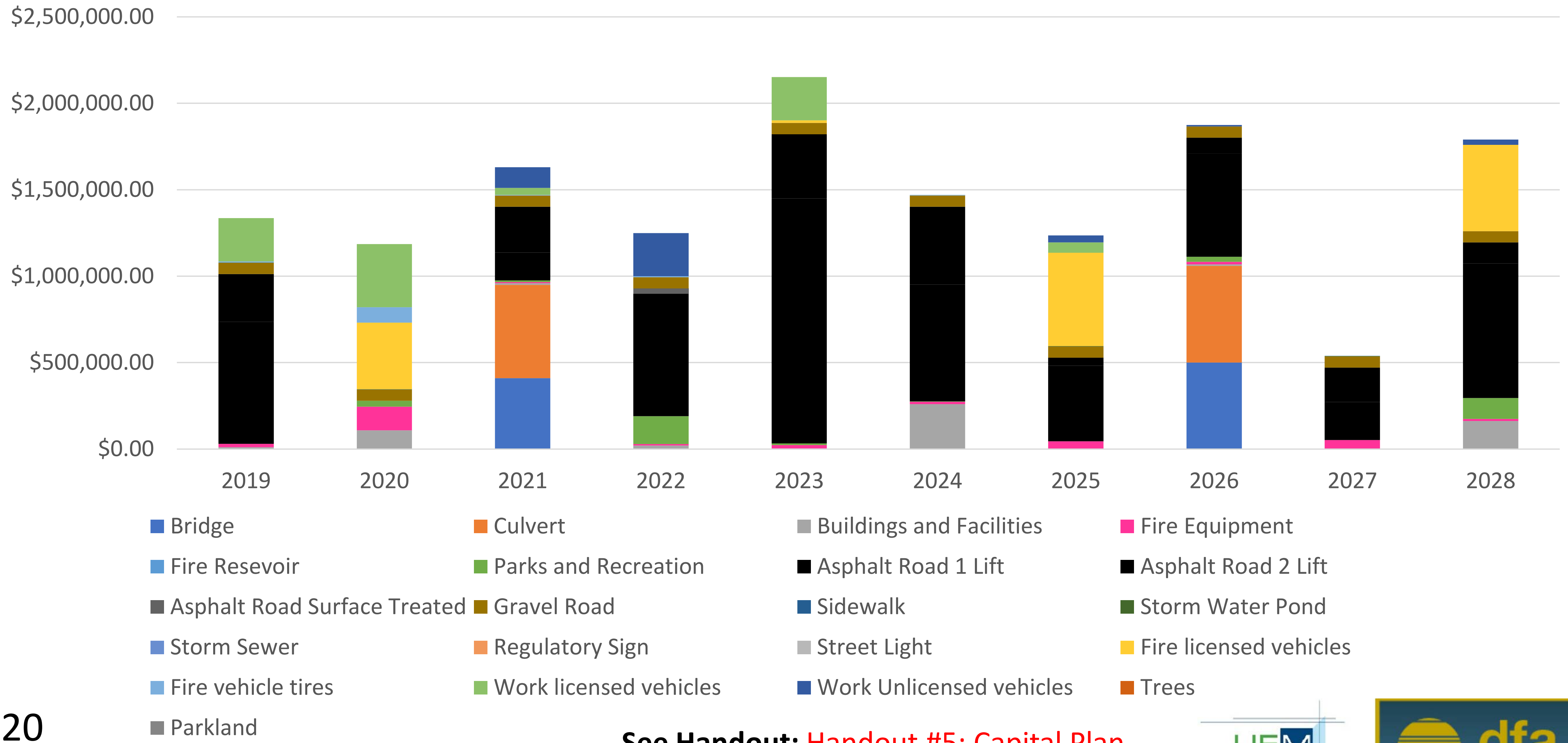


ch 2018 Asset Management Plan: Service Level Policies

gulation et Group	Major Asset Class	Service Level Policy	Lifecycle/ Deterioration Rate	Consequence items impacted by failure tc achieve service level
re Municipal ets"	Hard Surface Roads (1 lift, 2 lift and Surface treated)	Class 3 roads be rehabilitated or reconstructed at a PCI of 65 Class 4 roads be rehabilitated or reconstructed at a PCI of 60 Class 5 roads be rehabilitated or reconstructed at a PCI of 60 The asset registry must be updated at least once per year to reflect the current condition whether the condition be inspected or not (those not inspected will be updated based on lifecycle standards).	Based upon a deterioration rate of 2 points per year the condition decreases from 100 to 60 over 20 years resulting in a remediation PCI of 60.	Health and Safety External Demand Financial Political
re Municipal ets"	Gravel Roads	Service level for gravel roads is the Minimum Maintenance Standard for Gravel Roads. See Ontario. Regulation. 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS. Repair will include grading and if required an application of additional granular material. If regrading is done more than 6 times during non-winter periods, then other alternatives should be considered such as surface treatment including asphalt and or reconstruction. However, if an inspection of the gravel base has been undertaken to ensure adequacy and the average daily traffic exceeds 400 vehicles the Township is recommended to apply a hard surface. For all gravel roads that have been graded immediately following the half load season the PCI will be assumed to be 90. The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).	5 points point adjustment per grading	Health and Safety External Demand Financial Political

See Handout: Handout #4: Service Level Policies: Puslinch Asset Classes

Township Of Puslinch: 10 Year Capital Needs to support Existing Infrastructure



See Handout: Handout #5: Capital Plan

Financial Strategy

Ontario Regulation 588/17 requires that for the proposed level of service, a municipality prepare a 10 year financial strategy that:

- **identifies the costs of undertaking the lifecycle activities**
- **identifies the annual funding projected to be available**
- **explains the financing options examined**
- **identifies any funding shortfall and explains how the funding shortfall and the associated risks will be addressed**

Financial Strategy

Three Financial Strategy Options were developed (based on Scenario 4 Lifecycle Activities - Capital Plan Slide 19).
Note: It has been assumed there are no "significant operating costs" (no significant increase in operating costs)

Financial Strategies Options are based on a combination of Pay-As-You-Go and Debt Financing (when necessary), with consideration given to reserve targets and municipal debt capacity.

Financial Strategy

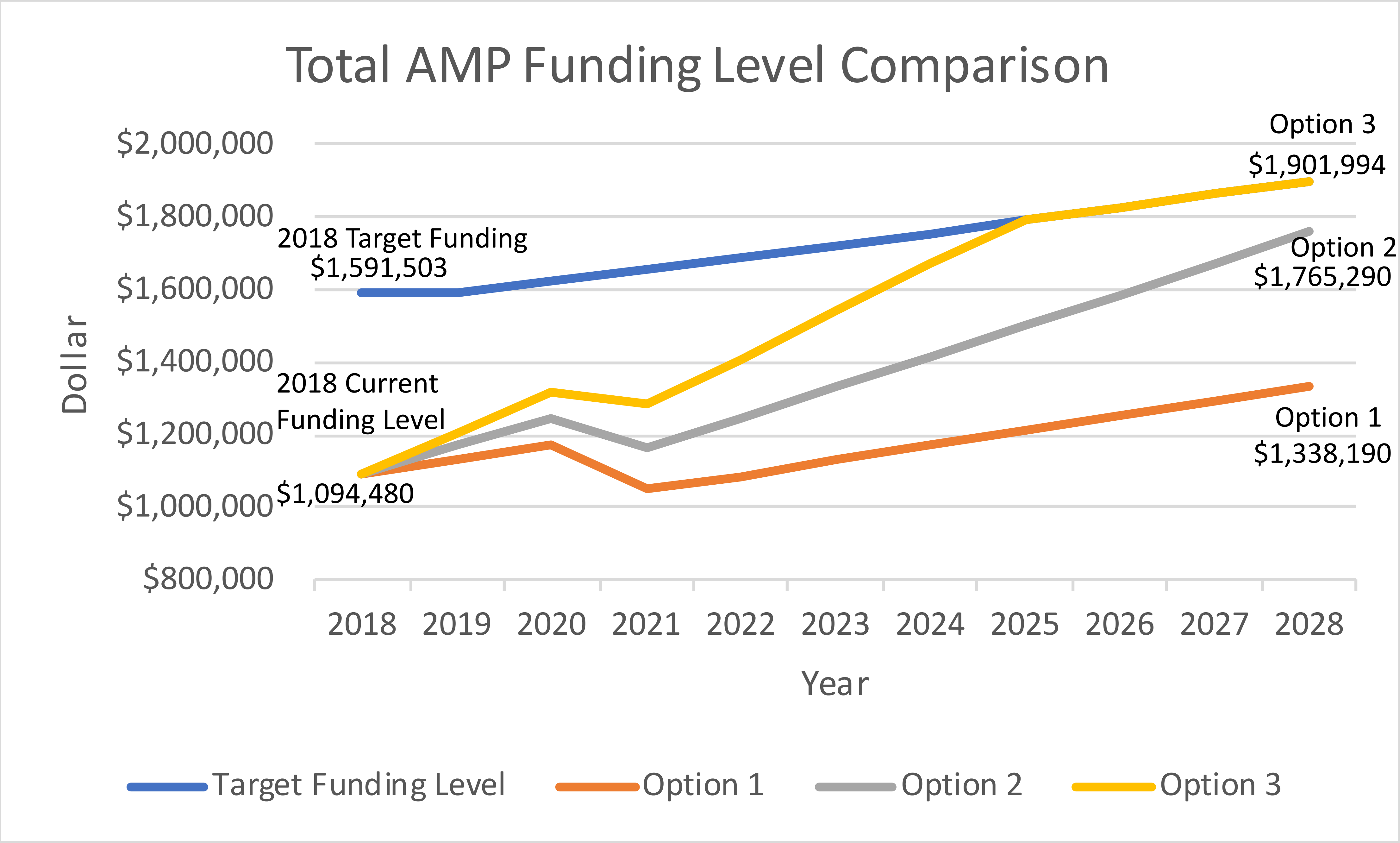
Financial Strategy Options considered three different levels of current funding (capital levy) increases:

- **Option 1 – Capital Levy Increase equivalent to a 1% Tax Impact on the Typical Single Family Detached Dwelling**
- **Option 2 – Capital Levy Increase equivalent to a 2% Tax Impact on the Typical Single Family Detached Dwelling**
- **Option 3 – Capital Levy Increase equivalent to a 3% Tax Impact on the Typical Single Family Detached Dwelling (Recommended)**

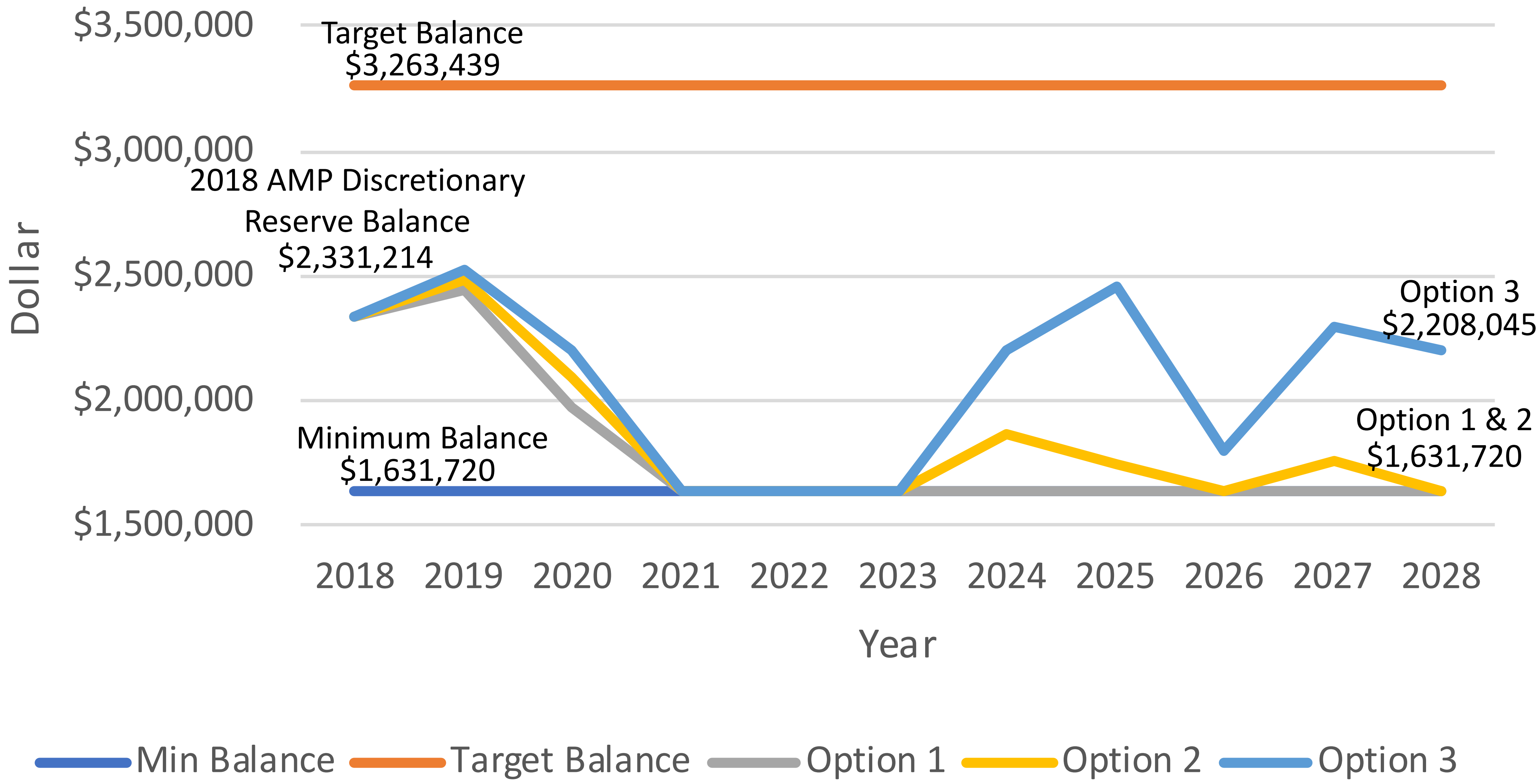
All Financial Strategy Options incorporated Financial Policy considerations regarding annual reserve funding levels, reserve balance targets, and municipal debt capacity.

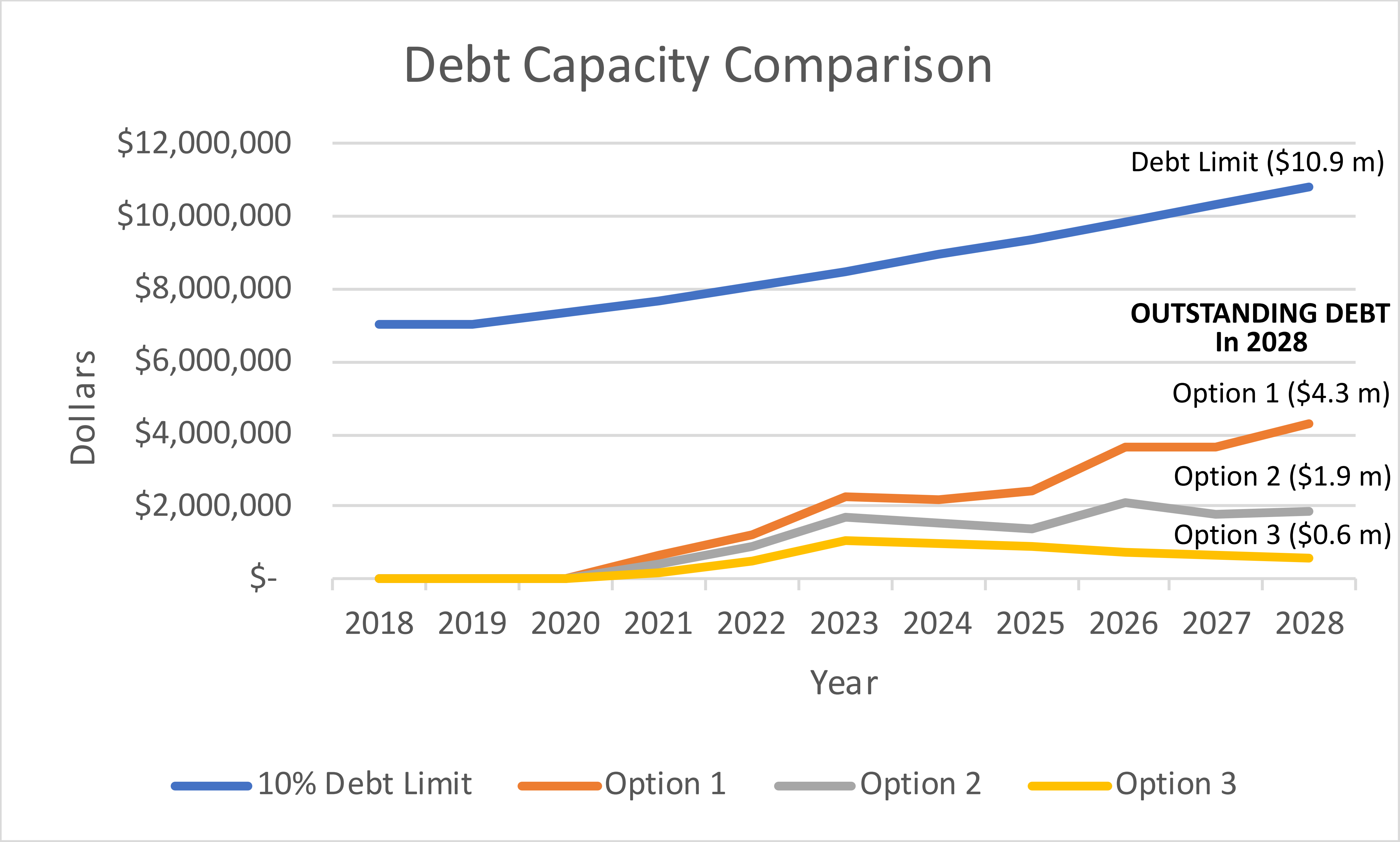
Financial Strategy

Financial Policy Considerations	
AMP Target Funding Levels	Target Level of AMP Funding to Equal 2% of Capital Asset Replacement Values
AMP Discretionary Reserve Target Balances	Discretionary AMP Reserve Balance to Range between 10% - 20% of 10 year inflated capital plan expenditures
Debt Capacity Restrictions	Debt Servicing as a percent of own source revenues to not exceed 10%


Total AMP Funding Level Comparison
$2,000,000
$1,800,000
$1,600,000
$1,400,000
$1,200,000
$1,000,000
$800,000
Dollar
2018 Target Funding
$1,591,503
2018 Current
Funding Level
$1,094,480
Option 3
$1,901,994
Option 2
$1,765,290
Option 1
$1,338,190
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Year
Target Funding Level
Option 1
Option 2
Option 3

AMP Discretionary Reserve Target Comparison




Debt Capacity Comparison
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Dollars
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Year
Debt Limit ($10.9 m)
OUTSTANDING DEBT In 2028
Option 1 ($4.3 m)
Option 2 ($1.9 m)
Option 3 ($0.6 m)
10% Debt Limit
Option 1
Option 2
Option 3

Recommended Financial Strategy Option

Option 3 (Capital Levy Increase to be Equivalent to a 3% Tax Impact on the Typical Single Family Detached Dwelling)

- **Achieves the Target AMP Funding Level by 2025**
- **Achieves and sustains an above minimum reserve target balance by 2023**
- **Results in the least debt required to fund the proposed capital plan**
- **Best positions the Township to address AMP activities beyond 2028**

Questions ?

We must consider the safety and protection of everyone, particularly **children**, in environments where marijuana is produced and consumed in various ways, be it smoked, vaped, or as edibles.

Making marijuana legal gives false perception to adolescents of the drug's harmful effects. Allowing smoking normalizes that it is safe and acceptable.

A great deal of time and money is being spent on economic development, beautification, and revitalization of our communities, only to be undone by loitering and crime which will further escalate since marijuana stores will stay open until 11:00 p.m., when other businesses will be closed.

Envision walking down the street and in parking lots, through clouds of second-hand smoke on your way to your favourite restaurant, store, park, or arena.

There is only **one** person in all of Wellington-Dufferin-Guelph Public Health to enforce tobacco laws, now being compounded by adding cannabis. That is **one person for a population of 300,000**. How can this possibly be done effectively?

Municipalities can implement by-laws declaring a smoke-free environment, prohibiting use of tobacco and marijuana in any form.

Municipalities can also ban edibles.

Drinking and driving and distracted driving continue to cause **death**. The problem will be further compounded with **drug impaired driving** and the consumption of **both alcohol and drugs** in combination. A ten-year trend shows **one in four** teens who died in motor vehicle accidents tested positive for cannabis. This impacts the safety of all citizens and puts a tremendous amount of pressure on our **police** forces.

This paper provides a closer look at the impacts of forfeiting rights as a municipality, the black market, impaired driving, emergency services, marijuana edibles, health, second-hand smoke, workplace safety, by-laws and policies, economical impact, environmental, real estate, insurance, entries to the U.S., and pardoning of criminals.

Colorado is used as a model since this state was the first to legalize marijuana for recreational use in 2014. There, the black market is booming. Crime is on the rise. Hospital visits are increasing. Now, its governor won't rule out recriminalizing it.

The following excerpts contain factual and statistical information and can be cross-referenced with accompanying links prefacing summaries.

FORFEITING RIGHTS AS A MUNICIPALITY

https://www.amo.on.ca/AMO-PDFs/Cannabis/What-s-New-with-Bill-36.aspx

If you opt in, you forfeit all rights as a municipality regarding the number and location of retail outlets.

- **"Restrictions on Municipal By-law Making Authority: Section 42(1) of the Act denies municipal governments the authority to pass a business licensing by-law respecting the sale of cannabis or the governance of retail stores. Section 42(2) of the Act denies municipal governments the authority to pass a by-law under the Planning Act that has the effect of distinguishing where cannabis can or cannot be sold. Under section 42(3), any existing by-law passed by a municipality to regulate cannabis retail location is deemed to be of no effect."**
- licenses will be granted by the Alcohol and Gaming Commission of Ontario (AGCO) **NOT** municipalities
- There is no cap on how many stores will be allowed to open in Ontario. In addition, a **single** company will be able to open up to a maximum of **75 stores**. This raises concerns about large corporations setting up shops on every corner.
- Will marijuana retailers be liable for selling to someone who uses the substance, gets in a vehicle, and kills someone? Will municipalities be negligent in allowing this to happen? Do you want this on your conscience?

https://www.ola.org/en/legislative-business/bills/parliament-42/session-1/bill-36#Sched247

Bill 36 of the Cannabis Act outlines that once a retail store is allowed to operate, the decision cannot be reversed.

Lifting of prohibition

  - 41(3) A municipality that has prohibited cannabis retail stores under subsection (1) may, by resolution, lift the prohibition and permit cannabis retail stores to be located in the municipality.

Lifted prohibition may not be restored

  - 41(4) A resolution passed for the purposes of subsection (3) is final and may not be reversed.

BLACK MARKET

www.cbc.ca/news/world/colorado-marijuana-black-market-1.4647198

Colorado: When recreational marijuana went on sale in 2014, the government's goal was to regulate and tax a drug that was already widely used and to squeeze out dealers and traffickers in the process. But, law enforcement authorities in the state say legalization has done the exact opposite.

- The black market is booming, despite more than 500 recreational marijuana dispensaries in the state.
- It's being driven by criminal organizations that grow marijuana in Colorado and smuggle their crop into states where it is still illegal and can be sold for a much greater profit.
- The black market hasn't gone away within the state, either, because some marijuana users are deterred by the higher dispensary prices and are loyal to their long-time dealers.
- Paul Roach, supervisor for Drug Enforcement Administration (DEA)
  - Drug trafficking organizations move there—disguised as legitimate operations
  - Will exploit Canadian laws to increase profit

- Anonymous drug dealer says legalization hasn't had a big impact on his business because he caters to clients who don't want to be seen going into a dispensary. His clientele also includes a number of truck drivers, who are prohibited from using marijuana under federal transportation laws.
- Users continue to support black market because they've built trust, and the drugs are cheaper.

www.theglobeandmail.com/news/national/ontario-vows-to-give-municipalities-40-million-for-marijuana-law-enforcement/article38260217/

- The elimination of illicit markets won't happen. Dispensaries will still have limits requiring proof of age, set price, potency constraints, and the stigma of being seen at these retailers in a small community. These restrictions are deterrents ensuring others will continue to turn to the streets.

www.cbc.ca/news/canada/british-columbia/legal-marijuana-in-colorado-brought-spike-in-black-market-1.4587048

- In Denver, DEA public information officer Randy Ladd said people sometimes peddle pot right outside legal dispensaries and they'll undercut prices in legitimate stores and skirt taxes.
- Ladd has a warning for Canadians who think legalizing cannabis will snuff out the illegal market and the crime that goes with it, even if all the jurisdictions in Canada legalize the drug at the same time.
- Ladd: "There are people who come to Colorado, and they'll come to Canada if they can — they'll come from the United States and they'll come from around the world to **rob people at gunpoint** for their marijuana. **They'll kill people**," he said. "I can tell you, there's a very dark side to it."

www.teenchallenge.ca/get-help/canadian-drug-crisis

- Canadian Security Intelligence Service (CSIS) estimates there are roughly 950 organized criminal groups active in Canada. About 80% derive revenues from illegal drug sales. *Edmonton Journal, April 4, 2009*
- 23% of Ontario students report that they were offered, sold, or given a drug at school in the last year. That's about 219,000 students. (*Legalization will not prevent this from occurring*).

IMPAIRED DRIVING

https://www150.statcan.gc.ca/n1/pub/85-002-x/2016001/article/14679-eng.htm

- Impaired driving still remains one of the most frequent criminal offences and is among the leading criminal causes of death in Canada.
- In 2015, drug-impaired driving doubled since 2009, when data became available.
- Drug-impaired driving is on the rise (Allen 2016).
- At least 1 out of 6 persons accused in an impaired driving court case in 2014/2015 had been previously accused in another impaired driving case during the preceding 10 years.

EMERGENCY SERVICES

FIRE

https://www.cbc.ca/news/canada/nova-scotia/hrm-fire-anticipates-increased-risks-from-home-grown-marijuana-1.4704155

- Home cultivation has brought increased risks of fires from people growing and smoking pot at home

- Someone takes a home and tries to build a modified greenhouse in a bedroom or room that's not built for that
- Increased risk comes from:
  - compressed carbon dioxide tanks that are used to increase yields
  - high-watt light bulbs that may melt nearby wiring
  - explosions from butane used to extract THC from marijuana
  - wiring issues caused by the theft of electricity to power high-watt lights

https://cafc.ca/page/cannabis

The Canadian Association of Fire Chiefs is concerned the federal government is overlooking the following implications:

- explosion conditions, fumigation, automation sprinkler systems, automatic emergency power systems, hazardous materials, exhaust, fumes, carbon dioxide emission, flammable and combustible liquid extraction systems, inspection, and education

POLICE

https://www.wellingtonadvertiser.com/comments/index.cfm?articleID=41719

Inspector Scott Lawson, Wellington County O.P.P Detachment Commander states:

- “You just have to know that cannabis will impair you. There’s tons of medical evidence to back that up.”
- “When you combine [cannabis and alcohol] and you get behind the wheel of your boat, of your motorcycle, of your vehicle, you’re going to be impaired.”
- “How would we know what 30 grams is because they’re not going to give us all a little scale. We don’t want to open those packages … we’re not handling product”
- “If organized crime is currently what’s supplying cannabis to Canada … they [could] find ways to get into the legal market and start distributing legal cannabis in an illegal way and using the profits to fund what they fund.”
- “With taxes added to the sale of marijuana, there’s a chance people will continue to buy illegal cannabis anyway.”
- “If you have young kids in your home or youth in your home and you’ve got four plants growing and curious kids … they kind of get it. The next thing you know, they’re cutting a bit of bud off it and trying to figure it out and they saw mom and dad rolling it. We won’t have any control over that. We won’t see that; we won’t know that until paramedics get called because the kid’s gone down or is struggling.”

PARAMEDICS

Paramedics are already victims of abuse, assault, and violence. Will this escalate with increased marijuana use?

https://www.theglobeandmail.com/cannabis/article-with-cannabis-legalization-looming-doctors-foresee-uptick-in/

- “Paramedics have seen more marijuana-related calls and are concerned about impaired driving causing collisions, as well as children who accidentally consume cannabis edibles. (Randy Mellow, President of Paramedic Chiefs of Canada).
- It makes it challenging for paramedics to distinguish the cause of the emergency

https://www.cbc.ca/news/health/cannabis-overdose-legalization-edibles-public-education-1.4800118

- Data from the Canadian Institute for Health Information (CIHI) shows that over the past three years the number of emergency room visits because of cannabis overdoses in Ontario has almost tripled — from 449 in 2013-14, to nearly 1,500 in 2017-18.
- Symptoms of cannabis overdose (THC poisoning) include elevated heart rate and blood pressure, anxiety, vomiting and in some cases psychosis, possibly necessitating hospitalization.

MARIJUANA EDIBLES

Edibles, including food and beverages, will be introduced in 2019.

Food and beverage companies are forming alliances with cannabis producers. This is dangerous.

www.nejm.org/doi/full/10.1056/NEJMp1500043

- Implications of edibles:
  - **psychoactive** effects delayed up to 4 hours, but can last more than 8 hours, extending the duration of impaired judgment and coordination that can lead to unsafe driving and accidental injuries
  - higher rates of calls (70%) to **poison**-control centres for unintentional marijuana exposure [edibles] in **children under 9 years of age**
  - increased **hospital** visits
  - cause **death**
- Increase in potency: THC more than 20%; levels in hashish reach up to 90%

HEALTH

www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=1&ContentID=3051

- the rational part of the brain is not fully developed until the age of 25

https://www.cps.ca/en/documents/position/cannabis-children-and-youth

- Structural changes of the brain on MRI have been documented in youth who use cannabis regularly indicating damage by THC.
- The THC content of marijuana available today is two to four times higher than from typical products used 40 years ago (20), a factor likely to magnify impact on the adolescent brain.
- increased neural activity, which means the brain is working harder to perform tasks

www.ncbi.nlm.nih.gov/pmc/articles/PMC3930618/

- marijuana use affects brain development and functioning
- causes deficit in attention and memory
- leads to risky behaviours, including increased marijuana use, aggressive and delinquent behaviour

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4827335/

- long-term marijuana use leads to addiction and increases when used in the teen years or daily

- 2.7 million people aged 12 and older met criteria for dependence
- Cessation is difficult and leads to relapse due to irritability, sleeping difficulties, dysphoria, craving, and anxiety

https://www.drugabuse.gov/publications/research-reports/marijuana/what-are-marijuanas-effects-lung-health

- Marijuana smoke contains carcinogenic combustion products, including about 50% more benzoprene and 75% more benzanthracene (and more phenols, vinyl chlorides, nitrosamines, reactive oxygen species) than cigarette smoke.
- Because of how it is typically smoked (deeper inhale, held for longer), marijuana smoking leads to four times the deposition of tar compared to cigarette smoking.

https://www.drugabuse.gov/publications/research-reports/marijuana/there-link-between-marijuana-use-psychiatric-disorders

- marijuana use increases risk for psychiatric disorders, including psychosis (schizophrenia), depression, anxiety, and substance use disorders

https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-use-affect-school-work-social-life

- marijuana's negative effects on attention, memory, and learning can last for days or weeks after the acute effects of the drug wear off
- someone who smokes marijuana daily functions at a reduced intellectual level most or all of the time
- students who smoke marijuana have poorer educational outcomes than their non-smoking peers, are significantly less likely to finish high school or obtain a degree
- have a much higher chance of developing dependence, using other drugs, and attempting suicide
- heavy marijuana use linked to lower income, greater welfare dependence, unemployment, criminal behavior, and lower life satisfaction

SECOND-HAND SMOKE

www.drugabuse.gov/publications/research-reports/marijuana/what-are-effects-secondhand-exposure-to-marijuana-smoke

- The National Institute on Drug Abuse reports the effects of **second-hand smoke** as being psychoactive, registering in the blood and urine, and affecting the lungs. Concerns raised about vulnerable populations include children and asthmatics.

https://fcm.ca/Documents/issues/Cannabis-Guide-EN.pdf (p.32)

- The understanding that tobacco consumption can be harmful to respiratory health and contribute to cancers, and that second-hand smoke can have similar negative health impacts, has qualified as health-related reasons for municipal restrictions on tobacco consumption. Local governments are likely to be able to draw on a similar approach for cannabis consumption where authorized. (The Federation of Canadian Municipalities)

WORKPLACE SAFETY

Consideration must be given to workplace safety, operation of machinery, detection, disciplinary action, decreased work performance, attendance, and loss of productivity.

https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-use-affect-school-work-social-life

- Increased risk for injury or accidents in the workplace: One study among postal workers found that employees who tested positive for marijuana on a pre-employment urine drug test had 55% more industrial accidents, 85% more injuries, and 75% greater absenteeism compared with those who tested negative for marijuana use.

BY-LAWS AND POLICIES

https://www.cbc.ca/news/canada/kitchener-waterloo/university-of-guelph-cannabis-policy-1.4791679

- University of Guelph—not allowed to smoke marijuana or tobacco anywhere on campus, including residences; no sales or deliveries are permitted

https://www.orangeville.com/news-story/8996509-up-in-smoke-shelburne-council-says-no-to-recreational-cannabis-use-in-public-spaces-/

- Shelburne council voted in favour of a new by-law — based on rules recently adopted in Markham — forbidding the smoking or vaping of recreational cannabis in public spaces.
- That means no lighting up or vaping of recreational cannabis anywhere that is accessible to the public including parks, trails, parking lots, town facilities, sidewalks, roads, shopping malls and other retail, commercial and business establishments.
- Markham (pop. 330,000), Richmond Hill (pop. 200,000), and King Township (pop. 25,000) have all opted out of allowing marijuana stores in their communities.
- **Our municipalities have the power to do the same.**

ECONOMICAL IMPACT

www.cbc.ca/news/business/cannabis-weed-pot-canada-1.4598560

- Economist and policy analyst Rosalie Wyonch, from the Canadian C.D. Howe Institute, says, “The clear economic logic is that so long as there is demand beyond what the legal industry can supply when new legislation takes effect this year, a market supplied by criminals will continue to exist.”
- In the Canadian case, the C.D. Howe investigation indicates that immediately after recreational sales are permitted, illegal suppliers will continue to control about half the market, wiping out roughly $420 million in potential excise tax revenue that would otherwise be collected.

http://research.cibcwm.com/economic_public/download/eijan16.pdf (p.8)

- Avery Shenfeld, CIBC economist, states, “The bottom line is that federal/provincial governments might reap as much as $5 billion from legalization, but only if all the underground sales are effectively curtailed. That’s on the order of 0.25% of GDP, no barnburner.”

www.theglobeandmail.com/news/national/ontario-vows-to-give-municipalities-40-million-for-marijuana-law-enforcement/article38260217/

- $40 million over 2 years shared amongst 444 municipalities in Ontario. This will not be divided equally among municipalities. A minimum of $10,000 will be given only if opting in.
- The federal government's share of the duties is capped at $100 million with only half to be shared with provinces and territories. This could also lessen. In fact, in December, 2017, it was 75%, now it is down to 50%. This is provided on a **per household** basis, which would not equate to much based on the 2016 census of approximately 10,800 households in Centre Wellington, 4,600 in Wellington North, 4,500 in Guelph-Eramosa, 4,000 in Erin, 3,200 in Minto, 3,100 in Mapleton, and 2,700 in Puslinch. The City of Guelph is 52,000.

https://www.amo.on.ca/AMO-Content/Policy-Updates/2018/AMORecommendationsBill36OntarioCannabisStatuteLawA

- The Association of Municipalities Ontario (AMO) remains concerned that the costs related to legalization, from closing illegal dispensaries to road enforcement and other use, will exceed the funds the province receives from the federal government, of which $40 million to be shared with municipal governments.

ENVIRONMENTAL

https://www.mccarthy.ca/en/insights/blogs/canadian-era-perspectives/spotlight-cannabis-part-2-taking-closer-look-environmental-costs-cannabis-cultivation?utm_source=Mondaq&utm_medium=syndication&utm_campaign=inter-article-link

- The primary environmental issues arising from the production of cannabis on a commercial scale include contaminated sites management, water use, effluent and waste management, odours and air quality, energy use and greenhouse gas (GHG) emissions.
- a cannabis plant needs 22 litres of water a day
- impacts on local watersheds as a result of the diversion of water for cannabis production
- generate effluent containing growth nutrients and pesticides, which could have potentially adverse environmental impacts on local ecosystems
- cannabis production generates a significant waste stream
- a significant amount of which is being disposed in landfills rather than being composted, which takes months and a considerable amount of space
- the growth of cannabis plants emits terpenes, which are a type of volatile organic compound (VOC) known for their strong odour
- The cultivation of cannabis is an energy intensive activity, particularly for the indoor production of cannabis which requires high-intensity lighting, air conditioners, and dehumidifiers to regulate humidity and temperature. The Northwest Power and Conservation Council has calculated that it takes approximately 5,000 kWh to produce one kilogram of cannabis product – this is the same amount of energy an average Canadian household would use in 4 months.

https://fcm.ca/Documents/issues/Cannabis-Guide-EN.pdf (p.14)

- As a type of intensive agriculture, cannabis production needs a supply of: water for irrigation, electricity for lighting, and energy for heating.

- Cannabis production has some special impacts in relation to odour emissions and a need for heightened security that can be associated with high-value crops.
- risks of outdoor cultivation to children and domestic pets

REAL ESTATE

https://www.zoocasa.com/blog/cannabis-report-2018/

- In a survey released on October 16, 2018, most Canadians feel that smoking cannabis inside their homes is generally a bad idea.
- 64% of those who indicated they were homeowners felt doing so would harm its resale value, an increase from the 39% who indicated as such in Zoocasa's previous Housing Trends Report.
- Over half of homeowners – 57% – felt that growing even the legal amount of cannabis (up to four plants under the Cannabis Act), would have a negative impact on a home's value.
- This stigma extends to prospective home buyers, too: A total of 52% respondents say they'd be less likely to consider specific houses for sale if they knew even a legal amount of cannabis had been grown in them.
- 42% agree that dispensaries will reduce values of homes in a neighbourhood compared with liquor stores (11%)
- 48% of respondents stated the presence of a dispensary nearby would reduce their desire to purchase a specific property
- 88% of landlords want to ban smoking in their rental units

INSURANCE

https://www.bnnbloomberg.ca/home-auto-insurance-costs-could-rise-after-marijuana-legalized-experts-1.1146073

- Canadians could face rising home and car insurance costs once recreational marijuana is legalized as insurers eye increased risks stemming from a potential increase in people consuming cannabis, according to industry experts.
- "A recent Statistics Canada survey revealed that about **one in seven** cannabis users with a driver's licence report **driving within two hours** of using it. This is an alarming statistic and this road safety risk and uncertainty around it will most likely be reflected in some level of increased auto insurance rates." (Hazel Tan, Intact Financial)
- "Ontario Automobile Policy **excludes coverage** for accidental loss or damage **caused by drivers under the influence** of intoxicating substances. If accidents as a result of cannabis use increase, insurance companies' loss-ratios will increase, and that will ultimately increase individual drivers' premiums." (Alyssa Furtado, CEO of Ratehub.ca)
- Tan also said the insurer would be introducing some **coverage limits** in their home insurance policies to "reflect the risk" once cannabis is legalized.
- "The biggest risks for insurers from people growing cannabis at home are **damages** to a property due to **fire and theft**, even if they're not growing pot at the scale of a grow-op," Furtado said.
- "Cannabis growers often modify the heating and electrical systems on their property, which can increase risks for **fire and electrocution**. Fumes can build up inside the home's ventilation system and cause **mould or fungus** to develop," Furtado said.

ENTRY TO U.S.

https://www.ctvnews.ca/canada/why-investing-in-pot-could-pose-problems-at-the-u-s-border-1.4011813

- Problems at the border could impact thousands of Canadian investors who have put an estimated $25 to $30 billion into Canada's biggest pot production companies—in theory making them financiers of a drug illegal under U.S. federal laws.
- Canadian businesspeople have been denied entry and even banned from investing in U.S. companies.
- includes a business man working for a company making equipment to harvest marijuana who was banned for life

CRIMINALS PARDONED

https://www.cbc.ca/news/politics/tasker-pot-pardons-limitations-1.4866610

https://www.ctvnews.ca/politics/bill-to-pardon-past-pot-convictions-coming-before-the-end-of-2018-1.4137578

- Those with criminal records for possession of marijuana will be pardoned and possibly have records expunged.
- Will they ask for compensation for having been incarcerated, costing taxpayers more money?
- A previous criminal record does not necessarily prohibit someone from obtaining a licence to run a legal cannabis store.

CONCLUSION

Many issues surrounding the legalization of cannabis are counterintuitive, defying common sense.

Municipalities have the power and social responsibility to enact by-laws to protect the health and safety of our citizens. Do the right thing. Be proactive. Protect and prevent erosion of our communities.

Declare a smoke-free environment in public spaces, prohibiting use of tobacco and marijuana in any form. Implement by-laws prohibiting the growing of cannabis anywhere. Ban edibles.

Do not forfeit your rights. Stop private marijuana retailers and producers from entering our communities.

Please OPT OUT before January 22, 2019.

REPORT FIN-2018-033

TO:	Mayor and Members of Council
FROM:	Mary Hasan, Director of Finance/Treasurer
MEETING DATE:	December 5, 2018
SUBJECT:	Annual Indexing of Development Charges File No. F20 DEV

RECOMMENDATIONS

That Report FIN-2018-033 regarding the Annual Indexing of Development Charges be received.

DISCUSSION

Purpose

The purpose of this report is to provide the Development Charge rates effective January 1, 2019. The rates are determined by applying the Construction Price Index to the 2018 rates.

Background

Development Charges are collected for the Township under By-law No. 054/14. Section 5 of the By-law states that the development charges imposed shall be adjusted annually, without amendment to this By-law, on January 1st of each year, in accordance with the prescribed index in the Act.

Section 7 of Ontario Regulation 82/98 of the Development Charges Act, 1997, states the following:

> “The Statistics Canada Quarterly, Construction Price Statistics, catalogue number 62-007 is prescribed as the index for the purposes of paragraph 10 of subsection 5 (1) of the Act. O. Reg. 82/98, s. 7.”

Analysis

The adjustments are made based on the most recent twelve-month change in the Statistics Canada Quarterly, “Building Construction Price Indexes” attached as Schedule A to this Report.

The Toronto non-residential buildings construction price index has increased by 5.2% from the third quarter of 2017 to the third quarter of 2018. Therefore, Township staff will implement an indexing factor increase of 5.2% effective January 1, 2019. The current rates for 2017 compared to the indexed rates for 2018 are outlined in Schedule B to this Report.

Residential Development: $5,212/dwelling unit * 1.052 = $5,483/dwelling unit

Non-Residential Development: $2.43/square foot * 1.052 = $2.56/square foot

The Township’s current By-law No. 054/14 expires effective September 3, 2019. Township staff are currently working with Watson & Associates to develop a Development Charges Background Study and By-law for Council’s approval.

FINANCIAL IMPLICATIONS

Development Charges are an important way of funding facilities and services directly related to new development in the Township. The annual indexing provision in By-law No. 054/14 helps to offset increases to initial development cost estimates identified for various growth-related capital projects.

APPLICABLE LEGISLATION AND REQUIREMENTS

Section 7 of Ontario Regulation 82/98 of the Development Charges Act, 1997

ATTACHMENTS

Schedule A –Building Construction Price Indexes

Schedule B – Schedule of Development Charges

Schedule A to Report FIN-2018-033

Statistics Canada Statistique Canada

Home → *The Daily*

Table 1
Building construction price indexes [1]

Back to main article CSV (2 KB)

Select columns

	Relative importance [2]	Third quarter 2017	Second quarter 2018	Third quarter 2018	Second quarter to third quarter 2018	Third quarter 2017 to third quarter 2018
	%	(2017=100)	(2017=100)	(2017=100)	% change	% change
Residential buildings construction price indexes						
Eleven census metropolitan area composite	100.0	101.2	106.4	107.3	0.8	6.0
St. John's, Newfoundland and Labrador	0.7	100.5	103.2	104.4	1.2	3.9
Halifax, Nova Scotia	1.6	100.7	104.7	105.8	1.1	5.1
Moncton, New Brunswick	0.4	100.9	103.4	104.2	0.8	3.3
Montréal, Quebec	11.6	100.7	102.7	103.7	1.0	3.0
Ottawa, Ontario	4.8	100.6	105.8	107.4	1.5	6.8

	Relative importance 2	Third quarter 2017	Second quarter 2018	Third quarter 2018	Second quarter to third quarter 2018	Third quarter 2017 to third quarter 2018
Toronto, Ontario	34.8	101.8	108.2	109.1	0.8	7.2
Winnipeg, Manitoba	3.1	101.4	111.0	111.7	0.6	10.2
Saskatoon, Saskatchewan	1.6	100.5	103.3	103.8	0.5	3.3
Calgary, Alberta	11.0	101.0	104.6	105.4	0.8	4.4
Edmonton, Alberta	9.8	100.6	104.4	105.2	0.8	4.6
Vancouver, British Columbia	20.7	101.3	107.3	108.4	1.0	7.0
Non-residential buildings construction price indexes						
Eleven census metropolitan area composite	100.0	100.3	103.1	104.6	1.5	4.3
St. John's, Newfoundland and Labrador	0.8	99.9	100.9	101.7	0.8	1.8
Halifax, Nova Scotia	1.2	100.6	102.5	103.7	1.2	3.1
Moncton, New Brunswick	0.7	99.9	101.8	103.3	1.5	3.4
Montréal, Quebec	12.6	100.5	103.8	105.6	1.7	5.1
Ottawa, Ontario	3.3	100.3	104.0	106.6	2.5	6.3
Toronto, Ontario	28.0	100.4	104.1	105.6	1.4	5.2

Schedule A to Report FIN-2018-033

	Relative importance 2	Third quarter 2017	Second quarter 2018	Third quarter 2018	Second quarter to third quarter 2018	Third quarter 2017 to third quarter 2018
Winnipeg, Manitoba	3.4	100.2	102.4	103.4	1.0	3.2
Saskatoon, Saskatchewan	2.6	100.0	101.8	102.9	1.1	2.9
Calgary, Alberta	13.2	100.1	101.4	102.6	1.2	2.5
Edmonton, Alberta	17.2	100.1	101.9	103.1	1.2	3.0
Vancouver, British Columbia	17.1	100.4	104.3	106.2	1.8	5.8

Source(s): Tables 18-10-0135-01, 18-10-0135-02 and 18-10-0137-01.

Date modified:

2018-11-15

Schedule B to Report FIN-2018-033

January 1, 2018 - December 31, 2018

Service	RESIDENTIAL				NON-RESIDENTIAL
	Single and Semi-Detached Dwelling	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Other Multiples	(per ft^2 of Gross Floor Area)
Municipal Wide Services:					
Roads and Related	$3,028	$1,834	$1,241	$2,302	$1.75
Fire Protection Services	$1,579	$957	$647	$1,200	$0.50
Parks and Recreation	$343	$208	$141	$261	$0.03
Administration - Studies	$263	$159	$108	$200	$0.15
Total Municipal Wide Services	$5,212	$3,158	$2,137	$3,963	$2.43

January 1, 2019 to the Adoption of the new By-law

Service	RESIDENTIAL				NON-RESIDENTIAL
	Single and Semi-Detached Dwelling	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Other Multiples	(per ft^2 of Gross Floor Area)
Municipal Wide Services:					
Roads and Related	$3,185	$1,930	$1,306	$2,421	$1.84
Fire Protection Services	$1,661	$1,006	$681	$1,262	$0.52
Parks and Recreation	$361	$219	$148	$274	$0.03
Administration - Studies	$277	$167	$114	$211	$0.16
Total Municipal Wide Services	$5,483	$3,322	$2,248	$4,169	$2.56

THE TOWNSHIP OF
Puslinch

PROGRESSING TOGETHER

REPORT FIN-2018-034

TO:	Mayor and Members of Council
FROM:	Mary Hasan, Director of Finance/Treasurer
MEETING DATE:	December 5, 2018
SUBJECT:	Report FIN-2018-034, regarding Ontario regulation 588/17

RECOMMENDATION

That Report FIN-2018-034, regarding Ontario regulation 588/17, Asset Management Planning for Municipal Infrastructure to be received.

DISCUSSION

Purpose

The purpose of this report is to provide information and an update in regard to the preparation of Assets Management Policies and Asset Management Plans, conforming to the requirements of Ontario regulation 588/17.

Background

The Province of Ontario passed Regulation 588/17 in late 2017, requiring that all municipalities prepare policies and plans that provide for the cost-effective management of assets through the development, policies and plans known as Asset Management.

The key elements of such policies and plans are as follows:

- Providing defined levels of service and monitoring performance;
- Managing the impact of growth through demand management and infrastructure investment;
- Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet defined level of service;
- Identifying, assessing and appropriately controlling risks; and
- Having a long-term financial plan that identifies required expenditures and how the plan will be funded.

The Township of Puslinch retained Urban and Environmental Management (UEM) Inc, to prepare such asset management policies and plans. UEM associated with DFA International to assist in the development of the life-cycle management and financial strategy, a significant component of the plans.

Project Status

The UEM Team has completed the preparation of an asset registry that meets the requirements of the Regulation. Further and based upon the registry, we undertook an initial analysis of the levels of service and associated costs on the long-term capital budget. The UEM Team will be scheduling a public meeting on January 17, 2018 at 7:00 PM, to seek input in regard to the levels of service and impact on the capital budget. The UEM Team wishes to provide an update to Council that will include a review of information to be presented to the public. Subsequent to the public meeting, a report will be presented to Council on concerns and comments received.

The appended screens reflex what will be presented to Council in order to update Council.

On Feb 6, 2019, the UEM Team will present a final report to Council. Included will be a project review, conclusions and recommendations as well as recommended levels of service and the impact on the ten-year capital budget. In addition, will be the approval of strategic asset management policies and asset management plans.

APPLICABLE LEGISLATION AND REQUIREMENTS

Ontario Regulation ONTARIO REGULATION 588/17 made under the INFRASTRUCTURE FOR JOBS AND PROSPERITY ACT, 2015.

ATTACHMENTS LIST

Handout #1 Sample Asset Registry, Puslinch Asset Classes

Handout #2 Consequence of Failure Logic

Handout #3 Road Classifications

Handout #4 Service Level Policies

Handout #5 Capital Plan

Handout #1: Sample Asset Registry, Puslinch Asset Classes

Bridges

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
1001	Core Municipal Infrastructure	Bridge	Cook's Mill Bridge	1	50	2042		2	70	Very High
1005	Core Municipal Infrastructure	Bridge	Leslie Road West Between Lots 35/36	1	50	2015		2	74	Very High
1007	Core Municipal Infrastructure	Bridge	French's Bridge	1	50	2034		2	67	Very High
1006	Core Municipal Infrastructure	Bridge	Concession 1, Lots 9/10, West Of SR 10S	1	50	2020		1	61	Very High
1003	Core Municipal Infrastructure	Bridge	Little's Bridge	1	50	2021	$ 240,000.00	1	22	Very High
1008	Core Municipal Infrastructure	Bridge	Galt Creek Bridge Gore Road Lot 2	1	50	2021	$ 170,000.00	1	60	Very High
1004	Core Municipal Infrastructure	Bridge	Moyer's Bridge	1	50	2026	$ 500,000.00	1	63	Very High

Culverts

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
2002	Core Municipal Infrastructure	Culvert	Culvert Of Cook's Mill Race	1	50	2063		1	52	Very High
2004	Core Municipal Infrastructure	Culvert	McFarlane's Culvert	1	50	2055		3	75	High
2008	Core Municipal Infrastructure	Culvert	7th Concession Culvert	1	50	2062		3	75	High
2011	Core Municipal Infrastructure	Culvert	Ellis Road Culvert At Lot 10 Conc 2	1	50	2060		3	75	High
2012	Core Municipal Infrastructure	Culvert	Concession 2 Bridge/Culvert Over Mill Creek	1	50	2044		3	75	High
2014	Core Municipal Infrastructure	Culvert	Leslie Road Culvert West Of Victoria	1	50	1995		1	55	Very High

Asphalt Roads 2 Lifts

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
40_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	McLean Road West	1	25	2019	$ 276,397.81	67.56577	2	Very High
164_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	McLean Road/Concession 7	1	25	2021	$ 149,046.19	71.81322	2	Very High
165_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	McLean Road/Concession 7	1	25	2021	$ 115,798.12	71.81322	2	Very High
72_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Laird Road West	1	25	2037	$ 288,107.40	97	5	Medium
73_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Laird Road West	1	25	2037	$ 115,651.98	97	5	Medium
74_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Laird Road West	1	25	2037	$ 172,979.91	97	5	Medium
27B	Core Municipal Infrastructure	Asphalt Road 2 Lift	Calfass Road	1	25	2036	$ 13,538.29	95.18593	5	Medium

Handout #1: Sample Asset Registry, Puslinch Asset Classes

Fire Reservoirs

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
FR_1	Asset Class	Fire Reservoir	Tank: (Arkell) #30 Boreham Dr	1	50	2049	$ 50,000.00			High
FR_2	Asset Class	Fire Reservoir	Tank: (Arkell) #38 Boreham Dr	1	50	2049	$ 50,000.00			High
FR_3	Asset Class	Fire Reservoir	Tank: (Audrey Meadows) Catherine Ct	1	50	2061	$ 50,000.00			Medium
FR_4	Asset Class	Fire Reservoir	Tank: (Audrey Meadows) Old Ruby	1	50	2061	$ 50,000.00			Medium
FR_5	Asset Class	Fire Reservoir	Tank: (Audrey Meadows) Old Ruby	1	50	2061	$ 50,000.00			Medium
FR_6	Asset Class	Fire Reservoir	Tank: (Community Center) #23 Brock Rd	1	50	2060	$ 50,000.00			Medium
FR_7	Asset Class	Fire Reservoir	Tank: (Estate Homes) #33 Carriage Ln	1	50	2050	$ 50,000.00			High

Storm Water Management Ponds

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
12001 - 3	Core Municipal Assets	Storm Water Pond	Boreham Drive SWM Outlet Device (Hicken Bottom)	1	20	2019	$ 2,000.00	4	4	Medium
12007 - 3	Core Municipal Assets	Storm Water Pond	Carriage Lane SWM Outlet Device (Hicken Bottom)	1	20	2020	$ 2,000.00	4	4	Medium
12002 - 3	Core Municipal Assets	Storm Water Pond	Daymond Drive SWM Outlet Device (Hicken Bottom)	1	20	2025	$ 2,000.00	4	4	Medium
12001	Core Municipal Assets	Storm Water Pond	Boreham Drive SWM	1	50	2049	$ 13,859.65	4	4	Medium
12001 - 1	Core Municipal Assets	Storm Water Pond	Boreham Drive SWM Tail Wall	1	50	2049	$ 2,000.00	4	4	Medium
12001 - 2	Core Municipal Assets	Storm Water Pond	Boreham Drive SWM Pond Enclosure	1	50	2049	$ 7,859.65	4	4	Medium
12001 - 4	Core Municipal Assets	Storm Water Pond	Boreham Drive SWM Headwall	1	50	2049	$ 2,000.00	4	4	Medium
12002	Core Municipal Assets	Storm Water Pond	Daymond Drive SWM	1	50	2055	$ 165,756.29	4	4	Medium
12002 - 1	Core Municipal Assets	Storm Water Pond	Daymond Drive SWM Tail Wall	1	50	2055	$ 2,000.00	4	4	Medium
12002 - 2	Core Municipal Assets	Storm Water Pond	Daymond Drive SWM Pond Enclosure	1	50	2055	$ 159,756.29	4	4	Medium
12002 - 4	Core Municipal Assets	Storm Water Pond	Daymond Drive SWM Headwall	1	50	2055	$ 2,000.00	4	4	Medium

Handout #1: Sample Asset Registry, Puslinch Asset Classes

Buildings & Facilities

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
53PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre:Structure	1	40	2050		4	4	Medium
67PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre:Roof	1	40	2058		5	5	Low
9PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre:Walls & Windows	1	20	2034		4	4	Medium
46PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre: Interior Finishes	1	40	2058		5	5	Low
93PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre:Mechanical	1	40	2058		5	5	Low
26PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre:Electrical	1	40	2058		5	5	Low
40PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre:Fire, Life-Safety	1	40	2058		5	5	Low
41PCC	Asset Class	Buildings and Facilities	Puslinch Community Centre: Septic Tank	1	30	2036		3	3	Medium

Vehicles

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
8013	Asset Class	Work licensed vehicles	2011 Single Axle Truck 304	1	8	2019	$ 250,000.00	77523		High
8014	Asset Class	Work licensed vehicles	2012 Dump/Plow 302	1	8	2020	$ 225,000.00	96095		Medium
7003	Asset Class	Work licensed vehicles	1 Ton Dump/Plow 305	1	12	2020	$ 100,000.00	103534		High
8019	Asset Class	Work licensed vehicles	2015 GMC Sierra 1500	1	5	2020	$ 40,000.00	42610		Medium
8016	Asset Class	Work licensed vehicles	2013 International Plow Truck 301	1	8	2021	$ 40,000.00	74804		Medium
8017	Asset Class	Work licensed vehicles	2015 International Plow Truck	1	8	2023	$ 250,000.00	31032		Medium

Handout #1: Sample Asset Registry, Puslinch Asset Classes

Storm Sewers

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
SW_201_SURFACE	Core Municipal Assets	Storm Sewer	Storm Sewer Carriage Lane	1	50	2050	$ 104,428.15			Medium
18_SWO_201_SURFACE	Core Municipal Assets	Storm Sewer	Carriage Lane Storm Sewer_Storm Sewer Outflow	1	50	2050	$ 5,000.00			Medium
19_SWO_201_SURFACE	Core Municipal Assets	Storm Sewer	Carriage Lane Storm Sewer_Storm Sewer Outflow	1	50	2050	$ 5,000.00			Medium
20_SWO_201_SURFACE	Core Municipal Assets	Storm Sewer	Carriage Lane Storm Sewer_Storm Sewer Outflow	1	50	2050	$ 5,000.00			Medium
21_SWO_201_SURFACE	Core Municipal Assets	Storm Sewer	Carriage Lane Storm Sewer_Storm Sewer Outflow	1	50	2050	$ 5,000.00			Medium
22_SWO_201_SURFACE	Core Municipal Assets	Storm Sewer	Carriage Lane Storm Sewer_Storm Sewer Outflow	1	50	2050	$ 5,000.00			Medium
23_SWO_201_SURFACE	Core Municipal Assets	Storm Sewer	Carriage Lane Storm Sewer_Storm Sewer Outflow	1	50	2050	$ 5,000.00			Medium

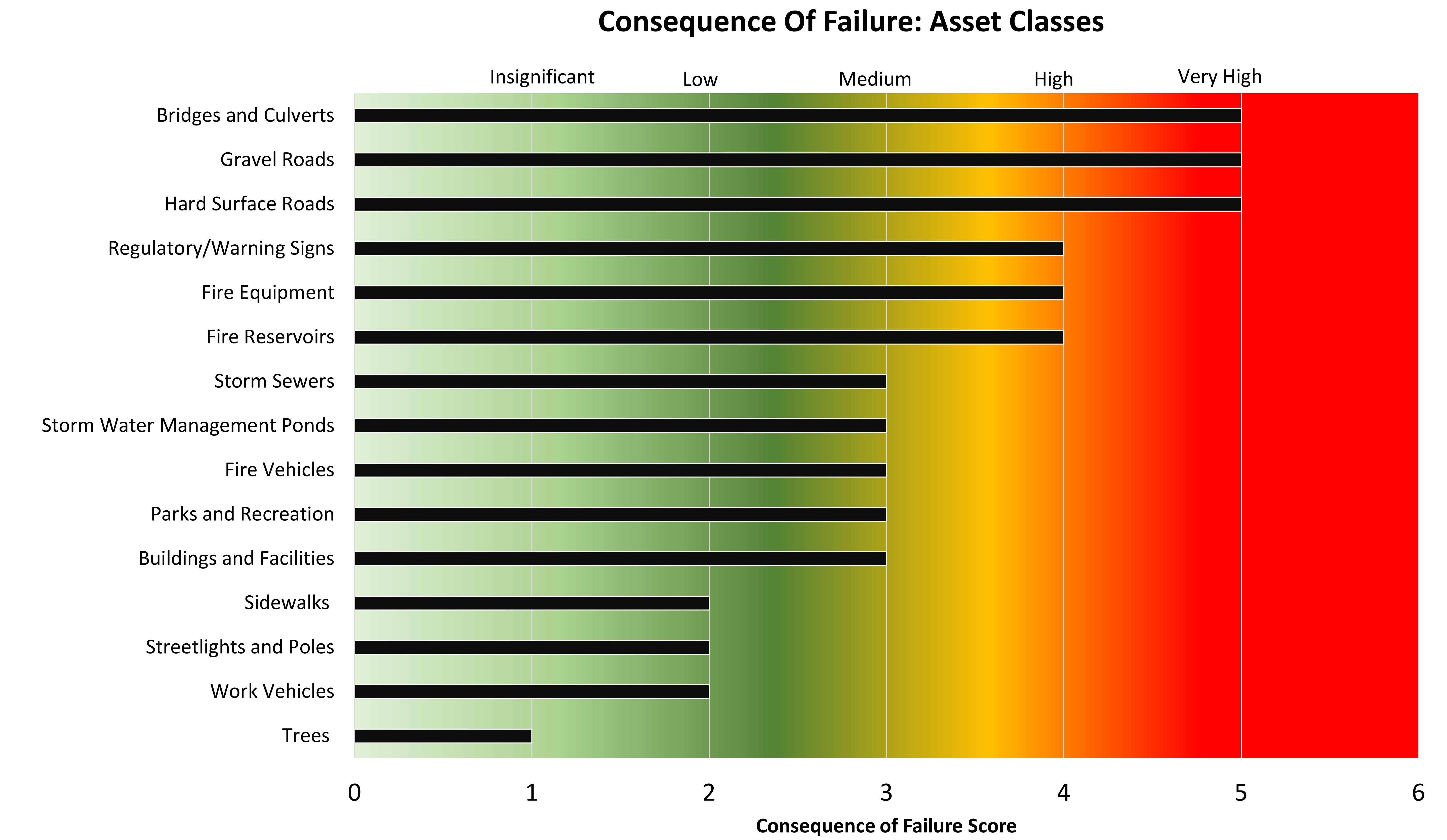
Fire Equipment

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
8_93FE	Asset Class	Fire Equipment	Thermal Imaging Camera	1	10	2019	$ 6,000.00	1	1	Very High
18_90FE	Asset Class	Fire Equipment	Air Cylinder:100	1	15	2019	$ 1,500.00	3	3	High
66_21FE	Asset Class	Fire Equipment	Bunker Gear #317 907001148 907001150	1	10	2019	$ 3,000.00	1	1	Very High
67_60FE	Asset Class	Fire Equipment	Bunker Gear #395 1307006351 1104007407	1	10	2019	$ 3,000.00	1	1	Very High
68_80FE	Asset Class	Fire Equipment	Bunker Gear #376 1104007399 3707960	1	10	2019	$ 3,000.00	1	1	Very High

Handout #2: Consequence of Failure Logic

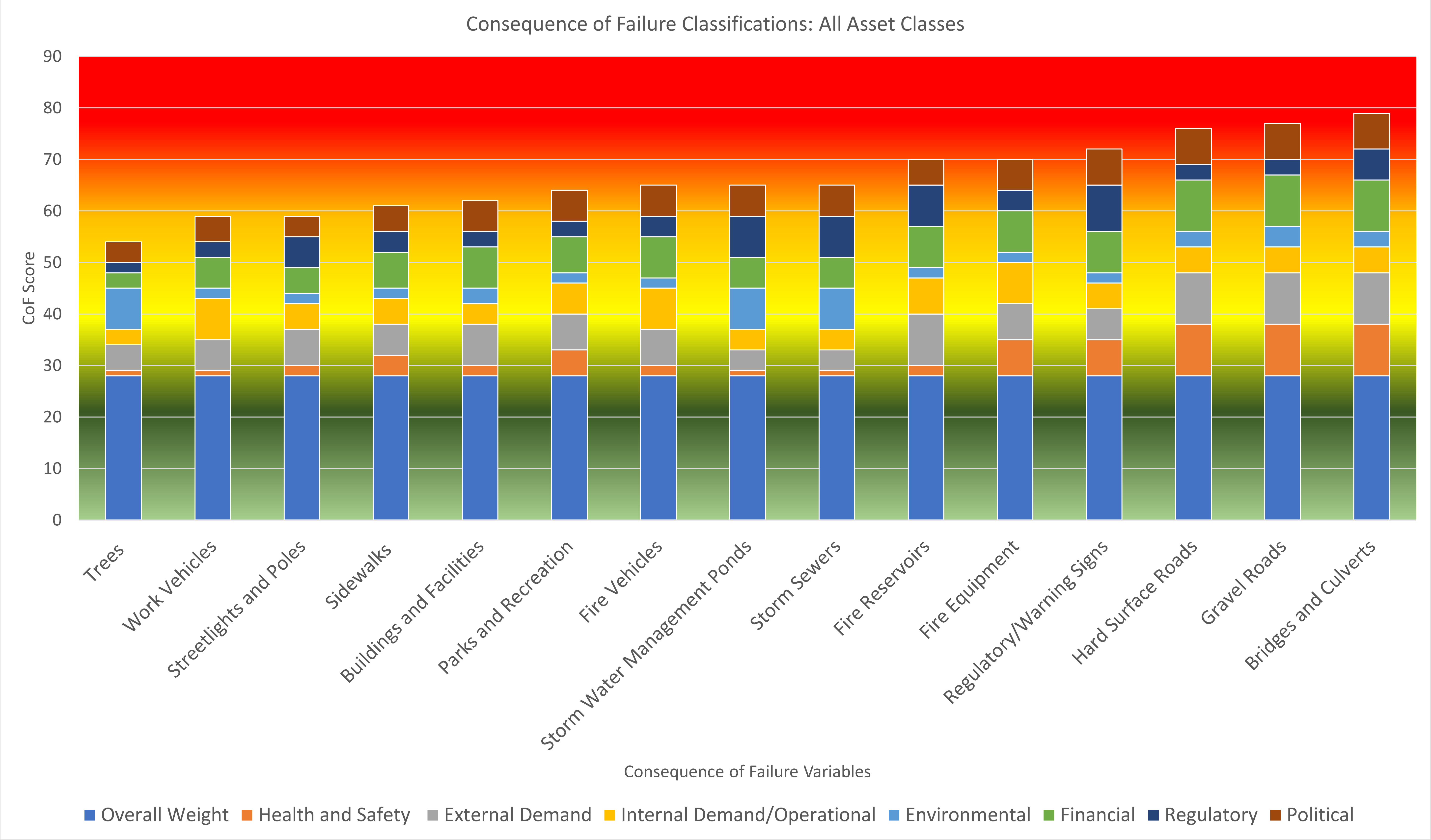
COF		**Health & Safety**	**External Demand (Reputation and Image)**	**Operational & Internal Demand**	**Environmental**	**Financial**	**Political**	**Legal & Regulatory Compliance**
Weight (1-5)		**5**	**5**	**2**	**3**	**3**	**2**	**5**
Consequence of Failure		Considers impacts to Public and Employee health and safety of asset failure	Considers the organization's Image and reputation from external or public perspective as a result of asset failure	Considers losses or interruptions to internal operations and services provided both internally and externally as a result of asset failure	Considers direct impacts to the natural environment as the result of asset failure	Considers financial impacts to the organization as a result of asset failure	Considers impact as a result of resolutions from Council as a result of an asset failure	Considers legal implications and ability to meet regulatory requirements as a result of asset failure
1	Insignificant	No obvious potential for injury or affects to health.	Negligible Impact on Public opinion of Staff	Small number of customers experiencing service disruption: Under 10 people affected	Very negligible impact. Reversible within 1 week.	Cost of Reactive response and replacement are under 100% to the cost of proactive replacement and increase cost to providing service is negligible	No potential for injury in a small number of individuals impacted	No prosecution
2	Low	Potential for minor injury or affects to health of an individual. Full recovery is expected.	Negative impact on Public of Staff	Service disruption at a localized level: 10 - 200 people affected, service interrupted 1 day	Material damage of local importance. Minor, short-term (within 6 months) very isolated damage to the environment.	Cost of Reactive response and replacement is 110% to 120% of proactive replacement or Increase in cost to providing service is over 5%	Small numbers of individuals affected by service interruptions	Claims by an individual possible.
3	Medium	Possibility of serious injuries or affects to health. May affect one or more individuals and/or result in short-term disabilities.	Some negative opinion of Senior Government staff and ethics	Significant localized service disruption:200 - 1,000 people affected, Service interrupted 1-5 days	Significant short-term (< 1 year) local damage to the environment.	Cost of Reactive response and replacement is over 110% to 125% of proactive replacement or Increase in cost to providing service is over 10%	Potential for expressions of concern; negative operation disruption to significant number of individuals generating complaints to members of Council	Possible Claims and prosecution by public groups or Government Agencies.
4	High	Probable likelihood for serious injury or affects to the health of one or more individuals with a possibility for loss of a life and the certainty of long-term disabilities.	Criminal charges against Senior staff or a Public official. Calls for public inquiry and/or change of a Senior official	Major localized disruption: 1,000 - 5,000 people affected, Service interrupted 5-30 days	Significant long-term (> 1 year) widespread damage to the environment.	Cost of Reactive response and replacement are over 125% to 200% of proactive replacement or Increase in cost to providing service is over 25%	Major disruptions affecting significant number of people generating complaints to Members of Council	Probable Claims and prosecution by interest groups or Government Agencies.
5	Severe	High Probability for death or multiple deaths with possible permanent disabilities.	Criminal charges against the municipality and/or Senior staff. Public Inquiry is necessary. Public outcry for change in Council/Senior Managers.	Township-wide service disruption: Over 5,000 people affected service interruption over 30 days	Major long-term (+5 years) or permanent widespread damage to the environment.	Cost of Reactive response and replacement are over 200% of proactive replacement or Increase in cost to providing service is over 50%	Disruptions to large percentage of population for lengthy periods involving complaints to embers of Council and media attention	Definite claims and prosecution by interest groups or government agencies.

Risk Matrix		Consequence of Failure (CoF)				
		Insignificant (1)	Low (2)	Medium (3)	High (4)	Severe (5)
Probability of Failure (PoF)	Almost Certain (5)	High	High	Very High	Very High	Very High
	Highly Likely (4)	Moderate	Moderate	High	High	Very High
	Likely (3)	Low	Low	Moderate	High	High
	Unlikely (2)	Very Low	Low	Low	Moderate	Moderate
	Almost Certainly Not (1)	Very Low	Very Low	Very Low	Low	Low

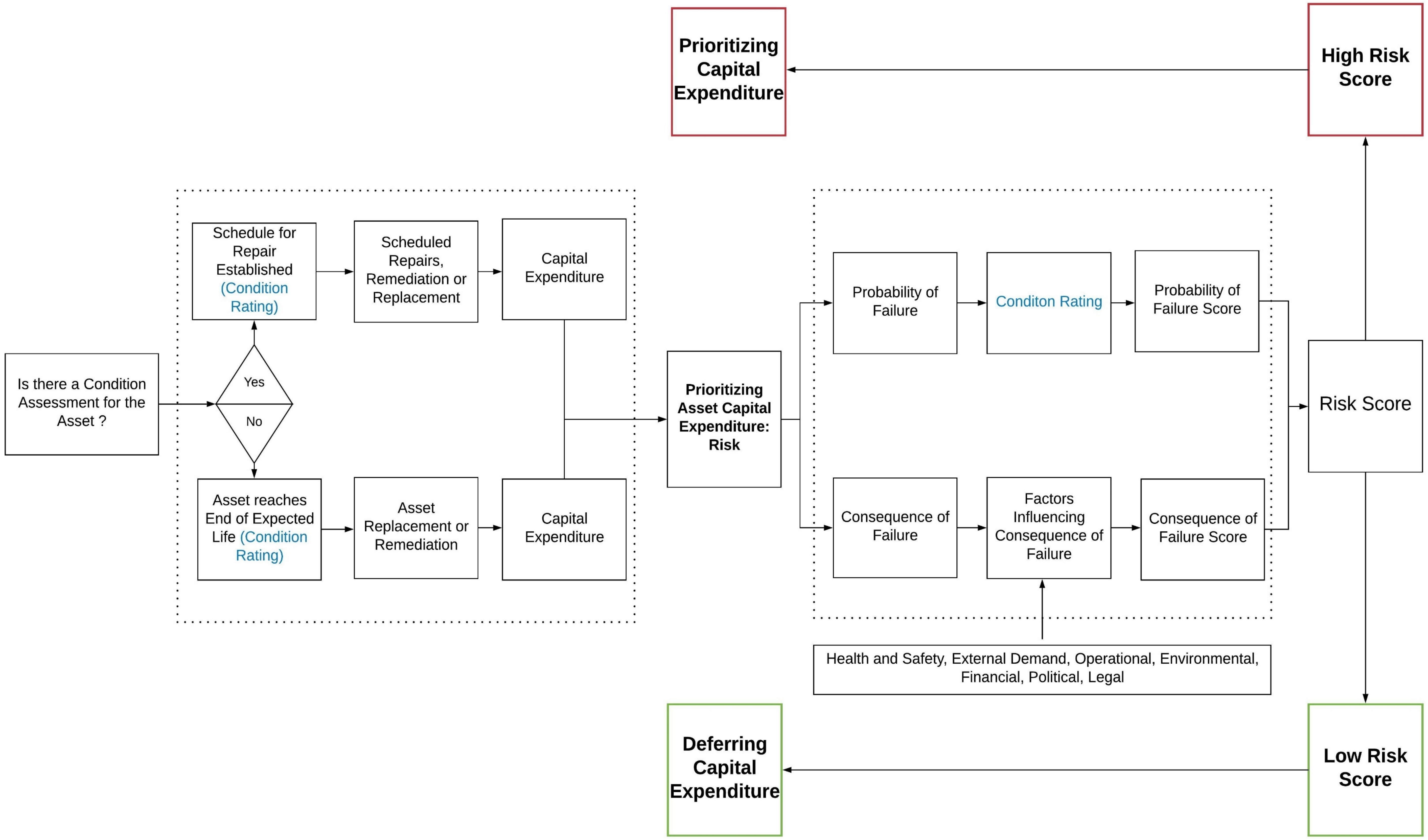

Consequence Of Failure: Asset Classes
Insignificant
Low
Medium
High
Very High
Bridges and Culverts
Gravel Roads
Hard Surface Roads
Regulatory/Warning Signs
Fire Equipment
Fire Reservoirs
Storm Sewers
Storm Water Management Ponds
Fire Vehicles
Parks and Recreation
Buildings and Facilities
Sidewalks
Streetlights and Poles
Work Vehicles
Trees
0
1
2
3
4
5
6
Consequence of Failure Score

Consequence of Failure Classifications							
Consequence of Failure Variables Asset Classes	Health and Safety	External Demand	Internal Demand/Operational	Environmental	Financial	Regulatory	Political
Hard Surface Roads	10	10	5	3	10	3	7
Gravel Roads	10	10	5	4	10	3	7
Bridges and Culverts	10	10	5	3	10	6	7
Buildings and Facilities	2	8	4	3	8	3	6
Work Vehicles	1	6	8	2	6	3	5
Fire Vehicles	2	7	8	2	8	4	6
Parks and Recreation	5	7	6	2	7	3	6
Fire Reservoirs	2	10	7	2	8	8	5
Streetlights and Poles	2	7	5	2	5	6	4
Sidewalks	4	6	5	2	7	4	5
Fire Equipment	7	7	8	2	8	4	6
Regulatory/Warning Signs	7	6	5	2	8	9	7
Storm Water Management Ponds	1	4	4	8	6	8	6
Storm Sewers	1	4	4	8	6	8	6
Trees	1	5	3	8	3	2	4

Handout #2: Consequence of Failure Logic



Handout #2: Consequence of Failure Logic



Puslinch Asset Management Plan 2018

Handout #3: Road Classifications

Ontario Road Classification Chart

Average Daily Traffic (number of motor vehicles)	91 - 100 km/h speed limit	81 - 90 km/h speed limit	71 - 80 km/h speed limit	61 - 70 km/h speed limit	51 - 60 km/h speed limit	41 - 50 km/h speed limit	1 - 40 km/h speed limit
53,000 or more	1	1	1	1	1	1	1
23,000 - 52,999	1	1	1	2	2	2	2
15,000 - 22,999	1	1	2	2	2	3	3
12,000 - 14,999	1	1	2	2	2	3	3
10,000 - 11,999	1	1	2	2	3	3	3
8,000 - 9,999	1	1	2	3	3	3	3
6,000 - 7,999	1	2	2	3	3	4	4
5,000 - 5,999	1	2	2	3	3	4	4
4,000 - 4,999	1	2	3	3	3	4	4
3,000 - 3,999	1	2	3	3	3	4	4
2,000 - 2,999	1	2	3	3	4	5	5
1,000 - 1,999	1	3	3	3	4	5	5
500 - 999	1	3	4	4	4	5	5
200 - 499	1	3	4	4	5	5	6
50 - 199	1	3	4	5	5	6	6
0 - 49	1	3	6	6	6	6	6

Source: O. Reg. 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Bridges and Culverts**

UEM Proposed Service Level Policy:

To inspect according to the Ontario structure inspection manual and Ontario Regulation 104/97. This inspection shall occur every two years and shall adjust the BCI based on the recommendations of the qualified engineer. The inspection report shall include all repairs that exceed the capital threshold in the capital budget to the schedule recommended by the qualified engineer.

The asset registry must be updated at least once per year to reflect whether the asset be inspected or not. Those not inspected will be based upon the requirements of the Ontario Regulation 104/97.

Township Current Service Level Policy:

Township bridges and culverts are inspected by a Professional Engineer biennially.

Lifecycle/ Deterioration Rate

50 year expected life.

Consequence of Failure items impacted by failure to achieve service level:

Health and Safety
External Demand
Financial
Political

Budget Implications

Bridge and Culvert
Inspection Reports
$15,000

Source Documents

Ontario Structure
Inspection Manuel

O. Reg. 104/97:
STANDARDS FOR
BRIDGES

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Gravel Roads**

UEM Proposed Service Level Policy:

The Service level for gravel roads is the Minimum Maintenance Standard for Gravel Roads. Repair will include grading and if required an application of additional granular material. If full regrading is done more than 6 times during each of two consecutive non-winter periods, then other alternatives should be considered such as surface treatment including asphalt and or reconstruction.

However, if an inspection of the gravel base has been undertaken to ensure adequacy and the average daily traffic exceeds 400 vehicles, the Township should consider the application of a hard surface.

For all gravel roads that have been graded following the half load season the PCI will be assumed to be 90.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

All Township owned gravel roads are regularly maintained in the form of grading and gravel addition. The Township does not have a policy for when a gravel road should be surface treated including asphalt and or reconstruction.

Lifecycle/ Deterioration Rate

5 points point adjustment per grading.

Consequence of Failure items impacted by failure to achieve service level:

Health and Safety
External Demand
Financial
Political

Budget Implications

Inspection of Gravel Base $6000 per link.	Gravel Road Surface Treatment Cost $12,000/km

Source Documents

O. Reg. 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS

Economics of Upgrading an Aggregate Road, Minnesota Department of Transportation

Gravel Road Management, Wyoming Technology Transfer Center

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Hard Surface Roads**

UEM Proposed Service Level Policy:

Class 3 roads be rehabilitated or reconstructed at a PCI of 65

Class 4 roads be rehabilitated or reconstructed at a PCI of 60

Class 5 roads be rehabilitated or reconstructed at a PCI of 60

The pavement condition index should be renewed in 2021 and should be renewed every 5 years thereafter. A traffic volume study should be undertaken every 5 years beginning in 2020.

The asset registry must be updated at least once per year to reflect the current condition whether the condition be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The 2013 Asset Management Plan and 2016 Pavement Condition Index (PCI) Report indicated that the Township will strive to maintain all hardtop and non-paved roads in a good to fair condition. For hardtop roads, this will approximately correspond to a PCI value of 65 or greater. The 2013 Asset Management Plan recommended completing a full PCI update every 5 years.

Lifecycle/ Deterioration Rate

Based upon a deterioration rate of 2 points per year the condition decreases from 100 to 60 over 20 years resulting in a remediation PCI of 60.

Consequence of Failure items impacted by failure to achieve service level:

Health and Safety
External Demand
Financial
Political

Budget Implications

Traffic Volume Study, $25,000	Pavement Condition Index Report, $24,500

Source Documents

2016 Pavement Condition Index Study	2017 Traffic Volume Study

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Storm Water Management Ponds**

UEM Proposed Service Level Policy:

Inspection of storm water management ponds should occur on average four times per year during the first two years of operation and then at least annually.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes visual, non-documented inspections of storm water management ponds as part of routine road inspections.

Lifecycle/ Deterioration Rate

50 years for pond components and 20 years for hicken bottom.

Consequence of Failure items impacted by failure to achieve service level:

Environmental
Regulatory

Budget Implications

No Significant Budget Implications.

Source Documents

(Section: 6:3:1 Storm Water Management Planning and Design Manual – Ontario).

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Storm Water Management Systems**

UEM Proposed Service Level Policy:

In reference to catch basin cleaning, as a general rule should be done annually but the frequency should be adjusted based upon the volume of material removed. Inspection of storm water management systems should occur on average four times per a year during the first two years of operation and then at least annually.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township does not annually inspect the storm water management systems or clean the storm water management systems as required to minimize the movement of silts through the outlets. The Township externally contracts the cleaning out of catch basins every two years as required.

Lifecycle/ Deterioration Rate

50 year expected life.

Consequence of Failure items impacted by failure to achieve service level:

Environmental
Regulatory

Budget Implications

No Major Budget Implications.

Source Documents

SECTION 4:2:3 STORM WATER MANAGEMENT PLANNING AND DESIGN MANUAL – ONTARIO)

(SECTION 6:2:3 STORM WATER MANAGEMENT AND PLANNING DESIGN MANUEL – ONTARIO)

Regulation 588/17 Asset Group: **Green Infrastructure**

Major Asset Class: **Street Trees**

UEM Proposed Service Level Policy:

This service level policy includes all trees planted in subdivisions and roadsides in the Township. Subsequent to planting a tree the agency or company planting trees shall be responsible with all maintenance including pruning and replacement if necessary. After acceptance by the Municipality, the tree shall be inspected every 5 years to determine any required maintenance.

The Township would hire an arborist or potentially the services of the University of Guelph to visually inspect only the trees planted in the subdivisions within the Township.

The asset registry must be updated at least once per year to reflect the current condition whether the condition be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes required maintenance of trees but there is no schedule for inspection.

Lifecycle/ Deterioration Rate

50 Years Expected Life.

Consequence of Failure items impacted by failure to achieve service level:

Environmental
External Deamnd

Budget Implications

Tree Inspections
$6000

Source Documents

UEM Professional Recommendation.

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Buildings and Facilities**

UEM Proposed Service Level Policy:

Buildings and Facilities owned by the Township of Puslinch should be inspected by a qualified structural engineer on a routine basis however not more than 5 years apart to determine necessary improvements, repairs or replacements. The qualified structural engineer should have the necessary expertise to address each component of the building including Electrical, HVAC and Mechanical. The cost of any such repair improvements should be integrated into the capital plan by way of updates to the asset registry.

In addition to inspections by a qualified structural engineer a qualified company or individual shall undertake an Arc-Flash study every 5 years of all electrical equipment to determine the adequacy of such equipment. In addition to the Arc Flash Study a qualified company or individual shall undertake infrared scanning of all equipment and wire terminations every 5 years to determine compliance with the Ontario Electrical Safety Code.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township's last Building Condition Assessment (BCA) report was completed in 2014. The BCA report recommended completion of an Arc Flash Study for all electrical equipment in the Township's facilities. The Township has not completed an Arc Flash Study at this time. The BCA report recommended that as part of a regular operations and maintenance program that all equipment and wire terminations be investigated via infrared scanning every 3 to 5 years. The Township has not completed infrared scanning of all equipment and wire terminations at this time.

Lifecycle/ Deterioration Rate

Varies from 20-40 years by component.

Consequence of Failure items impacted by failure to achieve service level:

External Demand
Financial

Budget Implications

Arc Flash Study $7,500	Infra-Red Scanning $3,000
Building Condition Assessment $25,000	

Source Documents

2014 Building Condition Report	Ontario Electrical Safety Code (OESC)

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Fire Equipment**

UEM Proposed Service Level Policy:

The service level policy for Fire Equipment shall be in accordance with the related NFPA standards: 1911, 1962, 1932, 1855, 1858, 1852 and 1971.

The asset registry must be updated at least once per year to reflect the current condition whether the condition be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes annual documented inspections of fire equipment in accordance with the related NFPA standards.

Lifecycle/ Deterioration Rate

Varies depending on type of equipment.

Consequence of Failure items impacted by failure to achieve service level:

Health and Safety
External Demand
Internal Demand/Operational
Financial

Budget Implications

No significant budget implications.

Source Documents

“Fire Protection Association 1851 "Standard on Selection, Care, Maintenance of Protective Ensembles for Structural Firefighting”.

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Fire Reservoir**

UEM Proposed Service Level Policy:

The Fire Department shall on an annual basis inspect all fire reservoirs in accordance with the Ontario Fire Code 213/07 and NFPA Standard 25 to ensure that such fire reservoirs can be easily accessible and that any components above the roof of the reservoir are in good condition. Such reservoirs shall not be obstructed by vegetation of any form such as plants, bushes and trees.

The fire department shall inspect the reservoir every 5 years to ensure structural integrity of the reservoir.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes annual documented inspections of fire reservoirs in accordance with Ontario Fire Code 213/07 and NFPA Standard 25 for the inspection and maintenance of all municipally owned fire reservoirs.

Lifecycle/ Deterioration Rate

50 Year Expected Life.

Consequence of Failure items impacted by failure to achieve service level:

External Demand
Internal Demand/Operational
Financial

Budget Implications

No significant budget implications.

Source Documents

UEM Professional Recommendation.

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Fleet**

UEM Proposed Service Level Policy:

Fleet shall be maintained in conformance with licensing practices of the Province of Ontario including the Ministry of Transportation and shall include a daily visual inspection of any licensed vehicle before the vehicle leaves the fleet storage facility of the Township. Inspection of fire and rescue services vehicles shall also be based on relevant NFPA standards. The fleet of the Township shall be determined for replacement based on the criteria noted in the Township's Fleet Management Policy

Further to the proposed service level policy described above. It is recommended by UEM that the Township retain their current service level policy in addition to the one proposed by UEM.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

3.1 Fleet acquisitions must follow the requirements of the Township's Purchasing and Procurement Policy. 3.2 Fleet will be replaced upon completion of a Capital Budget Sheet with justification from the Department Head and subsequent approval by Council as part of the Capital Budget process. The Capital Budget sheet must include the following:

The type/style of fleet needed to best serve the requirements of the Township (ie. crew cab vs. single cab, passenger van vs. car, used vs. new, contracted service vs. internal service provision, etc.). Detailed specifications. An amount and further information regarding the sale/trade-in of the replaced asset. The sale/trade-in value shall reduce the total acquisition cost of the new asset to be purchased. Information from Section 3.3 for consideration as part of the Capital Budget process.

3.3 Fleet will be replaced upon consideration of a combination of the following criteria: The odometer reading is approaching 180,000 kilometers. The hours are approaching 10,000 hours for plow/dump trucks and 4,000 hours for lawnmowers, tractors and other small vehicles that do not have an odometer tracking mileage. The fleet is fully amortized in accordance with the estimated useful life (amortization rates) established in the Township's Tangible Capital Asset Policy. The fleet becomes unserviceable or unsafe due to a major accident or mechanical failure that would not be economical to repair. If a used vehicle within the fleet is in good condition and is available, the Township reserves the right to re-assign the vehicle to a department requiring a vehicle of the same type as opposed to acquiring a new vehicle.

Lifecycle/ Deterioration Rate

Varies from 7-25 years by vehicle type.

Consequence of Failure items impacted by failure to achieve service level:

External Demand
Internal Demand/Operational
Financial

Budget Implications

No significant budget implications.

Source Documents

FLEET MANAGEMENT POLICY: Puslinch

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Fleet**

Township Current Service Level Policy Cont'd:

All Commercial Motor Vehicles owned by the Township require an Annual Inspection Certificate as required by the Ministry of Transportation (MTO).

Fire and Rescue Services Fleet:

Visual non-documented 360-degree inspection prior to the fleet leaving the Fire Station. Weekly documented MTO Schedule 1 Inspection completed for commercial motor vehicles Fire and Rescue Services fleet require annual testing of pumps and aerial devices (ie. ladders) in accordance with NFPA Standard 1911. Non-destructive testing of aerial devices (ie. ladders) is required every 5 years in accordance with NFPA Standard 1911.

Public Works Fleet:

Daily documented MTO Schedule 1 Inspection completed for commercial motor vehicles.

Non-commercial motor vehicles (ie. pick-up trucks):

Daily documented inspection logbook completed for non-commercial motor vehicles.

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Parks and Recreation**

UEM Proposed Service Level Policy:

All parks and recreation facilities including but not restricted to baseball diamonds, baseball diamond lights, soccer fields, tennis courts and trails available for public use shall be inspected as frost leaves the ground in late winter or early spring to ensure the safety of such Parks and Recreation assets. Included is both internal and external fencing, hard surfaces, bleachers and any other ancillary assets located within parks and recreation areas. Upon identification of any surface deficiencies that may endanger the public repairs shall be undertaken prior to such infrastructure being deemed available for public use.

Subsequent inspections should occur monthly until parks and recreation assets are closed prior to the winter season.

For Assets an example being "Trails" that may be open for public use throughout the winter inspections shall occur following winter storms to ensure the safety of the public.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes visual, non-documented weekly inspections of parks while performing maintenance activities in the Township's parks.

The Township completes monthly documented playground inspections.

Lifecycle/ Deterioration Rate

Varies from 15-40 years depending on asset type.

Consequence of Failure items impacted by failure to achieve service level:

External Demand
Financial

Budget Implications

No significant budget implications.

Source Documents

UEM Professional Recommendation.

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Regulatory Signs/Warning Signs**

UEM Proposed Service Level Policy:

The Township shall retain a qualified company/individual that shall test the retro reflectivity of each sign once per calendar year with each inspection taking place no more than 16 months from the previous inspection. In conformance with the retro reflectivity specified in the Ontario Traffic Manual and when not meeting such requirements the Township shall replace the sign. Further, the Township shall conform with the requirement for class 3,4 and 5 highways as per the Ontario Regulation 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS.

The standard for the frequency of inspecting regulatory signs or warning signs to check to see that they meet the retro-reflectivity requirements of the Ontario Traffic Manual is once per calendar year, with each inspection taking place not more than 16 months from the previous inspection. O. Reg. 23/10, s. 8; O. Reg. 47/13, s. 12 (1); O. Reg. 366/18, s. 13.

If a regulatory sign or warning sign is illegible, improperly oriented, obscured or missing, the standard is to repair or replace the sign within the time set out in the Table to this section after becoming aware of the fact. O. Reg. 23/10, s. 8; O. Reg. 366/18, s. 13.

Class of Highway	Time
1	7 days
2	14 days
3	21 days
4	30 days
5	30 days

The asset registry must be updated at least once per year to reflect the current condition whether the condition be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township externally contracts the completion of retro reflectivity inspections of regulatory/warning signs annually.

Lifecycle/ Deterioration Rate

15 years expected life for sign and post.

Consequence of Failure items impacted by failure to achieve service level:

Health and Safety
External Demand
Internal Demand/Operational
Financial

Budget Implications

No significant budget implications.

Source Documents

Ontario Regulation 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Sidewalks**

UEM Proposed Service Level Policy:

In accordance with Ontario. Regulation. 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS, the standard for the frequency of inspecting sidewalks is once per year with each inspection occurring no more than 16 months from the previous inspection. Any discontinuity that exceeds 2cm shall be treated or repaired within 14 days of the inspection.

Under winter conditions sidewalks must be inspected within 48 hours of the end of snow accumulation to ensure that there is less than 8cm of snow accumulated on the sidewalk and to reduce to the level of 8cm within the same 48-hour period. The same time period of 48 hours shall apply when ice forms on a sidewalk and shall require either removal or a treatment such as sand, salt or a combination of both to the sidewalk within the same 48-hour period.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes annual documented sidewalk inspections.

Lifecycle/ Deterioration Rate

20 year expected life.

Consequence of Failure items impacted by failure to achieve service level:

Financial

Budget Implications

Sidewalk Winter Maintenance $20,000

Source Documents

Ontario Regulation 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS.

Regulation 588/17 Asset Group: **Municipal Assets**

Major Asset Class: **Streetlights and Poles**

UEM Proposed Service Level Policy:

All luminaires shall be inspected once per calendar year with each inspection taking place not more than 16 months from the last inspection. The standard of repair should be as outlined in Section 10 of Ontario Regulation 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS. The same standard of inspection shall apply to luminaire arms and poles and supporting luminaires that are owned by the Township.

The technology with streetlighting is evolutionary at the present time in Puslinch. The Township is in the process of modifying their streetlighting to LED fixtures while maintaining existing fixtures and poles. After the completion of the conversion to LED fixtures the policy should be to replace fixtures in a cyclical manner every 20 years. Poles should be inspected every 5 years to determine the need to replace based on a pole life of 30 years.

The asset registry must be updated at least once per year to reflect the current condition whether the asset be inspected or not (those not inspected will be updated based on lifecycle standards).

Township Current Service Level Policy:

The Township completes visual, non-documented yearly inspections to note any light deficiencies.

Lifecycle/ Deterioration Rate

30 year expected life for poles and 20 years for fixtures.

Consequence of Failure items impacted by failure to achieve service level:

External Demand

Budget Implications

No significant budget implications.

Source Documents

Section 10, Ontario Regulation 239/02: MINIMUM MAINTENANCE STANDARDS FOR MUNICIPAL HIGHWAYS.

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Sewage Collection Systems, Sewage Pumping Stations, Sewage Treatment Plants**

UEM Proposed Service Level Policy:

Township Current Service Level Policy:

Lifecycle/ Deterioration Rate

Consequence of Failure items impacted by failure to achieve service level:

Budget Implications

Source Documents

Regulation 588/17 Asset Group: **Core Municipal Assets**

Major Asset Class: **Water Treatment Plants. Water Pumping Stations, Water Storage Facilities, Raw Water Supply, Water Distribution Mains**

UEM Proposed Service Level Policy:

Township Current Service Level Policy:

Lifecycle/ Deterioration Rate

Consequence of Failure items impacted by failure to achieve service level:

Budget Implications

Source Documents

Regulation 588/17 Asset Group: **Green Infrastructure**

Major Asset Class: **Parklands**

UEM Proposed Service Level Policy:

Township Current Service Level Policy:

Lifecycle/ Deterioration Rate

Consequence of Failure items impacted by failure to achieve service level:

Budget Implications

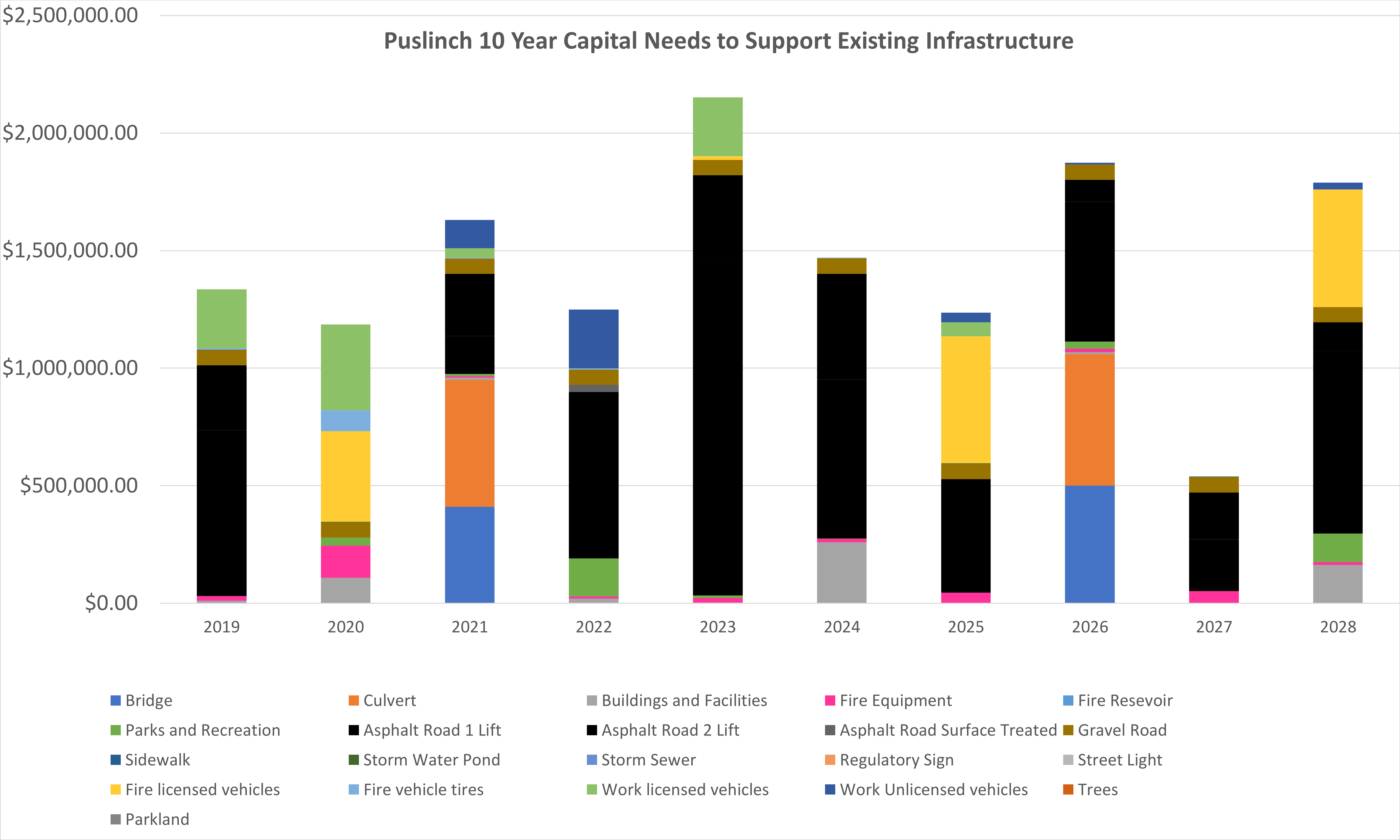
Source Documents

Handout #5: Capital Plan

Asset Classes in Puslinch included in Capital Plan

- Roads
  - Gravel Roads
  - Surface Treated Roads
  - Hard Surface Roads
- Bridges
- Culverts
- Sidewalks
- Storm Sewers
- Storm Water Management Ponds
- Regulatory/Warnings Signs
- Street Lights
  - Standard Street Lights
  - Decorative Street Lights
  - Floodlights
- Public Works
  - Work Licensed Vehicles
  - Work Unlicensed Vehicles
- Buildings and Facilities
  - Municipal Complex
  - Puslinch Community Centre
  - Optimist Recreation Centre
  - Fire Hall
  - Various Storage Buildings
- Parks and Recreation
  - Baseball Diamond Lights
  - Parks Equipment
  - Bleachers
  - Fencing
  - Etc
- Parklands
- Fire Assets
  - Fire Vehicle
  - Fire Equipment
  - Fire Reservoirs
- Street Trees

Handout #5: Capital Plan



Handout #5: Capital Plan

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Bridges	$0.00	$0.00	$410,000.00	$0.00	$0.00	$0.00	$0.00	$500,000.00	$0.00	$0.00	$910,000.00
Culverts	$0.00	$0.00	$540,000.00	$0.00	$0.00	$0.00	$0.00	$560,000.00	$0.00	$0.00	$1,100,000.00
Buildings and Facilities	$10,750.00	$108,000.00	$10,000.00	$20,000.00	$3,000.00	$260,000.00	$0.00	$8,000.00	$0.00	$0.00	$419,750.00
Fire Equipment	$19,500.00	$242,748.00	$6,000.00	$9,000.00	$12,000.00	$10,500.00	$45,000.00	$9,000.00	$52,000.00	$12,000.00	$440,098.00
Fire Reservoirs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Parks and Recreation	$0.00	$34,668.00	$10,000.00	$161,385.00	$10,000.00	$1,800.00	$0.00	$29,828.00	$0.00	$121,230.00	$368,911.00
Asphalt Roads 1 Lift	$705,619.91	$0.00	$161,136.66	$708,589.46	$1,417,522.40	$676,507.13	$437,028.21	$595,336.42	$219,975.00	$777,983.79	$5,699,698.98
Asphalt Roads 2 Lift	$276,397.81	$0.00	$264,844.32	$0.00	$371,396.70	$450,397.48	$46,560.00	$92,916.73	$199,107.66	$121,118.06	$1,822,738.75
Asphalt Road Surface Treated	$0.00	$0.00	$0.00	$0.00	$0.00	$29,781.02	$0.00	$0.00	$0.00	$0.00	$29,781.02
Gravel Roads	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$65,000.00	$650,000.00
Sidewalk	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Storm Water Ponds	$2,000.00	$2,000.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$0.00	$2,000.00	$0.00	$8,000.00
Storm Sewers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Regulatory Signs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Street Light	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Fire licensed vehicles	$0.00	$520,000.00	$0.00	$0.00	$15,300.00	$0.00	$540,000.00	$0.00	$0.00	$500,000.00	$1,575,300.00
Fire vehicle tires	$6,600.00	$0.00	$3,300.00	$5,766.00	$0.00	$2,900.00	$0.00	$0.00	$0.00	$0.00	$18,566.00
Work licensed vehicles	$250,000.00	$365,000.00	$40,000.00	$0.00	$250,000.00	$0.00	$60,000.00	$0.00	$0.00	$0.00	$965,000.00
Work Unlicensed vehicles	$0.00	$0.00	$120,000.00	$250,000.00	$0.00	$0.00	$40,000.00	$8,000.00	$0.00	$30,000.00	$448,000.00
Trees	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Parkland	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total	$1,335,867.72	$1,337,416.00	$1,630,280.98	$1,219,740.46	$2,144,219.10	$1,496,885.63	$1,235,588.22	$1,868,081.14	$538,082.66	$1,627,331.85	$14,563,493.75

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
8_93FE	Asset Class	Fire Equipment	Thermal Imaging Camera	1	10	2019	$ 6,000.00	1	1	Very High
18_90FE	Asset Class	Fire Equipment	Air Cylinder:100	1	15	2019	$ 1,500.00	3	3	High
66_21FE	Asset Class	Fire Equipment	Bunker Gear #317 907001148 907001150	1	10	2019	$ 3,000.00	1	1	Very High
67_60FE	Asset Class	Fire Equipment	Bunker Gear #395 1307006351 1104007407	1	10	2019	$ 3,000.00	1	1	Very High
68_80FE	Asset Class	Fire Equipment	Bunker Gear #376 1104007399 3707960	1	10	2019	$ 3,000.00	1	1	Very High
69_51FE	Asset Class	Fire Equipment	Bunker Gear #386 1104007401 907001149	1	10	2019	$ 3,000.00	1	1	Very High
40_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	McLean Road West	1	25	2019	$ 276,397.81	67.56577	2	Very High
134	Core Municipal Infrastructure	Asphalt Road 1 Lift	Watson Road South	1	25	2019	$ 64,906.17	65.84384	2	Very High
135	Core Municipal Infrastructure	Asphalt Road 1 Lift	Watson Road South	1	25	2019	$ 60,251.17	65.84384	2	Very High
136	Core Municipal Infrastructure	Asphalt Road 1 Lift	Watson Road South	1	15	2019	$ 89,556.28	65.84384	2	Very High
140	Core Municipal Infrastructure	Asphalt Road 1 Lift	Watson Road South	1	25	2019	$ 172,801.23	65.72904	2	Very High
139	Core Municipal Infrastructure	Asphalt Road 1 Lift	Watson Road South	1	25	2019	$ 214,310.11	65.7	2	Very High
133	Core Municipal Infrastructure	Asphalt Road 1 Lift	Watson Road South	1	25	2019	$ 103,794.95	65.15506	2	Very High
12001 - 3	Core Municipal Assets	Storm Water Pond	Boreham Drive SWM Outlet Device (Hicken Bottom)	1	20	2019	$ 2,000.00	4	4	Medium
27_69FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
28_4FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
29_40FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
30_35FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
31_1FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
32_77FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
33_70FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
34_59FVT	Asset Class	Fire vehicle tires	T-37	1	10	2019	$ 825.00		1	High
8013	Asset Class	Work licensed vehicles	2011 Single Axle Truck 304	1	8	2019	$ 250,000.00	77523		High
1006	Core Municipal Infrastructure	Bridge	Concession 1, Lots 9/10, West Of SR 10S	1	50	2020		1	61	Very High
6_70FE	Asset Class	Fire Equipment	Power Hydraulic Tool set	1	20	2020	$ 52,500.00	1	1	Very High
11_103FE	Asset Class	Fire Equipment	Rapid Deployment Water Craft	1	10	2020	$ 6,000.00	4	4	Medium
14_25FE	Asset Class	Fire Equipment	Air Cylinder:84	1	15	2020	$ 1,500.00	3	3	High

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
15_87FE	Asset Class	Fire Equipment	Air Cylinder:85	1	15	2020	$ 1,500.00	3	3	High
17_76FE	Asset Class	Fire Equipment	Air Cylinder:88	1	15	2020	$ 1,500.00	3	3	High
19_90FE	Asset Class	Fire Equipment	Air Cylinder:101	1	15	2020	$ 1,500.00	3	3	High
20_85FE	Asset Class	Fire Equipment	Air Cylinder:102	1	15	2020	$ 1,500.00	3	3	High
21_85FE	Asset Class	Fire Equipment	Air Cylinder:103	1	15	2020	$ 1,500.00	3	3	High
22_9FE	Asset Class	Fire Equipment	Air Cylinder:104	1	15	2020	$ 1,500.00	3	3	High
23_42FE	Asset Class	Fire Equipment	Air Cylinder:105	1	15	2020	$ 1,500.00	3	3	High
24_94FE	Asset Class	Fire Equipment	Air Cylinder:106	1	15	2020	$ 1,500.00	3	3	High
25_35FE	Asset Class	Fire Equipment	Air Cylinder:107	1	15	2020	$ 1,500.00	3	3	High
27_67FE	Asset Class	Fire Equipment	Air Cylinder:109	1	15	2020	$ 1,500.00	3	3	High
28_48FE	Asset Class	Fire Equipment	Air Cylinder:310	1	15	2020	$ 1,500.00	3	3	High
29_64FE	Asset Class	Fire Equipment	Air Cylinder:311	1	15	2020	$ 1,500.00	3	3	High
32_104FE	Asset Class	Fire Equipment	Air Cylinder:314	1	15	2020	$ 1,500.00	3	3	High
33_34FE	Asset Class	Fire Equipment	Air Cylinder:315	1	15	2020	$ 1,500.00	3	3	High
34_30FE	Asset Class	Fire Equipment	Air Cylinder:316	1	15	2020	$ 1,500.00	3	3	High
35_104FE	Asset Class	Fire Equipment	Air Cylinder:317	1	15	2020	$ 1,500.00	3	3	High
36_48FE	Asset Class	Fire Equipment	Air Cylinder:318	1	15	2020	$ 1,500.00	3	3	High
37_107FE	Asset Class	Fire Equipment	Air Cylinder:319	1	15	2020	$ 1,500.00	3	3	High
43_107FE	Asset Class	Fire Equipment	Air Cylinder:337	1	15	2020	$ 1,500.00	3	3	High
44_55FE	Asset Class	Fire Equipment	Air Cylinder:339	1	15	2020	$ 1,500.00	3	3	High
46_91FE	Asset Class	Fire Equipment	Air Cylinder:341	1	15	2020	$ 1,500.00	3	3	High
48_109FE	Asset Class	Fire Equipment	Air Cylinder:343	1	15	2020	$ 1,500.00	3	3	High
49_104FE	Asset Class	Fire Equipment	Air Cylinder:344	1	15	2020	$ 1,500.00	3	3	High
50_57FE	Asset Class	Fire Equipment	Air Cylinder:345	1	15	2020	$ 1,500.00	3	3	High
51_94FE	Asset Class	Fire Equipment	Air Cylinder:346	1	15	2020	$ 1,500.00	3	3	High
54_31FE	Asset Class	Fire Equipment	Air Cylinder:349	1	15	2020	$ 1,500.00	3	3	High
55_41FE	Asset Class	Fire Equipment	Air Cylinder:350	1	15	2020	$ 1,500.00	3	3	High
56_58FE	Asset Class	Fire Equipment	Air Cylinder:351	1	15	2020	$ 1,500.00	3	3	High
57_105FE	Asset Class	Fire Equipment	Air Cylinder:352	1	15	2020	$ 1,500.00	3	3	High
58_88FE	Asset Class	Fire Equipment	Air Cylinder:353	1	15	2020	$ 1,500.00	3	3	High
59_35FE	Asset Class	Fire Equipment	Air Cylinder:354	1	15	2020	$ 1,500.00	3	3	High
60_57FE	Asset Class	Fire Equipment	Air Cylinder:355	1	15	2020	$ 1,500.00	3	3	High
77_9FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		3	High
78_16FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		3	High
79_57FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		3	High
80_30FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		3	High
69_41FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		4	Medium
74_27FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
41_72FVT	Asset Class	Fire Equipment	T-38	1	10	2020	$ 648.00		4	Medium
75_43FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		4	Medium
76_67FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		4	Medium

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
59_56FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
62_23FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
67_99FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
60_51FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
61_92FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
68_20FVT	Asset Class	Fire Equipment	Ultralight MMR 2000	1	15	2020	$ 7,450.00		4	Medium
70_84FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
71_45FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
72_79FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
73_30FVT	Asset Class	Fire Equipment	Fire Hawk 2002	1	15	2020	$ 7,450.00		4	Medium
63_86FVT	Asset Class	Fire Equipment	Fire Hawk M7	1	15	2020	$ 7,450.00		4	Medium
64_69FVT	Asset Class	Fire Equipment	Fire Hawk M7	1	15	2020	$ 7,450.00		4	Medium
65_29FVT	Asset Class	Fire Equipment	Fire Hawk M7	1	15	2020	$ 7,450.00		4	Medium
66_17FVT	Asset Class	Fire Equipment	Fire Hawk M7	1	15	2020	$ 7,450.00		4	Medium
3036	Asset Class	Parks and Recreation	Community Centre Complex: Horse Paddock Bleachers	6	20	2020	$ 30,000.00	1	1	High
3047	Asset Class	Parks and Recreation	Morriston Meadows: Benches	2	20	2020	$ 1,000.00	1	1	High
3059	Asset Class	Parks and Recreation	Old Morriston Meadows: Fencing Backstop	1	20	2020	$ 3,668.00	1	1	High
12007 - 3	Core Municipal Assets	Storm Water Pond	Carriage Lane SWM Outlet Device (Hicken Bottom)	1	20	2020	$ 2,000.00	4	4	Medium
5035	Asset Class	Fire licensed vehicles	Rescue Truck 35	1	20	2020	$ 520,000.00		3	Medium
8014	Asset Class	Work licensed vehicles	2012 Dump/Plow 302	1	8	2020	$ 225,000.00	96095		Medium
7003	Asset Class	Work licensed vehicles	1 Ton Dump/Plow 305	1	12	2020	$ 100,000.00	103534		High
8019	Asset Class	Work licensed vehicles	2015 GMC Sierra 1500	1	5	2020	$ 40,000.00	42610		Medium
3046	Asset Class	Parks and Recreation	Morriston Meadows: Bleachers	2	25	2020.5	$ 10,000.00	1	1	High
3068	Asset Class	Parks and Recreation	Badonach Soccer Field: 3 Seat Bleacher	2	25	2020.5	$ 2,000.00	1	1	High
1003	Core Municipal Infrastructure	Bridge	Little's Bridge	1	50	2021	$ 240,000.00	1	22	Very High
1008	Core Municipal Infrastructure	Bridge	Galt Creek Bridge Gore Road Lot 2	1	50	2021	$ 170,000.00	1	60	Very High
2009	Core Municipal Infrastructure	Culvert	Gilmour Rd Culvert Over Aberfoyle Creek	1	50	2021	$ 540,000.00	1	50	Very High
71_102FE	Asset Class	Fire Equipment	Bunker Gear #308	1	10	2021	$ 3,000.00	3	3	High
72_58FE	Asset Class	Fire Equipment	Bunker Gear #378 1104007403 1104007408	1	10	2021	$ 3,000.00	3	3	High

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
3052	Asset Class	Parks and Recreation	Morriston Meadows: 6 Seat HighBleachers	1	25	2021	$ 5,000.00	1	1	High
3053	Asset Class	Parks and Recreation	Morriston Meadows: 6 Seat High Bleachers	1	25	2021	$ 5,000.00	1	1	High
164_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	McLean Road/Concession 7	1	25	2021	$ 149,046.19	71.81322	2	Very High
165_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	McLean Road/Concession 7	1	25	2021	$ 115,798.12	71.81322	2	Very High
52	Core Municipal Infrastructure	Asphalt Road 1 Lift	Maple Leaf Lane	1	25	2021	$ 74,719.41	65	2	Very High
57	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 4	1	25	2021	$ 86,417.25	65	2	Very High
15_73FVT	Asset Class	Fire vehicle tires	A-33	1	10	2021	$ 825.00		3	Medium
16_16FVT	Asset Class	Fire vehicle tires	A-33	1	10	2021	$ 825.00		3	Medium
17_74FVT	Asset Class	Fire vehicle tires	A-33	1	10	2021	$ 825.00		3	Medium
18_76FVT	Asset Class	Fire vehicle tires	A-33	1	10	2021	$ 825.00		3	Medium
8016	Asset Class	Work licensed vehicles	2013 International Plow Truck 301	1	8	2021	$ 40,000.00	74804		Medium
8001	Asset Class	Work Unlicensed vehicles	JCB Backhoe 6	1	10	2021	$ 120,000.00	2		High
51OCCIR	Asset Class	Buildings and Facilities	Optimist Community Centre Ice Rink::Electrical, only lighting needs to be replaced	1	40	2022	$ 10,000.00	1	1	High
16_87FE	Asset Class	Fire Equipment	Air Cylinder:87	1	15	2022	$ 1,500.00	3	3	High
38_15FE	Asset Class	Fire Equipment	Air Cylinder:320	1	15	2022	$ 1,500.00	3	3	High
39_99FE	Asset Class	Fire Equipment	Air Cylinder:323	1	15	2022	$ 1,500.00	3	3	High
40_31FE	Asset Class	Fire Equipment	Air Cylinder:334	1	15	2022	$ 1,500.00	3	3	High
42_79FE	Asset Class	Fire Equipment	Air Cylinder:336	1	15	2022	$ 1,500.00	3	3	High
45_27FE	Asset Class	Fire Equipment	Air Cylinder:340	1	15	2022	$ 1,500.00	3	3	High
3063	Asset Class	Parks and Recreation	Old Morriston Meadows: Light Towers	7	40	2022	$ 161,385.00	1	1	High
88	Core Municipal Infrastructure	Asphalt Road 1 Lift	Townline Road	1	15	2022	$ 153,118.55	67.91016	2	Very High
59	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 4	1	25	2022	$ 217,096.90	67.33618	2	Very High
158	Core Municipal Infrastructure	Asphalt Road 1 Lift	McLean Road East	1	25	2022	$ 68,451.36	67.33618	2	Very High
121A	Core Municipal Infrastructure	Asphalt Road 1 Lift	Maddaugh Road	1	25	2022	$ 25,593.57	66.7622	2	Very High
121B	Core Municipal Infrastructure	Asphalt Road 1 Lift	Maddaugh Road	1	25	2022	$ 26,657.77	66.7622	2	Very High
15_SURFACE	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1	1	25	2022	$ 217,671.29	66.64741	2	Very High
7_64FVT	Asset Class	Fire vehicle tires	P-32	1	10	2022	$ 686.00		3	Medium

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
8_19FVT	Asset Class	Fire vehicle tires	P-32	1	10	2022	$ 686.00		3	Medium
9_22FVT	Asset Class	Fire vehicle tires	P-32	1	10	2022	$ 686.00		3	Medium
10_14FVT	Asset Class	Fire vehicle tires	P-32	1	10	2022	$ 686.00		3	Medium
11_90FVT	Asset Class	Fire vehicle tires	P-32	1	10	2022	$ 686.00		3	Medium
12_46FVT	Asset Class	Fire vehicle tires	P-32	1	10	2022	$ 686.00		3	Medium
13_63FVT	Asset Class	Fire vehicle tires	A-33	1	10	2022	$ 825.00		3	Medium
14_38FVT	Asset Class	Fire vehicle tires	A-33	1	10	2022	$ 825.00		3	Medium
8002	Asset Class	Work Unlicensed vehicles	Road Grader G740 501	1	25	2022	$ 250,000.00			Medium
73_67FE	Asset Class	Fire Equipment	Bunker Gear #301 1301002761 1301002766	1	10	2023	$ 3,000.00	4	4	Medium
74_22FE	Asset Class	Fire Equipment	Bunker Gear #336 1301002757 1301002762	1	10	2023	$ 3,000.00	4	4	Medium
75_67FE	Asset Class	Fire Equipment	Bunker Gear #392 1301002758 1301002763	1	10	2023	$ 3,000.00	4	4	Medium
76_55FE	Asset Class	Fire Equipment	Bunker Gear #337 1301002760 1301002765	1	10	2023	$ 3,000.00	4	4	Medium
3060	Asset Class	Parks and Recreation	Old Morriston Meadows: 6 seat Concrete Bleachers	2	50	2023	$ 10,000.00	1	1	High
115	Core Municipal Infrastructure	Asphalt Road 2 Lift	Concession 7	1	25	2023	$ 59,774.06	75.5	3	High
116	Core Municipal Infrastructure	Asphalt Road 2 Lift	Concession 7	1	25	2023	$ 43,396.49	75.5	3	High
132	Core Municipal Infrastructure	Asphalt Road 1 Lift	McRae Station Road	1	15	2023	$ 35,396.73	74.38252	2	Very High
204_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Bridle Path	1	25	2023	$ 155,793.60	69.9	2	Very High
185_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Bridle Path	1	25	2023	$ 62,265.67	69.89192	2	Very High
212A	Core Municipal Infrastructure	Asphalt Road 1 Lift	Winer Road	1	25	2023	$ 62,387.18	69.7469	2	Very High
212B_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Winer Road	1	25	2023	$ 50,166.87	69.7469	2	Very High
63B	Core Municipal Infrastructure	Asphalt Road 1 Lift	Maltby Road East	1	25	2023	$ 106,047.09	69.68	2	Very High
63A_SURFACE	Core Municipal Infrastructure	Asphalt Road 1 Lift	Maltby Road East	1	25	2023	$ 106,960.16	69.67589	2	Very High
17	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1	1	25	2023	$ 216,762.17	69.10191	2	Very High
97	Core Municipal Infrastructure	Asphalt Road 1 Lift	Sideroad 10 North	1	25	2023	$ 108,921.31	69.05812	2	Very High
108	Core Municipal Infrastructure	Asphalt Road 1 Lift	Sideroad 20 North	1	25	2023	$ 214,743.89	68.82853	2	Very High

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
148	Core Municipal Infrastructure	Asphalt Road 1 Lift	Puslinch-Flamborough Townline	1	25	2023	$ 31,635.26	68.6	2	Very High
22	Core Municipal Infrastructure	Asphalt Road 1 Lift	Leslie Road West	1	25	2023	$ 56,595.30	68.59894	2	Very High
23	Core Municipal Infrastructure	Asphalt Road 1 Lift	Leslie Road West	1	25	2023	$ 128,411.36	68.59894	2	Very High
25	Core Municipal Infrastructure	Asphalt Road 1 Lift	Leslie Road West	1	25	2023	$ 106,699.36	68.59894	2	Very High
54C	Core Municipal Infrastructure	Asphalt Road 1 Lift	Roszell Road 2013	1	25	2023	$ 138,648.22	68.3	2	Very High
90	Core Municipal Infrastructure	Asphalt Road 1 Lift	Roszell Road	1	25	2023	$ 104,314.38	68.3	2	Very High
7005B	Asset Class	Fire licensed vehicles	2013 Vehicle For Fire & Rescue	1	7	2023	$ 15,300.00		4	Medium
8017	Asset Class	Work licensed vehicles	2015 International Plow Truck	1	8	2023	$ 250,000.00	31032		Medium
47_55FE	Asset Class	Fire Equipment	Air Cylinder:342	1	15	2024	$ 1,500.00	3	3	High
77_100FE	Asset Class	Fire Equipment	Bunker Gear #388 4748801 4749620	1	10	2024	$ 3,000.00	3	3	High
78_9FE	Asset Class	Fire Equipment	Bunker Gear #318	1	10	2024	$ 3,000.00	3	3	High
79_75FE	Asset Class	Fire Equipment	Bunker Gear #310 4748800 4749619	1	10	2024	$ 3,000.00	3	3	High
3025	Asset Class	Parks and Recreation	Community Centre Complex: Wooden Fences Beside Batting Cages	1	15	2024	$ 1,800.00	2	2	High
SECTION 34,35	Core Municipal Infrastructure	Asphalt Road 2 Lift	Concession 2	1	25	2024	$ 286,220.75	76.89447	3	High
36	Core Municipal Infrastructure	Asphalt Road 2 Lift	Concession 2/2A	1	25	2024	$ 124,715.65	76.89447	3	High
166	Core Municipal Infrastructure	Asphalt Road 1 Lift	Sideroad 20 North	1	25	2024	$ 155,484.08	71.92802	2	Very High
18	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1/Leslie Rd W	1	25	2024	$ 255,662.64	71.8	2	Very High
19	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1	1	25	2024	$ 48,441.10	71.8	2	Very High
4	Core Municipal Infrastructure	Asphalt Road 1 Lift	Gore Road	1	25	2024	$ 136,800.74	71.16823	2	Very High
28_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Victoria Street And Church Street	1	25	2024	$ 39,461.07	70.89486	2	Very High
5	Core Municipal Infrastructure	Asphalt Road 1 Lift	Gore Road	1	25	2024	$ 80,118.57	70.13507	2	Very High
120	Core Municipal Infrastructure	Asphalt Road Surface Treated	Maddaugh Road	1	25	2024	$ 5,665.04	66.7622	2	Very High
153	Core Municipal Infrastructure	Asphalt Road Surface Treated	Nassagaweya-Puslinch Townline	1	7	2024	$ 12,553.32	98	5	Medium

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
154	Core Municipal Infrastructure	Asphalt Road Surface Treated	Nassagaweya-Puslinch Townline	1	7	2024	$ 6,622.64	98	5	Medium
155	Core Municipal Infrastructure	Asphalt Road Surface Treated	Nassagaweya-Puslinch Townline	1	7	2024	$ 4,940.02	98	5	Medium
25_57FVT	Asset Class	Fire vehicle tires	T-37	1	10	2024	$ 825.00		4	Medium
26_100FVT	Asset Class	Fire vehicle tires	T-37	1	10	2024	$ 825.00		4	Medium
33232_70FVT	Asset Class	Fire vehicle tires	C-1			2024	$ 250.00			
45_1FVT	Asset Class	Fire vehicle tires	C-1		10	2024	$ 250.00		1	High
46_31FVT	Asset Class	Fire vehicle tires	C-1		10	2024	$ 250.00		1	High
47_71FVT	Asset Class	Fire vehicle tires	C-1		10	2024	$ 250.00		1	High
48_70FVT	Asset Class	Fire vehicle tires	C-1		10	2024	$ 250.00		1	High
80_57FE	Asset Class	Fire Equipment	Bunker Gear #333 4924090 4924085	1	10	2025	$ 3,000.00	4	4	Medium
81_37FE	Asset Class	Fire Equipment	Bunker Gear #387 4924092 4924080	1	10	2025	$ 3,000.00	4	4	Medium
82_9FE	Asset Class	Fire Equipment	Bunker Gear #387 4924092 4924080	1	10	2025	$ 3,000.00	4	4	Medium
83_94FE	Asset Class	Fire Equipment	Bunker Gear #326 4924091 4924082	1	10	2025	$ 3,000.00	4	4	Medium
84_89FE	Asset Class	Fire Equipment	Bunker Gear #321 4992302 4924081	1	10	2025	$ 3,000.00	4	4	Medium
85_11FE	Asset Class	Fire Equipment	Bunker Gear #370 4924095 4924083	1	10	2025	$ 3,000.00	4	4	Medium
86_72FE	Asset Class	Fire Equipment	Bunker Gear #381 4924093 4924086	1	10	2025	$ 3,000.00	4	4	Medium
87_51FE	Asset Class	Fire Equipment	Bunker Gear #306 4992301 4992304	1	10	2025	$ 3,000.00	4	4	Medium
88_35FE	Asset Class	Fire Equipment	Bunker Gear #309 4924096 4924084	1	10	2025	$ 3,000.00	4	4	Medium
89_97FE	Asset Class	Fire Equipment	Bunker Gear #307 4924089 4924079	1	10	2025	$ 3,000.00	4	4	Medium
90_29FE	Asset Class	Fire Equipment	Bunker Gear #380 4992303 4992306	1	10	2025	$ 3,000.00	4	4	Medium
91_44FE	Asset Class	Fire Equipment	Bunker Gear #375 4924077 4992305	1	10	2025	$ 3,000.00	4	4	Medium
92_20FE	Asset Class	Fire Equipment	Bunker Gear #303 5017234 5017235	1	10	2025	$ 3,000.00	4	4	Medium
93_73FE	Asset Class	Fire Equipment	Bunker Gear #320 4924094 4924087	1	10	2025	$ 3,000.00	4	4	Medium
94_89FE	Asset Class	Fire Equipment	Bunker Gear #355 4924088 4924078	1	10	2025	$ 3,000.00	4	4	Medium
32	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 2	1	25	2025	$ 220,554.56	73.56539	2	Very High

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
51_SURFACE	Core Municipal Infrastructure	Asphalt Road 2 Lift	Old Brock Road	1	25	2025	$ 46,560.00	72.76182	2	Very High
16	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1	1	25	2025	$ 216,473.65	72.54578	2	Very High
12002 - 3	Core Municipal Assets	Storm Water Pond	Daymond Drive SWM Outlet Device (Hicken Bottom)	1	20	2025	$ 2,000.00	4	4	Medium
5031	Asset Class	Fire licensed vehicles	Fire Pumper 31	1	20	2025	$ 540,000.00		3	Medium
7009	Asset Class	Work licensed vehicles	2017 Pickup Truck - Staff - 3/4 Ton	1	8	2025	$ 60,000.00	4198		Medium
8018	Asset Class	Work Unlicensed vehicles	Brush Chipper	1	10	2025	$ 40,000.00	4		Medium
1004	Core Municipal Infrastructure	Bridge	Moyer's Bridge	1	50	2026	$ 500,000.00	1	63	Very High
2006	Core Municipal Infrastructure	Culvert	Victoria Road Culvert Over Galt Creek	1	50	2026	$ 65,000.00	2	72	Very High
2007	Core Municipal Infrastructure	Culvert	Irish Creek Culvert On Townline Road	1	50	2026	$ 180,000.00	1	57	Very High
2010	Core Municipal Infrastructure	Culvert	Ellis Road Culvert Over Puslinch Lake Irish Creek	1	50	2026	$ 250,000.00	1	43	Very High
2013	Core Municipal Infrastructure	Culvert	Victoria Road Culvert North Of Leslie	1	50	2026	$ 65,000.00	2	70	Very High
95_47FE	Asset Class	Fire Equipment	Bunker Gear #315 5085806 5085940	1	10	2026	$ 3,000.00	5	5	Medium
96_14FE	Asset Class	Fire Equipment	Bunker Gear #319 5122954 5085938	1	10	2026	$ 3,000.00	5	5	Medium
97_58FE	Asset Class	Fire Equipment	Bunker Gear #391 5085805 5085939	1	10	2026	$ 3,000.00	5	5	Medium
3028	Asset Class	Parks and Recreation	Community Centre Complex: Light Poles	2	20	2026	$ 5,200.00	2	2	High
3029	Asset Class	Parks and Recreation	Community Centre Complex: Fencing	1	20	2026	$ 9,694.00	2	2	High
3070	Asset Class	Parks and Recreation	Badonach Soccer Field: Fencing (East Side)	1	20	2026	$ 14,934.00	2	2	High
195	Core Municipal Infrastructure	Asphalt Road 2 Lift	Deer View Ridge	1	25	2026	$ 92,916.73	75.9761	3	High
48	Core Municipal Infrastructure	Asphalt Road 1 Lift	Smith Road	1	15	2026	$ 34,843.10	75.53048	3	High
21	Core Municipal Infrastructure	Asphalt Road 1 Lift	Leslie Road West	1	25	2026	$ 211,569.82	75.51692	3	High
14	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1	1	25	2026	$ 217,138.73	75.28733	3	High
46_SURFACE	Core Municipal Infrastructure	Asphalt Road 1 Lift	Gilmour Road	1	25	2026	$ 26,040.41	74.91271	2	Very High

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
160	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 4	1	25	2026	$ 46,904.02	74.56832	2	Very High
161	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 4	1	25	2026	$ 35,471.58	74.56832	2	Very High
38	Core Municipal Infrastructure	Asphalt Road 1 Lift	Mason Road	1	25	2026	$ 23,368.76	74.25416	2	Very High
4060	Asset Class	Work Unlicensed vehicles	Floor Scrubber	1	10	2026	$ 8,000.00	4		Medium
9_104FE	Asset Class	Fire Equipment	Washer/Extractor	1	10	2027	$ 10,000.00	4	4	Medium
10_2FE	Asset Class	Fire Equipment	Gear Dryer	1	10	2027	$ 6,000.00	4	4	Medium
12_41FE	Asset Class	Fire Equipment	Defibrillators	7	10	2027	$ 21,000.00	3	3	High
98_23FE	Asset Class	Fire Equipment	Bunker Gear #379 5312492 5312493	1	10	2027	$ 3,000.00	5	5	Medium
99_1FE	Asset Class	Fire Equipment	Bunker Gear #382 5310558 5310560	1	10	2027	$ 3,000.00	5	5	Medium
100_87FE	Asset Class	Fire Equipment	Bunker Gear #323 5310555 5310559	1	10	2027	$ 3,000.00	5	5	Medium
101_49FE	Asset Class	Fire Equipment	Bunker Gear #385 5310557 5310562	1	10	2027	$ 3,000.00	5	5	Medium
102_20FE	Asset Class	Fire Equipment	Bunker Gear #322 5310556 5310561	1	10	2027	$ 3,000.00	5	5	Medium
34	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 2	1	25	2027	$ 219,975.00	77	3	High
205	Core Municipal Infrastructure	Asphalt Road 2 Lift	Fox Run Drive	1	25	2027	$ 32,822.68	76.55008	3	High
206	Core Municipal Infrastructure	Asphalt Road 2 Lift	Fox Run Drive	1	25	2027	$ 17,412.23	76.55008	3	High
207	Core Municipal Infrastructure	Asphalt Road 2 Lift	Fox Run Drive	1	25	2027	$ 91,323.90	76.55008	3	High
196	Core Municipal Infrastructure	Asphalt Road 2 Lift	Fox Run Drive	1	25	2027	$ 57,548.85	76.55	3	High
12003 - 3	Core Municipal Assets	Storm Water Pond	Aberfoyle Business Park SWM Block 6 Outlet Device (Hicken Bottom)	1	20	2027	$ 2,000.00	4	4	Medium
15002	Asset Class	Buildings and Facilities	Municipal Complex:Parking Lot Municipal Complex	1	25	2028		2	2	Medium
103_101FE	Asset Class	Fire Equipment	Bunker Gear #350 5483616 5483622	1	10	2028	$ 3,000.00	5	5	Medium
104_60FE	Asset Class	Fire Equipment	Bunker Gear #335 5483615 5483621	1	10	2028	$ 3,000.00	5	5	Medium
105_24FE	Asset Class	Fire Equipment	Bunker Gear #302 5483614 5483619	1	10	2028	$ 3,000.00	5	5	Medium
106_92FE	Asset Class	Fire Equipment	Bunker Gear #305 5483613 5483618	1	10	2028	$ 3,000.00	5	5	Medium

Handout #5: Capital Plan

Asset Number	Major Asset Class	Asset Class	Description	Quantity	Life Expectancy	Replacement Year	Capital Plan	Condition	Condition Index	Risk
3082	Asset Class	Parks and Recreation	Community Centre Complex: Parking Lot Community Centre Complex	1	25	2028	$ 91,875.00	2	2	High
14003	Asset Class	Parks and Recreation	Community Centre Complex: Tennis Court Fencing	1	40	2028	$ 21,615.00	5	5	Medium
3056	Asset Class	Parks and Recreation	Old Morriston Meadows: Gravel Road	1	25	2028	$ 7,740.00	2	2	High
78	Core Municipal Infrastructure	Asphalt Road 1 Lift	Niska Road	1	25	2028	$ 63,744.44	84.6	3	High
126	Core Municipal Infrastructure	Asphalt Road 1 Lift	Victoria Road South	1	25	2028	$ 217,705.39	84.5858	3	High
30	Core Municipal Infrastructure	Asphalt Road 1 Lift	Main St And Back	1	25	2028	$ 36,264.05	79.7	3	High
190	Core Municipal Infrastructure	Asphalt Road 2 Lift	Telfer Glen	1	25	2028	$ 97,421.12	79.64957	3	High
9	Core Municipal Infrastructure	Asphalt Road 1 Lift	Puslinch-Flamborough Townline	1	25	2028	$ 56,748.41	79.19039	3	High
10	Core Municipal Infrastructure	Asphalt Road 1 Lift	Puslinch-Flamborough Townline	1	25	2028	$ 69,805.42	79.19039	3	High
214	Core Municipal Infrastructure	Asphalt Road 2 Lift	Beiber Road	1	25	2028	$ 23,696.95	78.846	3	High
13A	Core Municipal Infrastructure	Asphalt Road 1 Lift	Concession 1	1	25	2028	$ 333,716.08	78.58929	3	High
5033	Asset Class	Fire licensed vehicles	Quint Truck	1	25	2028	$ 500,000.00	55667		Medium
7007	Asset Class	Work Unlicensed vehicles	Lawn Tractor	1	10	2028	$ 30,000.00			Low

Handout #5: Capital Plan

Capital Expenditure by Building

Puslinch Buildings and Facilities Remediation Schedule
Source Data: BUILDING CONDITION ASSESSMENT 2014

Building Component	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Puslinch Community Centre: Structure										
Puslinch Community Centre: Roof		$ 100,000.00								
Puslinch Community Centre: Walls & Windows										
Puslinch Community Centre: Interior Finishes						$ 17,500.00		$ 5,000.00		
Puslinch Community Centre: Mechanical										
Puslinch Community Centre: Electrical	$ 5,000.00									
Puslinch Community Centre: Fire, Life-Safety						$ 750.00				
Municipal Complex: Structure										
Municipal Complex: Roof						$ 125,000.00				
Municipal Complex: Walls & Windows						$ 100,000.00				
Municipal Complex: Interior Finishes										
Municipal Complex: Mechanical	$ 5,750.00	$ 5,000.00	$ 10,000.00	$ 20,000.00		$ 16,000.00				
Municipal Complex: Electrical		$ 3,000.00			$ 3,000.00			$ 3,000.00		
Municipal Complex: Fire, Life-Safety						$ 750.00				
Total	$ 10,750.00	$ 108,000.00	$ 10,000.00	$ 20,000.00	$ 3,000.00	$ 260,000.00		$ 8,000.00		

RESOLUTION
MUNICIPAL COUNCIL
THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

2018-

Date: December 5, 2018

Moved by: ______________________ Seconded by: ________________________

That Council for the Township of Puslinch has received correspondence from the Grand River Conservation Authority (GRCA) regarding the appointment of members to the GRCA; and

That Council supports the appointment of Chris White as Grand River Conservation Authority Member to the end of this term of Council, ending November 30, 2022; and

That this resolution be circulated to the GRCA, Township of Guelph/ Eramosa and Town of Erin.

RECORDED VOTE	YES	NO	CONFLICT	ABSENT
Councillor Bulmer				
Councillor Roth				
Mayor Lever				
Councillor Sepulis				
Councillor Fielding				
TOTAL				

MAYOR: ________________________

CARRIED	**LOST**

From: Karen Landry
To: Nina Lecic
Subject: FW: Appointment of Member - Grand River Conservation Authority
Date: Monday, October 1, 2018 11:10:26 AM

From: Eowyn Spencer <espencer@grandriver.ca>
Sent: Monday, October 1, 2018 10:52 AM
To: Dina Lundy <Dina.Lundy@erin.ca>; Meaghen Reid <mreid@get.on.ca>; Karen Landry <KLandry@puslinch.ca>
Subject: Appointment of Member - Grand River Conservation Authority

Town of Erin Clerk's Office
Township of Guelph Eramosa Clerk's Office
Township of Puslinch Clerk's Office

Dear Ms. Lundy, Ms. Reid, and Ms. Landry:

Please note that the appointment of Chris White as the representative of the Town of Erin, and the Townships of Guelph Eramosa and Puslinch will expire on Friday, November 30, 2018.

When making new appointments please be aware that Section 14(4.1) of the *Conservation Authorities Act*, R.S.O.1990 (the Act) provides as follows:

A member shall be appointed for a term of up to four years, as may be determined by the council that appoints the member.

This does not preclude a municipality from re-appointing the same member for a further term.

Additionally, Section 14(4.2) of the Act reads:

A member's term begins at the first meeting of the authority after his or her appointment and expires immediately before the first meeting of the authority after the appointment of his or her replacement.

In order to maintain operational needs and ensure a smooth transition of board members, please appoint new members for a term to commence on or after December 1, 2018.

Please advise as to the effective and expiry dates of your new appointment as soon as possible.

Should you have any questions or concerns regarding this email, please contact Karen Armstrong, Deputy CAO & Secretary Treasurer at karmstrong@grandriver.ca.

Kind regards,

Eowyn Spencer | Executive Assistant | Grand River Conservation Authority
www.grandriver.ca | Phone: 519-621-2763 x.2200 | espencer@grandriver.ca

From: Karen Landry
To: Nina Lecic
Subject: FW: Appointment to Grand River Conservation Authority
Date: Tuesday, November 20, 2018 9:00:30 AM

From: Ian Roger <iroger@get.on.ca>
Sent: Monday, November 19, 2018 2:54 PM
To: Karen Landry <KLandry@puslinch.ca>
Cc: Nina Lecic <nlecic@puslinch.ca>; Meaghen Reid <mreid@get.on.ca>
Subject: RE: Appointment to Grand River Conservation Authority

Karen,

Please accept this email as confirmation of Mayor Chris White's intent to stand again for the GRCA Board as the representative for Guelph/Eramosa, Puslinch and Erin. Council will be passing a formal resolution to advise the GRCA in it advance of its December Board Meeting.

Ian Roger, P. Eng.
Chief Administrative Officer
Township of Guelph/Eramosa
8348 Wellington Road 124, P.O. Box 700
Rockwood, ON N0B 2K0
Phone: 519-856-9596 ext. 105
Fax: 519-856-2240
www.get.on.ca

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REPORT ADM-2018-036

TO: Mayor and Members of Council

FROM: Karen Landry, CAO/Clerk

MEETING DATE: December 5, 2018

SUBJECT: Feasibility Study for Municipal Water and Wastewater Services – Commercial/Industrial – Aberfoyle Area

---

RECOMMENDATIONS

THAT Council receives Report ADM-2018-036 regarding Feasibility Study for Municipal Water and Wastewater Services – Commercial/Industrial – Aberfoyle Area; and

That Council authorizes the commencement of this project in the amount of $29,083 to be funded as follows:

- **County of Wellington Business Retention and Expansion Municipal Implementation Fund - $25,000; and**
- **Legal Contingency Discretionary Reserve - $4,083.**

Background

Council at its meeting held on June 20, 2018 through Council Resolution No.'s 2018-212 and 2018-213 authorized the following:

> "That the Water Feasibility Notice of Motion to reduce the scope of the study to the properties located in the industrial and commercial lands in the vicinity of Brock Road and Highway 401, be referred back to staff to contact the industrial/commercial sector within the study area in Aberfoyle in order to determine their interest in municipal water and wastewater."
>
> "That staff reports back on the potential increase in industrial/commercial growth and intensification opportunities as a result of serviceable lots."

Prior to commencing work on the reduced scope of the feasibility study for the industrial/commercial sector in the Aberfoyle area, staff have obtained the cost from CIMA and Ontario Clean Water Agency (OCWA) as outlined below:

CIMA	$25,216
OCWA	$3,867

The Township made an application to the County of Wellington Business Retention and Expansion Implementation Fund for this feasibility study. The Township's application for this grant funding has been successful with an allocation of $25,000.

Purpose

The purpose of this report is to obtain authorization to commence works related to the reduced scope of the feasibility study based on the quotes and grant funding received.

Attached as Schedule A and B to this Report is CIMA and OCWA's quote for conducting the works. Attached as Schedule C to this Report is the County of Wellington's correspondence in response to the potential increase in industrial/commercial growth and intensification opportunities as a result of serviceable lots.

Financial Implications

As discussed throughout the report.

Applicable Legislation and Requirements

Not applicable

Attachments

Schedule A – CIMA Quote

Schedule B – OCWA Quote

Schedule C – County of Wellington Correspondence dated December 5, 2018

November 1, 2018

Township of Puslinch
c/o Ontario Clean Water Agency (OCWA)
2225 Erin Mills Parkway
Mississauga, ON   L5K 1T9

Attention: **Mr. James Su, P.Eng., Project Manager**

RE: **WATER AND SEWAGE SERVICING FEASIBILITY STUDY
PROPOSAL FOR ADDITIONAL STUDY**

Dear Mr. Su:

Further to our conversation on October 30, 2018, we are pleased to present our updated Work Plan and Budget estimate to complete the additional study for the Water and Wastewater Servicing Plan for the Township of Puslinch.

CIMA+ has completed the Feasibility Study for Municipal Water and Wastewater Servicing in the Township of Puslinch for the Study Area defined in the original Terms of Reference; however, at the Public Open House and at the subsequent Council Meeting on June 20, 2018, significant vocal opposition from the residential population within the Township was voiced against the provision of municipal water and wastewater services for residential properties.

Accordingly, Council has requested that the Study be re-visited to consider the provision of Water and Wastewater Services for the Industrial and Commercial users within the Aberfoyle Urban Hamlet limits only.

1. WORK PLAN AND SCOPE OF ADDITIONAL SERVICES

In order to assess the feasibility of providing municipal water and wastewater services to the Industrial and Commercial users within the Aberfoyle Urban Hamlet area, CIMA+ will:

- Update the employment projections
- Update projected water and wastewater demands
- Conduct one(1) workshop meeting with Industrial / Commercial Users in Aberfoyle
- Update the conceptual Servicing Alternatives for Intra-Municipal Servicing and Inter-Municipal servicing based on the updated water and wastewater demand projections
- Update Preliminary Cost estimates for the servicing options
- Present the preliminary findings of the Study Update to Council
- Document the findings within an Addendum to the Feasibility Study for Municipal Water and Wastewater Servicing.

2. SCHEDULE

Following authorization to proceed with the additional Study, we will work with the Township and OCWA to establish a schedule acceptable to all parties. On a Preliminary basis, we anticipate that CIMA+ will require approximately six (6) to eight (8) weeks to complete this additional work, following authorization to proceed.

3. DELIVERABLES

CIMA+ proposes to prepare an Addendum to the Feasibility Study for Municipal Water and Wastewater Servicing, to address the provision of servicing the smaller Study Area. This Addendum would include be structured to present updated Design Criteria, Updated Servicing Alternatives, and updated Cost Recovery options.

4. COMMERCIAL TERMS

In order to complete the above Work Plan, we propose to undertake this Work on a Time and Expense basis to an Upset Limit of $24,780.00 plus taxes.

.

Name and Role	Est. Hours	Rate	Amount
Stuart Winchester, Project Manager	24	$185	$4,400
Erin Longworth, Class EA Lead	24	$145	$3,480
Diego Prashad, Linear Design Lead	24	$110	$2,640
Various, Engineering Support	100	$90	$9,000
Various, CAD/GIS Support	57	$80	$4,560
Victoria Damsic, Administrative Support	4	$65	$260
Expenses (Printing, Mileage, etc.)			$400
	233		**$24,780**

Our proposal is valid for your acceptance for 30 days, after which time a review of the terms and conditions offered may be required.

We trust the above is in order; however, should you have any questions or require any additional information, please do not hesitate to contact the undersigned.

Sincerely,

CIMA Canada Inc.

Stuart Winchester, P.Eng.
Partner, Director, Municipal Infrastructure
Stuart.winchester@cima.ca

SW:vd

Encl.

cc: Karen Landry, Township of Puslinch

T000866A-050-180814-L-ESC2- Additional Work Plan and Budget-e03

Mary Hasan

From: Karen Landry
Sent: Monday, November 05, 2018 9:40 AM
To: Mary Hasan
Subject: FW: Puslinch - Feasibility Study for Water and Wastewater Servicing - Additional Industrial and Commercial Review
Attachments: T000866A-050-180814-L-ESC2- Additional Work Plan and Budget-e03.pdf

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From: James Su <JSu@ocwa.com>
Sent: Wednesday, October 31, 2018 12:03 PM
To: Karen Landry <KLandry@puslinch.ca>
Subject: Puslinch - Feasibility Study for Water and Wastewater Servicing - Additional Industrial and Commercial Review

Hi Karen,

Please find attached CIMA's proposal for additional review of the Industrial and Commercial area within the Aberfoyle urban hamlets. We have reviewed it and found it acceptable.

OCWA's additional effort to project manage this work is an upset limit of $3,800 plus HST on a time and material basis.

Please let me know if you have any questions.

Breakdown of OCWA fees:

8	Attend one (1) workshop meeting with Industrial / Commercial Users. Review/comment on presentation material
4	Attend 1 council meeting
10	Review/comment on reports from CIMA
8	Review memos, hold calls, provide updates, admin
30	**Total hours**
$120	**per hour**
$3,600.00	Fees
$200.00	Expenses
$3,800.00	**Total Budget**

James Su, P.Eng., LEED Green Assoc.
Project Planning & Delivery Group

Ontario Clean Water Agency
Sheridan Centre | 2225 Erin Mills Parkway, Suite 1200, Mississauga, ON, L5K 1T9
Tel: 905-491-3043 | Cell: 905-301-8541 | Fax: 905-855-3232 | Email: jsu@ocwa.com

PLANNING REPORT
for the TOWNSHIP OF PUSLINCH

COUNCIL DATE: December 5, 2018
TO: Karen Landry, CAO/Clerk
Township of Puslinch
FROM: Sarah Wilhelm, Manager of Development Planning
County of Wellington
SUBJECT: **Potential for Industrial and Commercial Intensification**

RECOMMENDATION

THAT Council receive the Report titled "Potential for Industrial and Commercial Intensification".

PURPOSE

Township Council considered the "Feasibility Study Report: Feasibility Study for Municipal Water and Sewage Servicing in the Township of Puslinch" prepared by CIMA+ at its meeting of June 20, 2018. The following related resolutions were approved at that time:

#2018-212 *That the Water Feasibility Notice of Motion, to reduce the scope of the study to properties located in the industrial and commercial lands in the vicinity of Brock Road and Highway 401, be referred back to staff to contact the industrial/commercial sector within the study area in Aberfoyle in order to determine their interest in municipal water and wastewater.*

#2018-213 *That staff reports back on the potential increase in industrial/commercial growth and intensification opportunities as a result of serviceable lots.*

The purpose of this report is to respond to resolution #2018-213.

BACKGROUND

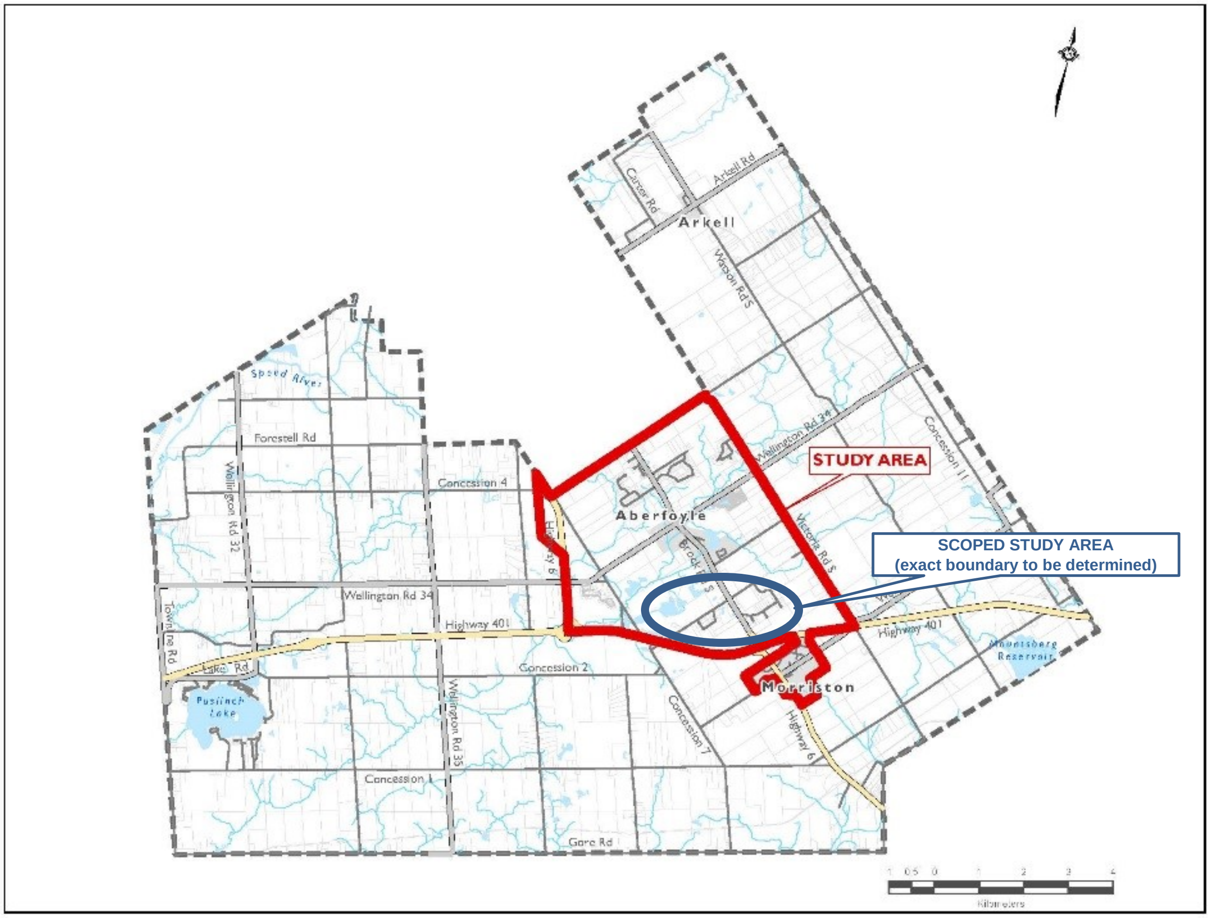
The Township retained CIMA+ consultants to undertake a feasibility study to assess the viability of providing municipal water and sewer services to key areas of Puslinch. Such municipal system may include a new municipal waste water treatment plant and municipal well(s) provided by the Township or by extension of such services from the City of Guelph. Puslinch is the only municipality in Wellington County without full or partial municipal services. Information about the study process and documentation to date may be found on the Township's website:

https://www.puslinch.ca/en/living-here/feasibility-study-for-municipal-water-and-sewage-servicing-.asp

The Feasibility Study Report presented by CIMA+ in June 2018 was based on a study area including Aberfoyle, Morriston and rural residential, rural employment and commercial land uses generally between the Hanlon Expressway (Highway 6 North) and Victoria Road, and Maltby Road and Highway 401.

Residents were generally not supportive of the servicing proposal. In response, Council decided to consider scoping the study to industrial/commercial uses within a smaller geographic area in the vicinity of Brock Road and Highway 401 between Aberfoyle and Morriston. Figure 1 identifies the original study area and a scoped study area (with exact boundaries to be determined).

FIGURE 1 Study Area and Scoped Study Area
Feasibility Study for Municipal Water and Sewage Servicing



Before instructing CIMA+ to undertake additional work within the scoped area, planning staff has been asked consider how much additional growth and intensification potential full municipal services might offer. For purposes of this report, **growth** means development of existing vacant industrial/commercial zoned and/or designated land and **intensification** means business expansion, infill or redevelopment of existing industrial/commercial land which has already been developed.

This employment area is unique within Wellington County. The Township's location close to the larger urban areas of Guelph, Cambridge and Hamilton combined with easy access to Highways 401 and 6 has created demand for industrial and commercial sites in Puslinch.

This demand has been recognized by longstanding land use policies, including the following current Official Plan policies:

> **Policy Area 7-1 (Puslinch Economic Development Area)**
> which recognizes the area as the predominant location for business and industry in the Township and provides for industrial, commercial, institutional and/or recreational activities or natural areas as after-uses to extractive or aggregate-related uses; and
>
> **Section 9.8.3 (Puslinch Industrial Policy)**
> which provides for additional uses in Rural Employment Areas of Puslinch, including complementary commercial uses (e.g. automotive uses, restaurants, motel and limited retail) and offices (including a head office and/or research centre).

The area between Aberfoyle and Morriston (together with the lands designated along the Highway 6 north corridor) represents the primary opportunity for major employment in Puslinch. The industrial lands in the vicinity of Brock Road and Highway 401 are generally developed at a low density and include single storey buildings, large surface areas for parking, loading and tractor trailer manoeuvering, and large outdoor storage and/or production needs. There are also highway commercial uses on Brock Road.

ZONING

The zoning of lands between Aberfoyle and Morriston varies, but is predominantly industrial. The Township's new Comprehensive Zoning By-law limits industrial uses to "dry industrial uses" if a municipal water supply is not available. A dry industrial use is defined as follows:

> *Any premises used for manufacturing, processing, fabrication and assembly of raw materials or repair, servicing, distribution and storage of materials, where:*
>
> *a) No water requirements are necessary as part of the assembly, manufacture, fabrication, repair, packaging and storage activities; and,*
>
> *b) No sewage disposal requirements are necessary as part of the assembly, manufacture, fabrication, repair, packaging and storage activities; and,*
>
> c) *Water supply and sewage disposal requirements are limited to those necessary to serve on-site employees only.*

Availability of municipal services would remove the above limitations.

Setting aside the issue of servicing, we note the Township has already created opportunities for industrial and commercial intensification through new regulations in the Comprehensive Zoning By-law (Figure 2). These changes allow for more efficient use of existing sites. The Township has also pre-zoned vacant lands for industrial or commercial use, where appropriate, which makes more land readily available for development.

FIGURE 2 Zoning By-law Changes which Support Intensification

Industrial (IND) Zone	Highway Commercial (HC) Zone
• maximum lot coverage increased from 45% to 75% • minimum landscape open space reduced from 25% to 15% • minimum front yard setback reduced from 15 m to 6 m	• maximum lot coverage increased from 35% to 45% • minimum lot frontage reduced from 30 m to 20 m • minimum front yard setback reduced from 10 m to 3 m • minimum exterior side yard setback reduced from 10 m to 7.5 m • minimum rear yard depth reduced from 7 m to 3 m

REVIEW

Since most of the lands in the revised study area are developed, our office conducted a review of industrial (or employment) and commercial land studies in other municipalities with a focus on intensification. There are many industrial and commercial land strategies, needs assessments and reviews available. Such documents are prepared to ensure that a municipality has enough land set aside to meet long-term needs for an appropriate mix and range of employment and commercial land. This is typically informed by an analysis of economic trends, local and regional policy context, land supply, land needs, etc. Specialized consultants are often retained to conduct these types of studies.

While intensification is encouraged as a general policy, the topic of intensification itself seems to receive little attention within these studies or as a standalone document, despite the benefits of industrial land intensification including:

- Accommodating increased economic and employment activity on a limited land base;
- More efficient use of lands and resources, as well as transportation and site service infrastructure; and
- Reducing the pressure to convert agricultural lands to industrial uses[1].

We were unable to find a comparable intensification study that fit the Township's servicing scenario. The best examples we found were for large urban areas with full municipal services. Within the available documentation we gained insight into some of the complexities and challenges of such work. Metro Vancouver, a regional government at the leading edge of the study of industrial intensification, notes the following:

> *Industrial intensification may occur in many different forms, one solution is not appropriate for all types of industrial activities. Responses vary by situation, reflecting different sector needs, site features, location characteristics, building forms, and market readiness. For example, some industrial sectors locations may intensify through equipment investments or automation, while others may intensify through larger and higher buildings*[2].

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[1] Summary Report: Opportunities for the Intensive Use of Industrial Land, Metro Vancouver, 2013

[2] Industrial Land Protection and Intensification Policies, Metro Vancouver, 2014: 8

The City of Kingston projects intensification to be 10% of the forecast employment growth on industrial land. This was qualified by the following observations:

> *Identifying and evaluating intensification opportunities against market demand is challenging. The intensification potential of underutilized industrial lands will largely be determined by future development plans of existing or future land owners which are highly speculative*[3].

The City's consultants (Watson & Associates Economists Ltd.) recommended that a separate comprehensive city-wide industrial lands intensification strategy be undertaken to effectively evaluate such potential. It does not appear that such additional work was undertaken.

DISCUSSION

Puslinch does not have base data available about the current use of lands within the scoped study area such as lot coverage, building height, or extent of parking/loading/storage, etc. This information would help us develop an understanding of current utilization of industrial/commercial land within the context of existing businesses. Even if this data were available, as we have noted above, projecting potential industrial/commercial intensification is complicated by many different factors. To help illustrate this challenge we have identified three sample intensification scenarios below, together with the type of questions needing further study.

FIGURE 3 Sample Intensification Scenarios

Scenario	Unknowns
1. Redevelop lands devoted to on-site septic systems for industrial/ commercial use	• Would the size and location of septic systems warrant redevelopment? • What are the technical requirements and cost to decommission a septic system?
2. Redevelop and/or expand existing industrial/ commercial uses by removing limitations for "dry industrial uses"	• Which industrial sectors are, or are expected to be, attracted to the area? • Will the location and current/future value of land justify redevelopment? • Have existing industrial buildings reached the end of their economic life? • Do the current owners have an interest in redevelopment or expanding their businesses?
3. Infilling on under-utilized parking lots and outdoor storage areas	• Will industrial users continue to have needs for expansive parking areas, manoeuvering areas and/or outdoor storage requirements? • Do current businesses want to retain land for future expansion?

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[3] The City of Kingston Employment Land Strategy Review, 2015: vi.

We also note that the source protection implications of a new municipal well or wells, would need to be considered in further detail. For example, depending on the location of a new municipal well(s), existing and future development may become subject to Source Protection Plan policies. In addition, any new municipal water taking would need to demonstrate that it is not causing a well interference impact to other municipal or private wells.

Lastly, this report has been based on growth and intensification within the scoped study area which is currently identified in the Township's Zoning By-law and/or designated in the County Official Plan for industrial/commercial use. Expanding employment areas beyond these currently recognized boundaries would have to be considered within the context of the local and provincial policy framework, which place a priority on directing growth to settlement areas with full municipal services across Wellington County. The key provincial planning policy documents include the Provincial Policy Statement, the Provincial Growth Plan for the Greater Golden Horseshoe (including the Agricultural System and Natural Heritage System mapping) and the Provincial Greenbelt Plan.

CONCLUSION

The Township has created a supportive regulatory environment for growth and intensification within the scoped study area through pre-zoning and more flexible industrial and highway commercial standards for building site coverage, building setbacks and landscaping coverage. In the absence of municipal services, this will make more land available for development for "dry industrial uses" in the future.

Given the challenges associated with predicting employment land intensification, the Township may wish to retain a qualified consultant with specialized experience to determine how municipal water and wastewater services might translate into intensification.

Respectfully Submitted,
County of Wellington Planning and Development Department

Sarah Wilhelm, BES, MCIP, RPP
Manager of Development Planning

REPORT ADM-2018-040

TO: Mayor and Members of Council

FROM: Nina Lecic, Deputy Clerk

DATE OF INTRODUCTION: December 5**,** 2018

DATE OF CONSIDERATION: December 19, 2018

SUBJECT: Committee Governance Review
File No. C12

RECOMMENDATIONS

That Report ADM-2018-040 regarding the Committee Governance Review be received;

And that Council approves the changes outlined in this report for the following Committees:

- **Heritage Committee**
- **Planning and Development Committee**
- **Recreation Committee**

And that Council directs staff to table a Committee Governance Review report at the beginning of the 2022-2026 term of Township Council.

DISCUSSION

Background

At the January 21, 2015 Council Meeting, Council underwent a Committee Governance Review and directed staff to table a Committee Governance Review at the first business meeting of the 2018-2022 Term of Council. As per the direction given by Council, staff has prepared a review of the current Committee structure.

Purpose

The purpose of conducting regular governance reviews is to ensure that Committee structure and processes:

- Provide continuous commitment to civic engagement, transparency and accountability;
- Are focussed and aligned with identified Township priorities; and
- Contribute to an efficient and effective decision-making process

The purpose of Report ADM-2018-040 is to:

- Provide a governance review of the following Township committees:
    - Heritage Committee
    - Planning and Development Committee
    - Property Standards Committee
    - Recreation Committee
- Update the terms of reference and structure of the respective committees; and
- Provide an overview of the Committee Remuneration.

Overview of Township Committees:

1. Heritage Committee (HC)

HC is a discretionary committee under Section 28 of the *Ontario Heritage Act*, which states the Council of a municipality may, by by-law establish a municipal heritage committee to advise and assist Council on matters relating to Part IV and V of the Act and such other heritage matters as Council may specify by by-law. Council passed By-law 2/11 to establish a Heritage Committee.

Recommendations - HC

Terms of Reference

Staff recommends amendments to the terms of reference as follows:

- Support staff will simply be identified as “Township staff” (instead of identifying a specific position) to avoid having to modify the Terms should changes in support staff be required. Similarly, under Budget and Resources, the Staff Resource will simply be identified as “Township Staff”.
- That the term of the Chair and Vice Chair be amended to be four years in order to match the Term of Council and to allow for continuity and stability for the length of the appointment. Staff is recommending that the Chair be the Council member appointed to HC, as Council Members have the most exposure to parliamentary and meeting rules and can ensure that meetings flow smoothly and efficiently. A Vice Chair can be appointed from the rest of the membership.
- The Meeting schedule will be modified to change the meeting time to 1:00 p.m. as requested by the HC. The rest of the meeting schedule (quarterly meetings on the first Monday of the month) will remain the same.

2. Planning and Development (PDAC)

The primary function of PDAC is to consider applications for minor variances from the Zoning By-law and to assist Council on planning and development matters that affect the Township.

The Committee is authorized by the *Planning Act* to consider applications for:

- Minor variances from the provisions of the Zoning By-law
- Extensions, enlargements or variations of existing legal non-conforming uses under the Zoning By-law
- Review and comment on Zoning By-law applications and Site Plan Applications in a defined area.

Recommendations - PDAC

Terms of Reference

Staff recommends amendments to the terms of reference as follows:

- Support staff will simply be identified as "Township staff" (instead of identifying a specific position) to avoid having to modify the Terms should changes in support staff be required. Similarly, under Budget and Resources, the Staff Resource will simply be identified as "Township Staff".
- That the term of the Chair and Vice Chair be amended to be four years in order to match the Term of Council and to allow for continuity and stability for the length of the appointment. Staff is recommending that the Chair be the Council member appointed to PDAC, as Council Members have the most exposure to parliamentary and meeting rules and can ensure that meetings flow smoothly and efficiently. A Vice Chair can be appointed from the rest of the membership.

3. Property Standards Committee

No current changes are proposed to the Property Standards Committee.

4. Recreation Committee (RC)

The primary function of the RC is to assist Council on issues that affect all recreation facilities, parks, playing fields, playgrounds, programs and community centre.

Recommendations - RC

Terms of Reference

Staff recommends amendments to the terms of reference as follows:

- That the meeting schedule be amended so that the Committee meets quarterly on the third Tuesday of the month at 7:00 p.m. in order to more effectively utilize staff and Township resources.
- That the term of the Chair and Vice Chair be amended to be four years in order to match the Term of Council and to allow for continuity and stability for the length of the appointment. Staff is recommending that the Chair be the Council member appointed to RC, as Council Members have the most exposure to parliamentary and meeting rules and can ensure that meetings flow smoothly and efficiently. A Vice Chair can be appointed from the rest of the membership.

- Support staff will simply be identified as “Township staff” (instead of identifying a specific position) to avoid having to modify the Terms should changes in support staff be required. Similarly, under Budget and Resources, the Staff Resource will simply be identified as “Township Staff”.
- That the “Deliverables” section be simplified and scoped down as follows:
    - Modify Item #3 which reads “Reviewing existing practices and policies and making recommendations to improve the delivery of services to the public” to read “Reviewing practices and policies identified by staff and Council and making recommendations to improve the delivery of services to the public.” This will align the review of policies with the “Policy Review schedule” as approved by Council at the beginning of their Term.
    - Modify Item #4 which reads: “Bringing forward and discussing concerns raised by the public that may affect the operation of the department” to read: “Notifying staff as soon as possible of any concerns raised by the public that may affect the operation of the department”. Staff believe that any operational issues should be brought to staff’s attention as soon as they are observed, so they can be addressed immediately, instead of waiting to bring it up at a meeting. This will allow staff to address concerns prudently and swiftly.
    - Remove Item #6 which reads: “Reviewing revenue and expense reports” as it overlaps with Item #7 which reads: “Perform high-level reviews of revenue and expense reports with particular attention to watching for changes (month to month and year over year) and initiating investigations, if needed, on the cause of the changes.”

In 2017, Council approved the Puslinch Community Newsletter Policy which resulted in the creation of a monthly Newsletter. Currently, Township staff send out monthly reminders to approved Organizations, and forward any submissions to a designated member of the Recreation Committee. That member prepares the Newsletter which staff then post on the website. With the Recreation schedule moving to a quarterly basis, staff is recommending that the designated Committee member responsible for the monthly Newsletter receive remuneration for the monthly production of the newsletter. Staff will follow up with the designated Committee member to determine appropriate remuneration and will report back through the budget process.

Committee Remuneration

Wellington County Clerks recently discussed remuneration for Committee Members. While the Township is somewhat aligned with the remuneration provided to Members of the Planning Advisory Committee (and Committee of Adjustment), this is not case with the remuneration provided for the Recreation and Heritage Committee where the Township’s remuneration is higher than the comparator municipalities.

The following is a breakdown of the remuneration paid by the other Wellington County Municipalities.

Municipality	Committee of Adjustment Remuneration	Recreation Committee (Or equivalent) Remuneration	Heritage Committee Remuneration
Centre Wellington	$75 per meeting	Community Services Advisory Committee- $0	$0
Erin	$80 per meeting	Trails Advisory Committee- $0	$0
Guelph-Eramosa	$75 per meeting	Does not have a RC or equivalent	$0
Mapleton	$0	$50 per meeting	Does not have a HC
Minto	All Members of Council	$0	$0
Puslinch	$103.84 per meeting – Chair $90.93 per meeting - Member	$103.84 per meeting – Chair $90.93 per meeting - Member	$103.84 per meeting – Chair $90.93 per meeting - Member
Wellington North	All Members of Council	Not applicable- Made up of Members of Council	Does not have a HC

Community volunteerism and participation is an important component of a transparent and accountable governance system. However, staff thought it prudent to notify Council of the practices in the surrounding Wellington County Municipalities.

Financial Implications

All committees require staff resources to varying degrees. The 2018 Operating Budget for the various committees which excludes Township staff resource requirements is outlined below:

	2018 Budget
Expenditures	
Heritage Committee	$6,065
PDAC	$6,060
Recreation Committee	$4,360
Expenditures Total	**$16,484**

Please note, the budgets identified above include per diems, mileage, training, etc.

Any other financial implications associated with any of the recommendations approved by Council as outlined in this Report will be included in the 2019 Operating Budget.

Applicable Legislation and Requirements

Municipal Act
Ontario Heritage Act

Attachments

Existing Terms of Reference

Heritage Committee

TERMS OF REFERENCE

1. ENABLING LEGISLATION

Section 28 of the *Ontario Heritage Act* states a municipality may by by-law establish a heritage committee to advise and assist the Council on all matters relating to the conservation of property or cultural heritage value or interest and heritage conservation districts and such other heritage matters as the Council may specify by by-law.

The Heritage Committee was established through the adoption of By-law 2-11.

2. MANDATE

The primary function of the Heritage Committee is to advise Council and make recommendations on heritage designations, applications for repeal of designations, applications for alterations, and/or removal/demolition of Part IV and Part V properties under the *Ontario Heritage* Act.

Deliverables

The Committee will accomplish its mandate by:

1. Providing comments to Council on all heritage applications.
2. Commenting on various development applications which may impact existing or potential heritage properties or districts when required.
3. Commenting on demolition permits that apply to heritage properties.
4. Recording sites of heritage significance that are worthy of preservation, and awarding heritage plaques.
5. Recording historical information related to properties with heritage significance.
6. Promoting public awareness of Puslinch’s heritage.
7. Discussing concerns raised by the public and staff.

3. TYPE OF COMMITTEE

Statutory Committee - Discretionary

4. MEMBERSHIP AND ROLES AND RESPONSIBILITIES

1. Composition

The Heritage Committee is composed of the following Members:

Role	Member Name
Members of the Public	5
Chair	To be determined
Vice-Chair	To be determined
Role	Support
Support Staff	Legislative Assistant
External Resources	N/A

A Member's term on the committee shall be concurrent with the Term of Council or until a successor is appointed.

2. Roles and Responsibilities

A Chair and Vice-Chair shall be appointed at the first meeting of the Committee and shall serve in this capacity for a minimum of 2 years.

The Chair's main role is to facilitate meetings.

The Committee will review and confirm at the end of the second year of the each term of Council the appointments of the Chair and Vice-chair.

3. Qualifications

Citizen Appointee with the following qualifications:

- Interest in Heritage buildings
- Demonstrated commitment and interest in the municipality

4. Office Deemed Vacant

The office of a member of the committee becomes vacant if the member is absent for three (3) meetings in a calendar year.

5. MEETING SCHEDULE

The Committee meets quarterly on the first Monday of the month at 7:00 p.m., and as many additional times as the Committee deems necessary.

Agenda Notification

Agendas for the committee meetings will be made available to the public in accordance with the notice provisions of the Township's procedural by-law. Meetings will be held at the Municipal Office of the Township of Puslinch.

General Meeting Schedule Guidelines

Three or more consecutive cancellation of meetings shall result in a report to Council for evaluation as to the Committee's mandate and functionality except in the following situations:

- Where the Committee has determined that meetings shall not be held during the summer months and December to recognize holiday schedules as they relate to quorum requirements.

- During a municipal election year, meetings shall be cancelled where possible in the last quarter.

6. REPORTING REQUIREMENTS AND METHOD

Specific Requirements

This Committee is established by Council and reports to Council.

Written reports or minutes from this Committee shall be submitted to Council after each meeting.

General Requirements

The Committee shall make recommendations to Council in response to a request from either Council or staff in the area of the Committee's mandate.

The Committee may make recommendations on issues within their mandate for Council's consideration.

7. BUDGET AND RESOURCES

Resource Budget

The following Township of Puslinch staff resources will be required per meeting for the successful operation of this Committee:

Staff Resource	Time Commitment (FTE) per meeting - estimate
Legislative Assistant	FTE - 5 hours

8. COMPLETION CRITERIA

This will be an on-going Committee until dissolved by Council.

Planning & Development Advisory Committee

TERMS OF REFERENCE

1. ENABLING LEGISLATION

The Township's procedural by-law provides that Council may at any time, as is deemed necessary establish a Committee for matters within its jurisdiction.

Section 44 (1) of the *Planning* Act states:

> If a municipality has passed a by-law under section 34 or a predecessor of such section, the Council of the municipality may by by-law constitute and appoint a committee of adjustment for the municipality composed of such persons, not fewer than three, as Council considers advisable.

The Planning & Development Advisory Committee was established through the adoption of By-law 09/15.

2. MANDATE

The primary function of the Planning & Development Advisory Committee is to consider applications for minor variances from the Zoning By-law and to assist Council on planning and development matters that affect the Township.

The Committee is authorized by the *Planning Act* to consider applications for:

- Minor variances from the provisions of the Zoning By-law
- Extensions, enlargements or variations of existing legal non-conforming uses under the Zoning By-law
- Determine whether a particular use conforms with the provisions of the Zoning By-law where the uses of land, buildings or structures permitted in the by-law are defined in general terms

Minor Variances

The Zoning By-law regulates how land and buildings are used and where buildings and structures can be located. This by-law also specifies lot sizes and dimensions, parking requirements, building heights and other regulations necessary to ensure proper and orderly development.

However, sometimes it is not possible or desirable to meet all of the requirements of the Zoning By-law. In that case, a property owner may apply for approval of a minor variance. A minor variance provides relief from a specific Zoning By-law requirement, excusing a property owner from meeting the exact requirements of the by-law.

For the Committee to approve this type of application, Section 45(1) of the *Planning Act* requires that the members must be satisfied that the application:

- Is considered to be a “minor” change from the Zoning requirements;
- Is desirable for the appropriate development or use of the land, building or structure;
- Maintains the general intent and purpose of the Official Plan; and
- Maintains the general intent and purpose of the Zoning By-law.

Deliverables

The Committee will accomplish its mandate by:

1. Reviewing the merits of a minor variance application, the documentation and evidence put forward and rendering decisions on the application in accordance with the requirements of the Planning Act.
2. Providing advice and recommendations to Council with respect to site plan applications within the area defined on Schedule "A" attached.
3. Reviewing and commenting on County of Wellington Land Division applications.
4. Reviewing and commenting on Zoning By-law Amendment applications.
5. Participating in the Community Improvement Plan (CIP) process.
6. Evaluating and making recommendations to Council on site alteration applications that are equal to or exceed 1,000 cubic metres.
7. Providing advice and recommendations to Council with respect to any special project or issue as requested by Council.

3. TYPE OF COMMITTEE

Advisory/Statutory Committee

4. MEMBERSHIP AND ROLES AND RESPONSIBILITIES

1. Composition

The Planning & Development Advisory Committee is composed of the following:

Role	Member Name
Members of Council	1
Members of the Public	4
Chair	To be determined
Vice-Chair	To be determined
Role	Support
Support Staff	Development Coordinator/Secretary-Treasurer Chief Building Official
External Resources	Planner

The members of the committee who are not members of a municipal council shall hold office for the term of the council that appointed them and the members of the committee who are members of a municipal council shall be appointed annually.

2. Roles and Responsibilities

A Chair and Vice-Chair shall be appointed at the first meeting of the Committee and shall serve in this capacity for a minimum of 2 years.

The Chair's main role is to facilitate meetings.

The Committee will review and confirm at the end of the second year of the each term of Council the appointments of the Chair and Vice-Chair.

3. Qualifications

Member of Council

Citizen Appointee with the following qualifications

- Planning
- Real Estate
- Agriculture
- Building/Construction
- Legal
- Architecture
- General knowledge of the *Planning Act* and the committee of adjustment process
- Demonstrated commitment and interest in the community

4. Office Deemed Vacant

The office of a member of the committee becomes vacant if the member is absent for three (3) meetings in a calendar year.

5. MEETING SCHEDULE

The Committee meets on the 2nd Tuesday of each month at 7:00 p.m., and as many additional times as the Committee deems necessary.

Agenda Notification

Agendas for the committee meetings will be made available to the public in accordance with the notice provisions of the Township's procedural by-law. Meetings will be held at the Municipal Office of the Township of Puslinch.

6. REPORTING REQUIREMENTS AND METHOD

Specific Requirements

This Committee is established by Council and reports to Council for all matters excluding committee of adjustment responsibilities.

Written reports or minutes from this Committee shall be submitted to Council after each meeting.

This Committee for committee of adjustment matters is a quasi-judicial tribunal with its members appointed by Council and it renders decisions on minor variance applications independently.

General Requirements

The Committee shall make recommendations to Council in response to a request from either Council or staff in the area of the Committee's mandate.

The Committee may make recommendations on issues within their mandate for Council's consideration.

7. BUDGET AND RESOURCES

Resource Budget

The following Township of Puslinch staff resources will be required per meeting for the successful operation of this Committee:

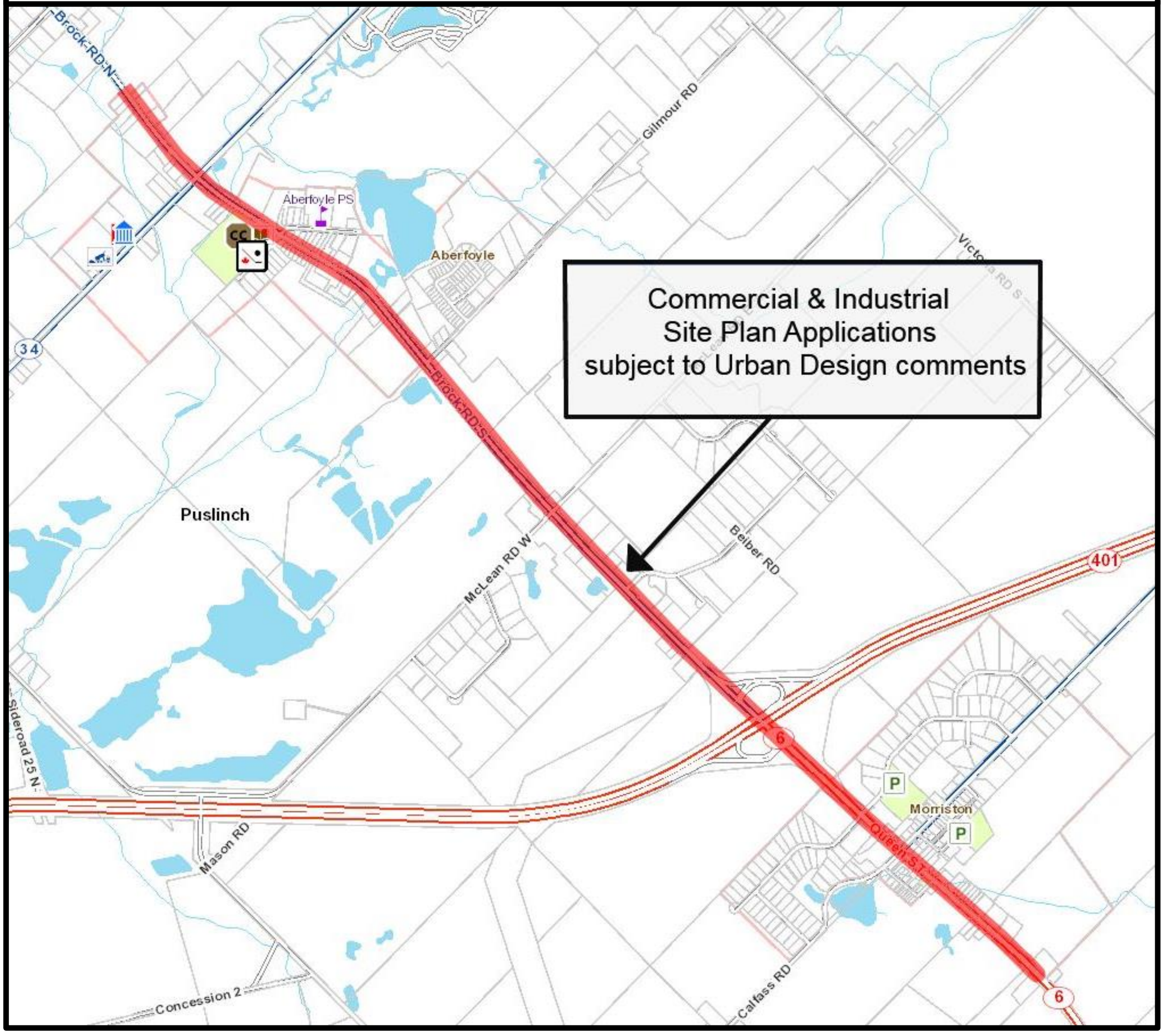
Staff Resource	Time Commitment (FTE) per meeting - estimate
Development Coordinator	FTE - 5 hours
External Resources	FTE – Planner as required

8. COMPLETION CRITERIA

This will be an on-going Committee until dissolved by Council.

Schedule “A”
Planning and Development Advisory Committee Terms of Reference

Site Plan Applications subject to Urban Design Guidelines



Commercial & Industrial
Site Plan Applications
subject to Urban Design comments

Property Standards Committee

TERMS OF REFERENCE

1. ENABLING LEGISLATION

Section 15.6 of the *Building Code* Act states:

If a municipality has passed a Property Standards By-law, Council shall establish a Property Standards Committee.

The Property Standards Committee was established through the adoption of By-law 37-89.

2. MANDATE

The primary function of the Property Standards Committee is to hear and determine all appeals in accordance with procedures established under the provisions of the *Statutory Powers Procedure Act.*

The Committee considers appeals to Property Standards Orders issued by Property Standards Officers (Municipal Law Enforcement Officer).

Deliverables

The Committee will accomplish its mandate in accordance with the *Building Code Act* by:

1. Hearing an appeal filed by the appellant
2. Rendering a decision to confirm, modify or rescind the Order or extend the time for complying with the Order.

3. TYPE OF COMMITTEE

Statutory Committee

4. MEMBERSHIP AND ROLES AND RESPONSIBILITIES

1. Composition

The Property Standards Committee is composed of the following:

Role	Member Name
Members of Council	5
Chair	To be determined
Vice-Chair	To be determined

Role	Support
Support Staff	Building & By-law Coordinator
Departmental Representatives	Chief Building Official Building Inspector/By-law Enforcement Officer

A Member's term on the committee shall be concurrent with the Term of Council or until a successor is appointed.

2. Roles and Responsibilities

A Chair and Vice-Chair shall be appointed at the first meeting of the Committee and shall serve in this capacity for a minimum of 2 years.

The Chair's main role is to facilitate meetings.

The Committee will review and confirm at the end of the second year of the each term of Council the appointments of the Chair and Vice-Chair.

3. Qualifications

Member of Council

4. Office Deemed Vacant

The office of a member of the committee becomes vacant if the member is absent for three (3) meetings in a calendar year.

5. MEETING SCHEDULE

The Committee meets as needed.

Hearing Notification

Notice of a Hearing will be made available to the public in accordance with the notice provisions of the Township's procedural by-law. Hearings will be held at the Municipal Office of the Township of Puslinch.

6. REPORTING REQUIREMENTS AND METHOD

The Committee is established by Council and has the power to make the final decision, which may be appealed to the Superior Court of Justice by notifying the Clerk of the municipality in writing and by applying to the court within 14 days after a copy of the decision is sent.

7. BUDGET AND RESOURCES

Resource Budget

The following Township of Puslinch staff resources will be required per meeting for the successful operation of this Committee:

Staff Resource	Time Commitment (FTE) per meeting - estimate
Building & By-law Coordinator	FTE – 3 hours
Chief Building Official	FTE – 1.5 hours
Building Inspector/By-law Enforcement Officer	FTE – 1.5 hours

8. COMPLETION CRITERIA

This will be an on-going Committee until dissolved by Council.

Schedule “A”
Recreation Committee

TERMS OF REFERENCE

1. ENABLING LEGISLATION

The Township’s procedural by-law provides that Council may at any time as is deemed necessary establish a Committee for matters within its jurisdiction.

The Recreation Committee was established through the adoption of By-law Number 10/15.

2. MISSION STATEMENT

With due diligence the committee members will work with all recreation staff members, township staff, council members and community members to maximize the township recreation resources.

3. MANDATE

The primary function of the Recreation Committee is to assist Council on issues that affect all recreation facilities, parks, playing fields, playgrounds, programs and community centre.

Deliverables

The Committee will accomplish its mandate by:

1. Advising Council on issues that affect all recreation facilities, parks, playing fields, playgrounds, programs and community centre (including policy and fee schedules).

2. Receiving and reviewing the operating and capital budget.

3. Reviewing existing practices and policies and making recommendations to improve the delivery of services to the public.

4. Bringing forward and discussing concerns raised by the public that may affect the operation of the department.

5. Encouraging and assisting, where necessary, programs of recreation to meet the needs and interests of the community.

6. Reviewing revenue and expense reports.

7. Perform high-level reviews of revenue and expense reports with particular attention to watching for changes (month to month and year over year) and initiating investigations, if needed, on the cause of the changes.

4. TYPE OF COMMITTEE

Advisory Committee

5. MEMBERSHIP AND ROLES AND RESPONSIBILITIES

1. Composition

The Recreation Committee is composed of the following Members:

Role	Member Name

Members of Council	1
Members of the Public	4
Chair	To be determined
Vice-Chair	To be determined
Role	Support
Support Staff	Deputy Clerk Director of Public Works and Parks
External Resources	N/A

A Member's term on the committee shall be concurrent with the Term of Council or until a successor is appointed.

2. Roles and Responsibilities

A Chair and Vice-Chair shall be appointed at the first meeting of the Committee and shall serve in this capacity for a minimum of 2 years.

The Chair's main role is to facilitate meetings.

The Committee will review and confirm at the end of the second year of the each term of Council the appointments of the Chair and Vice-chair.

3. Qualifications

Member of Council

Citizen Appointee with the following qualifications:

- Recreation
- Marketing
- Fundraising
- Business
- Financial
- Communication
- Demonstrated commitment and interest in the municipality

4. Office Deemed Vacant

The office of a member of the committee becomes vacant if the member is absent for three (3) meetings in a calendar year.

6. MEETING SCHEDULE

The Committee meets on the 3rd Tuesday of each month at 7:00 p.m., and as many additional times as the Committee deems necessary.

<u>Agenda Notification</u>

Agendas for the committee meetings will be made available to the public in accordance with the notice provisions of the Township's procedural by-law. Meetings will be held in the Council Chambers at the Municipal Office of the Township of Puslinch.

<u>General Meeting Schedule Guidelines</u>

Three or more consecutive cancellation of meetings shall result in a report to Council for evaluation as to the Committee's mandate and functionality except in the following situations:

- Where the committee has determined that meetings shall not be held during the summer months and December to recognize holiday schedules as they relate to quorum requirements.
- During a Municipal election year, meetings shall be cancelled where possible in the last quarter.

7. REPORTING REQUIREMENTS AND METHOD

Specific Requirements

This Committee is established by Council and reports to Council.

Written reports or minutes from this Committee shall be submitted to Council after each meeting.

General Requirements

The Committee shall make recommendations to Council in response to a request from either Council or staff in the area of the Committee's mandate.

The Committee may make recommendations on issues within their mandate for Council's consideration.

8. BUDGET AND RESOURCES

Resource Budget

The following Township of Puslinch staff resources will be required per meeting for the successful operation of this Committee:

Staff Resource	Time Commitment (FTE) per meeting – estimate
Administrative Assistant	FTE - 4 hours
Deputy Clerk	FTE – 3 hours
Director of Public Works & Parks	FTE – 2 hours

9. COMPLETION CRITERIA

This will be an on-going Committee until dissolved by Council.

REPORT ADM-2018-042

TO: Mayor and Members of Council

FROM: Karen Landry, CAO/Clerk

DATE: December 5, 2018

SUBJECT: Cannabis Update – Retail Stores

RECOMMENDATIONS

That Report ADM-2018-042 regarding Cannabis Update be received; and

That should Council wish to opt-out of the hosting of cannabis retail stores that it pass a resolution directing staff in the manner required under Ontario Regulation 468/18 s.22 to opt out by January 22, 2019; and

That should Council wish to opt-in to hosting of cannabis retail stores that it direct staff to report back on the establishment of a "Municipal Cannabis Retail Policy Statement".

DISCUSSION

Purpose

The purpose of this report is to provide Council with information as it relates to the implementation of cannabis retail stores.

Background

The provincial government has committed to allowing private recreational cannabis retail stores throughout Ontario starting April 1, 2019. As recreational cannabis is a legal, controlled and regulated product, cannabis stores will be considered like any other type of retail and as such, no zoning changes are needed. Municipal provisions that apply to retail stores would apply to cannabis retail stores.

The provincial government has established a regulatory framework (O. Reg 468.18) under the recently passed *Cannabis Licence Act, 2018* that provides further clarity on how these private businesses will be licensed and regulated by the Alcohol and Gaming Commission of Ontario (AGCO). These regulations deal with various elements of the retail regime including matters in which municipal governments may have an interest.

The regulations speak to how a licence to open a cannabis store will be issued. The full details of the AGCO process have not yet been released, however the AGCO will issue guidance information once finalized.

The licensing regime with have three parts: operator approval; retail site location approval; and store management licensing.

The Township has a one-time opportunity to opt-out of allowing retail cannabis stores within the Township. The decision to opt-out must be made by January 22, 2019. If the Township does not opt-out by January 22 in the manner required under Ontario Regulation 468/18 s.22, the Township is opted-in by default.

To protect youth, the provincial cannabis retailing regulations include a 150-meter buffer area for cannabis stores to keep them separated from schools. No buffers from any other use has been specified by the regulations.

For a municipality that opts-in, the Association of Municipalities (AMO) in discussions with some member municipalities suggests that a municipality may wish to consider establishing a “Municipal Cannabis Retail Policy Statement” identifying specific and significant locally sensitive considerations or uses that best represent the expectations of the community in allowing cannabis retail. For example, a policy statement may identify specific sensitive uses and express parameters to consider proximity to these sensitive areas.

The AGCO cannabis licensing process, much like the process for liquor licensing applications, requires that a notice (15-day window) of a proposed cannabis store site be posted for comments from area residents and businesses before a site authorization is made. At this time, the municipal government will not be provided pre-notification of the application, but can make comments about whether the proposal is in the public interest as described by regulation. The legislation provides that municipal comments should focus on whether a proposed storefront location is in the public interest. Public interest is defined as public health or safety, protecting youth and eliminating the illegal market.

For a municipality that opts-in, it is recommended the municipality identify a key senior staff lead to:

- process proposed cannabis store notices from the AGCO; and

- provide a one-window approach to coordinate municipal input within the 15-day commentary period.

Please note the only mechanism for not permitting any retail stores in a municipality is through the opting out process.

Financial Implications

It is important to note that the government has different funding plans for those municipalities that opt-out of retail sales compared to those that opt-in as of January 22, 2019.

AMO has advised that, "While opting out can be reversed after January 22, the municipal government will not gain any additional funding from the Ontario Cannabis Legalization Implementation Fund (OCLIF) than it had as of January 22 when it opted- out beyond the minimum second payment of $5,000".[1]

According to the Ministry of Finance, the OCLIF will be distributed as follows:

- In early January, the first payment of $15 million will be made to all municipalities on a per household basis, adjusted so that each municipality receives at least $5,000 to enable municipalities to proceed with their planned legalization activities.

- A second payment of $15 million will then be distributed following the deadline for municipalities to opt-out under the Cannabis Licence Act, which is January 22, 2019.
  - If a municipality has not opted-out of hosting private retail stores in accordance with the Cannabis Licence Act, it will receive funding based on the 2018 MPAC household numbers, adjusted so that at least $5,000 is provided to each municipality.
  - If a municipality has opted-out of hosting private retail stores in accordance with the Cannabis Licence Act, it will receive a maximum amount of $5,000. Please note that if a municipality opts-out by January 22, 2019, and opts back in later, that municipality will not be eligible for additional funding.

- The province is setting aside $10 million of the municipal funding to address costs from unforeseen circumstances related to the legalization of recreational cannabis, and **priority will be given to municipalities that have not opted-out**. Further details will be provided at a later date.

---

[1] AMO, Municipal Cannabis Update, November 21, 2018

- If Ontario’s portion of the federal excise duty on recreational cannabis over the first two years of legalization exceeds $100 million, the Province will provide 50 per cent of the **surplus only to municipalities that have not opted-out as of January 22, 2019**.

The Township will be required to share 50% of its allocation with the County based on the splitting of household numbers between the Township and the County. The County will only receive funding in relation to opt-out decisions made by its lower tier municipalities.

The Township is able to utilize this funding to address the implementation costs that directly relate to the legalization of recreational cannabis. Examples of permitted costs include:

- Increased enforcement (ie. by-law enforcement and litigation);
- increased response to public inquiries (ie. correspondence);
- increased fire services; and
- by-law/policy development (ie. workplace safety policy).

Applicable Legislation and Requirements

Cannabis Licence Act
Ontario Regulation 468/18

REPORT PD-2018-010

CONCURRENCE REPORT to INDUSTRY CANADA

FROM: Nina Lecic, Deputy Clerk

DATE: December 5, 2018

SUBJECT: Telecommunication Application File A12/BEL– Bell Mobility- Site location Concession Gore Part Lot 23, Parts 2 and 4, municipally known as 7094 Gore Road

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RECOMMENDATIONS:

That Report PD-2018-010 regarding Telecommunication Application File A12/BEL– Bell Mobility- Site location Concession Gore Part Lot 23, Parts 2 and 4, municipally known as 7094 Gore Road, be received;

And that Council authorizes the release of the Concurrence Report to Industry Canada regarding the proposed 70 metre Bell Mobility Telecommunication Steel Self-Support Tower.

BACKGROUND:

Purpose of Report

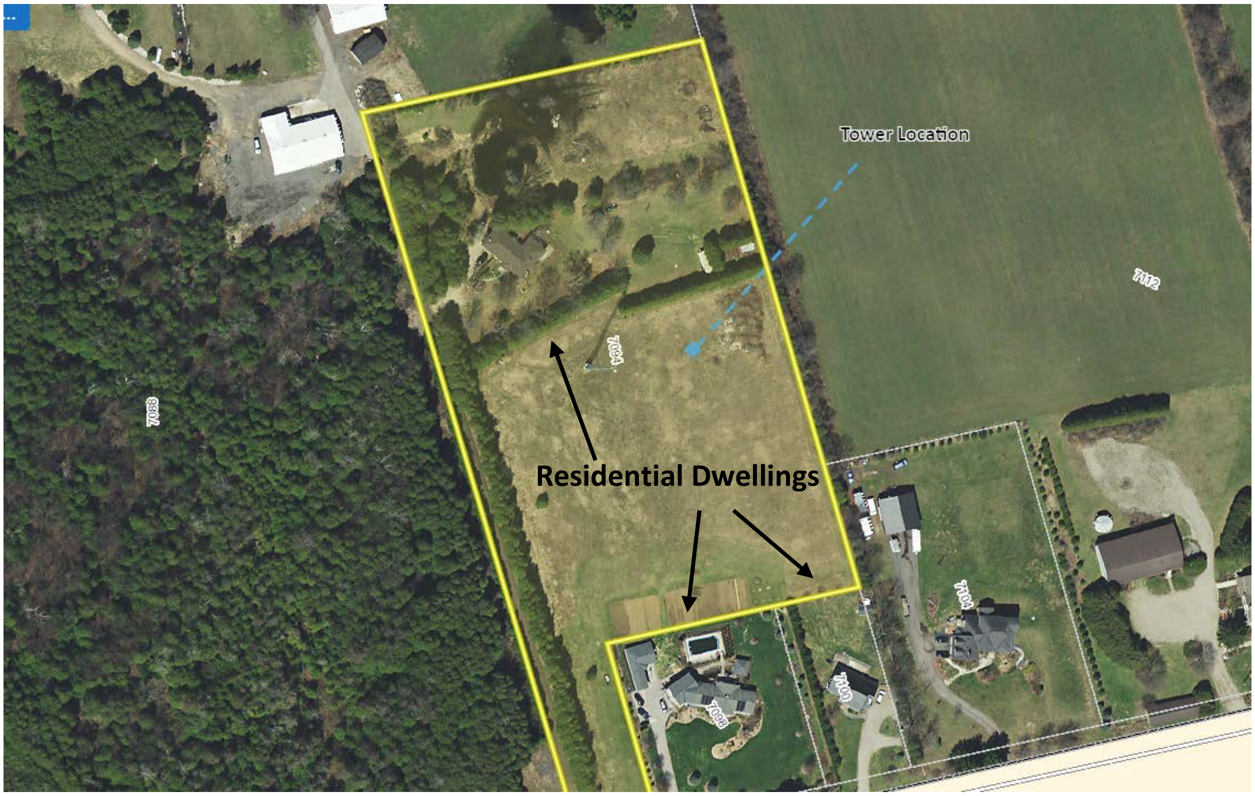
Industry Canada, the Federal department responsible for granting authorization for telecommunication facilities, requires that applicants consult with the local land use authority for telecommunication installations. The Township follows Industry Canada's default public consultation process for antenna siting, which Applicants are expected to cooperate with in order to complete the approval process as set by Industry Canada. This Concurrence report has taken into consideration all consultations, discussions and submissions of the public and Bell Mobility.

2. Application

The purpose of the application is to construct a 70 metre, steel self-supported telecommunication tower with associated equipment shelter at the base and perimeter security fencing. The purpose of the tower is to provide the infrastructure for carriers to improve wireless communication services in the immediate area.

3. Location & Site Characteristics

The proposed wireless communication structure will be located north side of Gore Road in between Sideroad 20 South and Sideroad 25 South on Agriculturally zoned land. The closest residential dwelling is approximately 114 metres to the south.



Source: County of Wellington 2010 Air Photo & Parcel Fabric

4. Staff, Agency & Public Circulation Comments:

The application was circulated to various external agencies and internal departments for comment. Staff notes that no objections were received from circulated agencies or departments.

Public notice was placed in the Wellington Advertiser and mailed to properties within a radius of three times the tower height (210 metres) as prescribed by Industry Canada. In addition, a large sign was placed on the property. No objections were received from any members of the public.

APPLICABLE LEGISLATION & REQUIREMENTS:

1. County of Wellington Official Plan

Section 12.6.1, Utilities Allowed, may permit the following uses in any land use designation, subject to the provisions of the Zoning By-law:

> All electrical power facilities, including all works defined by the Power Corporation Act and telecommunications facilities and multi-use cables, provided that the development satisfies the provisions of the Environmental Assessment Act, the Environmental Protection Act and any other relevant legislation.

2. Township of Puslinch Zoning By-Law

When utility services are licensed by Industry Canada, Local, Regional and Provincial Planning documents do not apply. The proposed tower is located in the Rural Area of the Township on Agricultural (A) zoned lands. Public uses are permitted in the A Zone.

CONCLUSION:

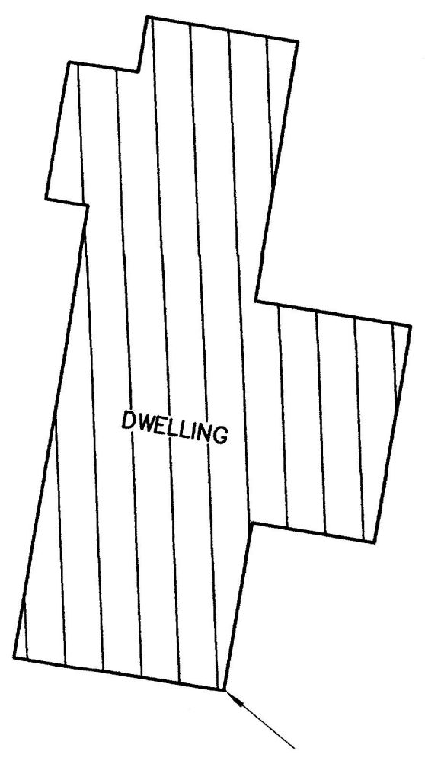
Township Staff notes that communication facilities are federally regulated with the final decision vested with Industry Canada. Bell Mobility has consulted with the Township prior to filing its application, and has submitted the documents and reports required by Industry Canada's Default Consultation Process. Bell Mobility is submitting payment on December 5, 2018. The Township has obtained written approval from the Hamilton Conservation Authority, but requests that Bell Mobility provides us with their Letter of Permission once they receive it from the Hamilton Conservation Authority.

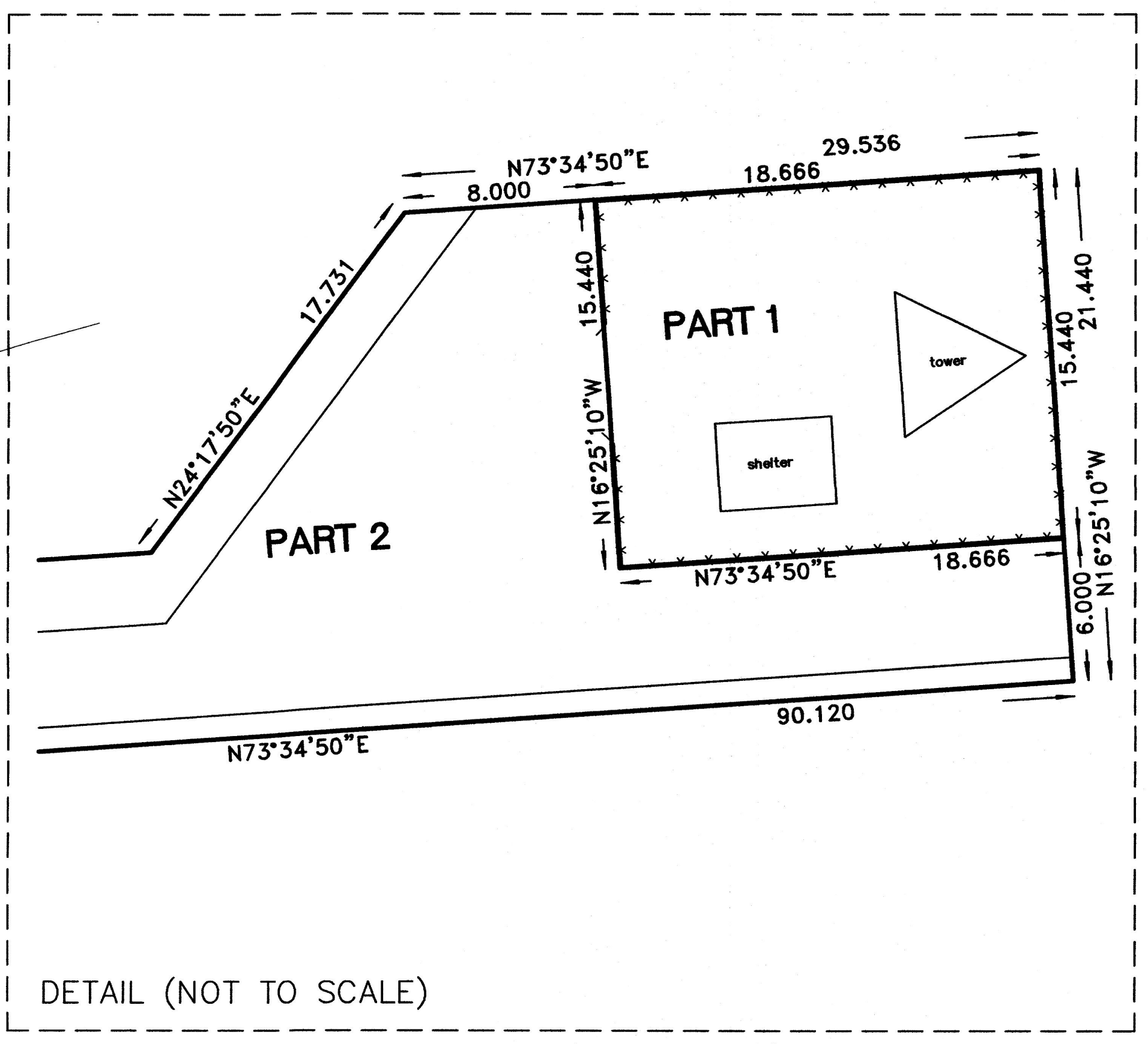
Staff has concluded that the Applicant has satisfied the requirements of the consultation process and has no further comments regarding the telecommunication tower and therefore recommend the issuance of this concurrence report.

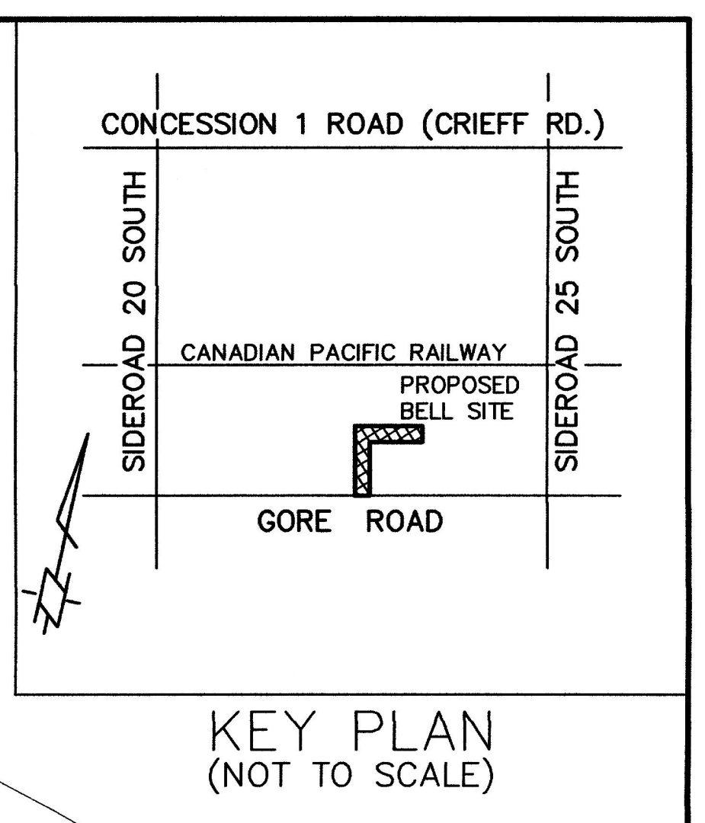
ATTACHMENTS:

Attachment "A" – Subject Property Survey

W2326 (7094 GORE RD.)

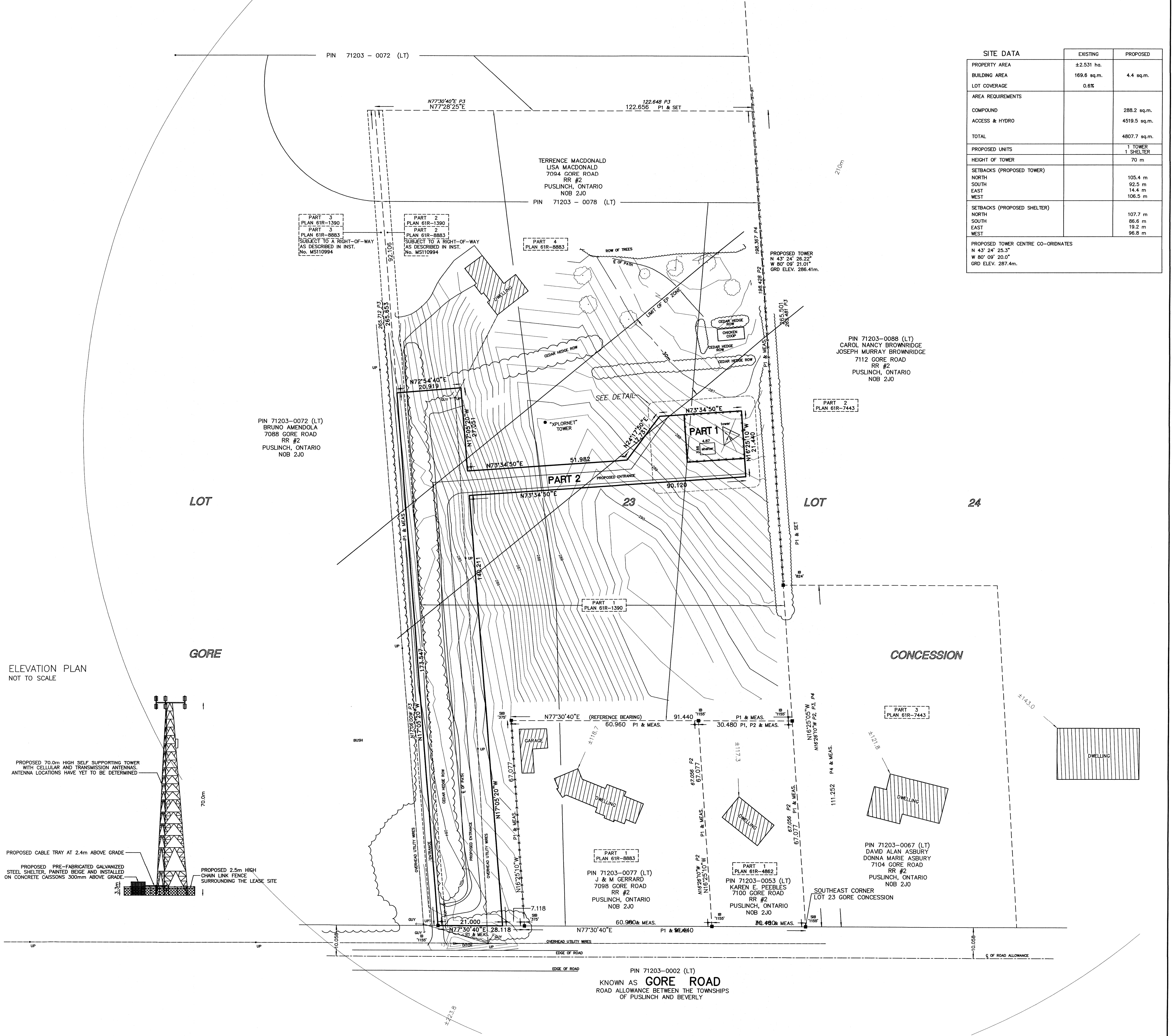






KEY PLAN
(NOT TO SCALE)

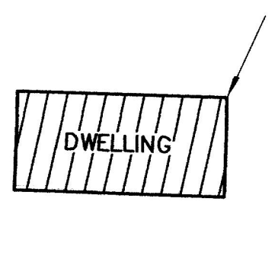
SITE DATA	EXISTING	PROPOSED
PROPERTY AREA	±2.531 ha.	
BUILDING AREA	169.6 sq.m.	4.4 sq.m.
LOT COVERAGE	0.6%	
AREA REQUIREMENTS		
COMPOUND		288.2 sq.m.
ACCESS & HYDRO		4519.5 sq.m.
TOTAL		4807.7 sq.m.
PROPOSED UNITS		1 TOWER 1 SHELTER
HEIGHT OF TOWER		70 m
SETBACKS (PROPOSED TOWER)		
NORTH		105.4 m
SOUTH		92.5 m
EAST		14.4 m
WEST		106.5 m
SETBACKS (PROPOSED SHELTER)		
NORTH		107.7 m
SOUTH		86.6 m
EAST		19.2 m
WEST		96.8 m
PROPOSED TOWER CENTRE CO-ORIDNATES N 43° 24' 25.3" W 80° 09' 20.0" GRD ELEV. 287.4m.		



PIN 71203–0002 (LT)

KNOWN AS **GORE ROAD**

ROAD ALLOWANCE BETWEEN THE TOWNSHIPS
OF PUSLINCH AND BEVERLY



LEGEND

UP DENOTES UTILITY POLE
GUY " GUY

NOTE:

THIS IS NOT A PLAN OF SURVEY AND SHALL NOTE BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

THIS SKETCH IS PROTECTED BY COPYRIGHT ©

ELEVATION NOTE:

ELEVATIONS SHOWN HEREON ORTHOMETRIC AND ARE REFERRED TO STATION 00119663352 HAVING AN ELEVATION 243.629m.

METRIC NOTE:

DISTANCES AND ELEVATIONS SHOWN HEREON ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOV. 21, 2018 (REV)
DATE

MARK GILMORE, O.L.S.

LANTHIER & GILMORE SURVEYING LTD.
173 CLARENCE ST., PORT COLBORNE, ONT. (905) 835–5477

SKETCH OF

PROPOSED BELL MOBILITY TOWER
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON

SCALE 1:500
SURVEY 20–316

0 10 20 30 40 meters

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER 066-2018

Being a by-law to amend By-law 012-2018 being the By-law to adopt the Council, Committees and Other Appointments – Compensation, Benefits and Expense Policy and to Repeal By-law No. 020-2017.

WHEREAS the *Municipal Act, S.O. 2001, c. 25*, Section 270 (1) as amended, requires a municipality to adopt and maintain policies with respect to certain matters; and

AND WHEREAS Council passed By-law 012-2018 being the By-law to adopt the Council, Committees and Other Appointments – Compensation, Benefits and Expense Policy and to Repeal By-law No. 020-2017 on February 21, 2018;

AND WHEREAS Council deems it expedient to amend the policy regarding the Compensation, Benefits and Expenses payable to Council, Committees and Other Appointments.

NOW THEREFORE the Council of the Corporation of the Township of Puslinch hereby enacts as follows:

1. That Section 4.3 of the Council, Committees and Other Appointments – Compensation, Benefits and Expense Policy is hereby amended to allow for the purchase of laptops at the end of a Council Member's term of Council, provided that the laptop is them removed from all Township networks and shared drives.

READ A FIRST, SECOND AND THIRD TIME AND FINALLY PASSED THIS 5th DAY OF DECEMBER, 2018.

____
James Seeley, Mayor

____
Karen Landry, CAO/Clerk

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER 067-2018

Being a by-law to confirm the proceedings of the Council of the Corporation of the Township of Puslinch at its Regular meeting held on December 5, 2018.

WHEREAS by Section 5 of the *Municipal Act, 2001, S.O. 2001, c.25* the powers of a municipal corporation are to be exercised by its Council;

AND WHEREAS by Section 5, Subsection (3) of the *Municipal Act,* a municipal power including a municipality's capacity, rights, powers and privileges under section 8, shall be exercised by by-law unless the municipality is specifically authorized to do otherwise;

AND WHEREAS it is deemed expedient that the proceedings of the Council of the Corporation of the Township of Puslinch at its Regular meeting held on December 5, 2018 be confirmed and adopted by By-law;

NOW THEREFORE the Council of the Corporation of the Township of Puslinch hereby enacts as follows:

1) The action of the Council of the Corporation of the Township of Puslinch, in respect of each recommendation contained in the reports of the Committees and each motion and resolution passed and other action taken by the Council at said meeting are hereby adopted and confirmed.

2) The Head of Council and proper official of the Corporation are hereby authorized and directed to do all things necessary to give effect to the said action of the Council.

3) The Head of Council and the Clerk are hereby authorized and directed to execute all documents required by statute to be executed by them, as may be necessary in that behalf and the Clerk authorized and directed to affix the seal of the said Corporation to all such documents.

READ A FIRST, SECOND AND THIRD TIME AND FINALLY PASSED THIS 5th DAY OF DECEMBER 2018.

James Seeley, Mayor

Karen Landry, C.A.O./Clerk