October 25, 2023 Project No. 19130670

Craig Bellinger, Environmental and Project Manager
R.W. Tomlinson Limited
100 Citigate Drive
Ottawa, ON
K2J 6K7

MAXIMUM PREDICTED WATER TABLE REPORT
PROPOSED STITTSVILLE 2 QUARRY
CITY OF OTTAWA, ONTARIO

Mr. Bellinger:

R.W. Tomlinson Limited (Tomlinson) is applying for a Class 'A' licence for a Quarry Below the Groundwater Table under the *Aggregate Resources Act* (ARA) for the proposed Stittsville 2 Quarry (site) located in Lots 15 and 16, Concession 11 in the Geographic Township of Goulbourn, City of Ottawa, Ontario. The site is located directly adjacent to the existing Stittsville Quarry. The area proposed to be licensed under the ARA is 121.7 hectares (ha) and the proposed extraction area is 109.8 ha. The boundaries of the licensed area and limit of extraction for the existing Stittsville Quarry and the proposed boundaries for the site are shown on Figure 1. To remain consistent with the development plan for the existing Stittsville Quarry, the site would be extracted in a series of three lifts. The final quarry floor for the proposed Stittsville 2 Quarry will slope from approximately 123 metres above sea level (asl) in the southwest to approximately 101 metres asl in the northeast which generally follows the contact between the Bobcaygeon Formation and Gull River Formation.

This report summarizes the results of the groundwater level monitoring completed on and in the vicinity of the site to fulfill the requirements of the Maximum Predicted Water Table Report as described in the Aggregate Resources Ontario: Technical Reports and Information Standards dated August 2020.

1.0 GROUNDWATER ELEVATIONS

As part of the required groundwater monitoring program for the Permit to Take Water (PTTW) for the existing Stittsville Quarry, monthly groundwater level measurements are recorded for the monitoring wells installed in BH99-1, BH99-3, BH03-9, BH05-13, BH13-16 and BH18-17.

To gather additional data in support of the ongoing licensing project for the site, water levels were measured quarterly in the existing monitoring wells located at BH05-10 and BH05-11. New boreholes (completed as open boreholes with no monitoring wells installed) were drilled at SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29 in March 2020 and water levels were measured on a monthly basis at those locations starting in May 2020.

The locations of the monitoring wells included in the groundwater monitoring program are shown on Figure 1.

The available groundwater elevation data measured as part of the ongoing groundwater level monitoring program for the site are described below. Figures 2 through 10 show the groundwater elevations plotted versus time at BH99-1, BH99-3, BH03-9, BH05-10, BH05-11, BH05-13, BH13-16, BH18-17, SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29. The groundwater elevation data used to generate Figures 2 through 10 are provided in Table 1.

1.1 BH99-1 and BH99-3

The monitoring wells in boreholes BH99-1 and BH99-3 (Figures 2 and 3) are the only remaining locations with a water level data record that extends to prior to the start of quarry dewatering at the existing Stittsville Quarry (October 14, 2002). Figure 2 shows that groundwater elevations in monitoring well BH99-1 remained relatively consistent between the pre-development and post-development monitoring programs until July 2020 when the water level dropped by approximately 13 metres. This drop in water level at BH99-1 is interpreted to be related to quarry expansion in the area of the monitoring well.

Figure 3 shows the deeper monitoring intervals, BH99-3A and BH99-3B show a decrease in groundwater elevations as compared to the recorded pre-dewatering groundwater elevations (prior to October 14, 2002). However, groundwater elevations at BH99-3A underwent a recovery period between July and September 2016 and remained consistent, yet variable until 2022 when a decrease was observed. Groundwater elevations in monitoring wells BH99-3C and BH99-3D in the period after dewatering began at the Stittsville Quarry are more variable when compared to pre-dewatering groundwater elevations (Figure 3).

1.2 BH03-9

Groundwater levels in monitoring well BH03-9C have remained consistent since monitoring began with a drop of approximately one metre in August 2011. The water levels in the deeper monitoring wells in BH03-9 (intervals ‘A’ and ‘B’) have increased over time such that they are at the same elevation as the upper monitor (Figure 4).

1.3 BH05-10

After an initial decrease in groundwater levels between June 2006 and January 2007, the groundwater levels have remained relatively variable at all three monitoring intervals without exhibiting any increasing or decreasing trends (Figure 5).

1.4 BH05-11

The groundwater level trends in BH05-11 are variable over time, but generally increased between 2006 and 2017. A slight decrease was observed in 2021 (Figure 6).

1.5 BH05-13

Groundwater elevations in the monitoring wells installed in BH05-13 have been consistent since monitoring began with the exception of BH05-13B where water levels increased by approximately 4.8 metres between May and July 2014 and has been consistent ever since (Figure 7).

1.6 BH13-16

The deeper monitoring intervals (intervals ‘A’ and ‘B’) at BH13-16 show a decreasing water level trend over time until approximately 2021 when groundwater levels in these monitors stabilized. The shallower monitoring intervals (intervals ‘C’ and ‘D’) have been relatively stable since monitoring began (Figure 8).

1.7 BH18-17

Groundwater elevations in the monitoring wells installed in BH18-17 have been relatively consistent since monitoring began (Figure 9).

1.8 SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29

Groundwater elevations in the monitoring wells installed in SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29 have been relatively consistent since monitoring began (Figure 10). Lower groundwater levels can be seen during the summer months at these monitoring locations.

1.9 Discussion

At BH99-3, where monitoring began before the existing Stittsville Quarry started dewatering, the decline in water levels at the deeper intervals appears in early 2006 and continued until mid-2012. After that time, water levels have been generally stable, but variable from one monitoring session to the next.

Monitoring wells that were installed after quarry dewatering began at the existing Stittsville Quarry (BH03-9, BH05-10, BH05-13 and BH13-16) generally show the same trend with the exception of the monitoring wells in BH03-9. The deeper monitoring intervals (intervals 'A' and 'B') at the various locations show a decreasing water level trend over time whereas the more shallow intervals (intervals 'C' and 'D') are relatively stable. The water levels in the deeper monitoring wells in BH03-9 have increased over time such that they are at the same elevation as the upper monitor (Figure 4).

In plan view (Figure 1), borehole BH99-3 is the closest remaining borehole to the quarry excavation and, as such, should show the greatest decrease in water levels. The deep intervals at this location show the greatest decrease in groundwater elevations. The more shallow intervals at this location, as well as the deep intervals at monitoring wells farther from the quarry excavation, show less decrease in groundwater elevations.

In general, the overall decline in groundwater levels at BH99-3A and BH99-3B and the deeper monitoring intervals at other locations (BH05-10A, BH05-10B, BH05-13A, BH13-16A and BH13-16B) is interpreted to be related to quarry dewatering activities at the existing Stittsville Quarry.

2.0 HORIZONTAL GROUNDWATER FLOW DIRECTION

Based on the results of the groundwater elevations collected at the site, at the shallow intervals, groundwater flow generally flows from west to east. Table 1 provides the available groundwater elevations for all on-site monitoring wells. In the shallow intervals, the highest groundwater elevations are found in monitoring wells installed on the western side of the site (i.e., BH99-1, BH99-3D, BH03-9C, BH05-10C and BH13-16D) and the lower groundwater elevations are found in the monitoring wells installed along the eastern edge of the proposed extraction area (BH18-17D and SQAT20-27).

In the deeper intervals, groundwater flow is generally from east to west likely due to the existing dewatered quarry on the western side of the Stittsville 2 Quarry site. The highest groundwater elevations are found in the monitoring wells located on the east edge of the proposed extraction area (BH18-17A). The lowest groundwater elevations are located on the western side of the site (BH05-10A, BH99-3A, BH13-16A and BH03-9A).

3.0 MAXIMUM PREDICTED WATER TABLE

Based on the available groundwater elevation data, the maximum predicted water table was estimated using the data collected from 2020 to 2022 at the shallow monitoring wells (99-1, BH99-3D, BH03-9C, BH05-10C, BH05-11, BH05-13C, BH13-16D, BH18-17D, SQAT20-25, SQAT20-26, SQAT20-27 and SQAT20-29). The data from December 13, 2021 was used to estimate the maximum predicted groundwater table since water levels in the shallow monitoring wells was generally higher during this session as compared to the other sessions. The water table generally slopes down from the western side of the site at BH99-3D (140.5 metres asl) to the eastern side of the site at SQAT20-27 (134.5 metres asl; refer to Figure 11).

4.0 CLOSURE

If you have any questions, please contact the undersigned.

WSP Canada Inc.

B. Henderson, M.A.Sc., P.Eng.
Environmental Engineer

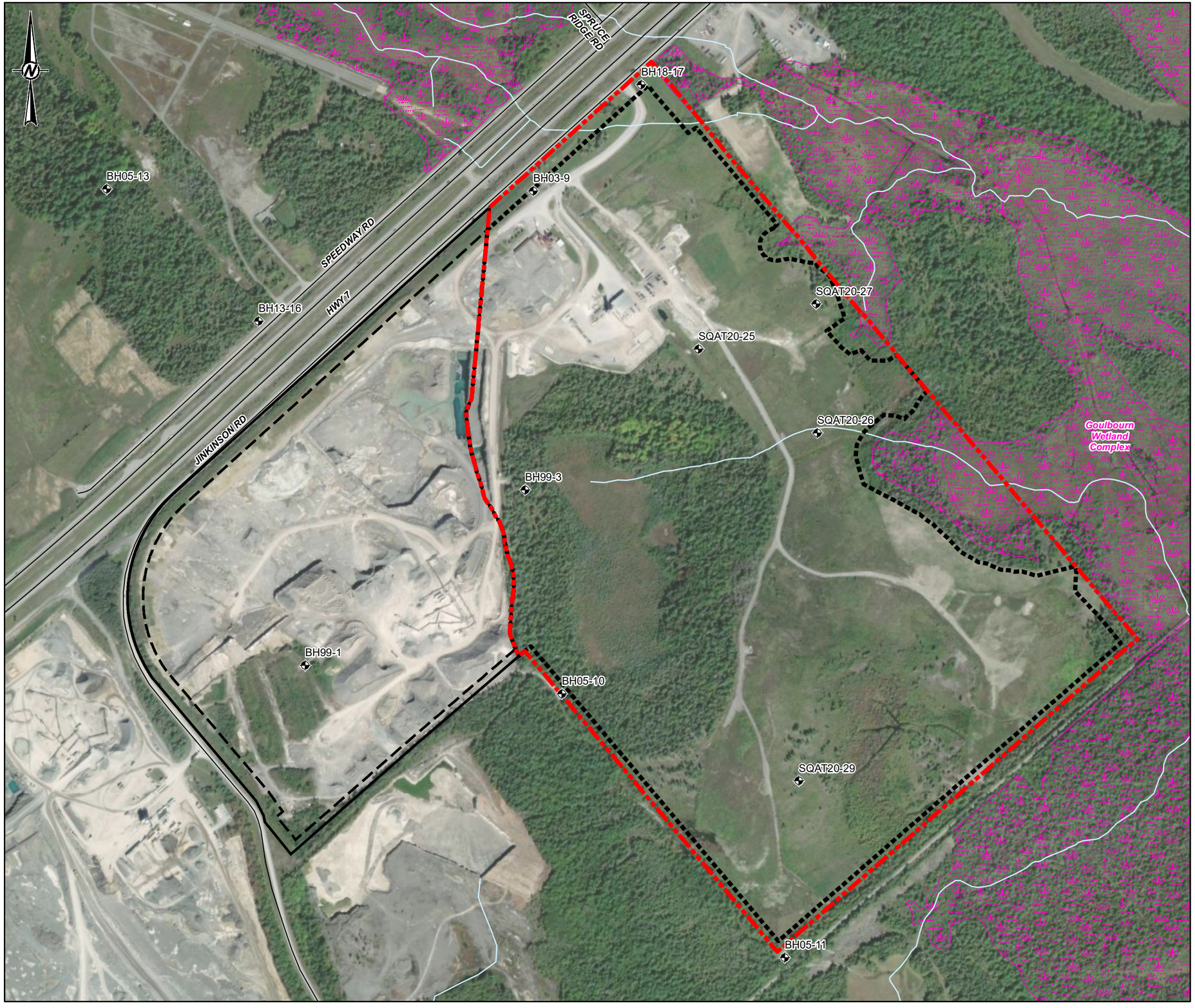
K.A. Marentette, M.Sc., P.Geo.
Senior Hydrogeologist/Principal

BH/KAM/rk

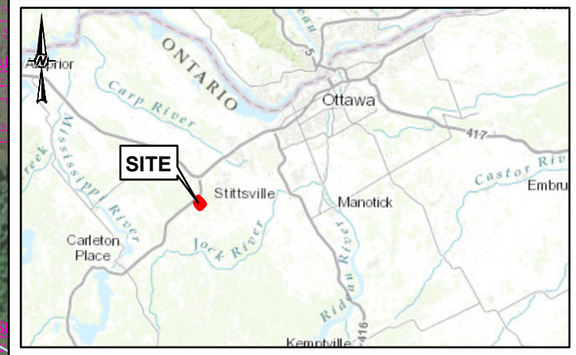
Attachments: Figures 1 to 11
Table 1
Author Qualifications and Experience

https://golderassociates.sharepoint.com/sites/115663/project files/6 deliverables/max water table/final/19130670-r-rev0-stittsville_2_mwr_25oct2023.docx

FIGURES



KEY MAP



SCALE 1:1,000,000

LEGEND

- MONITORING WELL LOCATION
- ROADWAY
- WATERCOURSE
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- PROPOSED STITSVILLE 2 QUARRY LICENSED AREA
- PROPOSED STITTSVILLE 2 QUARRY EXTRACTION AREA
- STITTSVILLE QUARRY LICENSED AREA
- STITTSVILLE QUARRY EXTRACTION AREA

0 75 150 300

1:7,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
   SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
SITE PLAN

CONSULTANT

wsp

YYYY-MM-DD	2023-03-02
DESIGNED	BH
PREPARED	BR
REVIEWED	BH
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19130670	0007	0	1

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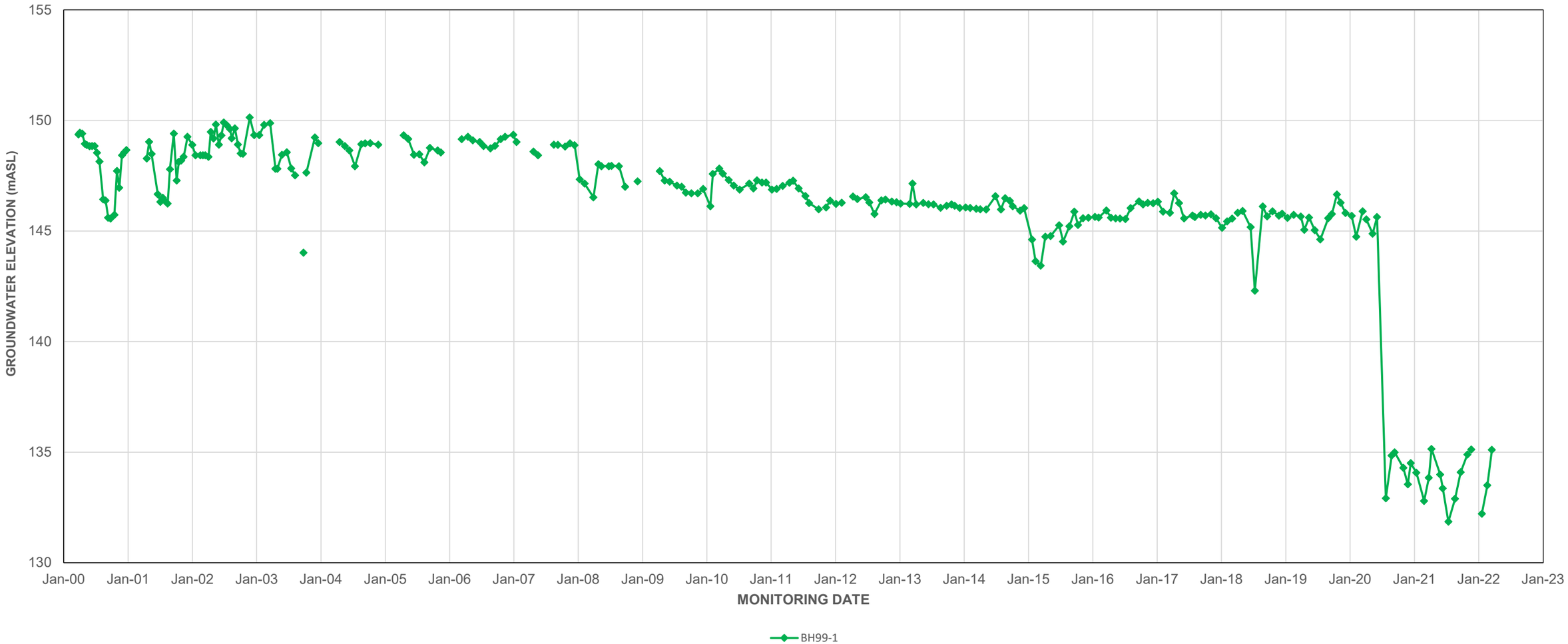

CLIENT
R.W. TOMLINSON LIMITED

CONSULTANT
wsp

YYYY-MM-DD	2022-09-28
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELL BH99-1

PROJECT No.	PHASE	Rev.	FIGURE
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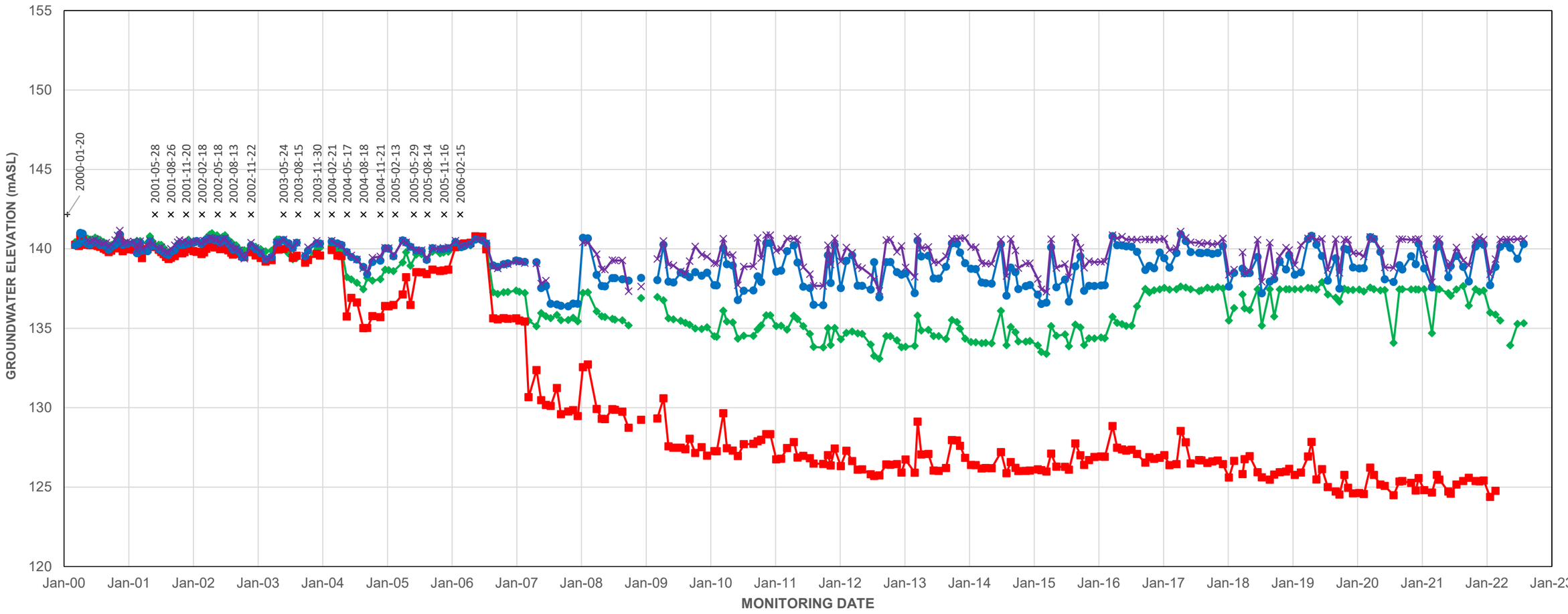

CLIENT
R.W. TOMLINSON LIMITED

CONSULTANT
wsp

YYYY-MM-DD	2022-09-28
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS 99-3A, BH99-3B, BH99-3C AND BH99-3D

PROJECT No.	PHASE	Rev.	FIGURE
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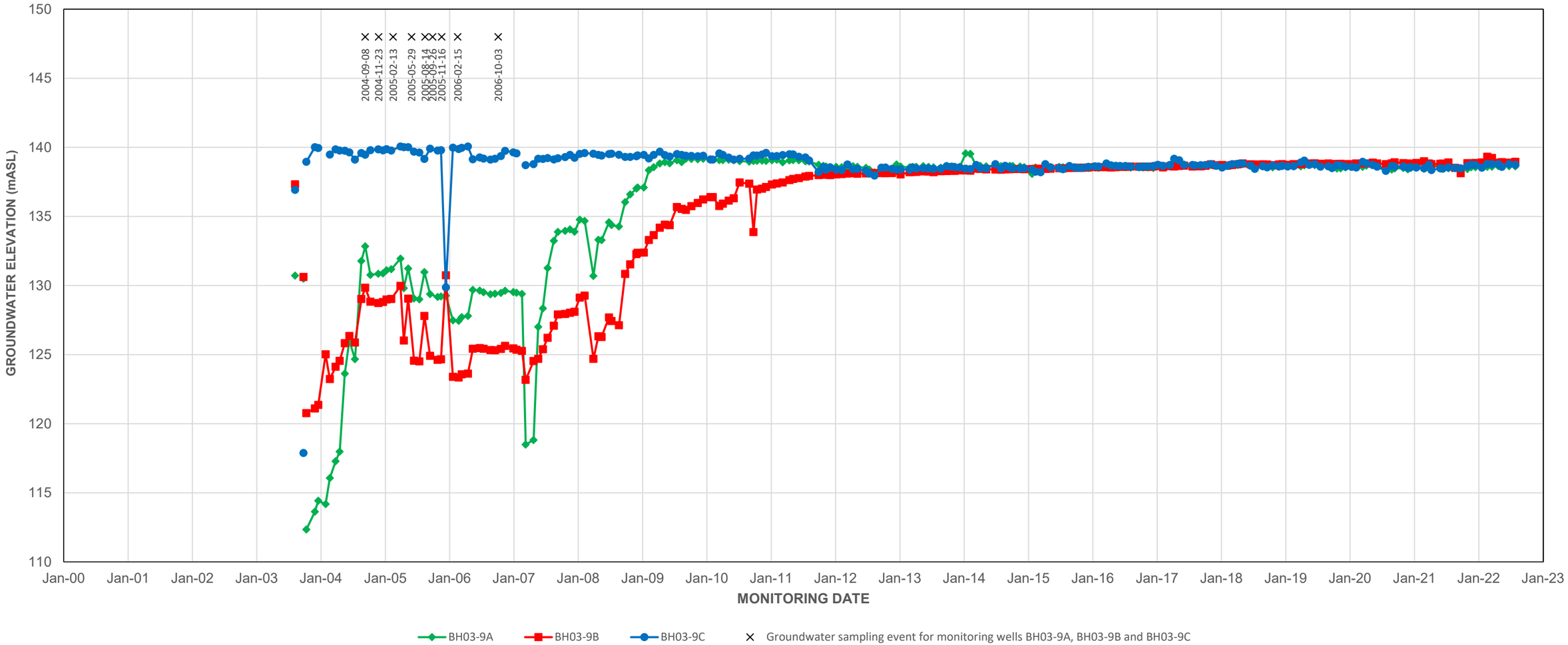

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PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH03-9A, BH03-9B AND BH03-9C

PROJECT No.	PHASE	Rev.	FIGURE
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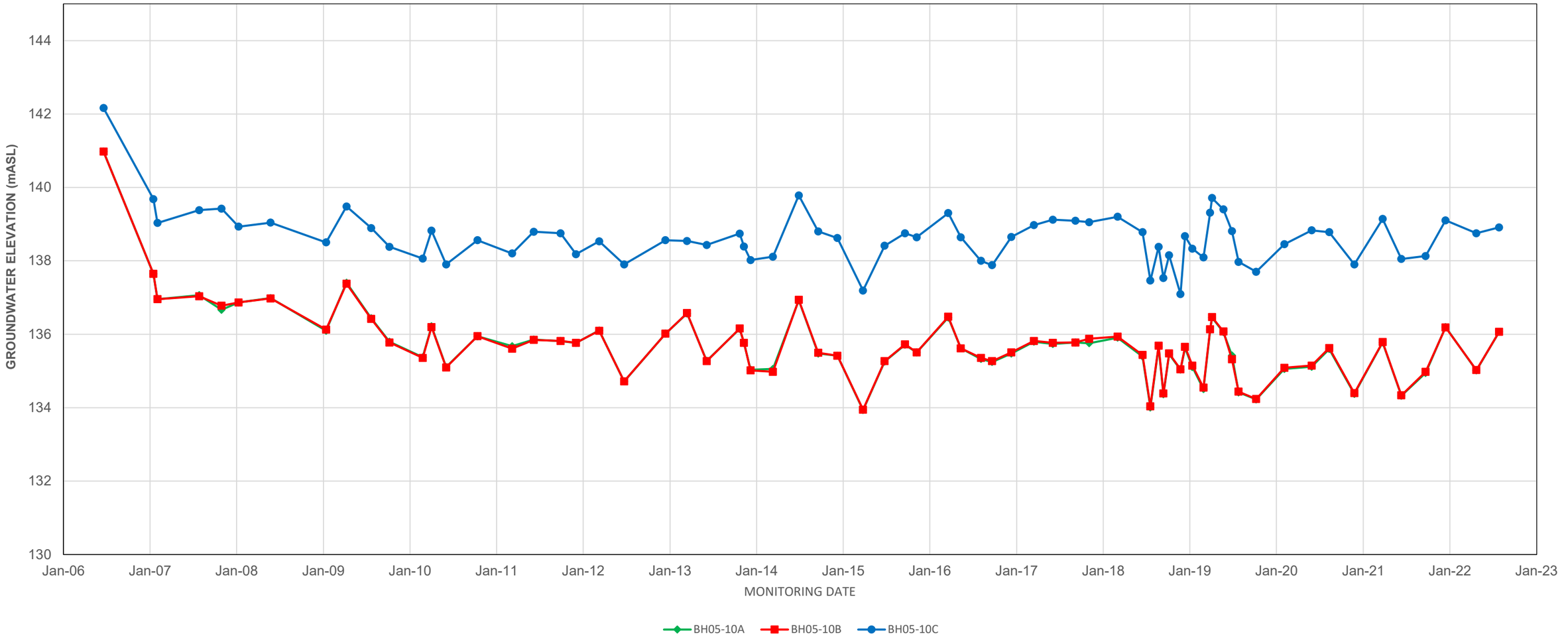

CLIENT
R.W. TOMLINSON LIMITED

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DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-10A, BH05-10B AND BH05-10C

PROJECT No.	PHASE	Rev.	FIGURE
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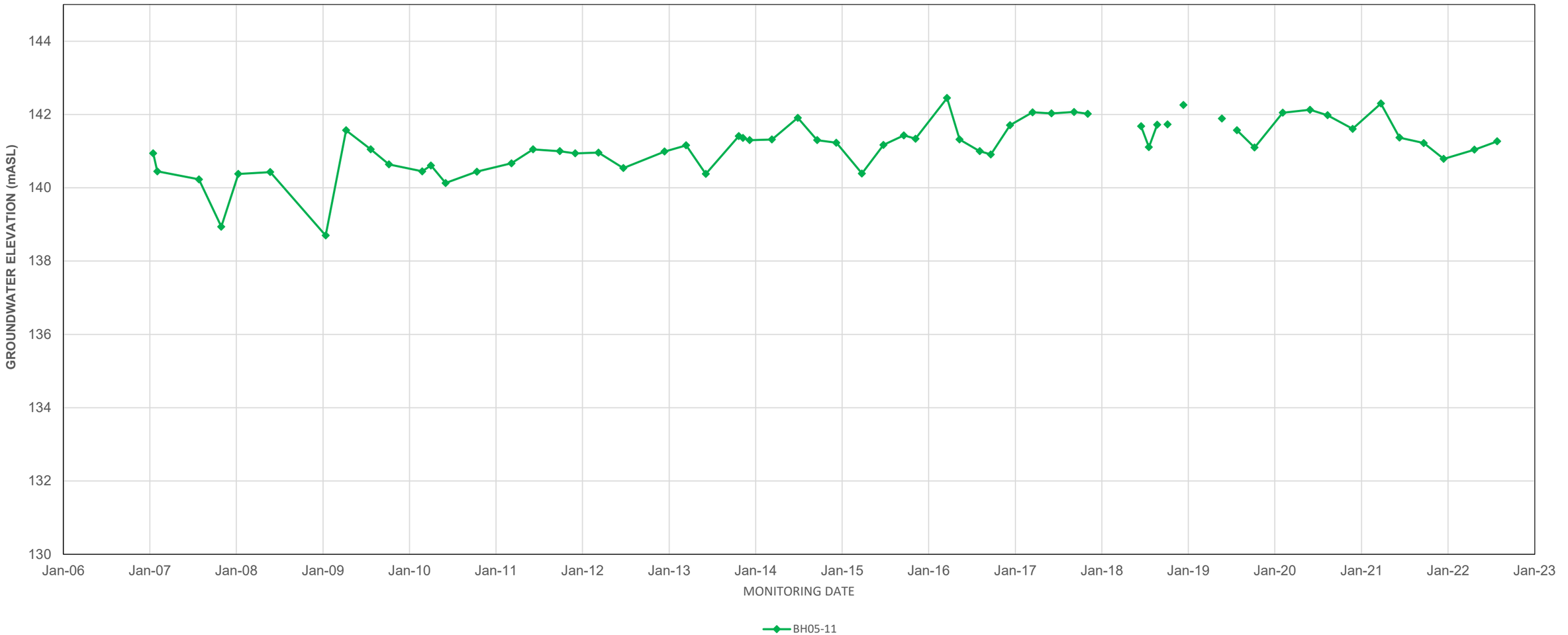

CLIENT
R.W. TOMLINSON LIMITED

CONSULTANT
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PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELL BH05-11

PROJECT No.	PHASE	Rev.	FIGURE
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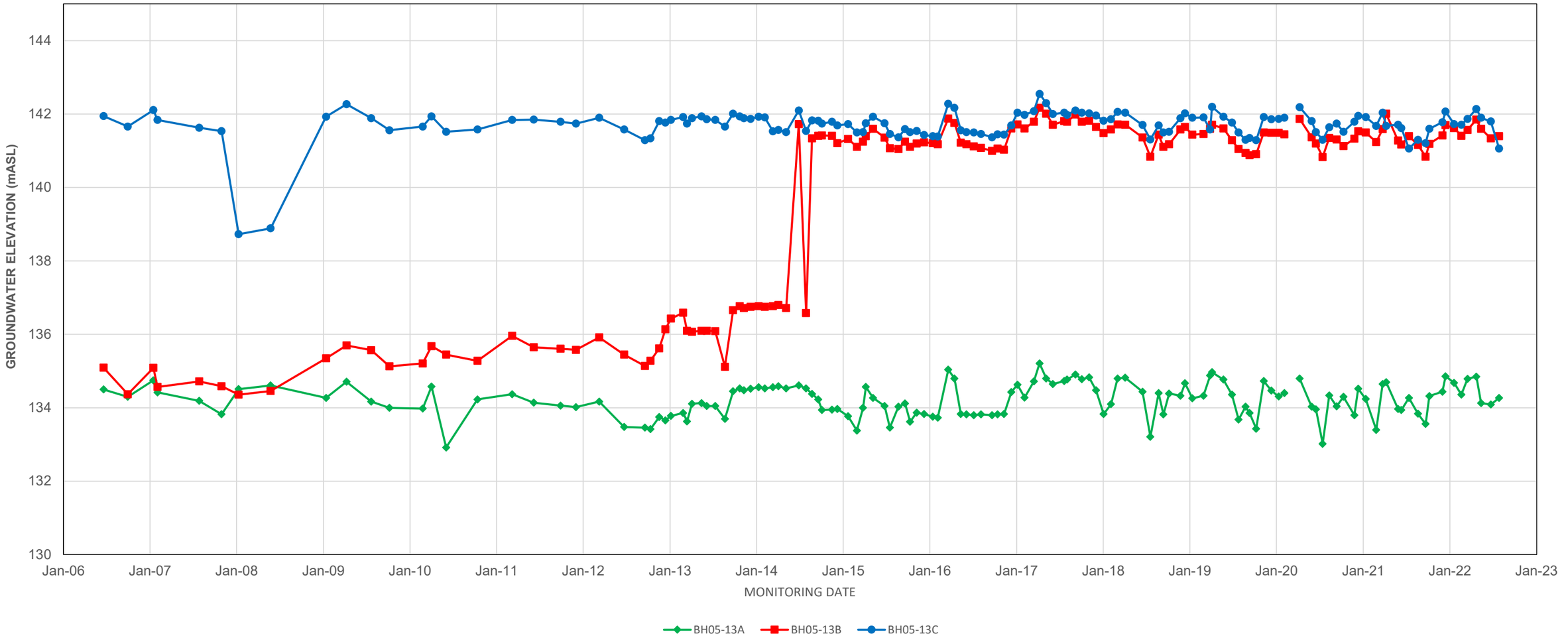

CLIENT
R.W. TOMLINSON LIMITED

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YYYY-MM-DD	2022-09-28
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH05-13A, BH05-13B AND BH05-13C

PROJECT No.	PHASE	Rev.	FIGURE
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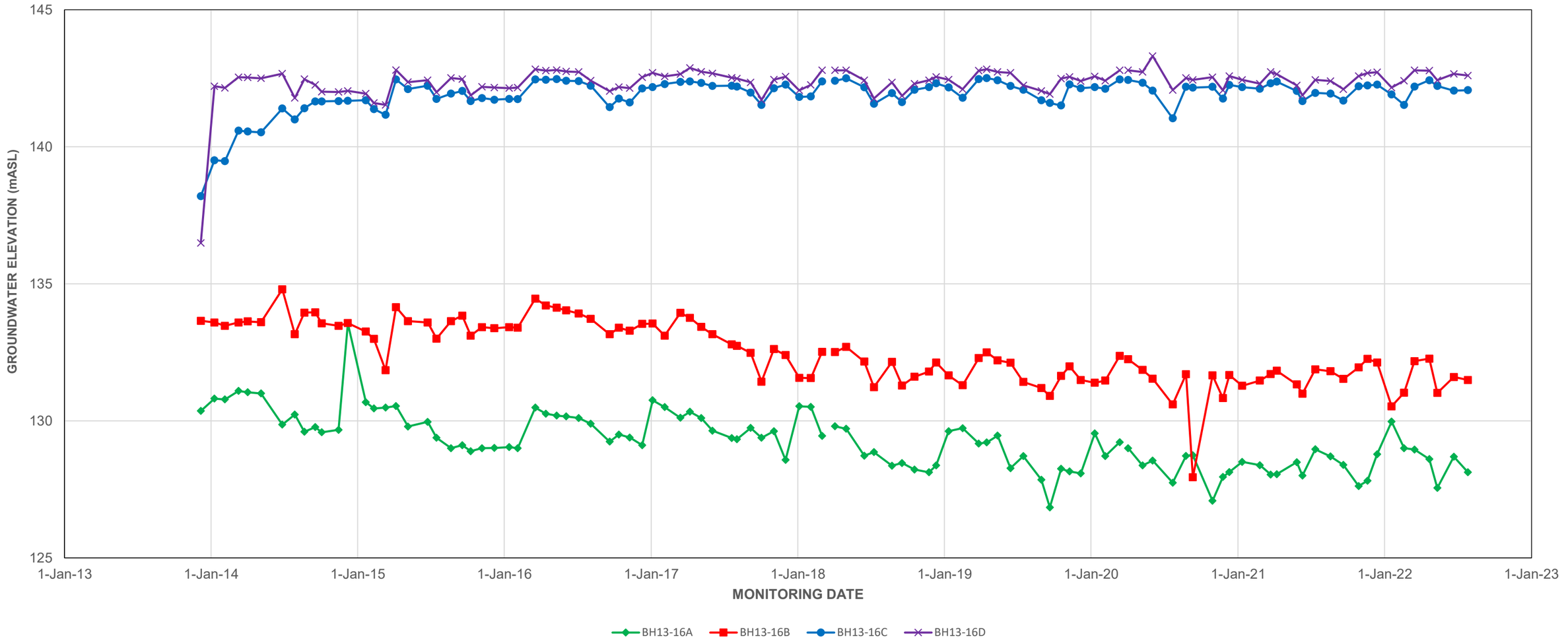

CLIENT
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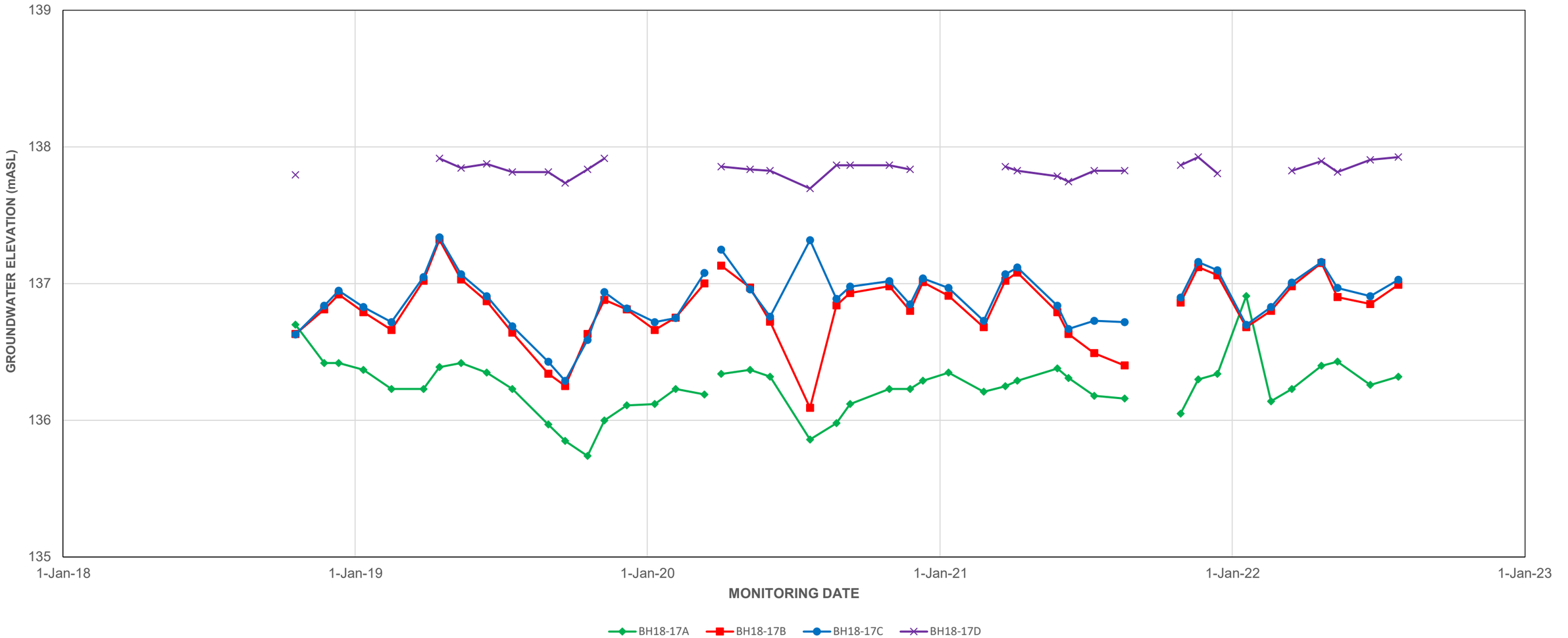
YYYY-MM-DD	2022-09-28
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH13-16A, BH13-16B, BH13-16C AND BH13-16D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	8



CLIENT
R.W. TOMLINSON LIMITED

CONSULTANT
wsp

YYYY-MM-DD	2022-09-28
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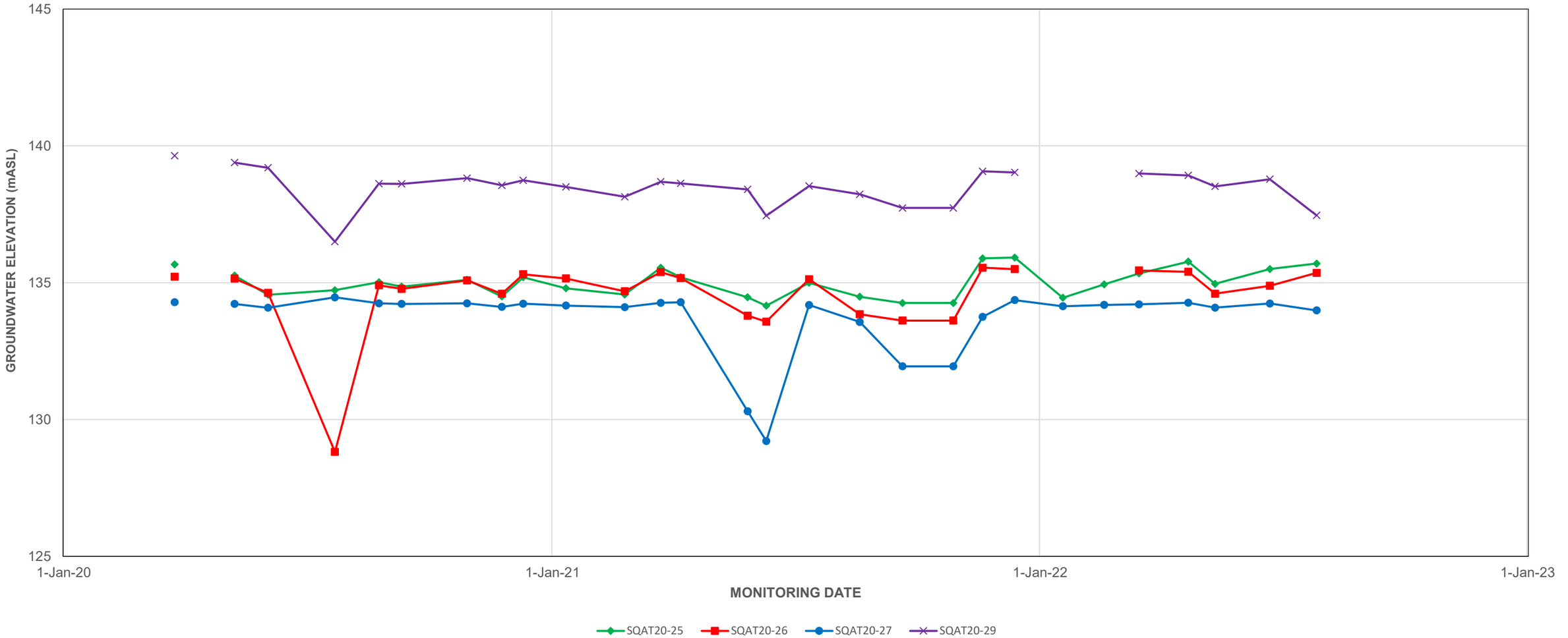
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS BH18-17A, BH18-17B, BH18-17C AND BH18-17D

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	9



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PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

CONSULTANT
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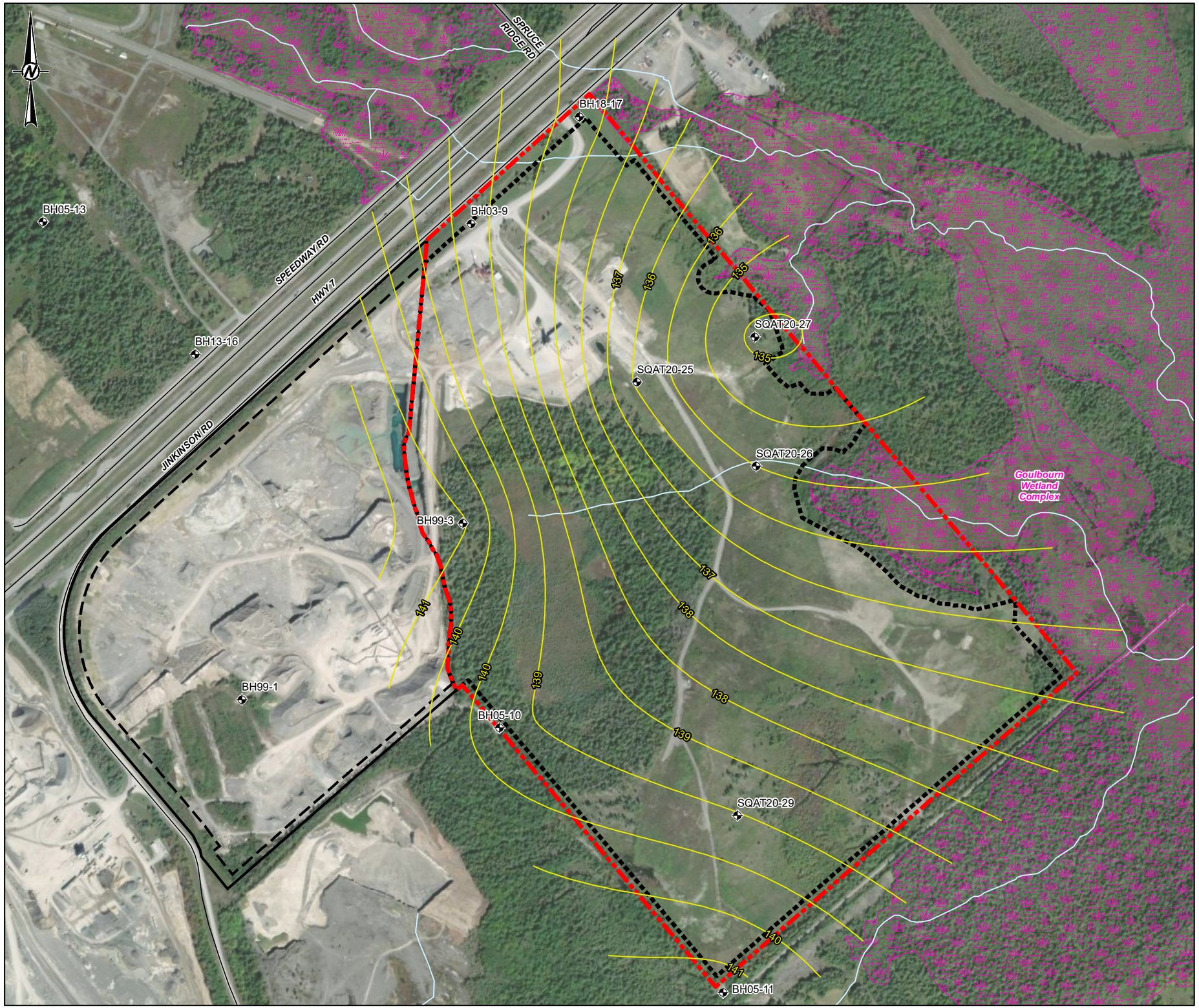
YYYY-MM-DD	2022-09-28
PREPARED	BH
DESIGN	BH
REVIEW	KAM
APPROVED	KAM

TITLE
GROUNDWATER ELEVATIONS AT MONITORING WELLS SQAT20-25, SQAT20-26, SQAT20-27 AND SQAT 20-29

PROJECT No.	PHASE	Rev.	FIGURE
19130670		0	10



KEY MAP

SCALE 1:1,000,000

LEGEND

- MONITORING WELL LOCATION
- ROADWAY
- WATERCOURSE
- GROUNDWATER ELEVATION CONTOURS
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- PROPOSED STITTSVILLE 2 QUARRY LICENSED AREA
- PROPOSED STITTSVILLE 2 QUARRY EXTRACTION AREA
- STITTSVILLE QUARRY LICENSED AREA
- STITTSVILLE QUARRY EXTRACTION AREA

0 75 150 300

1:7,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

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3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 18N

CLIENT
R.W. TOMLINSON LIMITED

PROJECT
PROPOSED STITTSVILLE 2 QUARRY
MAXIMUM PREDICTED WATER TABLE REPORT

TITLE
MAXIMUM PREDICTED WATER TABLE

CONSULTANT

wsp

YYYY-MM-DD	2023-03-02
DESIGNED	BH
PREPARED	BR
REVIEWED	BH
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
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TABLE 1

GROUNDWATER ELEVATIONS (metres above sea level)

	28-Jan-00	4-Feb-00	11-Feb-00	18-Feb-00	26-Feb-00	4-Mar-00	11-Mar-00	18-Mar-00	25-Mar-00	1-Apr-00	15-Apr-00	30-Apr-00	12-May-00	27-May-00	10-Jun-00	24-Jun-00	8-Jul-00	22-Jul-00	12-Aug-00	26-Aug-00
BH99-1	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	Frozen	149.36	149.44	149.40	148.94	148.88	148.83	148.84	148.84	148.53	148.14	146.43	146.37
BH99-3A	Frozen	Frozen	Frozen	Frozen	Frozen	140.42	Frozen	Frozen	140.25	140.74	140.68	140.61	140.65	140.58	140.44	140.70	140.63	140.56	140.42	140.33
BH99-3B	Frozen	Frozen	Frozen	Frozen	Frozen	140.25	Frozen	Frozen	140.18	140.78	140.74	140.25	140.25	140.22	140.23	140.25	140.18	140.13	140.01	139.93
BH99-3C	Frozen	Frozen	Frozen	Frozen	Frozen	140.23	Frozen	Frozen	140.34	141.00	140.96	140.45	140.31	140.27	140.39	140.47	140.38	140.26	140.23	140.14
BH99-3D	--	--	--	--	--	--	--	--	--	--	--	--	140.54	140.45	140.52	140.60	140.44	140.37	140.34	140.38
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	9-Sep-00	23-Sep-00	15-Oct-00	29-Oct-00	11-Nov-00	27-Nov-00	9-Dec-00	22-Dec-00	29-Jan-01	15-Feb-01	5-Mar-01	16-Mar-01	16-Apr-01	30-Apr-01	14-May-01	18-Jun-01	3-Jul-01	16-Jul-01	30-Jul-01	13-Aug-01
BH99-1	145.60	145.56	145.73	147.71	146.95	148.43	148.55	148.66	Frozen	Frozen	Frozen	Frozen	148.28	149.03	148.48	146.66	146.31	146.50	146.35	146.24
BH99-3A	140.14	140.23	140.40	140.67	140.93	140.31	140.38	140.37	140.34	140.50	140.49	139.75	140.39	140.79	140.48	140.26	140.24	140.06	139.89	139.77
BH99-3B	139.80	139.88	140.03	140.19	140.75	139.85	140.00	139.97	139.94	140.08	140.02	139.41	139.98	140.28	140.12	139.95	139.80	139.67	139.49	139.36
BH99-3C	139.95	140.10	140.26	140.43	140.91	140.26	140.30	140.31	140.38	139.73	140.39	139.89	139.85	140.47	140.20	139.97	139.91	139.78	139.69	139.62
BH99-3D	140.13	140.28	140.55	140.84	141.15	140.32	140.39	140.44	140.47	139.88	140.48	139.97	140.16	140.51	140.29	140.05	140.11	139.89	139.80	139.75
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	26-Aug-01	17-Sep-01	3-Oct-01	15-Oct-01	29-Oct-01	12-Nov-01	4-Dec-01	31-Dec-01	18-Jan-02	15-Feb-02	1-Mar-02	15-Mar-02	2-Apr-02	15-Apr-02	1-May-02	14-May-02	31-May-02	14-Jun-02	28-Jun-02	16-Jul-02
BH99-1	147.79	149.40	147.28	148.12	148.18	148.35	149.26	148.89	148.42	148.42	148.42	148.42	148.35	149.48	149.18	149.81	148.90	149.32	149.90	149.77
BH99-3A	139.85	139.86	140.10	140.39	140.29	140.39	140.57	140.47	140.43	140.24	140.47	140.69	140.89	140.98	140.80	140.85	140.65	140.76	140.85	140.57
BH99-3B	139.43	139.54	139.80	140.00	139.71	139.80	139.98	139.86	139.81	139.67	139.78	140.00	140.16	140.24	140.08	140.12	139.98	140.05	140.13	139.90
BH99-3C	139.80	139.93	140.23	140.36	140.24	140.27	140.34	140.39	140.49	140.31	140.48	140.58	140.64	140.61	140.55	140.61	140.40	140.56	140.63	140.37
BH99-3D	140.00	140.22	140.41	140.55	140.45	140.51	140.39	140.45	140.49	140.34	140.51	140.51	140.71	140.68	140.59	140.64	140.31	140.61	140.67	140.36
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	2-Aug-02	12-Aug-02	30-Aug-02	16-Sep-02	2-Oct-02	15-Oct-02	22-Nov-02	18-Dec-02	15-Jan-03	12-Feb-03	18-Mar-03	17-Apr-03	28-Apr-03	24-May-03	21-Jun-03	16-Jul-03	7-Aug-03	23-Sep-03	10-Oct-03	27-Nov-03
BH99-1	149.61	149.19	149.64	148.91	148.50	148.49	150.13	149.33	149.33	149.80	149.88	147.82	147.82	148.45	148.56	147.83	147.52	144.02	147.64	149.23
BH99-3A	140.41	140.21	140.22	139.98	139.88	139.91	140.25	140.13	139.98	139.84	139.90	140.59	140.59	140.51	139.71	139.34	139.42	139.15	139.32	140.14
BH99-3B	139.75	139.64	139.69	139.70	139.53	139.49	139.79	139.58	139.42	139.21	139.28	139.96	139.96	139.99	140.11	139.43	139.56	139.13	139.30	139.68
BH99-3C	140.14	139.95	139.96	139.80	139.47	139.47	140.22	139.98	139.74	139.37	139.49	140.41	140.41	140.56	140.36	140.06	140.39	139.55	139.89	140.36
BH99-3D	140.20	140.01	140.03	139.91	139.60	139.38	140.38	140.05	139.81	139.33	139.45	140.37	140.37	140.58	140.28	140.08	140.38	139.57	140.09	140.51
BH03-9A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	130.72	130.50	112.35	113.63
BH03-9B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	137.32	130.62	120.77	121.11
BH03-9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	136.92	117.88	138.96	140.02
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	16-Dec-03	27-Jan-04	20-Feb-04	24-Mar-04	16-Apr-04	15-May-04	10-Jun-04	12-Jul-04	17-Aug-04	8-Sep-04	7-Oct-04	21-Nov-04	18-Dec-04	7-Jan-05	3-Feb-05	27-Mar-05	15-Apr-05	10-May-05	12-Jun-05	12-Jul-05
BH99-1	148.97	Frozen	Frozen	Frozen	149.02	148.84	148.64	147.93	148.92	148.96	148.97	148.90	Frozen	Frozen	Frozen	Frozen	149.33	149.16	148.45	148.47
BH99-3A	140.06	Frozen	140.21	140.01	139.95	138.22	138.07	137.86	137.46	138.17	138.00	138.08	138.69	138.66	138.59	139.14	139.79	138.94	139.64	139.66
BH99-3B	139.57	Frozen	139.92	139.57	139.54	135.74	136.91	136.62	135.01	135.02	135.76	135.70	136.40	136.38	136.46	137.12	138.21	136.46	138.53	138.52
BH99-3C	140.33	Frozen	140.46	140.34	140.25	139.80	139.49	139.33	138.86	138.42	139.17	139.26	140.04	140.02	139.54	140.54	140.40	140.13	139.90	139.87
BH99-3D	140.31	Frozen	140.52	140.27	140.19	139.76	139.58	139.33	138.78	138.55	139.44	139.52	140.07	140.04	139.56	140.51	140.40	140.10	139.93	139.91
BH03-9A	114.42	114.18	116.07	117.29	117.98	123.62	126.01	124.67	131.78	132.84	130.77	130.85	130.88	131.11	131.18	131.95	129.81	131.23	129.06	129.00
BH03-9B	121.36	125.02	123.23	124.12	124.55	125.83	126.35	125.87	129.03	129.84	128.84	128.73	128.81	128.99	129.03	129.97	126.02	129.05	124.56	124.51
BH03-9C	139.95	Frozen	139.48	139.86	139.77	139.76	139.64	139.12	139.59	139.47	139.79	139.86	139.78	139.87	139.77	140.07	140.01	140.02	139.69	139.62
BH05-10A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-10C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH05-13C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	10-Aug-05	11-Sep-05	24-Oct-05	12-Nov-05	10-Dec-05	19-Jan-06	21-Feb-06	10-Mar-06	14-Apr-06	12-May-06	19-Jun-06	20-Jun-06	12-Jul-06	20-Aug-06	15-Sep-06	29-Sep-06	18-Oct-06	11-Nov-06	28-Dec-06	15-Jan-07
BH99-1	148.10	148.76	148.65	148.55	Frozen	Frozen	Frozen	149.15	149.26	149.10	--	149.02	148.84	148.73	148.85	--	149.15	149.26	149.35	149.02
BH99-3A	139.30	139.82	139.71	139.76	139.82	140.46	140.12	140.17	140.21	140.67	--	140.65	140.25	137.26	137.16	--	137.26	137.28	137.37	137.30
BH99-3B	138.41	138.69	138.60	138.64	138.69	140.10	140.30	140.34	140.38	140.79	--	140.76	139.97	135.62	135.56	--	135.63	135.59	135.62	135.48
BH99-3C	139.31	140.05	139.97	139.99	140.04	140.43	140.11	140.18	140.28	140.59	--	140.54	140.35	138.96	138.86	--	139.04	139.09	139.27	139.23
BH99-3D	139.36	140.05	139.99	140.06	140.10	140.51	140.17	140.25	140.33	140.64	--	140.59	140.34	138.86	138.76	--	138.98	139.03	139.22	139.17
BH03-9A	130.97	129.38	129.17	129.21	129.27	127.48	127.45	127.71	127.80	129.69	--	129.63	129.51	129.37	129.41	--	129.47	129.62	129.53	129.48
BH03-9B	127.80	124.91	124.62	124.66	130.74	123.39	123.35	123.57	123.62	125.42	--	125.47	125.43	125.33	125.32	--	125.41	125.63	125.45	125.35
BH03-9C	139.16	139.90	139.77	139.79	129.87	139.98	139.88	139.97	140.07	139.14	--	139.27	139.19	139.12	139.17	--	139.37	139.75	139.64	139.56
BH05-10A	--	--	--	--	--	--	--	--	--	--	140.98	--	--	--	--	--	--	--	--	137.65
BH05-10B	--	--	--	--	--	--	--	--	--	--	140.98	--	--	--	--	--	--	--	--	137.65
BH05-10C	--	--	--	--	--	--	--	--	--	--	142.16	--	--	--	--	--	--	--	--	139.68
BH05-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	140.94
BH05-13A	--	--	--	--	--	--	--	--	--	--	134.50	--	--	--	--	134.30	--	--	--	134.75
BH05-13B	--	--	--	--	--	--	--	--	--	--	135.09	--	--	--	--	134.37	--	--	--	135.09
BH05-13C	--	--	--	--	--	--	--	--	--	--	141.94	--	--	--	--	141.66	--	--	--	142.11
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	1-Feb-07	15-Feb-07	8-Mar-07	22-Apr-07	18-May-07	14-Jun-07	11-Jul-07	27-Jul-07	15-Aug-07	7-Sep-07	18-Oct-07	29-Oct-07	15-Nov-07	11-Dec-07	9-Jan-08	6-Feb-08	27-Mar-08	24-Apr-08	12-May-08	23-May-08
BH99-1	--	Frozen	Frozen	148.59	148.42	Blocked	Blocked	--	148.90	148.89	148.82	--	148.96	148.88	147.33	147.14	146.52	148.02	147.93	--
BH99-3A	--	137.22	135.49	135.12	135.95	135.75	135.63	--	135.84	135.51	135.52	--	135.66	135.43	137.22	137.26	136.06	135.75	135.71	--
BH99-3B	--	135.42	130.66	132.36	130.47	130.17	130.11	--	131.24	129.59	129.76	--	129.84	129.47	132.55	132.72	129.92	129.30	129.28	--
BH99-3C	--	139.18	Frozen	139.16	137.53	137.65	136.54	--	136.50	136.42	136.38	--	136.56	136.54	140.70	140.66	138.37	137.66	137.64	--
BH99-3D	--	139.10	Frozen	139.08	137.81	138.00	Dry	--	Dry	Dry	Dry	--	Dry	Dry	140.40	140.38	139.66	138.71	138.69	--
BH03-9A	--	129.39	118.49	118.82	127.01	128.35	131.27	--	133.24	133.88	133.96	--	134.07	133.90	134.77	134.67	130.69	133.31	133.28	--
BH03-9B	--	125.27	123.17	124.54	124.69	125.39	126.22	--	127.09	127.91	127.94	--	128.03	128.10	129.12	129.27	124.69	126.33	126.28	--
BH03-9C	--	Frozen	138.71	138.78	139.17	139.16	139.22	--	139.13	139.21	139.30	--	139.46	139.25	139.53	139.59	139.54	139.46	139.41	--
BH05-10A	136.96	--	--	--	--	--	--	137.07	--	--	--	136.67	--	--	136.87	--	--	--	--	136.99
BH05-10B	136.96	--	--	--	--	--	--	137.04	--	--	--	136.78	--	--	136.87	--	--	--	--	136.98
BH05-10C	139.03	--	--	--	--	--	--	139.38	--	--	--	139.42	--	--	138.93	--	--	--	--	139.04
BH05-11	140.45	--	--	--	--	--	--	140.23	--	--	--	138.94	--	--	140.38	--	--	--	--	140.43
BH05-13A	134.42	--	--	--	--	--	--	134.19	--	--	--	133.82	--	--	134.51	--	--	--	--	134.61
BH05-13B	134.57	--	--	--	--	--	--	134.72	--	--	--	134.59	--	--	134.36	--	--	--	--	134.46
BH05-13C	141.84	--	--	--	--	--	--	141.63	--	--	--	141.53	--	--	138.73	--	--	--	--	138.89
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	23-Jun-08	8-Jul-08	19-Aug-08	23-Sep-08	22-Oct-08	26-Nov-08	3-Dec-08	7-Jan-09	12-Jan-09	5-Feb-09	4-Mar-09	8-Apr-09	6-May-09	3-Jun-09	14-Jul-09	21-Jul-09	10-Aug-09	3-Sep-09	4-Oct-09	6-Oct-09
BH99-1	147.93	147.94	147.93	147.00	--	--	147.24	--	--	--	Frozen	147.71	147.28	147.23	147.05	--	147.00	146.73	146.70	--
BH99-3A	135.59	135.54	135.50	135.18	--	--	136.90	--	--	--	136.96	136.76	135.62	135.56	135.46	--	135.34	135.22	134.99	--
BH99-3B	129.91	129.86	129.75	128.73	--	--	129.23	--	--	--	129.32	130.59	127.56	127.48	127.48	--	127.38	128.04	127.15	--
BH99-3C	138.16	138.16	138.09	138.00	--	--	138.17	--	--	--	138.03	140.26	137.94	137.89	138.51	--	138.39	138.22	138.53	--
BH99-3D	139.29	139.26	139.27	137.33	--	--	137.62	--	--	--	139.36	140.49	139.01	138.95	138.58	--	138.43	139.22	140.15	--
BH03-9A	134.58	134.38	134.27	136.04	136.59	137.02	137.10	137.09	--	138.35	138.57	138.83	138.93	138.85	139.07	--	138.93	139.17	139.16	--
BH03-9B	127.69	127.43	127.13	130.84	131.53	132.28	132.37	132.39	--	133.30	133.65	134.19	134.41	134.37	135.68	--	135.55	135.47	135.74	--
BH03-9C	139.52	139.54	139.47	139.31	139.31	139.36	139.42	139.46	--	139.20	139.46	139.68	139.44	139.33	139.51	--	139.45	139.40	139.38	--
BH05-10A	--	--	--	--	--	--	--	--	136.10	--	--	137.41	--	--	--	136.44	--	--	--	135.80
BH05-10B	--	--	--	--	--	--	--	--	136.13	--	--	137.38	--	--	--	136.42	--	--	--	135.78
BH05-10C	--	--	--	--	--	--	--	--	138.50	--	--	139.48	--	--	--	138.89	--	--	--	138.38
BH05-11	--	--	--	--	--	--	--	--	138.70	--	--	141.57	--	--	--	141.05	--	--	--	140.64
BH05-13A	--	--	--	--	--	--	--	--	134.27	--	--	134.71	--	--	--	134.17	--	--	--	134.00
BH05-13B	--	--	--	--	--	--	--	--	135.35	--	--	135.70	--	--	--	135.57	--	--	--	135.13
BH05-13C	--	--	--	--	--	--	--	--	141.93	--	--	142.27	--	--	--	141.89	--	--	--	141.56
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	10-Nov-09	10-Dec-09	20-Jan-10	3-Feb-10	23-Feb-10	12-Mar-10	1-Apr-10	4-May-10	2-Jun-10	5-Jul-10	29-Aug-10	22-Sep-10	12-Oct-10	9-Nov-10	2-Dec-10	5-Jan-11	1-Feb-11	7-Mar-11	14-Apr-11	5-May-11
BH99-1	146.70	146.90	146.12	147.58	--	147.82	147.59	147.30	147.05	146.87	147.14	146.92	147.29	147.19	147.19	146.87	146.90	147.04	147.18	147.27
BH99-3A	134.95	135.06	134.50	134.46	--	136.10	135.42	135.37	134.35	134.53	134.52	134.93	135.18	135.81	135.81	135.13	135.16	134.91	135.78	135.57
BH99-3B	127.51	126.98	127.26	127.25	--	129.65	127.45	127.30	126.96	127.70	127.72	127.88	127.98	128.33	128.33	126.74	126.79	127.46	127.83	126.86
BH99-3C	138.31	138.50	137.71	137.70	--	140.05	139.04	138.95	136.78	137.36	137.39	138.27	137.92	140.37	140.37	138.57	138.63	139.85	140.22	139.14
BH99-3D	139.63	139.51	139.09	139.08	--	140.64	139.64	139.61	137.71	138.88	138.90	140.68	139.40	140.86	140.86	139.88	139.99	140.64	140.64	140.56
BH03-9A	139.14	139.18	139.11	139.12	--	139.08	139.08	139.10	139.06	139.01	138.97	139.02	139.03	139.04	139.02	139.07	139.10	138.92	139.05	139.08
BH03-9B	135.97	136.23	136.40	136.40	--	135.76	135.93	136.15	136.32	137.46	137.37	133.87	136.95	137.01	137.13	137.31	137.39	137.46	137.63	137.71
BH03-9C	139.36	139.40	139.13	139.12	--	139.56	139.45	139.26	139.12	139.17	139.19	139.42	139.41	139.48	139.60	139.36	139.37	139.44	139.50	139.49
BH05-10A	--	--	--	--	135.38	--	136.22	--	135.11	--	--	--	135.95	--	--	--	--	135.68	--	--
BH05-10B	--	--	--	--	135.36	--	136.20	--	135.10	--	--	--	135.95	--	--	--	--	135.61	--	--
BH05-10C	--	--	--	--	138.06	--	138.82	--	137.90	--	--	--	138.56	--	--	--	--	138.20	--	--
BH05-11	--	--	--	--	140.45	--	140.61	--	140.13	--	--	--	140.44	--	--	--	--	140.67	--	--
BH05-13A	--	--	--	--	133.98	--	134.58	--	132.92	--	--	--	134.23	--	--	--	--	134.37	--	--
BH05-13B	--	--	--	--	135.21	--	135.68	--	135.45	--	--	--	135.28	--	--	--	--	135.96	--	--
BH05-13C	--	--	--	--	141.66	--	141.94	--	141.52	--	--	--	141.58	--	--	--	--	141.84	--	--
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	6-Jun-11	14-Jul-11	4-Aug-11	27-Sep-11	24-Oct-11	8-Nov-11	1-Dec-11	4-Jan-12	5-Feb-12	8-Mar-12	9-Apr-12	4-May-12	21-Jun-12	11-Jul-12	9-Aug-12	17-Sep-12	10-Oct-12	16-Nov-12	12-Dec-12	4-Jan-13
BH99-1	146.92	146.58	146.26	145.98	--	146.06	146.37	146.22	146.28	Frozen	146.56	146.44	146.53	146.29	145.77	146.38	146.42	146.33	146.30	146.24
BH99-3A	135.13	134.65	133.82	133.79	135.01	133.94	135.02	134.30	134.71	134.79	134.68	134.64	133.97	133.26	133.08	134.51	134.49	134.24	133.80	133.83
BH99-3B	126.97	126.82	126.48	126.46	127.01	126.36	127.42	126.32	127.29	126.64	126.09	126.11	125.81	125.70	125.73	126.42	126.40	126.44	125.91	126.73
BH99-3C	137.62	137.53	136.48	136.46	139.60	137.85	140.24	137.53	139.25	139.60	137.68	137.67	137.44	139.16	136.95	139.16	139.17	138.54	138.38	138.46
BH99-3D	138.84	138.41	137.67	137.66	140.22	139.01	140.66	139.21	140.08	139.74	138.86	138.78	138.36	138.08	137.35	140.54	140.59	139.81	140.18	138.83
BH03-9A	139.06	139.00	138.98	138.74	138.66	138.62	138.57	138.59	138.57	138.58	138.64	138.59	138.52	138.40	138.19	138.21	138.19	138.37	138.76	138.61
BH03-9B	137.78	137.89	137.93	138.00	138.02	138.40	137.99	138.04	138.07	138.10	138.13	138.09	138.12	138.13	138.14	138.14	138.13	138.14	138.29	138.04
BH03-9C	139.32	139.27	139.05	138.22	138.58	138.38	138.56	138.40	138.36	138.76	138.42	138.45	138.31	138.11	137.96	138.53	138.54	138.45	138.40	138.41
BH05-10A	135.86	--	--	135.82	--	--	135.77	--	--	136.11	--	--	134.72	--	--	--	--	--	136.02	--
BH05-10B	135.85	--	--	135.82	--	--	135.77	--	--	136.10	--	--	134.72	--	--	--	--	--	136.02	--
BH05-10C	138.79	--	--	138.75	--	--	138.18	--	--	138.53	--	--	137.90	--	--	--	--	--	138.56	--
BH05-11	141.05	--	--	141.00	--	--	140.94	--	--	140.96	--	--	140.54	--	--	--	--	--	140.99	--
BH05-13A	134.14	--	--	134.06	--	--	134.02	--	--	134.17	--	--	133.48	--	--	133.46	133.42	133.75	133.66	133.78
BH05-13B	135.65	--	--	135.61	--	--	135.58	--	--	135.92	--	--	135.45	--	--	135.14	135.28	135.62	136.14	136.43
BH05-13C	141.85	--	--	141.79	--	--	141.74	--	--	141.90	--	--	141.58	--	--	141.29	141.34	141.81	141.77	141.84
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	25-Feb-13	13-Mar-13	3-Apr-13	13-May-13	4-Jun-13	12-Jun-13	10-Jul-13	20-Aug-13	23-Sep-13	21-Oct-13	8-Nov-13	6-Dec-13	9-Jan-14	4-Feb-14	10-Mar-14	2-Apr-14	5-May-14	27-Jun-14	28-Jul-14	22-Aug-14
BH99-1	146.22	147.14	146.20	146.27	--	146.21	146.20	146.05	146.14	146.20	146.14	146.04	146.06	146.04	146.00	145.98	145.97	146.57	145.97	146.48
BH99-3A	133.89	135.79	134.86	134.90	--	134.51	134.51	134.32	135.52	135.39	134.97	134.35	134.13	134.11	134.06	134.08	134.05	136.09	133.93	135.08
BH99-3B	125.90	129.12	127.05	127.08	--	126.04	126.02	126.20	127.96	127.94	127.59	126.84	126.39	126.38	126.17	126.20	126.19	127.20	125.87	126.57
BH99-3C	137.21	140.53	139.52	139.57	--	138.14	138.13	138.88	140.34	140.32	139.77	139.10	138.75	138.73	137.89	137.84	137.81	140.29	137.06	138.82
BH99-3D	138.23	140.75	140.04	140.12	--	139.15	139.14	139.53	140.63	140.62	140.66	140.68	140.12	140.10	139.11	139.07	139.05	140.59	138.28	140.62
BH03-9A	138.55	138.58	138.59	138.64	--	138.59	138.55	138.53	138.55	138.58	138.60	138.59	139.56	139.53	138.65	138.67	138.63	138.68	138.64	138.64
BH03-9B	138.20	138.23	138.23	138.26	--	138.25	138.20	138.28	138.29	138.31	138.30	138.33	138.34	138.31	138.46	138.45	138.41	138.40	138.38	138.41
BH03-9C	138.40	138.56	138.48	138.49	--	138.48	138.45	138.46	138.64	138.60	138.57	138.56	138.46	138.43	138.72	138.51	138.48	138.78	138.46	138.67
BH05-10A	--	136.57	--	--	135.28	--	--	--	--	136.15	135.77	135.04	--	--	135.06	--	--	136.93	--	--
BH05-10B	--	136.58	--	--	135.27	--	--	--	--	136.16	135.77	135.02	--	--	134.98	--	--	136.94	--	--
BH05-10C	--	138.54	--	--	138.43	--	--	--	--	138.74	138.39	138.02	--	--	138.11	--	--	139.78	--	--
BH05-11	--	141.16	--	--	140.38	--	--	--	--	141.41	141.36	141.30	--	--	141.32	--	--	141.91	--	--
BH05-13A	133.86	133.63	134.11	134.13	134.05	--	134.05	133.70	134.45	134.53	134.48	134.52	134.56	134.53	134.56	134.59	134.53	134.61	134.53	134.38
BH05-13B	136.59	136.10	136.07	136.10	136.10	--	136.09	135.12	136.66	136.77	136.72	136.75	136.77	136.75	136.77	136.80	136.72	141.73	136.58	141.34
BH05-13C	141.92	141.74	141.89	141.94	141.86	--	141.84	141.66	142.01	141.94	141.89	141.87	141.93	141.91	141.53	141.57	141.51	142.10	141.54	141.83
BH13-16A	--	--	--	--	--	--	--	--	--	--	--	130.36	130.81	130.78	131.09	131.04	131.00	129.86	130.23	129.60
BH13-16B	--	--	--	--	--	--	--	--	--	--	--	133.65	133.59	133.47	133.59	133.63	133.60	134.80	133.16	133.95
BH13-16C	--	--	--	--	--	--	--	--	--	--	--	138.20	139.51	139.48	140.59	140.56	140.53	141.40	141.00	141.41
BH13-16D	--	--	--	--	--	--	--	--	--	--	--	136.49	142.21	142.15	142.54	142.53	142.50	142.67	141.78	142.47
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	17-Sep-14	3-Oct-14	14-Nov-14	7-Dec-14	21-Jan-15	10-Feb-15	27-Feb-15	11-Mar-15	25-Mar-15	6-Apr-15	6-May-15	24-Jun-15	16-Jul-15	21-Aug-15	18-Sep-15	9-Oct-15	6-Nov-15	7-Dec-15	13-Jan-16	3-Feb-16
BH99-1	146.36	146.12	145.92	146.03	144.61	143.63	--	143.43	--	144.74	144.77	145.26	144.52	145.21	145.87	145.27	145.58	145.60	145.64	145.61
BH99-3A	134.75	134.16	134.15	134.20	133.92	133.50	--	133.39	--	135.13	134.53	134.61	133.87	135.23	135.05	133.94	134.37	134.36	134.42	134.37
BH99-3B	126.21	126.01	126.02	126.04	126.11	126.06	--	125.98	--	127.11	126.28	126.27	126.09	127.74	127.00	126.39	126.70	126.89	126.92	126.90
BH99-3C	138.54	137.47	137.65	137.73	137.12	136.53	--	136.62	--	140.10	137.59	138.07	136.68	138.90	139.53	137.36	137.67	137.66	137.69	137.71
BH99-3D	139.89	138.79	139.07	139.09	138.10	137.44	--	137.30	--	140.61	138.80	139.04	138.21	140.70	140.06	138.81	139.22	139.16	139.18	139.20
BH03-9A	138.66	138.65	138.61	138.57	138.08	138.54	--	138.40	--	138.49	138.57	138.59	138.55	138.50	138.51	138.50	138.49	138.51	138.54	138.52
BH03-9B	138.42	138.43	138.43	138.42	138.43	138.44	--	138.46	--	138.45	138.46	138.49	138.48	138.50	138.52	138.52	138.53	138.54	138.58	138.57
BH03-9C	138.55	138.48	138.47	138.48	138.38	138.24	--	138.20	--	138.79	138.56	138.51	138.42	138.65	138.55	138.50	138.53	138.59	138.63	138.61
BH05-10A	135.48	--	--	135.42	--	--	--	--	133.94	--	--	135.26	--	--	135.72	--	135.51	--	--	--
BH05-10B	135.50	--	--	135.42	--	--	--	--	133.95	--	--	135.27	--	--	135.73	--	135.51	--	--	--
BH05-10C	138.80	--	--	138.62	--	--	--	--	137.19	--	--	138.41	--	--	138.75	--	138.64	--	--	--
BH05-11	141.30	--	--	141.23	--	--	--	--	140.39	--	--	141.17	--	--	141.43	--	141.34	--	--	--
BH05-13A	134.23	133.94	133.95	133.97	133.77	--	133.38	--	134.00	134.57	134.27	134.05	133.46	134.03	134.12	133.62	133.87	133.83	133.76	133.73
BH05-13B	141.41	141.42	141.41	141.21	141.32	--	141.11	--	141.25	141.40	141.60	141.36	141.07	141.05	141.25	141.11	141.20	141.23	141.21	141.18
BH05-13C	141.82	141.74	141.79	141.69	141.73	--	141.50	--	141.51	141.75	141.93	141.75	141.46	141.37	141.59	141.51	141.54	141.43	141.40	141.39
BH13-16A	129.77	129.58	129.67	133.55	130.68	130.45	--	130.48	--	130.54	129.79	129.96	129.38	129.00	129.11	128.89	129.00	129.01	129.04	129.00
BH13-16B	133.96	133.56	133.47	133.57	133.26	132.99	--	131.85	--	134.15	133.64	133.59	133.00	133.64	133.84	133.11	133.42	133.38	133.42	133.40
BH13-16C	141.66	141.66	141.67	141.68	141.70	141.38	--	141.17	--	142.46	142.11	142.23	141.75	141.94	142.04	141.67	141.78	141.72	141.75	141.74
BH13-16D	142.26	142.01	142.00	142.04	141.94	141.60	--	141.53	--	142.80	142.36	142.43	141.99	142.51	142.47	141.88	142.19	142.16	142.14	142.16
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	18-Mar-16	13-Apr-16	10-May-16	3-Jun-16	4-Jul-16	3-Aug-16	19-Sep-16	12-Oct-16	8-Nov-16	9-Dec-16	4-Jan-17	3-Feb-17	14-Mar-17	7-Apr-17	5-May-17	2-Jun-17	20-Jul-17	1-Aug-17	2-Aug-17	5-Sep-17
BH99-1	145.93	145.60	145.57	145.56	145.54	146.03	146.34	146.20	146.27	146.25	146.32	145.87	145.82	146.70	146.26	145.57	145.70	--	145.63	145.73
BH99-3A	135.72	135.34	135.26	135.14	135.16	136.38	137.48	137.25	137.39	137.44	137.54	137.43	137.45	137.62	137.56	137.45	137.34	--	137.39	137.55
BH99-3B	128.84	127.48	127.37	127.30	127.35	127.08	126.54	126.88	126.77	126.84	127.01	126.38	126.45	128.53	127.82	126.49	126.70	--	126.68	126.52
BH99-3C	140.80	140.23	140.22	140.16	140.13	139.81	138.67	138.93	138.78	139.77	139.42	138.82	139.74	140.92	140.49	139.80	139.75	--	139.73	139.77
BH99-3D	140.86	140.66	140.77	140.59	140.58	140.57	140.60	140.58	140.56	140.60	140.64	139.91	140.03	141.09	140.69	140.41	140.38	--	140.30	140.36
BH03-9A	138.69	138.63	138.62	138.60	138.55	138.53	138.55	138.54	138.54	138.51	138.61	138.62	138.63	138.76	138.69	138.76	138.71	--	138.67	138.69
BH03-9B	138.57	138.54	138.57	138.59	138.59	138.61	138.60	138.60	138.59	138.61	138.67	138.56	138.64	138.62	138.65	138.68	138.61	--	138.63	138.63
BH03-9C	138.83	138.70	138.66	138.65	138.65	138.61	138.58	138.61	138.61	138.65	138.74	138.67	138.72	139.18	139.07	138.73	138.72	--	138.70	138.71
BH05-10A	136.46	--	135.62	--	--	135.33	135.25	--	--	135.48	--	--	135.80	--	--	135.74	--	--	--	135.78
BH05-10B	136.48	--	135.62	--	--	135.36	135.27	--	--	135.51	--	--	135.82	--	--	135.77	--	--	--	135.78
BH05-10C	139.30	--	138.64	--	--	138.00	137.88	--	--	138.65	--	--	138.97	--	--	139.12	--	--	--	139.09
BH05-11	142.45	--	141.32	--	--	141.00	140.91	--	--	141.71	--	--	142.06	--	--	142.03	--	--	--	142.07
BH05-13A	135.04	134.80	133.83	133.82	133.80	133.82	133.80	133.82	133.83	134.43	134.63	134.28	134.72	135.21	134.80	134.65	134.73	134.77	--	134.91
BH05-13B	141.88	141.76	141.22	141.18	141.12	141.08	141.00	141.06	141.03	141.61	141.72	141.61	141.79	142.17	142.01	141.71	141.81	141.79	--	141.99
BH05-13C	142.28	142.17	141.56	141.51	141.50	141.46	141.37	141.45	141.44	141.69	142.04	141.98	142.08	142.55	142.30	142.00	142.04	141.98	--	142.10
BH13-16A	130.48	130.26	130.19	130.16	130.10	129.89	129.24	129.50	129.39	129.11	130.75	130.50	130.11	130.33	130.10	129.64	129.37	--	129.33	129.74
BH13-16B	134.46	134.21	134.13	134.03	133.92	133.72	133.16	133.40	133.29	133.54	133.55	133.11	133.94	133.76	133.43	133.16	132.79	--	132.74	132.48
BH13-16C	142.46	142.45	142.47	142.41	142.40	142.23	141.45	141.76	141.62	142.13	142.18	142.29	142.37	142.39	142.33	142.22	142.23	--	142.20	141.98
BH13-16D	142.83	142.78	142.80	142.75	142.73	142.42	142.03	142.18	142.14	142.54	142.70	142.57	142.65	142.88	142.74	142.68	142.52	--	142.49	142.35
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	2-Oct-17	2-Nov-17	1-Dec-17	2-Jan-18	4-Jan-18	2-Feb-18	2-Mar-18	22-Mar-18	3-Apr-18	1-May-18	15-Jun-18	9-Jul-18	18-Jul-18	22-Aug-18	23-Aug-18	11-Sep-18	17-Sep-18	5-Oct-18	18-Oct-18	22-Nov-18
BH99-1	145.70	145.75	145.58	--	145.14	145.43	145.56	--	145.82	145.90	145.17	142.30	--	--	146.11	--	145.66	--	145.89	--
BH99-3A	137.46	137.59	137.51	--	135.48	136.27	--	137.12	136.25	136.14	137.46	135.17	--	--	137.46	--	135.74	--	137.44	--
BH99-3B	126.61	126.67	126.44	--	125.60	126.65	--	125.82	126.75	126.95	125.93	125.62	--	--	125.47	--	125.78	--	125.93	--
BH99-3C	139.68	139.74	140.18	--	137.63	138.49	--	138.76	138.46	138.48	139.49	137.20	--	--	137.94	--	138.10	--	139.17	--
BH99-3D	140.28	140.32	140.65	--	138.37	138.69	--	139.78	138.45	138.59	140.57	137.93	--	--	140.38	--	138.25	--	139.55	--
BH03-9A	138.69	138.71	138.67	--	138.69	138.65	138.70	--	138.73	138.79	138.71	138.64	--	--	138.63	--	138.66	--	138.55	--
BH03-9B	138.67	138.77	138.70	--	138.72	138.68	138.73	--	138.77	138.84	138.77	138.76	--	--	138.77	--	138.76	--	138.71	--
BH03-9C	138.72	138.79	138.67	--	138.54	138.67	138.78	--	138.81	138.84	138.68	138.44	--	--	138.64	--	138.56	--	138.69	--
BH05-10A	--	135.76	--	--	--	--	135.91	--	--	--	135.40	--	134.01	135.66	--	134.37	--	135.46	--	135.04
BH05-10B	--	135.88	--	--	--	--	135.94	--	--	--	135.44	--	134.04	135.69	--	134.39	--	135.48	--	135.05
BH05-10C	--	139.05	--	--	--	--	139.20	--	--	--	138.78	--	137.46	138.38	--	137.53	--	138.15	--	137.09
BH05-11	--	142.02	--	--	--	--	Frozen	--	--	--	141.68	--	141.11	141.72	--	--	--	141.73	--	--
BH05-13A	134.78	134.83	134.48	133.83	--	134.10	134.80	--	134.82	--	134.44	--	133.21	134.40	--	133.82	--	134.39	--	134.33
BH05-13B	141.79	141.82	141.65	141.48	--	141.58	141.72	--	141.71	--	141.36	--	140.84	141.44	--	141.11	--	141.18	--	141.58
BH05-13C	142.04	142.02	141.96	141.82	--	141.86	142.06	--	142.04	--	141.70	--	141.31	141.69	--	141.50	--	141.52	--	141.89
BH13-16A	129.38	129.62	128.57	--	130.53	130.51	129.45	--	129.80	129.71	128.73	128.86	--	--	128.36	--	128.46	--	128.22	--
BH13-16B	131.43	132.62	132.40	--	131.57	131.56	132.52	--	132.51	132.70	132.17	131.23	--	--	132.15	--	131.29	--	131.61	--
BH13-16C	141.53	142.14	142.27	--	141.82	141.84	142.39	--	142.41	142.50	142.17	141.57	--	--	141.96	--	141.63	--	142.08	--
BH13-16D	141.71	142.45	142.56	--	142.06	142.26	142.79	--	142.79	142.79	142.43	141.76	--	--	142.35	--	141.86	--	142.30	--
BH18-17A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	136.70	--
BH18-17B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	136.63	--
BH18-17C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	136.63	--
BH18-17D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	137.80	--
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	23-Nov-18	11-Dec-18	11-Jan-19	15-Feb-19	27-Feb-19	27-Mar-19	4-Apr-19	16-Apr-19	13-May-19	22-May-19	14-Jun-19	27-Jun-19	16-Jul-19	25-Jul-19	23-Aug-19	30-Aug-19	9-Sep-19	20-Sep-19	7-Oct-19	18-Oct-19
BH99-1	145.69	145.78	145.59	145.73	--	145.65	--	145.05	145.61	--	145.04	--	144.62	--	--	145.58	--	145.77	--	146.65
BH99-3A	137.45	137.45	137.45	137.46	--	137.54	--	137.52	137.43	--	137.90	--	137.13	--	--	136.92	--	136.67	--	137.49
BH99-3B	125.98	126.15	125.76	125.91	--	126.92	--	127.84	125.48	--	126.13	--	125.00	--	--	124.72	--	124.53	--	125.76
BH99-3C	138.71	139.58	138.38	138.52	--	140.61	--	140.82	140.27	--	139.55	--	138.00	--	--	139.41	--	137.50	--	140.02
BH99-3D	140.07	139.92	138.97	140.23	--	140.66	--	140.78	140.57	--	140.63	--	138.67	--	--	140.61	--	138.49	--	140.58
BH03-9A	138.60	138.64	138.64	138.63	--	138.63	--	138.70	138.74	--	138.71	--	138.65	--	--	138.70	--	138.48	--	138.47
BH03-9B	138.76	138.78	138.74	138.78	--	138.79	--	138.82	138.83	--	138.85	--	138.81	--	--	138.83	--	138.78	--	138.80
BH03-9C	138.62	138.67	138.62	138.64	--	138.91	--	139.04	138.74	--	138.79	--	138.60	--	--	138.63	--	138.51	--	138.71
BH05-10A	--	135.63	135.11	--	134.51	136.12	136.46	--	--	136.06	--	135.43	--	134.42	--	--	--	--	134.23	--
BH05-10B	--	135.66	135.15	--	134.55	136.14	136.47	--	--	136.08	--	135.32	--	134.44	--	--	--	--	134.24	--
BH05-10C	--	138.67	138.33	--	138.09	139.31	139.71	--	--	139.40	--	138.81	--	137.97	--	--	--	--	137.70	--
BH05-11	--	142.26	--	--	--	--	--	--	--	141.89	--	--	--	141.57	--	--	--	--	141.10	--
BH05-13A	--	134.67	134.26	--	134.33	134.88	134.97	--	--	134.77	--	134.36	--	133.68	134.03	--	133.86	--	133.43	--
BH05-13B	--	141.65	141.44	--	141.46	141.60	141.71	--	--	141.61	--	141.29	--	141.05	140.94	--	140.88	--	140.91	--
BH05-13C	--	142.02	141.90	--	141.91	141.58	142.20	--	--	141.93	--	141.77	--	141.50	141.30	--	141.35	--	141.29	--
BH13-16A	128.12	128.37	129.62	129.73	--	129.17	--	129.21	129.46	--	128.27	--	128.71	--	--	127.85	--	126.84	--	128.25
BH13-16B	131.80	132.13	131.66	131.30	--	132.29	--	132.50	132.21	--	132.12	--	131.42	--	--	131.20	--	130.91	--	131.64
BH13-16C	142.18	142.32	142.17	141.79	--	142.47	--	142.51	142.43	--	142.22	--	142.08	--	--	141.70	--	141.60	--	141.51
BH13-16D	142.43	142.55	142.45	142.10	--	142.78	--	142.83	142.73	--	142.70	--	142.24	--	--	142.04	--	141.92	--	142.49
BH18-17A	136.42	136.42	136.37	136.23	--	136.23	--	136.39	136.42	--	136.35	--	136.23	--	--	135.97	--	135.85	--	135.74
BH18-17B	136.81	136.92	136.79	136.66	--	137.02	--	137.32	137.03	--	136.87	--	136.64	--	--	136.34	--	136.25	--	136.63
BH18-17C	136.84	136.95	136.83	136.72	--	137.05	--	137.34	137.07	--	136.91	--	136.69	--	--	136.43	--	136.29	--	136.59
BH18-17D	Frozen	Frozen	Frozen	Frozen	--	Frozen	--	137.92	137.85	--	137.88	--	137.82	--	--	137.82	--	137.74	--	137.84
SQAT20-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SQAT20-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GROUNDWATER ELEVATIONS (metres above sea level)

	8-Nov-19	6-Dec-19	10-Dec-19	10-Jan-20	3-Feb-20	5-Feb-20	12-Mar-20	24-Mar-20	2-Apr-20	7-Apr-20	8-May-20	28-May-20	2-Jun-20	15-Jun-20	13-Jul-20	22-Jul-20	10-Aug-20	24-Aug-20	10-Sep-20	9-Oct-20
BH99-1	146.28	145.81	--	145.68	--	144.74	145.89	--	145.52	--	144.88	--	145.63	--	--	132.91	--	134.84	134.99	--
BH99-3A	137.40	137.41	--	137.43	--	137.32	137.56	--	137.46	--	137.38	--	137.40	--	--	134.08	--	137.44	137.46	--
BH99-3B	124.95	124.60	--	124.62	--	124.56	126.22	--	125.76	--	125.16	--	125.07	--	--	124.49	--	125.35	125.38	--
BH99-3C	139.95	138.83	--	138.77	--	138.79	140.74	--	140.63	--	139.81	--	138.09	--	--	137.92	--	138.97	138.71	--
BH99-3D	140.56	139.72	--	139.70	--	139.52	140.74	--	140.61	--	139.99	--	138.83	--	--	138.80	--	140.61	140.61	--
BH03-9A	138.48	138.55	--	138.74	--	138.60	138.59	--	138.68	--	138.72	--	138.70	--	--	138.42	--	138.40	138.47	--
BH03-9B	138.81	138.78	--	138.78	--	138.84	138.84	--	138.84	--	138.89	--	138.83	--	--	138.79	--	138.85	138.92	--
BH03-9C	138.69	138.60	--	138.59	--	138.54	138.95	--	138.85	--	138.73	--	138.60	--	--	138.30	--	138.64	138.60	--
BH05-10A	--	--	--	--	135.06	--	--	--	--	--	--	135.12	--	--	--	--	135.60	--	--	--
BH05-10B	--	--	--	--	135.09	--	--	--	--	--	--	135.15	--	--	--	--	135.63	--	--	--
BH05-10C	--	--	--	--	138.45	--	--	--	--	--	--	138.83	--	--	--	--	138.78	--	--	--
BH05-11	--	--	--	--	142.05	--	--	--	--	--	--	142.13	--	--	--	--	141.98	--	--	--
BH05-13A	134.73	--	134.47	134.31	134.40	--	--	--	--	134.80	--	134.03	--	133.96	133.02	--	134.34	--	134.04	134.30
BH05-13B	141.50	--	141.49	141.49	141.45	--	--	--	--	141.87	--	141.37	--	141.20	140.83	--	141.35	--	141.31	141.13
BH05-13C	141.92	--	141.86	141.87	141.90	--	--	--	--	142.19	--	141.81	--	141.51	141.30	--	141.64	--	141.74	141.52
BH13-16A	128.15	128.08	--	129.54	--	128.71	129.22	--	129.00	--	128.37	--	128.55	--	--	127.74	--	128.72	128.74	--
BH13-16B	131.99	131.49	--	131.39	--	131.47	132.37	--	132.25	--	131.86	--	131.54	--	--	130.60	--	131.70	127.94	--
BH13-16C	142.28	142.14	--	142.18	--	142.12	142.46	--	142.44	--	142.34	--	142.05	--	--	141.04	--	142.19	142.16	--
BH13-16D	142.55	142.40	--	142.57	--	142.41	142.79	--	142.79	--	142.73	--	143.31	--	--	142.07	--	142.51	142.44	--
BH18-17A	136.00	136.11	--	136.12	--	136.23	136.19	--	136.34	--	136.37	--	136.32	--	--	135.86	--	135.98	136.12	--
BH18-17B	136.88	136.81	--	136.66	--	136.75	137.00	--	137.13	--	136.97	--	136.72	--	--	136.09	--	136.84	136.93	--
BH18-17C	136.94	136.82	--	136.72	--	136.75	137.08	--	137.25	--	136.96	--	136.76	--	--	137.32	--	136.89	136.98	--
BH18-17D	137.92	Frozen	--	Frozen	--	Frozen	Frozen	--	137.86	--	137.84	--	137.83	--	--	137.70	--	137.87	137.87	--
SQAT20-25	--	--	--	--	--	--	--	135.67	--	--	135.26	--	134.56	--	--	134.73	--	135.02	134.86	--
SQAT20-26	--	--	--	--	--	--	--	135.22	--	--	135.15	--	134.63	--	--	128.82	--	134.91	134.78	--
SQAT20-27	--	--	--	--	--	--	--	134.29	--	--	134.23	--	134.09	--	--	134.47	--	134.25	134.23	--
SQAT20-29	--	--	--	--	--	--	--	139.64	--	--	139.39	--	139.20	--	--	136.50	--	138.62	138.61	--

GROUNDWATER ELEVATIONS (metres above sea level)

	29-Oct-20	24-Nov-20	10-Dec-20	11-Jan-21	24-Feb-21	23-Mar-21	7-Apr-21	27-May-21	10-Jun-21	12-Jul-21	19-Aug-21	20-Sep-21	6-Oct-21	28-Oct-21	19-Nov-21	30-Nov-21	13-Dec-21	18-Jan-22	18-Feb-22	16-Mar-22
BH99-1	134.29	133.54	134.50	134.07	132.79	133.84	135.14	133.98	133.36	131.85	132.89	134.09	--	134.89	135.12	--		132.21	133.50	135.10
BH99-3A	137.44	137.44	137.43	137.45	134.69	137.46	137.46	137.21	137.04	137.44	137.66	136.42	--	137.45	137.30	--	137.37	137.37	135.99	135.86	135.49
BH99-3B	125.26	124.78	125.56	124.81	124.66	125.76	125.47	124.72	124.58	125.16	125.38	125.58	--	125.38	125.36	--	125.41	124.38	124.76	Blocked
BH99-3C	139.54	139.04	140.32	138.77	137.58	140.11	140.32	138.22	138.92	139.56	138.87	137.95	--	140.14	140.37	--	140.26	137.72	138.86	140.13
BH99-3D	140.57	140.59	140.63	139.66	137.90	140.63	140.60	138.81	139.10	140.08	139.27	138.96	--	140.57	140.73	--	140.58	138.39	139.35	140.59
BH03-9A	138.50	138.41	138.50	138.53	138.46	138.54	138.58	138.68	138.57	138.48	138.49	138.48	--	138.43	138.57	--	138.57	138.64	138.59	138.60
BH03-9B	138.86	138.83	138.78	138.87	138.99	138.84	138.78	138.81	138.82	138.91	138.52	138.13	--	138.86	138.82	--	138.87	138.91	139.32	139.23
BH03-9C	138.61	138.52	138.58	138.54	138.48	138.74	138.36	138.48	138.46	138.55	138.51	138.48	--	138.64	138.75	--	138.73	138.53	138.80	138.78
BH05-10A	--	134.38	--	--	--	135.78	--	--	134.33	--	--	134.95	--	--	--	--	136.20	--	--	--
BH05-10B	--	134.40	--	--	--	135.79	--	--	134.34	--	--	134.98	--	--	--	--	136.19	--	--	--
BH05-10C	--	137.90	--	--	--	139.14	--	--	138.05	--	--	138.13	--	--	--	--	139.10	--	--	--
BH05-11	--	141.61	--	--	--	142.30	--	--	141.37	--	--	141.22	--	--	--	--	140.79	--	--	--
BH05-13A	--	133.80	134.52	134.24	133.40	134.65	134.70	133.97	133.94	134.27	133.84	133.56	134.32	--	--	134.44	134.86	134.68	134.36	134.79
BH05-13B	--	141.33	141.53	141.50	141.24	141.59	142.01	141.28	141.17	141.40	141.16	140.84	141.19	--	--	141.42	141.70	141.62	141.41	141.57
BH05-13C	--	141.79	141.95	141.92	141.68	142.04	141.68	141.71	141.62	141.06	141.30	141.21	141.60	--	--	141.78	142.07	141.73	141.71	141.87
BH13-16A	127.08	127.95	128.13	128.50	128.38	128.04	128.05	128.49	128.00	128.96	128.70	128.39	--	127.62	127.81	--	128.78	129.97	129.00	128.95
BH13-16B	131.66	130.83	131.67	131.28	131.47	131.71	131.83	131.33	130.99	131.88	131.81	131.53	--	131.95	132.26	--	132.13	130.53	131.03	132.18
BH13-16C	142.19	141.76	142.26	142.18	142.12	142.32	142.38	142.04	141.67	141.97	141.94	141.69	--	142.21	142.24	--	142.27	141.91	141.53	142.20
BH13-16D	142.54	142.06	142.58	142.44	142.30	142.73	142.65	142.24	141.88	142.44	142.40	142.10	--	142.58	142.69	--	142.72	142.16	142.41	142.79
BH18-17A	136.23	136.23	136.29	136.35	136.21	136.25	136.29	136.38	136.31	136.18	136.16	--	--	136.05	136.30	--	136.34	136.91	136.14	136.23
BH18-17B	136.98	136.80	137.01	136.91	136.68	137.02	137.08	136.79	136.63	136.49	136.40	--	--	136.86	137.12	--	137.06	136.68	136.80	136.98
BH18-17C	137.02	136.85	137.04	136.97	136.73	137.07	137.12	136.84	136.67	136.73	136.72	--	--	136.90	137.16	--	137.10	136.70	136.83	137.01
BH18-17D	137.87	137.84	Frozen	Frozen	Frozen	137.86	137.83	137.79	137.75	137.83	137.83	--	--	137.87	137.93	--	137.81	Frozen	Frozen	137.83
SQAT20-25	135.11	134.50	135.20	134.80	134.57	135.55	135.20	134.47	134.16	135.00	134.49	134.26	--	134.26	135.89	--	135.92	134.45	134.94	135.34
SQAT20-26	135.09	134.60	135.31	135.16	134.69	135.39	135.17	133.80	133.58	135.13	133.85	133.62	--	133.62	135.55	--	135.50	Frozen	Frozen	135.45
SQAT20-27	134.25	134.12	134.24	134.17	134.11	134.27	134.29	130.31	129.22	134.19	133.57	131.95	--	131.95	133.76	--	134.37	134.14	134.19	134.21
SQAT20-29	138.82	138.56	138.74	138.50	138.14	138.69	138.63	138.41	137.45	138.53	138.23	137.73	--	137.73	139.07	--	139.03	Frozen	Frozen	138.99

GROUNDWATER ELEVATIONS (metres above sea level)

	22-Apr-22	12-May-22	22-Jun-22	27-Jul-22
BH99-1	Damaged	--	--	--
BH99-3A	Blocked	133.92	135.27	135.32
BH99-3B	Blocked	Blocked	Blocked	Blocked
BH99-3C	140.33	140.07	139.38	140.30
BH99-3D	140.59	140.58	140.61	140.63
BH03-9A	138.64	138.65	138.64	138.63
BH03-9B	138.90	138.93	138.90	138.95
BH03-9C	138.78	138.59	138.78	138.74
BH05-10A	135.02	--	--	136.07
BH05-10B	135.03	--	--	136.07
BH05-10C	138.75	--	--	138.91
BH05-11	141.04	--	--	141.27
BH05-13A	134.85	134.13	134.09	134.27
BH05-13B	141.85	141.60	141.34	141.40
BH05-13C	142.14	141.90	141.80	141.06
BH13-16A	128.60	127.55	128.69	128.12
BH13-16B	132.27	131.02	131.60	131.49
BH13-16C	142.43	142.22	142.05	142.07
BH13-16D	142.78	142.43	142.66	142.60
BH18-17A	136.40	136.43	136.26	136.32
BH18-17B	137.15	136.90	136.85	136.99
BH18-17C	137.16	136.97	136.91	137.03
BH18-17D	137.90	137.82	137.91	137.93
SQAT20-25	135.77	134.96	135.50	135.70
SQAT20-26	135.40	134.60	134.89	135.36
SQAT20-27	134.27	134.09	134.24	133.99
SQAT20-29	138.92	138.52	138.78	137.46

Author Qualifications and Experience

Education

M.Sc. Geology, University of Windsor, Windsor, Ontario, 1988

B.Sc. Geology, Honours, University of Windsor, Windsor, Ontario, 1986

Certifications

Registered Professional Geoscientist, 2002

Languages

English – Fluent

WSP Canada Inc. – Ottawa, Ontario

Employment History

Career Summary

Principal/Senior Hydrogeologist (1997 to Present)

Mr. Kris A. Marentette, M.Sc., P.Geo., is a Principal and Senior Hydrogeologist in the Ottawa office of WSP Canada Inc. (previously Golder Associates), and has 20 years of broad experience in the fields of water supply development, physical hydrogeological characterization studies, regional scale groundwater studies, waste management, contaminated sites assessment /remediation, aggregate resource evaluations and the licensing and permitting of quarry development and expansion projects. Kris is responsible for business development, project management, and senior technical review of hydrogeology, quarry and sand and gravel pit development and expansion, golf course irrigation, site assessment and remediation projects, and waste facility siting, design, operation and environmental compliance monitoring assignments from the Ottawa office.

From 1997 to 2001, Mr. Marentette was Project Manager for Golder Associates' component of one of the largest Environmental Site Assessment (ESA) contracts in Canada which involved the assessment of over 780 sites which were being transferred from Transport Canada to NAV CANADA. Golder Associates completed Phase I ESA of approximately 400 sites of which about 130 sites required Phase II ESA activities. The sites ranged from small antennas towers to large, complex international airports. Project involved considerable logistic planning to mobilize personnel across the country, familiarity with federal and provincial soil and groundwater remediation criteria, development of site-specific remediation options (including permafrost sites), and ongoing interaction with consultant team and Transport Canada/NAV CANADA.

Kris has also been involved as principal consultant or senior reviewer for over 100 Phase I ESAs and over 50 Phase II ESAs completed by the Ottawa office. These projects included industrial, commercial, and residential properties ranging from former coal gasification plants to microcircuit manufacturers. Projects have included an evaluation of permitting requirements related to waste water discharges and air emissions as well as designated substances surveys. Kris has also conducted subsurface investigations at numerous bulk storage, fuel dispensing and pipeline sites; development of groundwater and soil vapour monitoring programs; design and permitting of remedial measures including product recovery and excavation of contaminated soil; supervision and verification of site remediation.

Kris has provided environmental consultation services to many wood product manufacturers in Renfrew County and Lanark County in the context of assessing environmental impacts of wood waste storage and lumber yard and sawmill operations on the natural environment. While working for the wood product manufacturers, Kris established a consistent approach to site investigations and set a focused list of leachate indicator parameters for groundwater and surface water assessments which has met with Ontario Ministry of Environment (MOE) approval.

Kris has been the Golder Associates Project Manager on a number of Ministry of Natural Resources quarry and pit licensing projects for both new operations and expansions to existing operations and has extensive experience in managing these complex, multi-disciplinary projects. Participated in comprehensive aggregate resource evaluations of Paleozoic sedimentary sequences (limestone) and Precambrian marble deposits at quarries in eastern Ottawa for the purpose of developing preferred site development plans to maximize the production of high quality aggregate products. The aggregate resource evaluations have typically included borehole coring, geological core logging, geophysical evaluations and comprehensive laboratory testing programs. Participated in other quarry-related projects associated with the Ministry of Environment Permit to Take Water Program and the issuance of Certificates of Approval (Industrial Sewage Works) under Section 53 of the Ontario Water Resources Act as well as studies undertaken for the purpose of complying with requirements under the Aggregate Resources Act. In the case of the Permit to Take Water approvals and industrial sewage works applications under Sections 34 and 53 of the Ontario Water Resources Act, Kris has consulted with, and interacted extensively, with MOE personnel in both the local District and Regional offices and with key personnel within the Environmental Assessment and Approvals Branch of the MOE in Toronto. Kris was the Project Manager assigned to assist the City of Ottawa in a comprehensive project focused on assisting City staff in understanding the intricate details of the MOE's Permit to Take Water Program. Kris is also well known to the local conservation authorities (Rideau Valley Conservation Authority, Mississippi Valley Conservation Authority and South Nation Conservation) as a result of involvement in water supply and quarry-related projects in the Ottawa area and has interacted with the Ontario Stone, Sand & Gravel Association on various issues related to the aggregate industry (e.g., addressing the MOE concern associated with the potential presence of dinitrotoluene in quarry discharge water, source water protection, etc.). Kris has appeared as an expert witness before the Ontario Municipal Board on quarry-related applications.

Golder Associates Ltd. – Ottawa, Ontario
Hydrogeologist/Senior Hydrogeologist (1988 to 1997)

Responsible for business development and the initiation, implementation and direction of hydrogeological investigations from the Ottawa office. Projects have included test well drilling programs for private services developments; subsurface investigations as related to the installation of subsurface sewage disposal systems; communal water supply investigations; and, regional hydrogeological studies to assist in establishing planning policies for future private services developments and to develop standards for water well construction.

Project manager for numerous hydrogeological studies of existing/proposed landfill sites including the assessment of impacts on water resources and developing and implementing monitoring programs and contingency and remedial action plans. Participated in hydrogeological aspects of waste management studies, preparation and submission of documentation to obtain Emergency Certificates of Approval and Site Interim Expansions of landfill sites under both the Environmental Assessment Act and Environmental Protection Act. Projects have included preparation of landfill site development and

operations plans including evaluations of landfill final cover design options. Expert testimony at hearings before the Environmental Assessment Board.

Also responsible for investigation, design and implementation of soil and groundwater remediation programs at hydrocarbons, metals, solvents, and PAH contaminated sites including the risk assessment approach to site management. Projects have included third party peer review of site remediation programs.

Conducted hydrogeological assessments of quarry developments/expansions and pre-acquisition environmental site audits.

PROJECT EXPERIENCE – WATER RESOURCES MANAGEMENT

Village of Winchester Water Supply Project
Ontario, Canada

Project Hydrogeologist for the Village of Winchester Water Supply Expansion Project. This project included the preliminary evaluation of potential target aquifers followed by a comprehensive test well investigation and aquifer characterization program. Participated in the development of a comprehensive Water Resources Protection Strategy.

Rural Subdivision Development
Ontario, Canada

Supervised test well drilling programs for numerous residential, industrial and commercial private services subdivision developments including evaluation and selection of target aquifers, development of site specific well construction requirements, analysis and interpretation of physical hydrogeological data and groundwater chemical data and preparation and submission of detailed hydrogeological reports. Responsible for conducting many subsurface investigations as related to the installation of small and large subsurface septic sewage disposal systems for private services developments including projects subject to the Ontario Ministry of the Environment Reasonable Use Guideline B-7.

Communal / Commercial Water Supply Evaluation
Ontario, Canada

Project Manager for communal water supply investigations for non-profit housing developments in Elgin and Clayton, Ontario and time share condominium development in Cobden, Ontario; responsible for groundwater resource evaluation with respect to project specific water supply requirements. Conducted hydrogeological assessment of the Evergreen Spring Water Site in the Township of Sebastopol, Ontario for Cott Beverages Ltd.; assessment included characterization of geological setting, quantity, quality and age of spring water and evaluation of potential sources of contamination in the vicinity of the spring.

Township of Kingston Planning Study
Ontario

Conducted hydrogeological study and general terrain analysis of rural Kingston Township to characterize the present status of the Township's groundwater resources to assist in establishing planning policies for locating new developments on private services and to provide standards for water well construction within the Municipality.

Land Development Evaluation
Ontario

Conducted a preliminary hydrogeological and terrain evaluation of a 400 acre parcel of land south of the Ottawa International Airport with respect to the feasibility of developing the site as a rural residential subdivision on private services.

PROJECT EXPERIENCE – WASTE MANAGEMENT

Township of Clarence Landfill Buchanan Landfill Bourget, Ontario/Chalk River, Ontario, Canada	Preparation and submission of documentation to the Ontario Ministry of the Environment to obtain an exemption from the Environmental Assessment Act and approval under the Environmental Protection Act for interim expansions of the Township of Clarence Landfill and Buchanan Landfill. Project involved detailed hydrogeological and geophysical site characterization studies, development of mitigation measures to address existing off-site impacts on groundwater and surface water resources and participation in the preparation of the site development and operations reports, trigger mechanisms, and contingency measures, site closure plans, public participation/presentations, document preparation and representation to regulatory agencies. Expert testimony at the Environmental Assessment Board hearings resulting in successful applications.
Dodge Landfill Espanola, Ontario, Canada	Project Hydrogeologist responsible for hydrogeological studies of existing landfill in support of an application to the Ontario Ministry of Environment for a long-term site expansion.
Lanark County Waste Management Master Plan City/Township of Kingston Waste Management Master Plan Ontario, Canada	Hydrogeological consultant on the master plan study teams involving technical aspects and document preparation, Environmental Assessment process, EA level field investigations and evaluation of site-specific engineered containment system requirements at the preferred sites and presentations to the steering committees and the public.
Armbro Mine Landfill Development Marmora, Ontario, Canada	Project Hydrogeologist as part of the Metro Toronto area landfill site search, for hydrogeological assessment, conceptual design and technical feasibility evaluation of constructing a municipal landfill in the 250 metre deep former open pit iron ore mine.
Township of Clarence Waste Management Planning Study Ontario, Canada	As part of a multi-disciplinary team, responsible for the hydrogeological aspects of a long term waste management planning study under the Environmental Assessment Act and Environmental Protection Act, including development and evaluation of alternative waste management components and systems, a systematic landfill site selection process and interaction with the Public Liaison Committee, municipal council and the public.
Municipal Waste Management Planning Studies Ontario, Canada	Participated in hydrogeological aspects of waste management planning studies to identify potentially suitable areas for landfill development to satisfy the long term waste disposal requirements for the Township of Grattan, Township of Pittsburgh and the Townships of Palmerston, North and South Canonto.

Various Landfill Sites
Eastern and Northern Ontario, Canada

Responsible for undertaking and/or managing hydrogeological and waste management studies at in excess of 50 municipal landfill sites. The typical objectives of these studies have been to define the physical and contaminant hydrogeology including use of geophysical methods; undertake site-specific impact assessments on groundwater and surface water resources and gas migration; complete site performance evaluations in terms of current regulatory requirements; develop site-specific remedial action plans; design and implement annual hydrogeological monitoring programs; assist in the preparation of site development, operations and contingency and remedial action plans; and, to assemble the necessary documentation required to apply to the Ontario Ministry of Environment for Certificate of Approval revisions to permit continued disposal. Conducted evaluations of final cover design options using the Hydrologic Evaluation of Landfill Performance (HELP) computer model for the purpose of selecting the most appropriate final cover design for numerous landfills based on hydrogeological considerations, economics and availability of construction materials in the vicinity of the sites.

PROJECT EXPERIENCE – CONTAMINATED SITES INVESTIGATION AND REMEDIATION

Nation-Wide Environmental Site Assessments
Canada

Project Manager for Golder Associates' component of one of the largest environmental site assessment contracts in Canada which involved the assessment of over 780 sites which were being transferred from Transport Canada to NAV CANADA. Golder Associates completed Phase I ESAs of approximately 400 sites of which about 130 sites required Phase II ESA activities. The sites ranged from small antenna towers to large, complex international airports. Project involved considerable logistic planning to mobilize personnel across the country, familiarity with federal and provincial soil and groundwater remediation criteria, development of site-specific remediation options (including permafrost sites), and ongoing interaction with consultant team and Transport Canada/NAV CANADA.

Assessment of Rockcliffe Airbase Lands
Ottawa, Ontario, Canada

Project Manager to participate as part of a multi-disciplinary team assembled to conduct an existing conditions assessment related to potential redevelopment of the Rockcliffe site for residential land use. Completed a review of subsurface environmental investigation reports in terms of identifying potential development constraints associated with soil and groundwater conditions at the site. Presented recommended actions for evaluating issues of potential environmental concern including development of cost estimates to address these concerns.

Environmental Site Assessments
Eastern Ontario, Canada

Senior Reviewer for over 100 Phase I ESAs and over 50 Phase II ESAs completed by the Ottawa office. These projects included industrial, commercial and residential properties ranging from former coal gasification plants to microcircuit manufacturers. Projects have included an evaluation of permitting requirements related to waste-water discharges and air emissions as well as designated substances surveys.

Assessment of Diesel Fuel Release
Smiths Falls, Ontario, Canada

Project Manager for an environmental impact study which focused on a diesel fuel leak at a large industrial site and included the delineation of the areal extent of contamination, assessment with respect to current soil and groundwater remediation criteria and participation in the development and implementation of a site specific monitoring program and evaluation of remedial options.

Petroleum Hydrocarbon Releases
Eastern Ontario, Canada

Conducted subsurface investigations at numerous bulk storage, fuel dispensing and pipeline sites; development of groundwater and soil vapour monitoring programs; design and permitting of remedial measures including product recovery and excavation of contaminated soil; supervision and verification of site remediation.

Investigation of Salt Storage Facilities
Eastern Ontario, Canada

Project Manager for hydrogeological investigation relating to an assessment of poor groundwater quality adjacent to a salt dome near Almonte, Ontario. Project involved an evaluation of existing water quality data, development and implementation of a replacement well drilling program and long term groundwater quality monitoring program; project involved extensive consultation with municipal officials, affected homeowners and representatives from the Ontario Ministry of the Environment. Responsible for hydrogeological impact assessments relating to salt storage facilities near Eganville and Deep River, Ontario. Investigations included reconnaissance level geophysical surveys to characterize general dimension of the contaminant plumes followed by confirmation drilling, monitoring well installation and groundwater sampling programs to delineate the nature and extent of the contaminant plumes originating from the salt storage facilities and to differentiate between groundwater impacts from the salt storage facilities and that from nearby landfill sites.

PROJECT EXPERIENCE – AGGREGATE INDUSTRY

Stittsville Quarry
Township of Goulbourn (Ottawa), Ontario, Canada

Project Manager and Project Hydrogeologist retained by R.W. Tomlinson Limited to provide geoscience and engineering services and to co-ordinate a multi-disciplinary study team in the preparation of the supporting documents, for a submission to the Ontario Ministry of Natural Resources, in support of an application for a Category 2, Class “A” license for a 44 million tonne quarry which intends to extract limestone from below the established groundwater table. Assignment also included preparation and submission of applications to the Ontario Ministry of Environment for approval under Section 34 (Permit to Take Water) and Section 53 (Industrial Sewage Works) of the Ontario Water Resources Act. All required approvals were obtained and the quarry became operational in September 2002. Kris continues to be involved as Project Director on all environmental compliance monitoring requirements associated with the Ministry of Natural Resources aggregate license and the Ministry of Environment approvals under Section 34 and 53 on the Ontario Water Resources Act.

Rideau Road Quarries
City of Gloucester (Ottawa), Ontario, Canada

In 2003, Golder Associates was retained by R.W. Tomlinson Limited to provide geoscience and engineering services and to co-ordinate a multi-disciplinary study team in the preparation of the supporting documents, for a submission to the Ontario Ministry of Natural Resources, in support of an application for a Category 2, Class "A" license for a 40 hectare parcel of land adjacent to Tomlinson's existing quarry operations. The quarry was designed to extract limestone from below the established groundwater table for the production of high quality aggregate suitable for all types of asphalt pavements. Kris was Project Director and Project Hydrogeologist for this assignment and Golder Associates' primary responsibilities included preparation of Level 1 and Level 2 Hydrogeological studies and Natural Environment evaluations of the property. Of particular significant for this project was the innovative approach develop by Golder Associates (in consultation with the Ministry of Natural Resources) for the purpose of addressing the presence of the American ginseng plant species and butternut trees on the property. The aggregate license was issued by the Ministry of Natural Resources in 2006.

Tatlock Quarry
Township of Lanark Highlands, Ontario, Canada

Project Director and Project Hydrogeologist retained in 2002 by Omya Canada Inc. to conduct Level 1 and Level 2 hydrogeological studies in support of an application to the Ministry of Natural Resources for a Category 2, Class "A" license for the extraction of calcitic marble (crystalline limestone) at the Omya Tatlock Quarry located northwest of Perth, Ontario. Golder Associates was also responsible for the preparation of an application for an industrial sewage works approval under Section 53 of the Ontario Water Resources Act. The quarry license application was issued by the Ministry of Natural Resources in April 2006 and the industrial sewage works approval was issued by the Ministry of Environment in March 2006. Kris continues to advise Omya Canada Inc. on matters related to environmental compliance monitoring and other issues pertaining to Ministry of Natural Resources aggregate license and the Ministry of Environment approvals under Section 34 and 53 on the Ontario Water Resources Act.

Dunvegan Quarry
Township of North Glengarry, Ontario, Canada

Project Hydrogeologist retained by the Township of North Glengarry to conducted a peer review of the hydrogeological aspects of the Cornwall Gravel Company Ltd. Dunvegan Quarry license application. The peer review focused on developing an opinion as to whether the Hydrogeological Assessment Report addressed the various components specified as part of a Hydrogeological Level 1 study and Hydrogeological Level 2 study in the context of a Category 2, Class "A" Quarry Below Water.

Klock Quarry
Aylmer, Quebec, Canada

Golder Associates was retained by Lafarge Canada Inc. to conduct the hydrogeological and natural environment assessments associated with obtaining approval for the extraction of limestone from a property situated adjacent to the existing Klock Quarry. Kris is responsible for overall project co-ordination and direction of a multi-disciplinary team.

Brechin Quarry
City of Kawartha Lakes, Ontario, Canada

Project Manager and Project Hydrogeologist retained by R.W. Tomlinson Limited to complete the necessary hydrogeological, hydrological and ecological studies to support an application under the Aggregate Resources Act. The proposed Brechin Quarry is located in the former Township of Carden within the City of Kawartha Lakes, Ontario. The property covers an area of approximately 206 hectares and involves an aggregate resource of 70 million tonnes with an expected operational timeframe of over 70 years. The assignment involves a comprehensive assessment of the potential effects of quarry development on private water supply wells and an adjacent Provincially Significant Wetland and other natural environment (biological) features as well as consideration of the potential cumulative impacts associated with multiple quarry developments in the area of the proposed Tomlinson Brechin Quarry. This project involves extensive municipal and public consultation as well as interaction with representatives of the Ontario Ministry of Natural Resources and Ontario Ministry of Environment. The aggregate license was issued by the Ministry of Natural Resources in 2009.

TRAINING

Ministry of Environment Approvals Reform and Air Emission Summary and Dispersion Modelling Report Workshop
Ministry of the Environment, 1998

Site Specific Risk Assessment Seminar
Ottawa, 1998

Contaminated and Hazardous Waste Site Management
1997

Occupational Health and Safety Course
1989, 1995

Groundwater Protection in Ontario Conference
Toronto, 1991

Short Course in Dense, Immiscible Phase Liquid Contaminants (DNAPLs) in Porous and Fractured Media
Waterloo Centre for Groundwater Research, 1990

PROFESSIONAL AFFILIATIONS

Associate Member, Ontario Stone Sand and Gravel Association (OSSGA)

Member, Association of Groundwater Scientists and Engineers (N.G.W.A.)

Member, International Association of Hydrogeologists

Member, Ottawa Geotechnical Group, The Canadian Geotechnical Society

Member, Ontario Water Well Association

WSP Canada Inc. – Ottawa, Ontario

Education

Master's of Applied Science Environmental Engineering, Carleton University, Ottawa, Ontario, 2006

Bachelor Environmental Engineering, Carleton University, Ottawa, Ontario, 2003

Bachelor of Arts Psychology, University of Guelph, Guelph, Ontario, 1996

Certifications

Registered Professional Engineer, Professional Engineers of Ontario, March 2009

Career Summary

Brian Henderson, P.Eng., is an Environmental Engineer with WSP Canada Inc. (previously Golder Associates), in Ottawa. He holds B.Eng. and M.A.Sc. degrees, both from the department of Civil and Environmental Engineering at Carleton University. He manages a wide variety of hydrogeological and environmental projects including borehole drilling, groundwater and surface water analysis and groundwater monitoring well installation. He has experience with the construction of numerical groundwater flow models used to assess the potential hydrogeological impacts of quarry and construction de-watering and larger scale models for regional studies.

Employment History

WSP Canada Inc.(previously Golder Associates Ltd.) – Ottawa, Ontario
Environmental Engineer (2006 to Present)

Brian is responsible for project management, technical analysis, data management and reporting for a variety of hydrogeological and environmental projects. In this role he leads the planning, management and execution of permitting applications, groundwater resource protection studies and other environmental/hydrogeological projects. Brian carries out groundwater sampling, field investigations (including soil and groundwater investigations and monitoring); residential groundwater sampling; data management, analysis and interpretation. In addition, he monitors and reports on the compliance of quarry sites and landfills in accordance with their Certificates of Approval and Permits to Take Water. Brian performs groundwater modelling for wellhead protection studies, construction-related groundwater control and quarry hydrogeological studies.

Carleton University – Ottawa, Ontario
Teaching Assistant (2003 to 2005)

Conducted problem analysis sessions for several environmental engineering courses; prepared and coordinated seminars; and helped students one on one. Courses included third year contaminant transport, third year water resources engineering and a fourth year risk assessment course.

City of Ottawa – Ottawa, Ontario
Engineering Assistant (2003)

Working under supervision of City of Ottawa standards engineer, helped to write the City of Ottawa's Sewer Use Guidelines, attended meetings from other departments about the guidelines, researched current acceptable products to determine if they would meet future standards and reviewed new products to establish if they meet with the City's standards.

Carleton University – Ottawa, Ontario
Research Assistant – NSERC Undergraduate Research Award (2002)

Conducted research on the separation of cellulose from sugarcane bagasse plant residue; applied laboratory procedures and analytical techniques to investigate the effectiveness of the separation for a series of individual experimental trials; and designed a bench-scale model for the continuous separation of cellulose based on the experimental trials.

City of Ottawa – Ottawa, Ontario
Laboratory Assistant (2001 to 2002)

Laboratory tested asphalt, aggregates and concrete used in road construction. Laboratory tests included particle size distribution and proctor values for aggregates, the compressive strength of concrete, and particle distribution, volume of voids, percent asphalt cement, and marshal properties for asphalt. In the field, core samples were taken and densities of asphalt were measured using a nuclear density gauge.

PROJECT EXPERIENCE – HYDROGEOLOGY

Rehabilitation of the West Block Ottawa, Ontario	Undertook the hydrogeological components associated with the rehabilitation of the West Block prior to occupation by the House of Commons. Brian prepared a Category 3 Permit to Take Water (PTTW) application and supporting documentation for water taking for construction dewatering from the proposed excavations inside and outside of the building.
Retrofit, Historical Restoration and Seismic Upgrade of the Wellington Building Ottawa, Ontario	Undertook the hydrogeological components associated with the assessment, and development of a treatment system for contaminated groundwater which was encountered under the floor slab. Brian undertook the modelling required to estimate potential groundwater inflow to the treatment system.
Major Rehabilitation of the Government Conference Centre Ottawa, Ontario	Undertook the hydrogeological components associated with the rehabilitation of the Government Conference Center prior to occupation by the Senate of Canada. Brian designed the field testing components of the hydrogeological program and prepared a Category 3 Permit to Take Water (PTTW) application and supporting documentation for water taking for construction dewatering from the proposed excavations inside and outside of the building.
Integrated Road, Sewer and Watermain Replacement/ Rehabilitation Ontario	Conducted background review, technical hydrogeological analysis and reporting related to infrastructure installation/replacement throughout the City of Ottawa. Analysis included predictions of the rate of groundwater inflow, water quality testing and the identification of hydrogeological risks.
Permit to Take Water Applications/ Environmental Activity and Sector Registry Documentation Ontario	Conducted background review, technical hydrogeological analysis and reporting related to Category 1, 2 and 3 Permit to Take Water (PTTW) applications as well as dewatering and discharge plans to support Environmental Activity and Sector Registry (EASR) registrations for construction dewatering projects, quarry dewatering and pumping tests.
Groundwater Numerical Modelling Ontario	Conducted hydrogeological investigations for proposed and existing quarry sites and construction dewatering projects. Developed detailed conceptual and numerical models for groundwater flow, and demonstrated impacts to local environment.
Groundwater and Surface Water Monitoring Programs Ontario	Managed groundwater and surface water monitoring programs; conducted data checks, technical review and analysis; and, prepared a comprehensive annual report for various landfill and quarry sites.

Potable Water and Wastewater Expansion
Village of Limoges, Ontario

In response to a hydraulic review of the potable water and wastewater systems for the Village of Limoges, Golder completed the necessary studies to inform a Master Plan for the two systems in accordance with the requirements of a Municipal Class Environmental Assessment. The Master Plan addressed the growth potential and the capacity constraints to develop a long-term outlook for the community. Brian served as Project Manager and Hydrogeologist for this project. As Project Manager he was responsible for budget/schedule maintenance and control, QA/QC of deliverables, development of a health & safety plan, communication with client and stakeholders, contractor guidance and supervision as well as team organization and communication. Brian also carried out data analysis, report preparation, field program design and water level/sample collection to complete a hydrogeological study to evaluate possible well locations.

Hydrogeological and Hydrological Assessments for Quarry Licensing
Ottawa (Goulbourn Twp.), Ontario

Golder carried out the necessary hydrogeological, hydrological and ecological studies to support applications under the Aggregate Resource Act and the Planning Act for a site plan license for a new quarry. Brian developed detailed conceptual and numerical models of groundwater flow, demonstrated potential impacts to local environment and proposed mitigative measures.

Hydrogeological Assessment for Quarry Licensing
Ottawa (Gloucester Twp.), Ontario

Golder carried out a hydrogeological studies to support an application under the Aggregate Resource Act and the Planning Act for a site plan license for a new quarry. Brian developed detailed conceptual and numerical models of groundwater flow, demonstrated potential impacts to local environment and proposed mitigative measures. He carried out on-site hydraulic conductivity testing and groundwater/surface water interaction studies. He was responsible for designing the field program and health & safety plan and preparing the report.

Hydrogeological Assessment for Quarry Licensing
Canaan Quarry Expansion, Ottawa, Ontario

Golder carried out a hydrogeological study to support an application under the Aggregate Resource Act and the Planning Act for a site plan license for a quarry expansion. Brian developed detailed conceptual and numerical models of groundwater flow, demonstrated potential impacts to local environment and proposed mitigative measures. He carried analysis of on-site hydraulic conductivity testing data. He was responsible for designing the field program and health & safety plan and preparing the report.

Conceptual Design for the Remediation of a Closed Landfill
County of Northumberland, Ontario

Golder presented a number of remediation alternatives to the County to address surface water compliance issues arising from leachate derived impacts identified in a nearby creek caused by a closed landfill. After a review and analysis of existing data, Brian developed the conceptual groundwater flow model, carried out numerical modelling of the remediation options, and prepared reports.

Options Evaluation and Preliminary Design for Tailings Management Option
Nunavut

Golder completed a tailings and waste rock management options evaluation and preliminary design of selected tailings management options at a mine site in Nunavut. Brian completed monitoring well development and sampling for groundwater quality of a deep monitoring well below permafrost using the WestbayTM monitoring well system.

Groundwater Vulnerability Study
Kingston, Ontario

Golder completed a Groundwater Vulnerability Study for the municipal water supply well servicing a subdivision in the northeast part of Kingston, Ontario. The groundwater vulnerability study included the delineation of the wellhead protection area (WHPA) around the well and the determination of vulnerability scores for the different zones within the WHPA. Brian was responsible for field program design, compilation, interpretation and analysis of data and report preparation. He also carried out the QA/QC of deliverables, conceptual model development and numerical modelling.

Phase III ESA at the Ottawa International Airport
Ottawa, Ontario

Golder completed a Phase III Environmental Site Assessment at the MacDonald-Cartier Ottawa International Airport which attempted to define the extent of groundwater and soil impacts based on the data gap analysis and the water quality results from the available monitoring wells installed during previous investigations. Brian was responsible for the collection of soil and groundwater samples, field program development, data analysis and report preparation. He also carried out compilation and interpretation of data, conceptual model development and contractor guidance and supervision.

Wellhead Protection Study
Deloro, Ontario

Golder carried out a Wellhead Protection Study for the Village of Deloro municipal well. The study included a groundwater vulnerability analysis, a threats inventory and a water quality risk assessment. Brian carried out groundwater flow modelling for the delineation of wellhead protection areas for the municipal well in Deloro. He conducted groundwater vulnerability mapping using ISI methods within the delineated areas.

PROJECT EXPERIENCE – HYDROGEOLOGY - INFRASTRUCTURE

Combined Sewage Storage Tunnel
Ottawa, Ontario

Golder carried out geotechnical and hydrogeological investigations for a new 6 km combined sewer storage tunnel system in Ottawa. A field investigation and reporting program was completed through the downtown core to support the preliminary and detail design team. Brian assisted with the design and implementation of the hydrogeological field program, carried out the packer test data analysis, compiled and interpreted data and completed pumping tests which were challenging due to the location on the streets of downtown Ottawa. Results of the hydrogeological assessment were included in a report used as a supporting document for a Permit to Take Water application for construction dewatering for the project. Brian also provided technical review and guidance to the team and the guidance and supervision of contractors.

South Nepean Collector Sewer Phase Two
Ottawa, Ontario

Undertook hydrogeological investigation for 2.5 kilometers of new deep trunk sewer in Barrhaven just north of the Jock River through sensitive clays, bouldery glacial till with permeable sand seams, and limestone bedrock. Providing hydrogeological input to design, tender documents and construction, including a PTTW application with supporting documentation. Key issues included assessment of the potential for basal heave, basal instability and general excavation conditions for the 6 to 10 metre deep excavations.

Ottawa Light Rail Transit Preliminary Design
Ottawa, Ontario

From 2010 to 2012, Golder carried out geotechnical, environmental and hydrogeological investigations for a new 12.5 km light rail transit system in Ottawa. A field investigation and reporting program was completed through the downtown core to support the preliminary design team. Brian assisted with the design and implementation of the hydrogeological field program, carried out the packer test data analysis, compiled and interpreted data and completed pumping tests which were challenging due to the location on the streets of downtown Ottawa. Brian also provided technical review and guidance to the team and the guidance and supervision of contractors.

West Transitway Extension (Bayshore Station to Moodie Drive)
Ottawa, Ontario

Undertook the hydrogeological components of the functional and detailed design for the West Transitway extension from Bayshore Station to Moodie drive. Subsurface conditions were determined using pre-existing information and a limited number of new test pits and boreholes/monitoring wells. A pumping test was carried out in the vicinity of Moodie Drive, due to the high hydraulic conductivity of the shallow bedrock, and numerical modelling analyses were undertaken to evaluate the issues related to construction dewatering. Golder obtained draft PTTW's for construction dewatering associated with construction of Phases 1 and 2.

Manotick Watermain Link
Ottawa, Ontario

Undertook hydrogeological investigations for detailed design of a watermain through the Village of Manotick, including two crossings under the Rideau River. Completed a Permit to Take Water application with supporting documentation.

Spencer Avenue Integrated Road, Sewer and Watermain Construction
Ottawa, Ontario

Undertook the, hydrogeological investigation for the integrated replacement of the roadway, watermain and sewer along Spencer Avenue from Western Avenue to Holland Avenue. Providing hydrogeological input to design and construction, and a Permit to Take Water application with supporting documentation.

Gilmour Trunk Sewer Reconstruction
Ottawa, Ontario

Undertook the hydrogeological investigation for the integrated replacement of the roadway, watermain and a deep trunk sewer along Gilmour Street, Waverley Street, Cartier Street and Elgin Street, with deep shaft connection to the Rideau Canal Interceptor trunk sewer. Providing hydrogeological input to design, tender documents and construction, including a Permit to Take Water application with supporting documentation.

Lavergne Street Integrated Road Sewer and Watermain Reconstruction
Ottawa, Ontario

undertook the hydrogeological component of the design and construction for the integrated replacement of the roadway, watermain and sewer along Lavergne Street, Jolliet Avenue, Ste Monique Street, et al. in Vanier. Project included deep excavations in peats, highly permeability sands below the water table, and shallow shale bedrock. Non-standard construction measures were considered and assessed as a means of limiting the potential for impacts to adjacent structures resulting from compression of the underlying peat soils due to groundwater level lowering. A Permit to Take Water application with supporting documentation was prepared.

Holland Avenue Watermain Replacement
Ottawa, Ontario

Geotechnical, hydrogeological and environmental subsurface investigations in support of design and tender of watermain replacement. Mr. Henderson undertook the hydrogeological components of the project, completed a Permit to Take Water application for the City of Ottawa, and assisted in developing construction specifications for soil and groundwater management.

Jockvale Road Jock River Bridge Replacement
Ottawa, Ontario

Undertook the hydrogeological components associated with the detailed design of the Jock River bridge replacement and the widening and reconstruction of Jockvale Road and associated subsurface utilities in Barrhaven. Golder obtained a Category 3 Permit to Take Water (PTTW) for water taking from the excavation for the Jockvale roadway/sewer service trenches, the bridge caissons and the North and South shafts for the construction of the horizontal utility bore below the Jock River. Analytical and numerical modelling was carried out to evaluate rates of water taking and impacts to the sensitive clay deposit and two dozen private water supply wells located within 500 metres of the site. Golder developed a monitoring program to support the water taking activities.

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