LAKE ROSALIND WELL 3 REHABILITATION AND WELL 1 TESTING

Prepared for:

THE CORPORATION OF THE MUNICIPALITY OF BROCKTON

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Lotowater
TECHNICAL SERVICES INC.

Date: December 19, 2018

Reference: 248-026

THE CORPORATION OF THE MUNICIPALITY OF BROCKTON

LAKE ROSALIND WELL 3 REHABILITATION AND WELL 1 TESTING

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FIGURES

APPENDICES

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December 19, 2018

Reference: 248-026

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Walkerton, Ontario
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Box 220

Attention: Scott Gowan, Project Manager, Veolia North America

SUBJECT: LAKE ROSALIND WELL 3 REHABILITATION AND WELL 1 TESTING

This report documents the work performed by Lotowater Technical Services Inc. (LTS) at Lake Rosalind Wells 1 and 3. The service program for Well 3 included well performance testing, video survey, pumping equipment replacement and well rehabilitation. The field work was performed over several days from November 28-30, 2018. Lotowater has worked at both wells in the past, starting in 2003, but has very limited information on the wells prior to this.

BACKGROUND

Lake Rosalind Well 3 is a 200 mm diameter drilled well, believed to be constructed in 1987 (see attached well record in **Appendix A**). The well is constructed with a 200 mm steel casing set to a depth of 15.5 m with a 150 mm diameter screen set in overburden from 15.84-18.92 m. The well penetrates a clay aquitard from roughly 11-13 m. The well was found equipped with a 10gpm and ½ horsepower motor installed in 2005. The well was last video inspected and serviced in 2005, at which time a new ½ horsepower submersible pump was installed. Well 3 has experienced periods where the levels have drawn down near the pump inlet, which has required pumping to be reduced to avoid pump cavitation. This has occurred several times in 2003, 2005, & 2007. In these cases, flows were made up by increasing pumping at Well 1.

Lake Rosalind Well 1 is a 1.0 m diameter dug well which is 4.12 m deep. No construction or MOE well record could be located for this well. The well is equipped with a 38 mm HDPE suction line and foot valve with a ½ horsepower jet pump and motor located in the pump house. This well has high artesian water levels and regularly flows to waste out a screened overflow when well levels are high. The well was last tested and inspected when repairs were made to the suction line and well tiles in 2011. Well 1 levels have fluctuated, but levels have never been low enough to cavitate the pump since at least 2003. The well reportedly has more issues with bacteria hits then Well 3, and for this reason, is used to supplement Well 3.

Both wells feed the plant which filters the incoming raw water through a bag filter system, then through a contact chamber and eventually into and underground reservoir. From there, submersible high lift pumps distribute to the Lake Rosalind distribution system, which services 60 residents along Lake Rosalind Road #4. Both wells operate simultaneously, with Well 3 operating at approximately 0.7 L/s and Well 1 at 0.3 L/s when the reservoir calls for water based on reservoir level. The average Lake Rosalind system demand has ranged from 15-30 m^3/day over recent years with roughly 70% of the flow from Well 3 and the remaining 30% from Well 1.

WELL 3 PRE-REHABILITATION TESTING

A pre-rehabilitation well step test was conducted on November 28, 2018. The data collected is provided in **Table 1** and was plotted graphically and compared against historical pumping levels on **Figure 1**. Static levels are well above levels measured during the last step test in 2003. Drawdowns, however, appear similar and indicate no significant loss in well performance due to plugging.

WELL 3 PRE-REHABILITATION VIDEO SURVEY

A pre-rehabilitation static video was completed November 28, 2018, with significant well construction details noted in **Table 2**. A DVD copy of the video has been enclosed with the original hard copy of this report. The video showed significant fouling of the casing and screen with debris filling the bottom of the well (**Photos 1 to 4**).

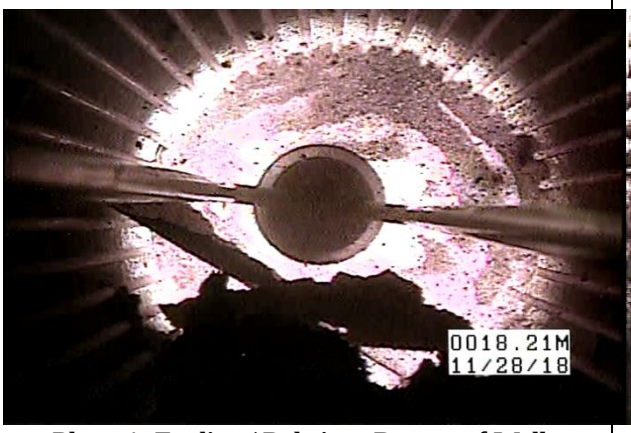


Photo 1: Fouling / Debris at Bottom of Well

Photo 2: Fouled Well Screen

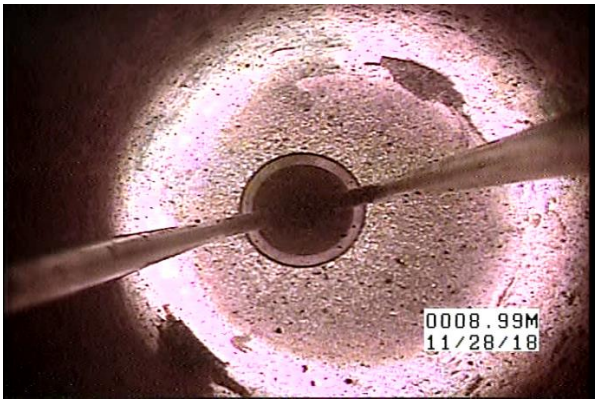


Photo 3: Buildup on Casing

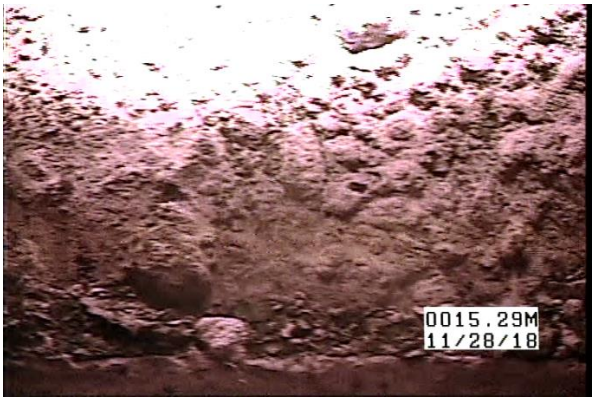


Photo 4: Buildup on Casing

WELL 3 REHABILITATION

The well rehabilitation was performed to remove the buildup on the screen and casing. The rehabilitation program utilized a dual tube airlift assembly and high pressure jetting system. The well was initially airlifted off bottom using a 50 mm x 10 mm dual airlift to remove sediment and debris in preparation of the jetting. After the initial airlift, the well was jetted with a high pressure rotating head jetting tool. The tool was raised and lowered over the casing and screen while jetting at 7,500psi @ 1.0 L/s, while simultaneously airlifting the well at a 1.0 L/s rate to remove material dislodged during jetting. The well was jetted and airlifted in this manner for two hours and produced a dark red to reddish brown discharge with some fine silt and sand. After the jetting, the well was airlifted off bottom until the discharge was clear and sediment free. Some photos of the rehabilitation setup and equipment are shown in (**Photos 5 to 8**).

Photo 5: Set up on Well

Photo 6: Jetting Tool

Photo 7: Airlift Discharge

Photo 8: Interior of Video/Logging Van

WELL 3 POST-REHABILITATION VIDEO SURVEY

A post-rehabilitation video was completed November 29, 2018, with significant well construction details noted in **Table 3**. A DVD copy of the video has been enclosed with the original hard copy of this report. The video showed the well screen had been successfully cleaned and the debris noted in the previous video removed (**Photos 9 to 11**). The video inspection identified a hole in the well casing following cleaning as shown in **Photo 12**. There were no indications of any leaking or sediment entering the well through the hole during the video.

Photo 9: Clean Well Screen

Photo 10: Bottom of Well

Photo 11: Clean Well Screen

Photo 12: Hole in Well Casing

WELL 3 CASING THICKNESS AND CALIPER LOGS

A casing thickness log was completed November 29, 2018. The results of the log are presented as **Figure 2** and show some variability in overall casing thickness, but no overall signs of thinning. Note however, the casing thickness log did not identify the small hole in the casing; as the log was outside resolution of the thickness tool.

A three arm caliper log was also run, which indicated a 200 mm nominal diameter casing which appears to decrease slightly in diameter with depth. At the k-packer and screen, the diameter decreases significantly to 159 mm interior diameter.

WELL 3 PUMP INSTALLATION

Lotowater installed a new pump, motor and HDPE discharge piping on November 29, 2018. In addition, a new stinger for the pitless adapter was cut and threaded then installed on top of the pitless adapter. A pump installation drawing has been included as **Figure 3**, and a well disinfection record has been included in **Appendix B**. Testing of the pump was performed after installation, which showed it performing satisfactorily. In addition, testing also indicated that there are no significant leaks or plugging of the line that connects the well to the plant.

WELL 3 POST-REHABILITATION TESTING

A post-rehabilitation well performance test was conducted on November 30, 2018. The data collected is provided in **Table 4** and was plotted graphically and compared against historical pumping levels on **Figure 1**. The post-rehabilitation test results indicated a similar performance when compared to the pre-rehabilitation data. The well is more than capable of producing the normal operating flow rate in the short term. The testing indicates that there is no significant plugging of the well screen.

WELL 1 TESTING

A data logging pressure transducer was installed in Well 1 to log the levels in Well 1 while Well 3 was off line for maintenance. Levels are plotted on **Figure 2**. Over the three days Well 1 was off, Well 3 averaged about 18 m^3/day. The well came on 4 times over this period and levels drew down from a high on Nov 28 of 0.71 m to a low of 0.97 m. The well recovered quickly and levels were well above the pump inlet (at 3.39 m) the entire time. Well 1 well drawing showing basic construction details was created and shown on **Figure 4**.

A brief test was performed to assess the existing Myers HJ50S-K jet pump performance with details as follows.

Flow	= 0.29 L/s
Pressure	= 42 psi
Amps	= 5.1
Well Level	= 0.71 m
TDH	= 33 m

The pump appears to be operating properly and close to its operating curve.

WELL 1 AND 3 PUMPING AND LEVEL HISTORY

Average monthly pumping rates and weekly well levels were plotted at each well starting in 2003. Well levels are collected manually by Veolia staff. These plots are shown in **Figures 5 and 6**. Total pumping appears to average 15-25m^3/day over the last several years.

Well 1 levels fluctuated from 0.4 - 2.9 m over the past 15 years with levels generally not going below 2.0 m, except for July of 2017. It appears that levels are generally lowest in the summer and highest in the early spring. Well levels don't necessarily correlate with pumping as there are times with increased pumping and high water levels in the spring on 2016. Conversely, there was a period of no pumping in the spring and summer of 2007 where levels were low. Although pumping may be a contributing factor to Well 1 level declines, it appears that there are other factors that have a more significant impact on levels. These could be due to changes in precipitation, recharge or pumping from other nearby wells.

Well 3 had extreme fluctuations of levels over the same 15 year period. Levels have been very near the well head such that the well was nearly overflowing to as low as the pump inlet at 17.1 m. Levels appear to be the lowest in late fall to early winter, and highest in spring. Years of low well levels where the pump was likely cavitating, were in 2003, 2005 & 2007. Similar to Well 1, low levels in the well don't always correlate to high periods of pumping, and there are likely other factors that are contributing to these severe level declines. Over the last 7 years, well levels have never approached the pump inlet.

IMPORTANT OBSERVATIONS

Well 3 was successfully rehabilitated and new pumping equipment installed. Some additional conclusions and observations for Well 3 are as follows:

- Pre rehabilitation performance testing showed well performance was similar to the last performance test in 2003, and that, despite the buildup seen on the screen, plugging was not having a significant impact on the wells performance.

- Pre inspection video showed corrosion and buildup covering the screen and casing which was removed by rehabilitation.

- The post rehabilitation video identified a hole in the casing, but there were no obvious signs of leaking water, sand or sediment entering through the hole.

- The casing thickness log showed no overall casing thinning. The hole is believed to be isolated to one small spot of the casing, which is outside the resolution of the casing thickness tool, so it was not seen in the casing thickness log.

- Post rehabilitation testing showed similar performance to the pre rehabilitation testing. The well can easily be pumped up to its equipped capacity, at least for the short term.

- Plugging of the well screen here is not a significant contributor to historic low water levels in this well.

- Long term review of level and pumping history shows that levels in the well can change relatively quickly, even drawing levels down to the pump, and reasons for this are not clear. Increased seasonal pumping from the well is likely contributing to these declines, but other factors such as precipitation, recharge and potentially, pumping from other nearby wells, are likely having significant impacts as well.

- Over the last 7 years the current use appears sustainable with levels maintained well above the pump inlet.

No service or maintenance was performed at Well 1. However, testing showed that the well levels were well above the pump inlet at the normal current pumping rate. In addition, the existing pump was found to be performing satisfactorily. Some additional conclusions and observations for Well 1 are as follows:

- Well 1 levels fluctuate but have never reached the pump inlet like at Well 3.

- Well 1 had a period of low levels recently in July of 2017 and the cause of this is not clear.

- Long term review of level and pumping history doesn't show a strong correlation with pumping and well levels. Levels appear more affected by other factors, such as precipitation and recharge.

- Over at least the last 15 years, the current use appears sustainable with levels maintained well above the pump inlet.

- Despite periods of low levels in either Well 1 or 3, these low levels never occurred at the same time. This is a good sign that the wells are not significantly interconnected and that if one well is experiencing low levels the other appears capable to meet increased pumping demands.

RECOMMENDATIONS

It appears the system has been working over the last 5 plus years with no significant issues. However, Lotowater recommends the following actions be considered to increase the reliability and security of the wells.

- Install a new stainless steel liner in Well 3 to repair the hole in the well casing. At the same time, raise the well casing and ground level to facilitate easier access and maintenance.

- If levels drop below 2.5 m in Well 1, and levels are above 13 m in Well 3, decrease pumping at Well 1 by 50% and increase pumping correspondingly at Well 3 to make up the difference. Return to the existing pumping configuration when levels in Well 1 recover to 2.0m.

- If levels drop below 12 m in Well 3, and levels are above 2.5 m in Well 1, decrease pumping at Well 3 by 50% and increase pumping correspondingly at Well 1 to make up the difference. Return to the existing pumping configuration when levels in Well 3 recover to 10.0m.

- Establish a warning criteria for different levels of water conservation based on well levels. This could include a yellow level warning to conserve, if water levels in Well 1 drop below 2.5 m or if water levels in Well 3 drop below 13 m. A red level warning would be if both Well 1 and Well 3 drop below 2.5 and 13 m correspondingly, which would instigate a higher level of conservation.

- Consider automating level collection at Well 1 and 3 using self-contained data logging transducers such as a Solonist Level Troll or van Essen Diver. Have the well log on a daily basis and download annually.

- Consider installing remote well level readouts in the pump house so operators can easily check well levels and optimize pumping schemes to balance pumping between the two wells as described above.

- Update the well level hydrographs and pumping history plots annually and have a hydrologist and/or groundwater professional review and comment.

It has been a pleasure working with Veolia and the Municipality of Brockton on this project. Please contact the undersigned if you require further information.

Yours sincerely,
Lotowater Technical Services Inc.

Boyd Pendleton, B. Sc., P. Geo.
Vice President

TABLES

TABLE 1

VARIABLE RATE PERFORMANCE TEST
Pre-Rehabilitation

Lotowater TECHNICAL SERVICES INC.

Well Name:	Lake Rosalind Well 3	**Project Number:**	248-026
Client:	Municipality of Brockton	**Date:**	2018-11-28
Technician Name:	Craig Lawson	**Pump:**	Client's
Water Level Device:	LTS water level meter	**Pump Inlet:**	17.1 mbtc
Water Level Reference:	Top of casing	**Flow Measuring Device:**	Clients meter
Test Note:	Top of sounding tube = 0.97 m above ground surface		

Time *hr:min*	Elapsed Time *min*	Level *mbBP*	Drawdown *m*	Flow *L/s*	Note
0:00	0	7.33	0.00	0.73	Start Step 1
0:01	1	7.86	0.53	0.73	
0:02	2	7.89	0.56	0.73	
0:03	3	7.89	0.56	0.73	
0:04	4	7.90	0.57	0.73	
0:05	5	7.90	0.57	0.73	
0:06	6	7.90	0.57	0.73	
0:08	8	7.91	0.58	0.73	
0:10	10	7.93	0.60	0.73	
0:12	12	7.93	0.60	0.73	
0:15	15	7.93	0.60	0.73	
0:20	20	7.96	0.63	0.73	
0:25	25	7.97	0.64	0.73	
0:30	30	7.97	0.64	0.73	

TABLE 2

Municipality of Brockton

Lake Rosalind Well 3
Pre-Rehabilitation Static Video Summary
2018/11/28

Elapsed Time (h:min)	Depth (ft below MP)	Depth (m below MP)	Comments
0:00	2.76	0.84	Below top of casing
0:01	6.99	2.13	Pitless adapter
0:04	17.72	5.40	Casing joint
0:04	17.72	5.40	Static water level
0:06	29.53	9.00	Pause, set sample pump to clear image
Chapter 2			
0:00	29.49	8.99	Below top of casing
0:02	37.27	11.36	Casing joint
0:05	49.70	15.15	K-Packer
0:06	51.90	15.82	Top of screen
0:08	59.74	18.21	Bottom of well, sediment
0:14	51.84	15.80	Top of screen
0:17	50.16	15.29	K-Packer
0:24	37.24	11.35	Casing joint
0:30	23.75	7.24	Water level
0:32	17.98	5.48	Casing joint
0:36	6.89	2.10	Pitless adapter
0:38	2.53	0.77	Below top of casing

Video survey conducted by Jason Dion

Note: Measuring point (MP) is top of casing which is 0.83 m above ground surface

TABLE 3

Municipality of Brockton

Lake Rosalind Well 3
Post-Rehabilitation Static Video Summary
2018/11/29

Elapsed Time (h:min)	Depth (ft below MP)	Depth (m below MP)	Comments
0:00	2.76	0.84	Below top of casing
0:00	6.89	2.10	Pitless adapter
0:02	17.39	5.30	Casing joint
0:02	23.39	7.13	Static water level
0:10	29.53	9.00	Pause, set sample pump to clear image
0:13	36.42	11.10	Casing joint
0:16	49.54	15.10	K-Packer
0:17	51.84	15.80	Top of screen
0:20	62.07	18.92	Bottom of well, sediment
0:29	51.97	15.84	Top of screen
0:31	50.36	15.35	K-Packer?
0:32	49.87	15.20	K-Packer?
0:36	45.51	13.87	Possible hole in casing
0:40	37.40	11.40	Casing joint
0:48	23.79	7.25	Water level
0:51	18.18	5.54	Casing joint
0:56	7.05	2.15	Pitless adapter
0:59	2.79	0.85	Below top of casing

Video survey conducted by Jason Dion

Note: Measuring point (MP) is top of casing which is 0.83 m above ground surface

TABLE 4

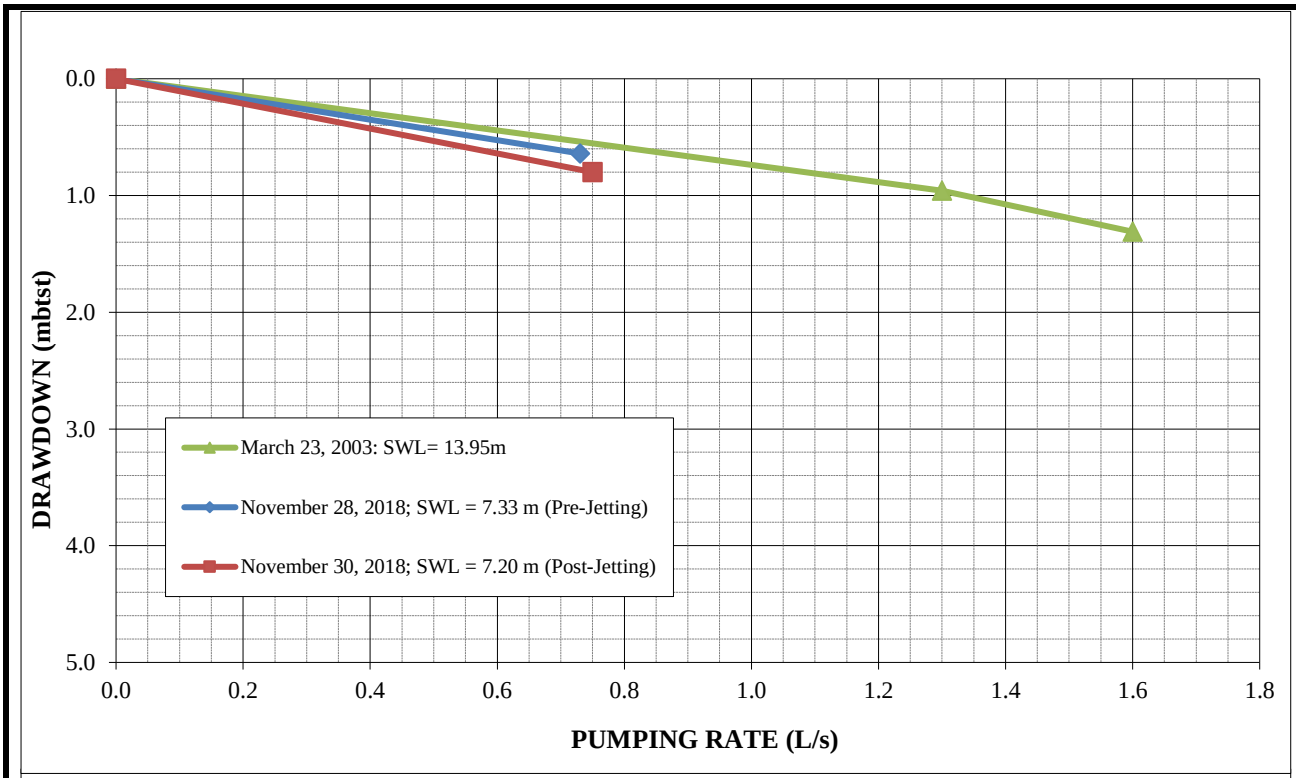
VARIABLE RATE PERFORMANCE TEST
Post-Rehabilitation

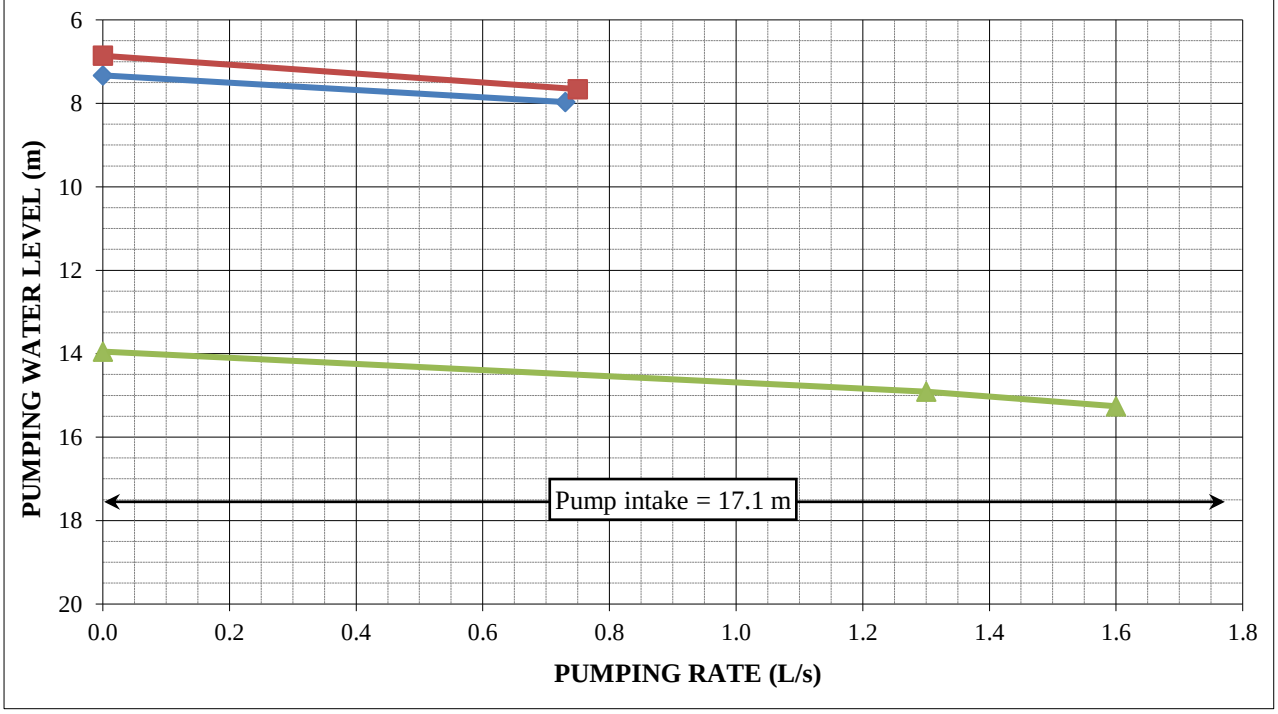
Lotowater TECHNICAL SERVICES INC.

Well Name:	Lake Rosalind Well 3	**Project Number:**	248-026
Client:	Municipality of Brockton	**Date:**	2018-11-30
Technician Name:	Craig Lawson	**Pump:**	Client's
Water Level Device:	LTS water level meter	**Pump Inlet:**	17.1 mbtc
Water Level Reference:	Top of casing	**Flow Measuring Device:**	Clients meter
Test Note:	Top of sounding tube = 0.97 m above ground surface		

Time *hr:min*	Elapsed Time *min*	Level *mbBP*	Drawdown *m*	Flow *L/s*	Note
0:00	0	7.03	0.00	0.75	Start Step 1
0:01	1	7.66	0.63	0.75	
0:02	2	7.74	0.71	0.75	
0:03	3	7.76	0.73	0.75	
0:04	4	7.76	0.73	0.75	
0:05	5	7.77	0.74	0.75	
0:06	6	7.78	0.75	0.75	
0:08	8	7.78	0.75	0.75	
0:10	10	7.79	0.76	0.75	
0:12	12	7.80	0.77	0.75	
0:15	15	7.81	0.78	0.75	
0:20	20	7.81	0.78	0.75	
0:25	25	7.82	0.79	0.75	
0:30	30	7.83	0.80	0.75	

FIGURES





Notes:

All water levels are referenced from top of sounding tube
Top of casing = 0.97 m above ground surface

MUNICIPALITY OF BROCKTON

LAKE ROSALIND WELL 3

Comparison of Variable Rate Tests

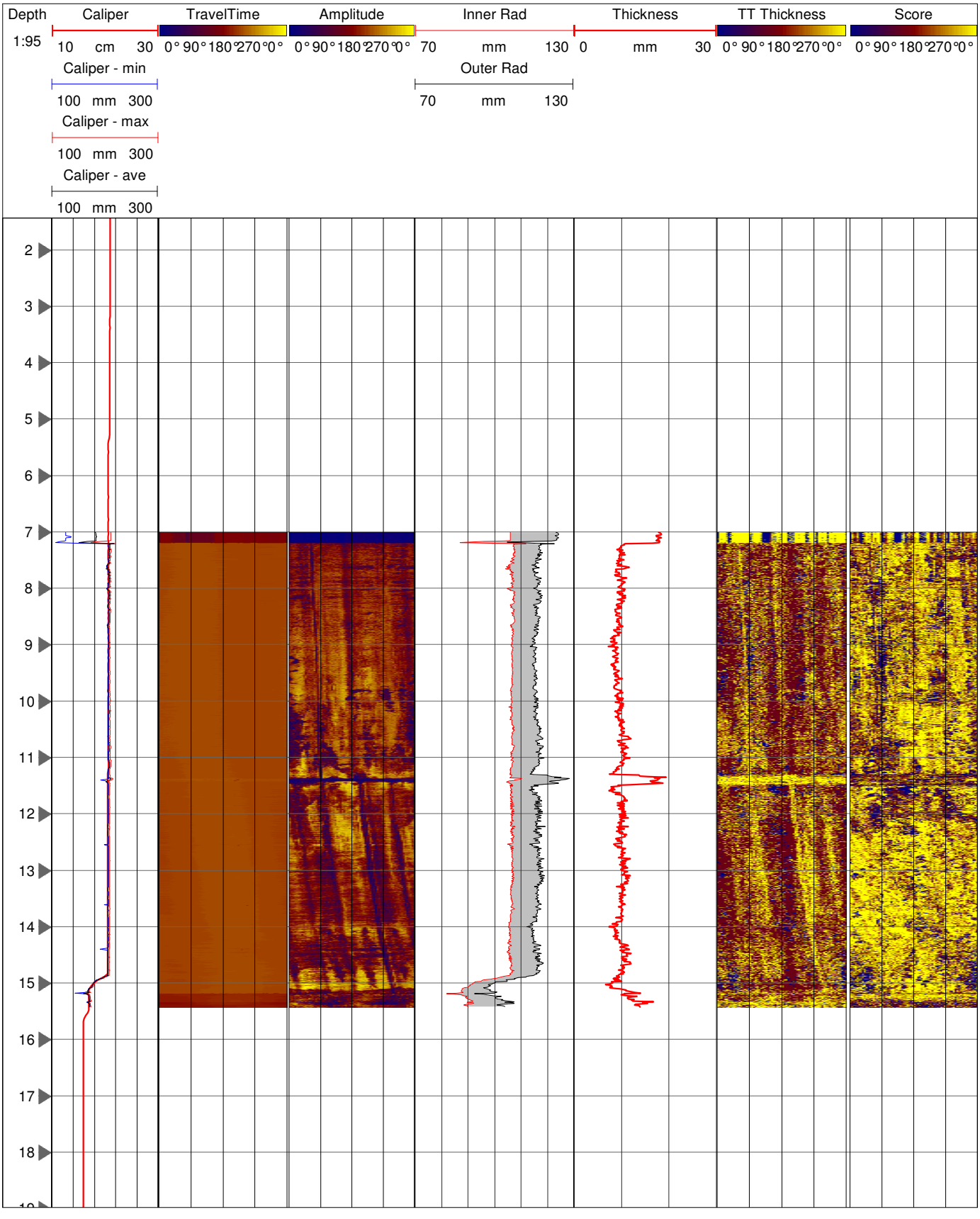
Lotowater Technical Services Inc. **Figure 1**

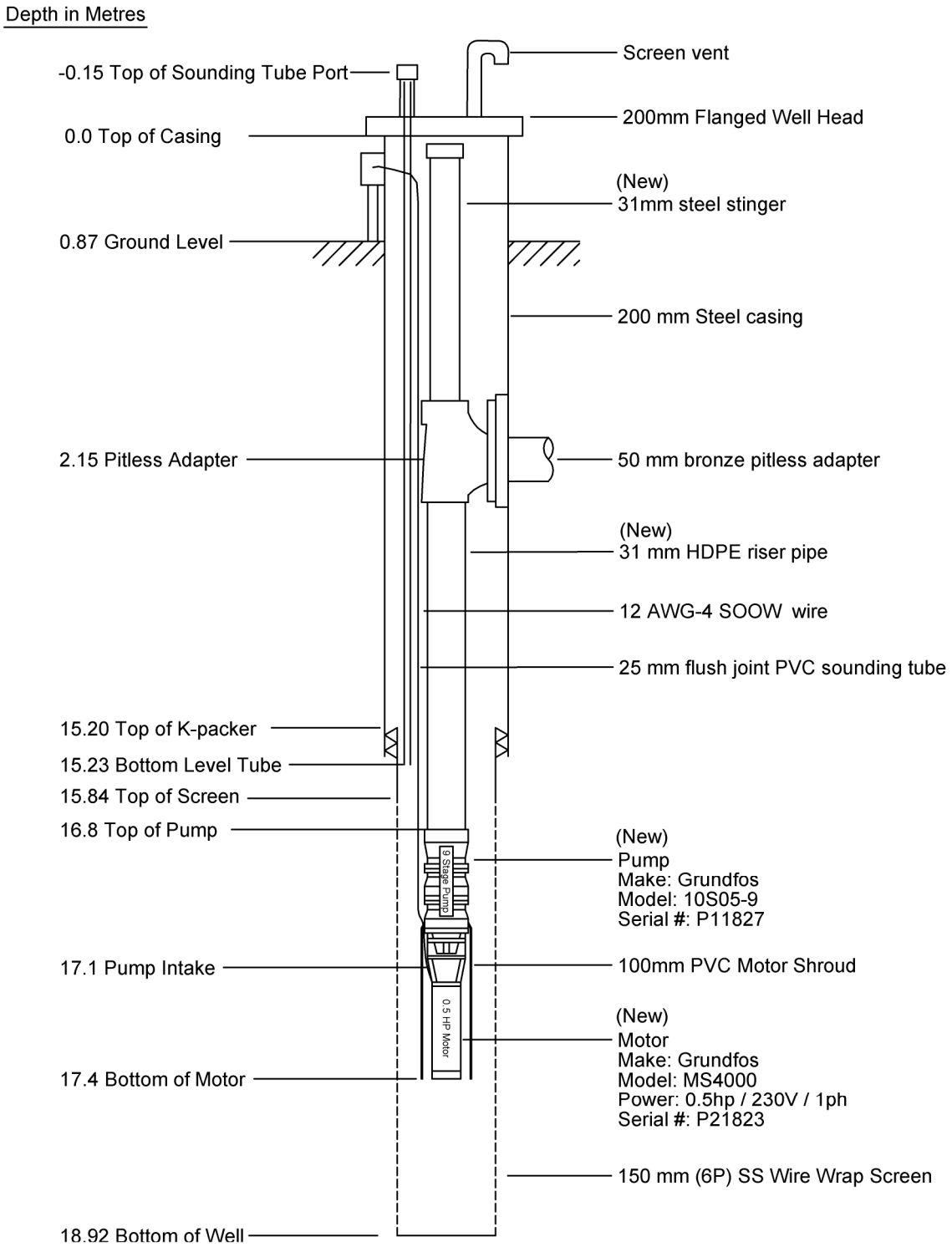
Reference: 248-026 2018-12-13

Lotowater
TECHNICAL SERVICES INC.

Figure 2

Client:	Municipality Of Brockton	Measuring Point:	TOC
Well Name:	Well 3	Measuring Point Elev:	0.84m ags
Location:	Lake Roslind	Logged By:	J. Dion
Project No:	248-026	Logging Date:	November 30, 2018





Lotowater TECHNICAL SERVICES INC.

CLIENT

MUNICIPALITY OF BROCKTON

TITLE

LAKE ROSALIND WELL 3
PUMP INSTALLATION DRAWING

PROJECT #:	248-026	G:\Lotowater Projects\248 Municipality of Brockton\ Lake Roalind Well 3.dwg		
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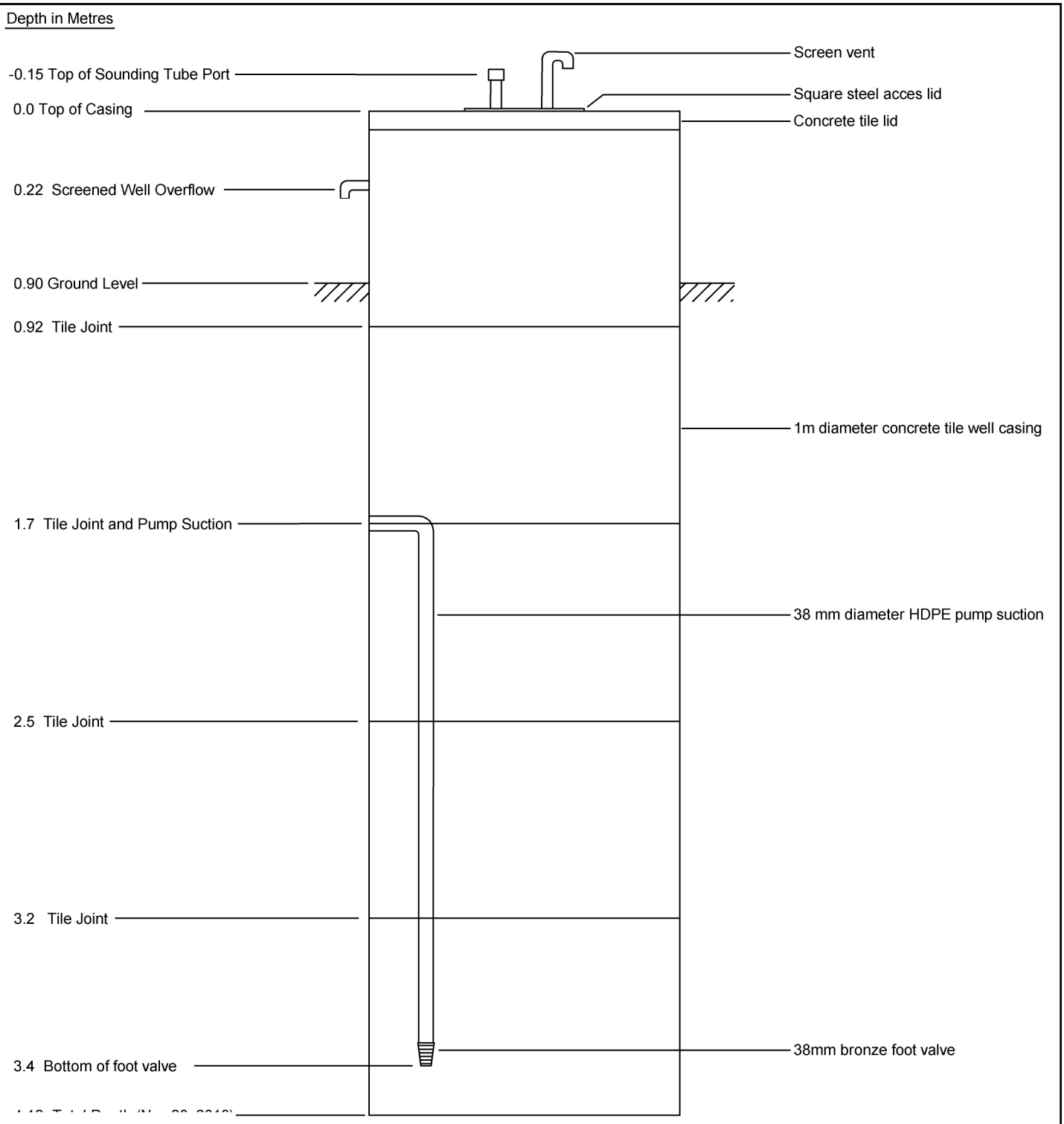


Lotowater TECHNICAL SERVICES INC.

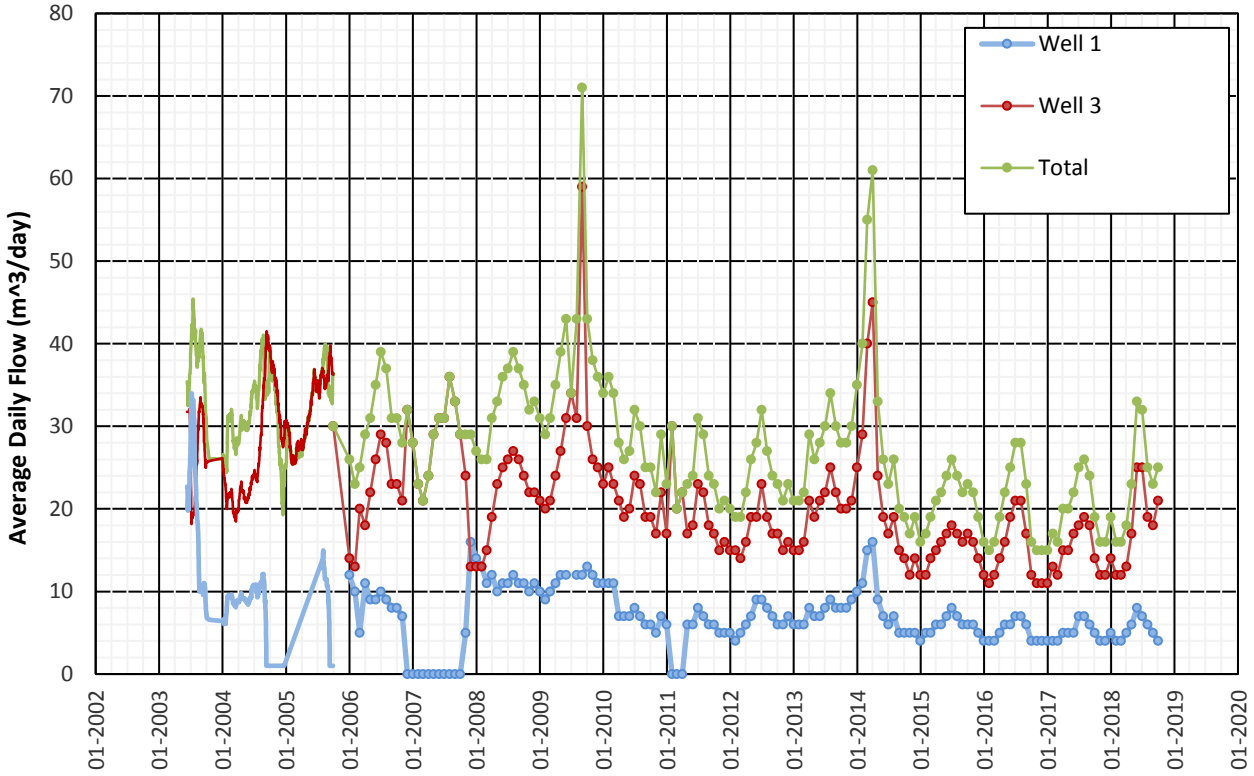
CLIENT

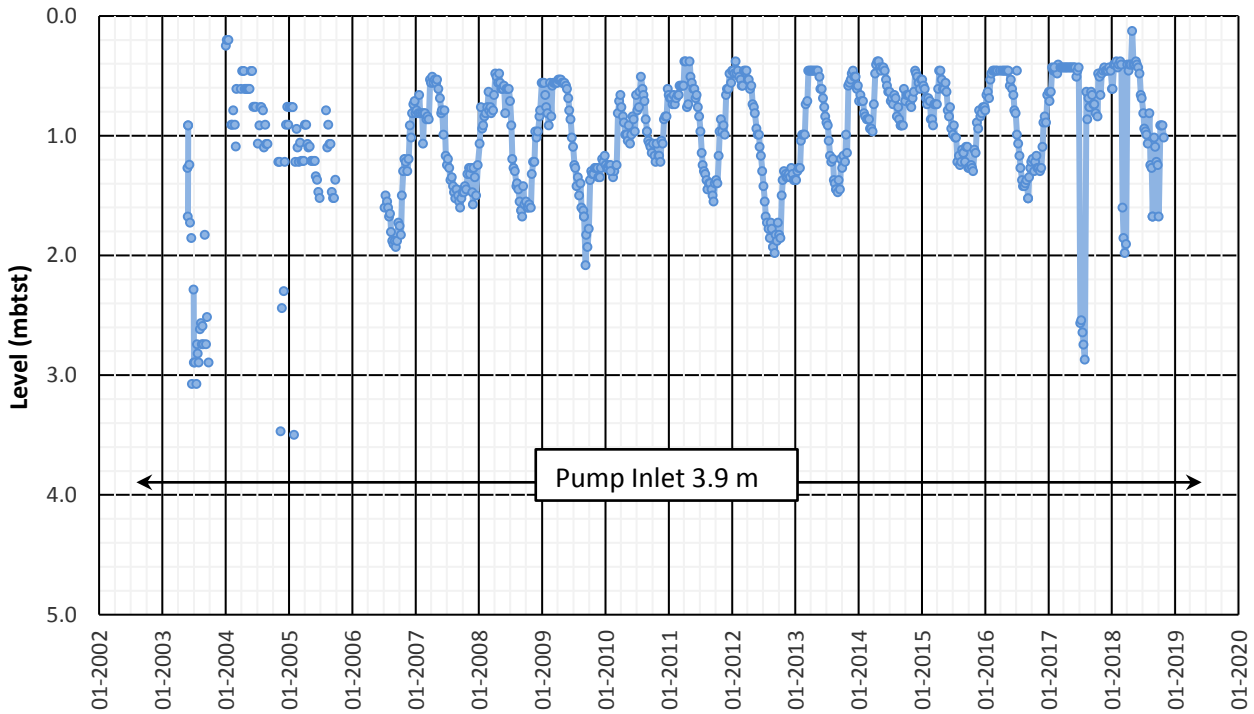
MUNICIPALITY OF BROCKTON

TITLE

LAKE ROSALIND WELL 1
INSTALLATION DRAWING

PROJECT #: 248-026			G:\Lotowater Projects\248 Municipality of Brockton\ Lake Roalind Well 1.dwg		
DESIGN			REVISION No.	SCALE	FIGURE
DRAWN	BP	2018/12/13	Dec 18, 2018	N.T.S	4
CHECKED	.	.			





Notes:
Levels refrenced to meters below sound tube port

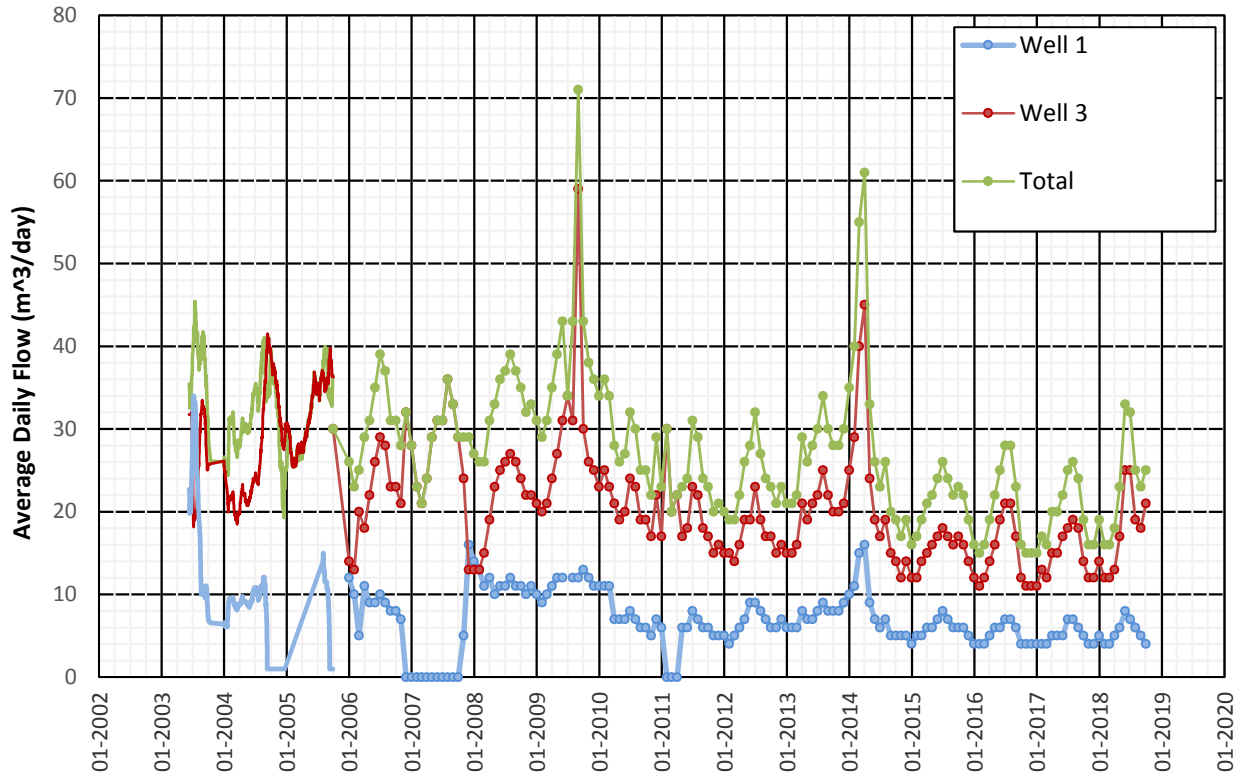
MUNICIPALITY OF BROCKTON

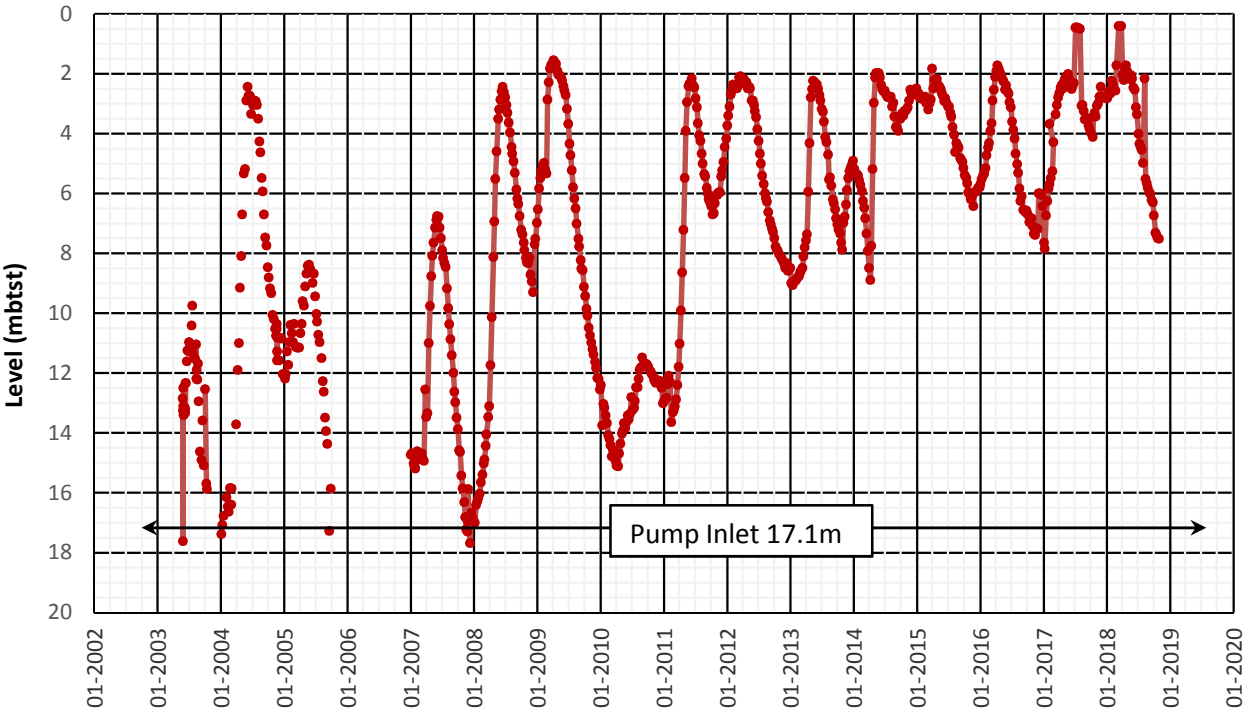
LAKE ROSALIND WELL 1

Well 1 Hydrograph vs Daily Pumping

Lotowater Technical Services Inc. **Figure 5**

Refference: 248-026 2018-12-18





Notes:
Levels refrenced to meters below sounding tube port

MUNICIPALITY OF BROCKTON

LAKE ROSALIND WELL 3

Well 3 Hydrograph vs Daily Pumping

Lotowater Technical Services Inc. **Figure 6**

Refference: 248-026 18/12/2018

APPENDICES

APPENDIX A

Water Well Record

Lake Rosalind Well 3

4/5/3E

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 1406588 | MUNICIP 14004 | CON DR N | 03

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Bruce	Brant Twp.	Con. 3 N.D.R.	67

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
TOWNSHIP OF BRANT	R.R. 1, Elmwood, Ontario. N0G 1S0	DAY 23 MO Apr. YR 87.

21 | ZONE 17 | EASTING 495560 | NORTHING 4890555 | RC | ELEVATION 0950 | RC | BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Fine sand	Silt	Soft	0	8
Brown	Medium sand		Soft	8	10
Brown	Fine sand	Silt	Soft	10	23
Brown	Medium sand		Soft	23	39
Brown	Clay	Silt	Soft	39	44
Brown	Medium sand		Soft	44	58
Brown	Medium sand	Silt	Soft	58	71
Grey	Clay	Silt	Soft	71	75

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
48, 60	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
8	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.250	0	48
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
10' x 18 slot 2' x 0 slot	7.75 INCHES	12.67 FEET
MATERIAL AND TYPE: Stainless Steel Telescope	DEPTH TO TOP OF SCREEN: 47.33 FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
60	75	Sand Fill

71 PUMPING TEST

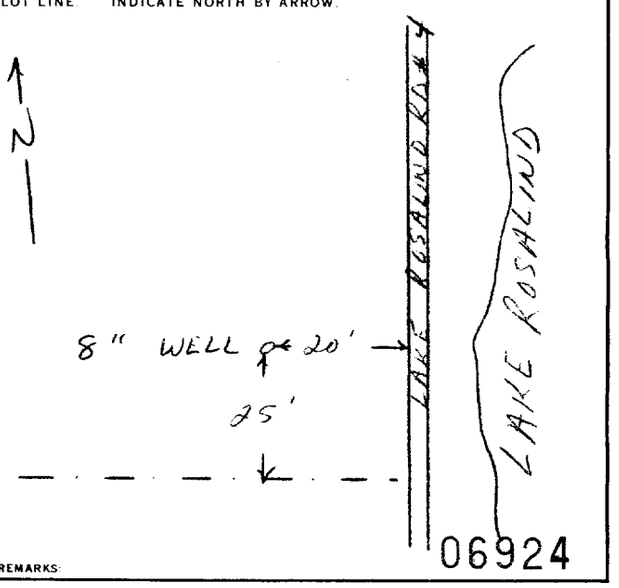
PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	70 Imp GPM	48 HOURS ___ MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (1 ☐ PUMPING 2 ☐ RECOVERY)	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
0.9 FEET	FEET		FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST	RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
GPM	46 FEET	1 ☒ CLEAR 2 ☐ CLOUDY	☐ SHALLOW ☐ DEEP	FEET	GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE

1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL 5 ☐ COMMERCIAL 6 ☒ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING ☐ OTHER ☐ NOT USED

METHOD OF DRILLING

1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
Davidson Well Drilling Limited	1737

ADDRESS: Box 486, Wingham, Ontario. N0G 2W0

NAME OF DRILLER OR BORER	LICENCE NUMBER
G. Reavie	T0156

SIGNATURE OF CONTRACTOR: [signature]

SUBMISSION DATE: DAY 7 MO. May YR. 87.

OFFICE USE ONLY

DATE RECEIVED: JUL 10 1987

DATE OF INSPECTION: 12/8/88

INSPECTOR:

REMARKS: APL

CSS.SS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

APPENDIX B

Well Disinfection Record

APPENDIX B

Well Chlorination Record

Well Name:	Lake Rosalind Well 3	
Client:	Municipality of Brockton	
Project #:	248-026	
Disinfected By:	Craig Lawson	
LTS Chlorination Worksheet Used:	Yes	
Treatment Volume:	428	**Litres**
Desired Concentration:	150	**ppm**
Volume of Mixing Water:	N/A	**Litres**
Qty of Sterilene Needed (granular 55%):	116.75	**grams**
Type and Quantity of Chlorine Used:	Sterilene 115 g	
Date and Time Chlorine Added:	2018-11-29 15:20	
Chlorine Residual Measured at Surface:	150 ppm	
Chlorine Residual Measurement Method:	Test strip	
Date & Time Chlorine Purged:	2018-11-29 9:00	
Pre-Purge Chlorine Residual Measured at Surface:	100 ppm	
Chlorine Residual Measurement Method:	Test strip	
Purged By:	Craig Lawson	
Purged To:	Waste	
Quantity and Type of Dechlorinating Agent Used:	Chlor-Oust	
Minutes of Pumping until Zero Free Chlorine Residual:	30 minutes	
Final Turbidity Measurement (NTU):	N/A	
Notes on Disinfection:	Recirculated to flush chlorine	

Lotowater TECHNICAL SERVICES INC.

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