Appendix A

Consultation Material

A.1 – Emails and Meeting Minutes

A.2 – Notice of Commencement

A.3 – Public Information Centre 1

A.4 – Public Information Centre 2

Appendix A.1

Notice of Commencement

PHOTO SUBMITTED

A FUNDRAISER IS BEING HELD at Boston Pizza in Orangeville on Monday in support of Taylor and Victoria Ciappara (above), whose new born son Nixxon is currently in the Hospital for Sick Children in Toronto fighting Type 2 Spinal Muscular Atrophy.

Fundraiser planned for baby Nixxon's battle with Type 2 SMA

Written By MIKE PICKFORD

A young boy, just six months old, is fighting for his life in Toronto's Hospital for Sick Children hospital after being diagnosed with a rare neuromuscular disorder. Now, friends of the family are preparing to host a fundraiser next week as they bid to help little Nixxon Ciappara and his parents, Tyler and Victoria.

It has been a heart-wrenching few months for the Ciappara family. Happiness at the birth of the couple's first child soon turned to concern and sorrow when a routine three-month checkup signalled Nixxon was showing signs of Spinal Muscular Atrophy, a disorder that causes progressive muscle-wasting and often leads to an early death. When he was officially diagnosed late last month, all that concern and sorrow turned into grit and determination as the steadfast Ciapparas, who live in Caledon, entered fight mode.

Nixxon was admitted to SickKids, where doctors expect he will stay for the next couple of months at least. Victoria, already on maternity leave from her position at The Millcroft Inn & Spa, moved into a Ronald McDonald house in downtown Toronto so she could be there for her son around the clock. Tyler, a tow truck operator, has since done the same.

Unfortunately, even when disaster strikes, life doesn't come to a complete standstill. With bills to pay and very little money coming in, the couple were left to worry about more than just their little boy's health. And so, up stepped Crystal McHughan and a host of other family friends to offer some assistance.

A GoFundMe page was set up on Sept. 17 and has so far raised $12,475 – more than double the original goal of $6,000. A fundraiser has been scheduled to take place on Monday (Oct. 16) at Boston Pizza in Orangeville from 6 to 9 p.m., where organizers hope to raise "as much as possible" to help the family through this tough time. There will be a silent auction with numerous prizes up for grabs, while Boston Pizza will donate 10 percent of all food sales over the course of the evening to the Ciapparas.

"As parents you should never, ever have to worry about money when your child is fighting in the hospital, so we want to help take some of that stress away and allow Victoria and Tyler to focus on Nixxon and Nixxon only," Crystal told the Citizen. "If people can come out and show them that they're not alone, that would be fantastic. It's times like these that you really need the help, support and love of your family, friends and community to help you through."

There are four types of Spinal Muscular Atrophy (SMA), Type 1 being worst-case scenario and primarily affecting newborn babies, and Type 4, which typically forms in adulthood, being base case.

Nixxon was diagnosed with Type 2, usually onset in children between six and 18 months of age. In most cases, children with this type are not able to stand and walk, but can maintain a sitting position. Body muscles are weakened and the respiratory system is troubled throughout a patient's life. While life expectancy is somewhat reduced, most people with SMA Type 2 live well into adulthood.

Nixxon has been receiving a new drug designed to fight SMA called Nusinersen. While it is designed to help those suffering with Type 1 SMA, it can also be used to help those suffering with Type 2. He is the first child at Sick Kids to receive this drug while under respiratory distress. He has already received two injections, with a further two planned over the coming month. Doctors are hoping the drug will give Nixxon the necessary support he needs to fight.

"Nixxon is a strong kid. He's been through a lot so far in his young life and it really isn't fair, but Victoria tells me he stills seems to be happy, he's still smiling every day and there's lots of fight left in him," Ms. McHughan said. "We're just hoping to lessen the burden a little bit on the financial side so they can focus on the important thing, which is helping Nixxon through this fight."

Again, the fundraiser will take place at Boston Pizza this Monday (Oct. 16) from 6 p.m. to 9 p.m.

Fire Prevention Week kicks off with open house in Shelburne

BY BRIAN LOCKHART

If you ever wanted to see a car ripped to shreds, a visit to the Shelburne and District Fire Hall's open house on Saturday, October 7, provided the right entertainment – in a good way.

Local fire fighters demonstrated how they use some of their powerful tools to extract accident victims from a damaged vehicle after a nasty collision.

While the firefighters removed the windshield and pried open jammed doors, Shelburne Fire Chief Brad Lemaich explained how each step in the procedure is done to protect both the victims in the car and the firefighters, who could be exposed to dangerous hazards such as metal shards, broken glass, and the force of flying parts under the pressure of their tools.

Hosted by the Shelburne Fire Department, the day also featured demonstrations and information by Dufferin County Paramedics, P.A.W.S. Emergency Training, and Shelburne Police Service.

The Shelburne Department covers a huge area, around 345 square kilometres.

Visitors had the opportunity to see the Department's equipment up close and find out what each vehicle does.

The Shelburne Department currently has one ladder truck, a pumper, a tanker, and a rescue vehicle.

"This is the start of Fire Prevention Week. We have typically done an open house here every year," explained Chief Lemaich. "The Fire Fighters Association spearheads this open house. It's a good way to get the public in and let them see what we do and provide them with the information they need and answer their questions. We invite other emergency services to join us."

A highlight of the tour for the many kids who attended is a trip through the mobile fire safety demonstration trailer, where they learn how fires start, how to prevent them, and what to do in case a real fire occurs.

"It's a mini house so we can bring children through and have them identify hazards and walk them through a process from beginning to end on what they need to do when their smoke alarm goes off, including getting out of the house and even calling 911. We take them through living room hazards, kitchen hazards, and into the bedroom. There's theatrical 'smoke' and smoke alarms that actually trigger as they would in your home. We help them escape the room and leave the building," Chief Lemaich explained of how they teach youngsters to react to a real emergency.

While it's a fun tour through the mini house for the kids, the lessons they learn will be remembered if they ever find themselves in a real fire situation.

Fire Prevention week is a national program that began on Sunday, October 8, and aims to educate the public on how to prevent fires in the home.

EMERGENCY DEMONSTRATION – Firefighters from the Shelburne Fire department use their high powered tools to dismantle a car during a demonstration at the Department's open house on Saturday, Oct. 7. PHOTO BY BRIAN LOCKHART

MPP Jones celebrates 10 years in Dufferin-Caledon

BY BILL REA

Even Sylvia Jones seemed a little mystified at how quickly time passes.

Tuesday marked 10 years to the day since her election as MPP for Dufferin-Caledon, and Ms. Jones celebrated the occasion with a reception at Caledon Community Complex in Caledon East that was attended by more than 200 people. Several prominent Progressive Conservatives were on hand for the festivities, including party leader Patrick Brown and former premier Ernie Eves.

"There are few people who make contributions in such a significant way," Mr. Brown said in his praise of Ms. Jones.

He recalled his early days as party leader, when he had to form a shadow cabinet, and he made Ms. Jones deputy leader of the Tory Caucus.

"When you work with somebody, you quickly realize who's competent and organized," he remarked.

He cited Ms. Jones's support of the craft cider industry and pointed to her successful efforts to prevent autistic children younger than five from being removed from Intensive Behavioural Intervention (IBI) therapy.

"Sylvia took the government on, and it's difficult to take the government on when they have a majority," he observed, adding she kept up the pressure with stories in the legislature about what the therapy meant to the families of the children. "It actually moved the government."

While he observed that Ms. Jones gets around Dufferin-Caledon a lot, the party leader also praised her for her work beyond the riding's boundaries.

"Sylvia helps out anywhere," he remarked. "She is such a great champion for our party."

Caledon Councillor Johanna Downey was on hand to make a presentation on behalf of the Town.

She said Ms. Jones has been a great support to her and her council, as well as a mentor to women in politics.

"Thank you for all the work you do," Ms. Downey said.

Ms. Jones expressed her appreciation for all the support she has received from constituents.

"I hear you," she said. "I hear a lot of people giving me a lot of great advice."

Continued from PAGE 2

Local resident hear about child abuse

She added, "I believe we have the resources right here in this community. Let's make it our goal to make Orangeville a safe place, let's make Dufferin County a safe place, even if your family is dysfunctional and messed up. We can help our children get the assistance they need – let them know they will be believed, acknowledged, supported and helped to get past any abuse they may be falling afoul of, they can turn their life around and come out the other side."

Ms. Moore echoed those sentiments, stating that, while people may not wish to believe or acknowledge it, there is a need right now for services in Dufferin County. Between April 1 and Oct. 5 this year there were 525 referrals to child protection services under DCAFS.

"The mistreatment of children is uncomfortable to talk about, because nobody really wants to believe it's happening here in our community, but it does. It happens in lots of different kinds of families, nobody is necessarily immune to it," Ms. Moore said. "We all have a role to play in breaking the silence around child abuse and neglect, we all have a role to play in supporting our community. I believe strongly that, if we work together, we can make a difference."

She added, "So let's speak up for kids and let them know they have a place here. Help us spread our message and help us work towards bringing an end to child abuse in Dufferin County."

As a part of its plans for Child Abuse Prevention month, DCAFS will be hosting 'Dress Purple Day' on Oct. 24, where it encourages students in all local schools to dress in purple clothing and speak up about the rights children have to safety and well-being. For more information, visit dcafs.on.ca.

Notice of Study Commencement

Increased Capacity of the Town of Shelburne's Water Supply
Schedule 'B' Municipal Class Environmental Assessment

THE STUDY

The Town of Shelburne has initiated a Schedule "B" Municipal Class Environmental Assessment to increase the rated capacity of water taking from one of the Town's existing facilities as operational limits and legislative changes to the allowable limits for arsenic will reduce the rated capacity of existing facilities to a point that is not sufficient to meet the Town's current and long-term needs. A number of alternatives will be examined as part of this study, and an assessment will be completed to identify the most cost-effective, environmentally sound, and sustainable approach to increasing the capacity of the existing facilities. Please see the map below for the project location.

THE PROCESS

The study will be undertaken as a Schedule "B" project in accordance with the requirements of the Municipal Class Environmental Assessment process (Municipal Engineers Association, October 2000, as amended in 2007, 2011, and 2015).

PUBLIC CONSULTATION

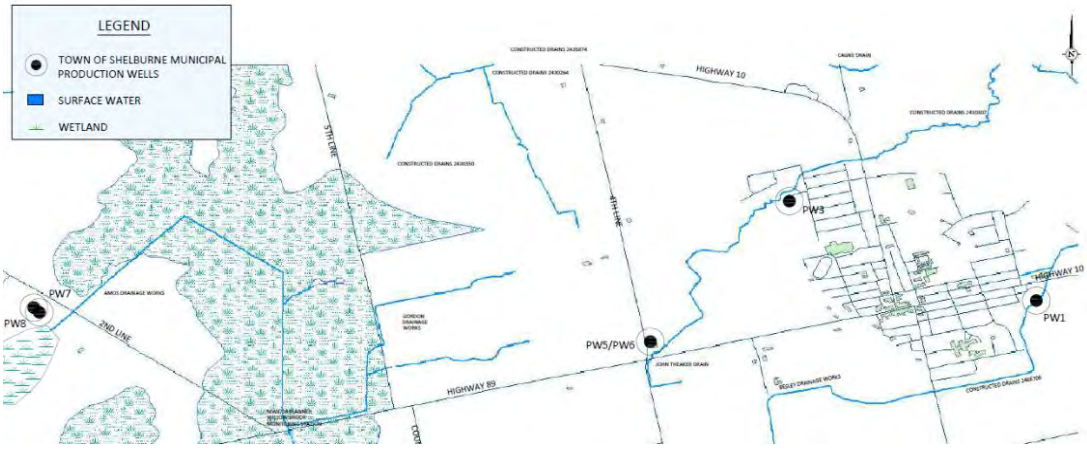
Public input and comments are an important component of the Class EA process. Two (2) Public Information Centres (PICs) will be held during the course of the study to present and receive comments on the project, alternative solutions, and the preferred alternative for increased water supply capacity. Notices for each PIC will be advertised in advance of the public meetings.

Upon completion of the study, the Report will be made available for public review and comment. Another advertisement will be published at that time, indicating where the report can be viewed.

CONTACT INFORMATION

Further information may be obtained from the Town's consultant for this project:

Stephen Burnett, P. Eng., Principal
S. Burnett & Associates Limited
210 Broadway, Unit 203. Orangeville, ON L9W 5G4
Tel: 519-941-2949 Fax: 519-941-2036



Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

This Notice first issued October 12th, 2017 in the Shelburne Free Press.

Name	Title	Company	Address	City	Province	Postal Code	Email	Email Sent	Comments	Read Receipt Received
Municipalities										
~~Christine Gervais~~	~~Director of Planning~~	~~East Garafraxa~~	~~Administration Office, 065371 Dufferin County Road 3, Unit 2~~	~~East Garafraxa~~	~~ON~~	~~L9W 7J8~~	cgervais@eastgarafraxa.ca	Y	email error corrected / no longer works for Amaranth	Y
~~Susan Stone~~	~~CAO/Clerk-Treasurer~~	~~East Garafraxa~~	~~Administration Office, 065371 Dufferin County Road 3, Unit 2~~	~~East Garafraxa~~	~~ON~~	~~L9W 7J8~~	sstone@eastgarafraxa.ca	Y	email error corrected / no longer works for Amaranth	Y
Township of Amaranth	Planning Department	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	planner@amaranth.ca		sent as cc by Christine Gervais, East Gary	
Bob Currie	Mayor	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	bcurrie@amaranth.ca	Y		
Chris Gerrits	Deputy Mayor	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	cgerrits@dufferincounty.ca	Y		Y
Nicole Martin	Interim Clerk	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	nmartin@amaranth.ca	Y	added as per Chris Gerrits	
Fazal Quadri	Treasurer	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	fquadri@amaranth.ca	Y	added as per Susan Stone, East Gary	
Heather Foster	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	hfoster@amaranth.ca	Y		Y
Mark Tijssen	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	mtijssen@amaranth.ca	Y	email was not confirmed	Y
Gail Little	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	glittle@amaranth.ca	Y		Y
Denise B. Holmes, AMCT	CAO/Clerk	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dholmes@melancthontownship.ca	Y		
Craig Micks	Public Works Superintendent	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	roads@melancthontownship.ca	Y		Y
Darren White	Mayor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dwhite@melancthontownship.ca	Y		Y
David Besley	Deputy Mayor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dbesley@melancthontownship.ca	Y		Y
Wayne Hannon	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	whannon@melancthontownship.ca	Y		
Margaret Mercer	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	mmercer@melancthontownship.ca	Y		Y
David Trotman	Director of Planning	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	Planning@townofmono.com	Y	See Judy Kohne, Planning Assistant	Y
Mark Early	Chief Administrative Officer and Clerk	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	mark@townofmono.com	Y		
Laura Ryan	Mayor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	laura.ryan@townofmono.com	Y		Y
Ralph Manktelow	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	ralph.manktelow@townofmono.com	Y		Y
Fred Nix	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	fred.nix@townofmono.com	Y		
Sharon Martin	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	sharon.martin@townofmono.com	Y		Y
John Creelman	Deputy Mayor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	john.creelman@townofmono.com	Y		Y
Judy Kohne	Planning Assistant	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	judy.kohne@townofmono.com		Email not sent to Judy directly, but read report sent	Y
Tracey Atkinson	CAO/Planner	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	tatkinson@mulmur.ca	Y		Y
Janet M. Horner	Mayor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	jhorner@mulmur.ca	Y		Y
Earl Hawkins	Deputy Mayor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	ehawkins@mulmur.ca	Y		
Shirley Boxem	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	sboxem@mulmur.ca	Y		Y
Patricia Clark	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	pclark@mulmur.ca	Y		Y
Ken Cufaro	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	kcufaro@mulmur.ca	Y		
Scott Burns	Director of Public Works	Dufferin County	55 Zina Street	Orangeville	ON	L9W 1E5	sburns@dufferincounty.ca	Y		
First Nations and Métis										
Donna Big Canoe	Chief	Chippewas of Georgina Island	RR#2 Box N-13	Sutton West	ON	L0E1 R0	donna.bigcanoe@georginaisland.com	Y		Y
Lester Anoquot	Chief	Saugeen First Nation	6493 Highway 21, RR1	Southampton	ON	N0H 2L0	sfn@saugeen.org	Y	email error at lanoquot@saugeenfirstnation.ca	
Guy Monague	Chief	Beausoleil First Nation	11 O'Gemaa Miikaan	Christian Island	ON	L9M 0A9	bfnchief@chimnissing.ca	Y		
Greg Nadjiwon	Chief	Chippewas of Nawash Unceded First Nation	135 Lakeshore Boulevard	Neyaashiinigmiing	ON	N0H 2T0	chiefsdesk@nawash.ca	Y		
Rodney Noganosh	Chief	Chippewas of Rama First Nation	5884 Rama Road, Suite 200	Rama	ON	L3V 6H6	chief@ramafirstnation.ca	Y		
Kelly LaRocca	Chief	Mississaugas of Scugog Island First Nation	22521 Island Road	Port Perry	ON	L9L 1B6	klarocca@scugogfirstnation.com	Y		
Stacey Laforme	Chief	Mississaugas of the New Credit First Nation	2789 Mississauga Road, R.R. #6	Hagersville	ON	N0A 1H0	stacey.laforme@mncfn.ca	Y		
Jesse Fieldwebster	Manager, Lands, Resources and Consultations	Métis Nation of Ontario	P.O. Box 4, 355 Cranston Crescent	Midland	ON	L4R 4K6	consultations@metisnation.org	Y	email corrected from Jesse Fieldwebster <JesseF@metisnation.org>	Y
Mark Hill	Chief	Six Nations of the Grand River Territory	1695 Chiefswood Road, PO Box 5000	Oshweken	ON	N0A 1M0	markhill@sixnations.ca	Y		
Review Agencies										
Barbara Slattery	Environmental Resource Planner & EA Coordinator	Ministry of Environment, Conservation and Parks	Ellen Fairclough Building, 12th Floor, 119 King Street West	Hamilton	ON	L8P 4Y7	barbara.slattery@ontario.ca	Y		Y
	General EA notification email	Ministry of Environment, Conservation and Parks					eanotification.wcregion@ontario.ca	Y	All project notices	
	Director, Environmental Assessment and Permissions	Ministry of Environment, Conservation and Parks	135 St. Clair Avenue West, 1st Floor	Toronto	ON	M4V 1P5			Only Notice of Completion	
Grand River Conservation Authority		Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	grca@grandriver.ca	Y	Automatic message to forward to appropriate contact	Y
Nottawasaga Valley Conservation Authority		Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre. 8195 8th Line	Utopia	ON	L0M 1T0	admin@nvca.on.ca	Y		Y
Andrew Prokopich							an.prok@hotmail.com			
Mark Anderson, P. Eng.	Water Quality Engineer	Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	manderson@grandriver.ca		Was forwarded info, include in further info	

Appendix A.2

Public Information Centre 1

May 28, 2020

To whom it may concern,

Re: Town of Shelburne, Water Supply Schedule 'B" Municipal Class Environmental Assessment
SBA File No: M17025

The Town of Shelburne (Town) is undertaking a Schedule 'B' Class Environmental Assessment (Class EA) to increase the rated capacity of water taking from the Town's existing facilities to meet the Town's current and long-term needs. Under the Class EA process, the Town will evaluate alternative means of increasing the rated capacity, and each alternative will be evaluated in terms of environmental, social, technical and cost considerations to arrive a preferred solution.

Further to the COVID-19 Pandemic and the Province's order restricting public gatherings, we are offering the opportunity to learn about studies completed to date and to provide feedback electronically through Zoom video conferencing.

Please contact Jennifer Willboughby, Clerk at jwilloughby@shelburne.ca to register no later than 12 pm Friday, June 19, 2020. To ensure your questions, comments or concerns are addressed during the public meeting, please submit them in advance by email by 12 pm June 19, 2020. A live stream of the meeting on the Town's YouTube channel will be made available at: https://www.youtube.com/channel/UCsar-MwF8CXrgPbe2EVxh-w.

Please let me know if you would like to be kept informed or consulted as part of the Class EA.

Yours truly,

Ian Callum, PMP, M.Sc.
Senior Environmental Project Manager
S. Burnett & Associates Limited
ian.callum@sbaengineering.com

S. Burnett & Associates Limited, 210 Broadway, Unit 203, Orangeville, ON, L9W 5G4 T: (519) 941-2949 F: (519) 941-2036
www.sbaengineering.com

Notice of Schedule 'B' Municipal Class Environmental Assessment - Public Information Center No. 1

Increased Capacity of the Town of Shelburne's Water Supply

THE STUDY
The Town of Shelburne is conducting a Schedule "B" Municipal Class Environmental Assessment (EA) to increase water supply to meet the Town's long-term needs.

THE PROCESS
The Schedule "B" assessment is being conducted in accordance with the Municipal Class EA process (Municipal Engineers Association, October 2000, as amended in 2007, 2011, and 2015).

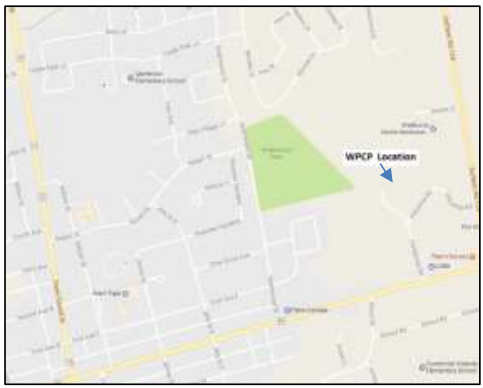
PUBLIC INFORMATION CENTER #2
Further to the COVID-19 Pandemic and the Province's order restricting public gatherings, we are offering the opportunity to learn about studies completed to date and to provide feedback, electronically through Zoom video conferencing.

Please contact the Clerk at jwilloughby@shelburne.ca to register no later than 12 pm Friday June 19, 2020. To ensure your questions, comments or concerns are addressed during the public meeting, please submit them in advance by email by 12 pm June 19, 2020. A live stream of the meeting on the Town's YouTube channel will be made available at https://www.youtube.com/channel/UCsar-MwF8CXrgPbe2EVxh-w.

7:30 pm -8:30 pm
Wednesday June 24th, 2020
Zoom Video Conference

CONTACT INFORMATION
Further information can also be obtained from the Town's consultant for this project:

Ian Callum, M.Sc., PMP
S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON L9W 5G4
T: 519-941-2949 ext. 240



Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. Except for personal information, all comments will become part of the public record.

This Notice first issued May 28th, 2020 in the Shelburne Free Press.

Name	Title	Company	Address	City	Province	Postal Code	Email	Email Sent	Comments	Read Receipt Received	Reminder Email
Municipalities											sent June 15, 2020
~~Christine Gervais~~	~~Director of Planning~~	~~East Garafraxa~~	~~Administration Office, 065371 Dufferin County Road 3, Unit 2~~	~~East Garafraxa~~	~~ON~~	~~L9W 7J8~~	~~cgervais@eastgarafraxa.ca~~	Y	email error corrected / no longer works for Amaranth	Y	N/A
~~Susan Stone~~	~~CAO/Clerk-Treasurer~~	~~East Garafraxa~~	~~Administration Office, 065371 Dufferin County Road 3, Unit 2~~	~~East Garafraxa~~	~~ON~~	~~L9W 7J8~~	~~sstone@eastgarafraxa.ca~~	Y	email error corrected / no longer works for Amaranth	Y	N/A
Township of Amaranth	Planning Department	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	planner@amaranth.ca		sent as cc by Christine Gervais, East Gary		Y
Bob Currie	Mayor	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	bcurrie@amaranth.ca	Y			Y
Chris Gerrits	Deputy Mayor	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	cgerrits@dufferincounty.ca	Y		Y	Y
Nicole Martin	Interim Clerk	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	nmartin@amaranth.ca	Y	added as per Chris Gerrits		Y
Fazal Quadri	Treasurer	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	fquadri@amaranth.ca	Y	added as per Susan Stone, East Gary		Y
Heather Foster	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	hfoster@amaranth.ca	Y		Y	Y
Mark Tijssen	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	mtijssen@amaranth.ca	Y		Y	Y
Gail Little	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	glittle@amaranth.ca	Y		Y	Y
Denise B. Holmes, AMCT	CAO/Clerk	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dholmes@melancthontownship.ca	Y			Y
Craig Micks	Public Works Superintendent	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	roads@melancthontownship.ca	Y		Y	Y
Darren White	Mayor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dwhite@melancthontownship.ca	Y		Y	Y
David Besley	Deputy Mayor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dbesley@melancthontownship.ca	Y		Y	Y
Wayne Hannon	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	whannon@melancthontownship.ca	Y			Y
Margaret Mercer	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	mmercer@melancthontownship.ca	Y		Y	Y
David Trotman	Director of Planning	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	Planning@townofmono.com	Y	See Judy Kohne, Planning Assistant	Y	Y
Mark Early	Chief Administrative Officer and Clerk	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	mark@townofmono.com	Y			Y
Laura Ryan	Mayor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	laura.ryan@townofmono.com	Y		Y	Y
Ralph Manktelow	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	ralph.manktelow@townofmono.com	Y		Y	Y
Fred Nix	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	fred.nix@townofmono.com	Y			Y
Sharon Martin	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	sharon.martin@townofmono.com	Y		Y	
John Creelman	Deputy Mayor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	john.creelman@townofmono.com	Y		Y	Y
Judy Kohne	Planning Assistant	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	judy.kohne@townofmono.com		Email not sent to Judy directly, but read report sent	Y	Y
Gord Feniak	Town of Mono Engineer	RJ Burnside & Associates Limited					Gord.Feniak@rjburnside.com		Added to list 23-June-20		
Tracey Atkinson	CAO/Planner	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	tatkinson@mulmur.ca	Y		Y	Y
Janet M. Horner	Mayor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	jhorner@mulmur.ca	Y		Y	Y
Earl Hawkins	Deputy Mayor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	ehawkins@mulmur.ca	Y			
Shirley Boxem	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	sboxem@mulmur.ca	Y		Y	Y
Patricia Clark	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	pclark@mulmur.ca	Y		Y	Y
Ken Cufaro	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	kcufaro@mulmur.ca	Y			Y
Scott Burns	Director of Public Works	Dufferin County	55 Zina Street	Orangeville	ON	L9W 1E5	sburns@dufferincounty.ca	Y			Y
First Nations and Métis											
Donna Big Canoe	Chief	Chippewas of Georgina Island	RR#2 Box N-13	Sutton West	ON	L0E1 R0	donna.bigcanoe@georginaisland.com	Y		Y	
Lester Anoquot	Chief	Saugeen First Nation	6493 Highway 21, RR1	Southampton	ON	N0H 2L0	sfn@saugeen.org	Y	email error at lanoquot@saugeenfirstnation.ca		
Rob Skye							rob.skye@saugeen.org		Didn't send directly but had recived reciept		Y
Guy Monague	Chief	Beausoleil First Nation	11 O'Gemaa Miikaan	Christian Island	ON	L9M 0A9	bfnchief@chimnissing.ca	Y			Y
Greg Nadjiwon	Chief	Chippewas of Nawash Unceded First Nation	135 Lakeshore Boulevard	Neyaashiinigmiing	ON	N0H 2T0	chiefsdesk@nawash.ca	Y			Y
Rodney Noganosh	Chief	Chippewas of Rama First Nation	5884 Rama Road, Suite 200	Rama	ON	L3V 6H6	chief@ramafirstnation.ca	Y			Y
Kelly LaRocca	Chief	Mississaugas of Scugog Island First Nation	22521 Island Road	Port Perry	ON	L9L 1B6	klarocca@scugogfirstnation.com	Y			Y
Stacey Laforme	Chief	Mississaugas of the New Credit First Nation	2789 Mississauga Road, R.R. #6	Hagersville	ON	N0A 1H0	stacey.laforme@mncfn.ca	Y			Y
Jesse Fieldwebster	Manager, Lands, Resources and Consultations	Métis Nation of Ontario	P.O. Box 4, 355 Cranston Crescent	Midland	ON	L4R 4K6	consultations@metisnation.org	Y	email corrected from Jesse Fieldwebster <JesseF@metisnation.org>	Y	Y
Mark Hill	Chief	Six Nations of the Grand River Territory	1695 Chiefswood Road, PO Box 5000	Oshweken	ON	N0A 1M0	markhill@sixnations.ca	Y			Y
Review Agencies											
Barbara Slattery	Environmental Resource Planner & EA Coordinator	Ministry of Environment, Conservation and Parks	Ellen Fairclough Building, 12th Floor, 119 King Street West	Hamilton	ON	L8P 4Y7	barbara.slattery@ontario.ca	Y		Y	Y
	General EA notification email	Ministry of Environment, Conservation and Parks					eanotification.wcregion@ontario.ca	Y	All project notices		
	Director, Environmental Assessment and Permissions	Ministry of Environment, Conservation and Parks	135 St. Clair Avenue West, 1st Floor	Toronto	ON	M4V 1P5			Only Notice of Completion		
Grand River Conservation Authority		Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	grca@grandriver.ca	Y	Automatic message to forward to appropriate contact	Y	Y
Nottawasaga Valley Conservation Authority		Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre. 8195 8th Line	Utopia	ON	L0M 1T0	admin@nvca.on.ca	Y		Y	Y
Mark Anderson, P. Eng.	Water Quality Engineer	Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	manderson@grandriver.ca		Was forwarded info, include in further info		Y

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Town of Shelburne

Water Supply Schedule 'B' Municipal Class Environmental Assessment

A People Place, A Change of Pace
SHELBURNE
ONTARIO, CANADA

Welcome to the First Public Information Centre!

June 24, 2020

Background

- Shelburne has experienced a continued rapid rate of population growth over the last 8+ years.
- The rapid growth has largely been attributed to the Town's relatively close proximity to major centers, relative affordability and small-town feel.
- Shelburne has naturally-occurring arsenic in its shallow groundwater aquifer that requires management to keep arsenic levels in drinking water levels below provincial drinking water standards.
- The Town has initiated a Schedule 'B' Municipal Class Environmental Assessment (EA) to determine the best means of ensuring that residents have a safe and adequate water supply for the next 20 years.
- The EA will identify the most cost-effective, environmentally sound and sustainable approach to meeting the Town's future water supply needs.

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Municipal Class EA Process

Phase 1

- Identify problems or opportunities.

Phase 2

- Identify alternative solutions to address the problems or opportunities.
- Consideration of technical, environmental, economical and social impacts.
- Recommend an alternative solution.
- Consult review agencies and the public. ← We are here
- Select preferred solution to address problems or opportunities.

Phase 5

- Proceed to detailed design and construction.

Note: Phase 3 and 4 of the Municipal Engineers Association Class EA Process only applies to Schedule C EAs.

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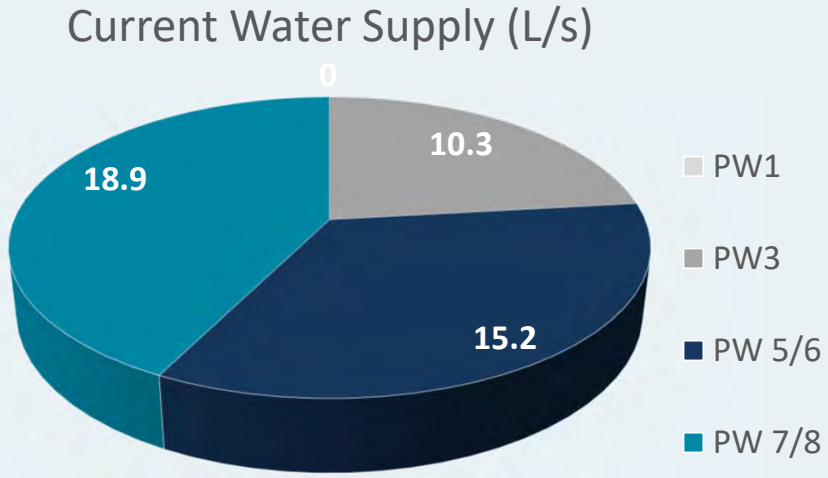
Existing Water Supply

- Water in Shelburne is currently supplied by six (6) production wells from four (4) pumphouses (PW1, PW3, PW5 & PW6, and PW7 & PW8)
- Water from PW5/6 is blended with PW7/8 to meet Ontario Drinking Water Standards, specifically for arsenic.
- Some of the Town's older wells (PW1 and PW3) have deteriorated over time, resulting in lower production rates. Well PW1 is currently shut down.



Existing wells can currently supply 44 L/s (3,836 m^3/day)

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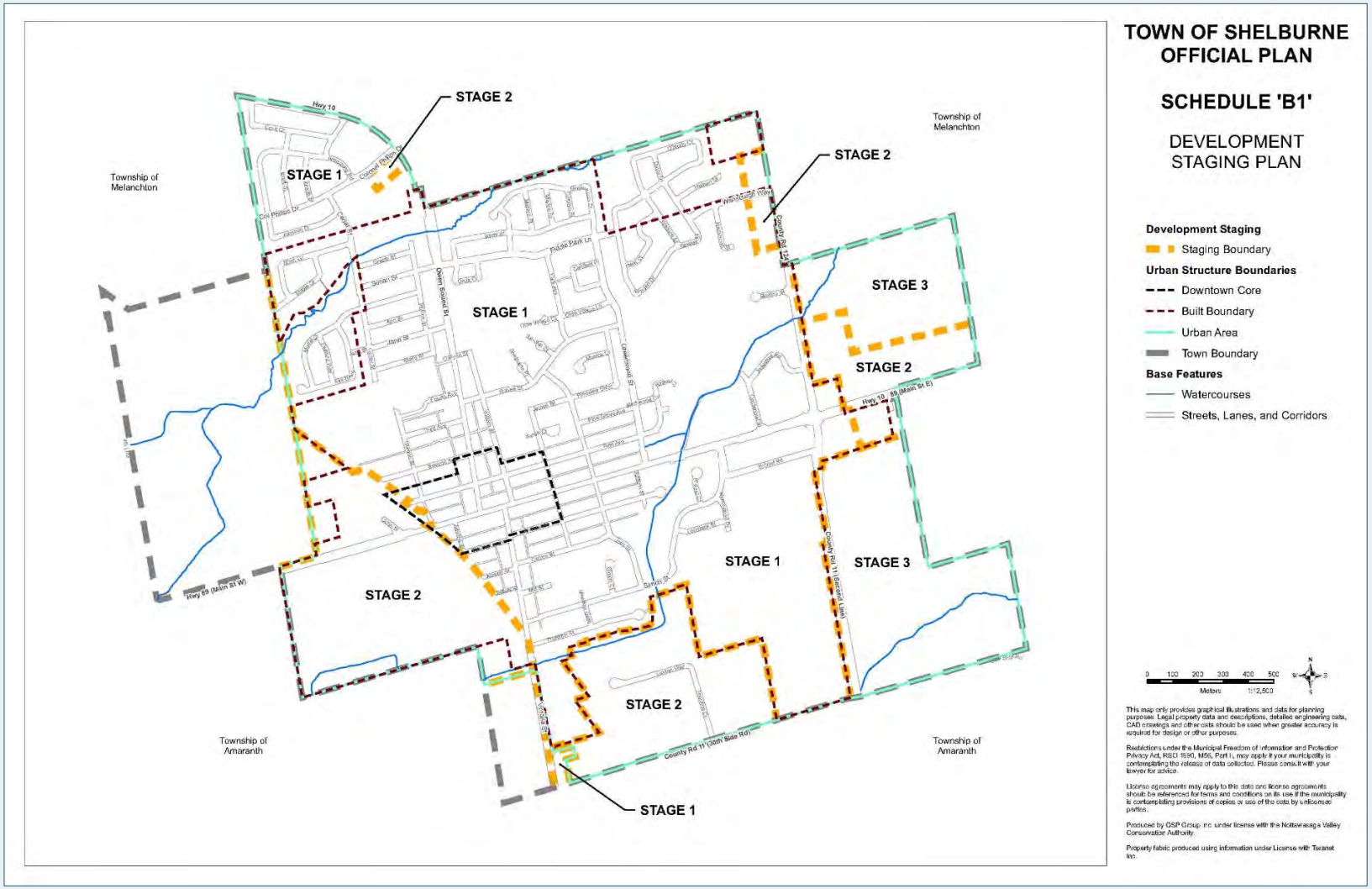
Development Plan



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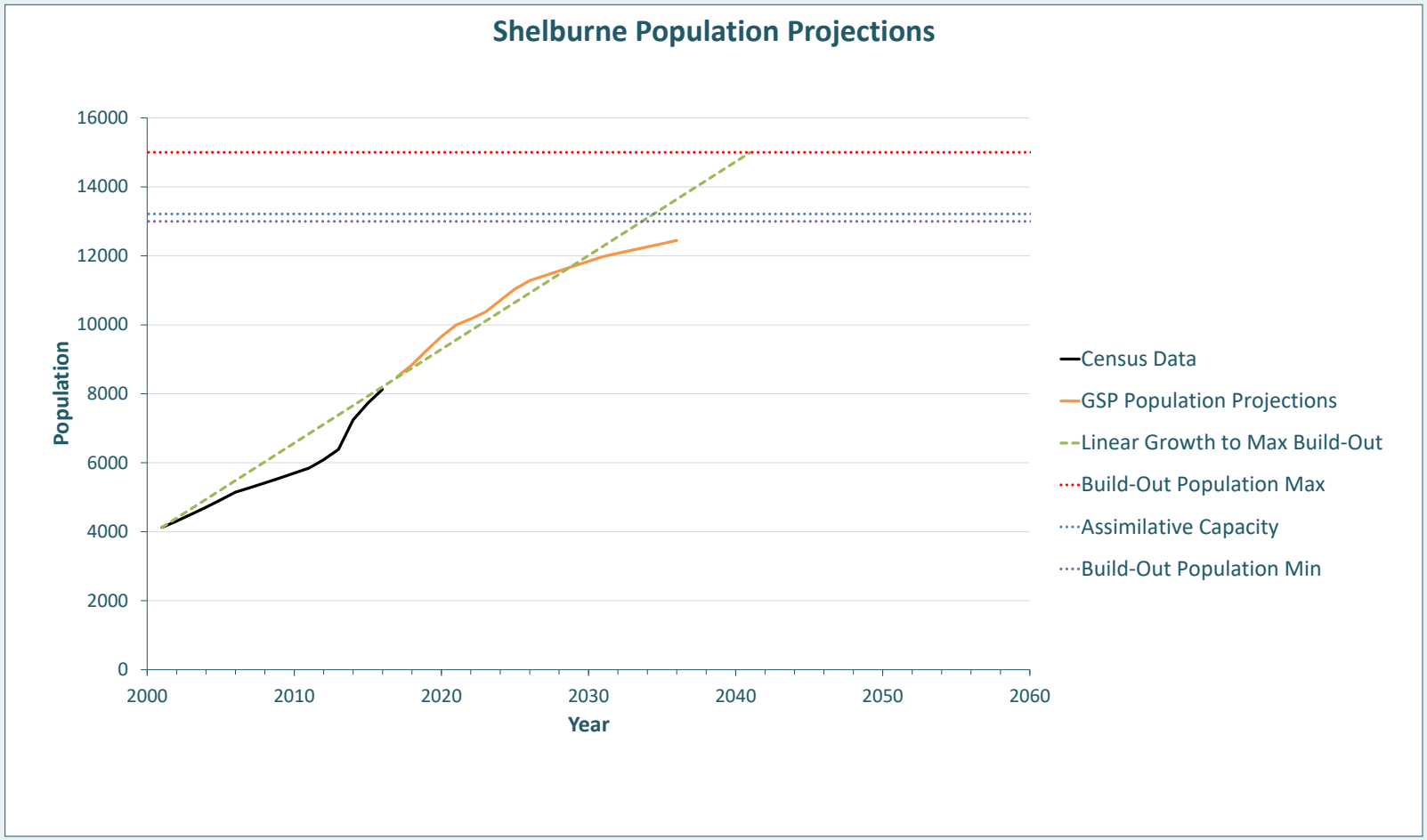
Population



*Build-out population estimated to occur between 13,000 and 15,000 in 2041

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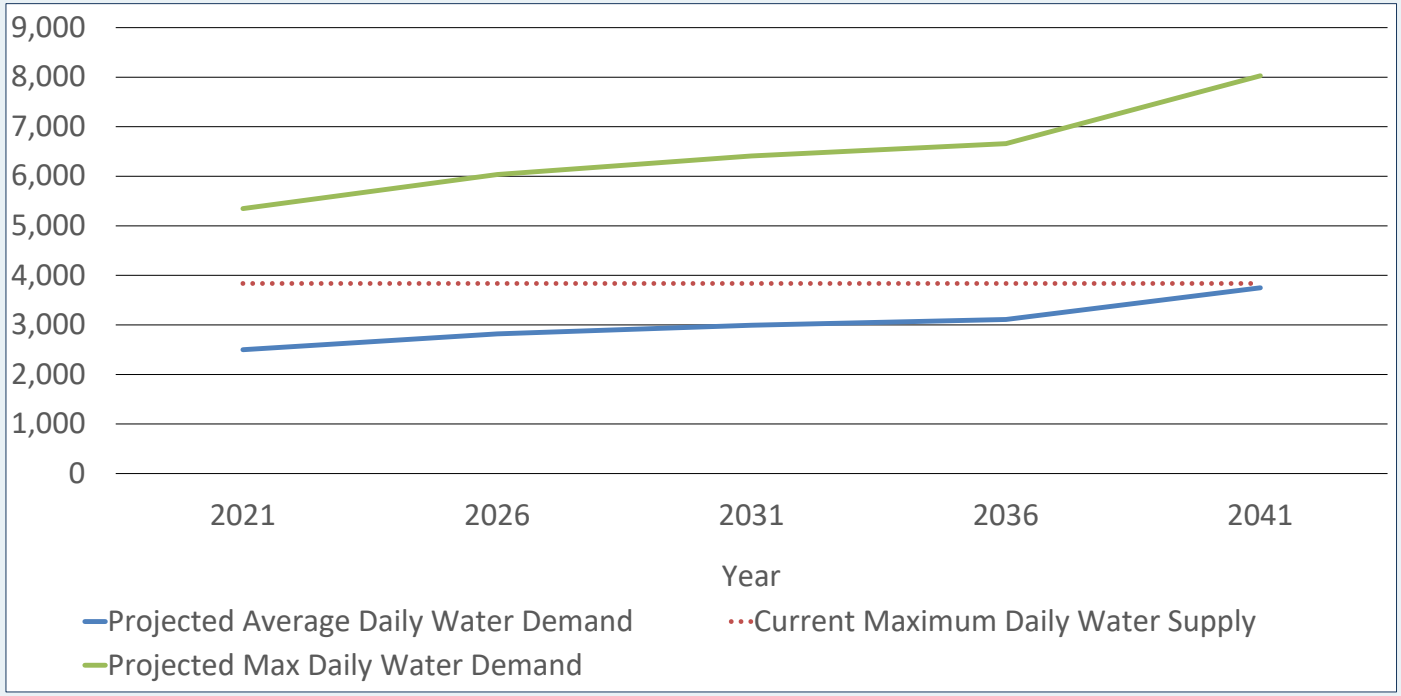
Future Water Supply Demands



- Existing system does not have adequate capacity to accommodate current or future flows.
- Water supply systems are designed to meet maximum daily demand, without including the highest production supply well.

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Problem / Opportunity Statement

- Current water supply in the Town of Shelburne is not sufficient to meet anticipated demands placed by a growing population over the next 20 years.

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Alternative Solutions

Alternative	Description
1. Do Nothing	If no action is taken to address the problem statement.
2. Increased Water Efficiency	Increasing water efficiency to reduce demand.
3. Rehabilitate Wells 1 and 3	Production has declined significantly at these wells compared to when the were brought online. Rehabilitation could improve their production rate.
4. Pumping Wells 7/8 concurrently at 18.9 L/s each	Pumping Wells 7/8 concurrently at 18.9 L/s to double their contribution to the Town's water supply.
5. Locating and developing a new well	Locating a new well location and testing to confirm whether it is viable.
6. Adding Arsenic Treatment to Wells 5/6	Adding arsenic treatment at Wells 5/6 to allow a higher pumping rate, as blending with Well 7/8 would not be required to keep arsenic concentrations below provincial standards.
7. Limit community growth	Limit community growth to the extent that additional water supply is not required.

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Ongoing and Planned Work

- A 72-hour pump test with larger pumps will be conducted this summer for wells PW7 and PW8 to confirm modelling predictions for a combined pumping rate of 37.6 L/s.
- Rehabilitation work has been conducted at Well PW1 and Well PW3, and preliminary results suggest their pumping capacity will be increased as a result of this work. This will be confirmed this summer through 72-hour pump tests.
- The Town met on June 12 with the Grand River and Nottawasaga Conservation Authorities to discuss Source Water Protection Requirements that would result from increasing the pump rate at Wells PW7 and PW8.

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Next Steps

1. Complete pumping tests for Wells PW1, PW3 and PW7/8 to confirm sustainable pumping rates and influence on other wells and the environment.
2. Evaluate and compare different “alternative solutions” to arrive at a recommended alternative solution.
3. Meet all source water protection requirements.
4. Conduct another Public Information Centre to present the results of the pumping tests and get feedback on the alternative solution.
5. File the “Notice of Completion” and start the 30-day public and agency review period. The ESR will be available at Town Hall and online for review at this time.

Let us know what you think

- A link to a survey will be sent to you within the next 30 minutes.
- The survey provides you the opportunity to provide feedback on tonight's meeting and the water supply options under consideration.

Thank you for attending!

Shelburne Water Supply Environmental Assessment - Public Information Centre #1

Feedback Survey

Use of Survey Information

The information you provide in this survey will help inform project decisions. Survey responses will be summarized in the environmental assessment report. No personal information, including your name or email address will be included in the report nor circulated outside the project team.

General Questions

1. Did you have any technical issues participating in the video conference?

- ◯ Yes
- ◯ No

2. Please describe your technical issue.

Project-related questions

3. During the meeting, 6 possible alternative solutions were proposed to meet the Town's water supply needs for the next 20 years. These included: 1) Do nothing, 2) Water conservation, 3) Rehabilitate Wells 1 and 3, 4) Pumping Wells 7/8 concurrently at 18.9 L/s each, 5) Locating and developing a new well, 6) Adding arsenic treatment to Wells 5/6 and 7) Limit community growth. Do you have any comments or concerns regarding any of the alternative solutions presented?

4. Do you have any other comments you would like to share?

Contact Information

5. Do you wish to be kept informed about the project going forward?

- ◯ Yes
- ◯ No

6. Please provide your name and email to receive future project updates. Your contact information will not be shared outside the project team nor linked with the feedback you provided in this survey.

Appendix A.3

Public Information Centre 2

May 13, 2024

To whom it may concern,

Re: Town of Shelburne, Water Supply Schedule 'B" Municipal Class Environmental Assessment
Public Information Centre #2
SBA File No: M17025

The Town of Shelburne (Town) is undertaking a Schedule 'B' Class Environmental Assessment (Class EA) to increase the rated capacity of water taking from the Town's existing facilities to meet the Town's current and long-term needs. Under the Class EA process, the Town has evaluated alternative means of increasing the rated capacity, and each alternative was evaluated in terms of environmental, social, technical and cost considerations to arrive a preferred solution.

We are offering the opportunity to learn about studies completed to date and to provide feedback on the preferred solution electronically through Zoom video conferencing. Details regarding the time of this Public Information Centre are provided in the attached Notice.

Following the Public Information Centre, further comments are invited for incorporation into the planning and design of the project and will be received until June 7thth, 2024. Subject to comments received, the Town plans to instruct the Town Engineer to finalize the Environmental Study Report, which will be made available for public review for a minimum 30-day review period.

Please let me know if you would like to be kept informed or consulted as part of the Class EA.

Yours truly,

Ian Callum, PMP, M.Sc.
Senior Environmental Project Manager
S. Burnett & Associates Limited
ian.callum@sbaengineering.com

Attachments: Notice of Public Information Centre

S. Burnett & Associates Limited, 210 Broadway, Unit 203, Orangeville, ON, L9W 5G4 T: (519) 941-2949 F: (519) 941-2036
www.sbaengineering.com

Notice of Schedule 'B' Municipal Class Environmental Assessment - Public Information Center No. 2

Increased Capacity of the Town of Shelburne's Water Supply

THE STUDY

The Town of Shelburne is conducting a Schedule "B" Municipal Class Environmental Assessment (EA) to increase water supply to meet the Town's long-term needs.

THE PROCESS

This project is being planned as a **Schedule B** project under the **Municipal Class Environmental Assessment.**

PUBLIC INFORMATION CENTER #2

We are offering the opportunity to learn about studies completed to date and to provide feedback on the preferred solution for addressing the Town's water supply needs. The meeting will be held electronically through Zoom video conferencing.

6:30 p.m. -7:30 p.m.
Thursday, May 30th, 2024
Zoom Video Conference

Please contact the Clerk at jwilloughby@shelburne.ca to register no later than 12:00 p.m. on Tuesday, May 28, 2024. To ensure your questions, comments or concerns are addressed during the public meeting, please submit them in advance by email by 12:00 p.m. May 28, 2024. A live stream of the meeting on the Town's YouTube channel will be made available at:

https://www.youtube.com/channel/UCsar-MwF8CXrgPbe2EVxh-w.

CONTACT INFORMATION

Further information can also be obtained from the Town's consultant for this project:

Ian Callum, M.Sc., PMP
S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON L9W 5G4
T: 519-215-6893

Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act. Except for personal information, all comments will become part of the public record.

This Notice first issued May 13th, 2024 in the Shelburne Free Press.

Name	Title	Company	Address	City	Province	Postal Code	Email	Email Sent	Comments	Read Receipt Received
Municipalities										
Guy Gardhouse	Mayor	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	ggardhouse@eastgarafraxa.ca	Y		Y
John Stirk	Deputy Mayor	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	jstirk@eastgarafraxa.ca	Y		Y
Lenora Banfield	Councillor	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	lbanfield@eastgarafraxa.com	Y	Email bounced back	
Dave Halls	Councillor	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	dhalls@eastgarafraxa.com	Y	Email bounced back	
Jeremy Zukowski	Councillor	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	jzukowski@eastgarafraxa.com	Y	Email bounced back	
Jessica Kennedy	Clerk	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	jkennedy@eastgarafraxa.ca	Y		
Peter Avgoustis	CAO	East Garafraxa	Administration Office, 065371 Dufferin County Road 3, Unit 2	East Garafraxa	ON	L9W 7J8	sstone@eastgarafraxa.ca	Y		
Ashley Harris	Planning Coordinator	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	planner@amaranth.ca	Y		
Chris Gerrits	Mayor	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	cgerrits@dufferincounty.ca	Y		
Gail Little	Deputy Mayor	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	glittle@amaranth.ca	Y		Y
Holly Boardman	Deputy Clerk	Township of Amaranth	374028 6 Line	Amaranth	ON	L0N 1L0	hboardman@amaranth.ca	Y		Y
Nicole Martin	CAO/Clerk	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	nmartin@amaranth.ca	Y		
Sabrina VanGerven	Treasurer	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	svangerven@amaranth.ca	Y		Y
Susan Graham	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	sgraham@amaranth.ca	Y		
Brad Metzger	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	bmetzger@amaranth.ca	Y		
Andrew Stirk	Councillor	Township of Amaranth	374028 6 Line	East Garafraxa	ON	L0N 1L0	astirk@amaranth.ca	Y		Y
Denise B. Holmes, AMCT	CAO/Clerk	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dholmes@melancthontownship.ca	Y		
Craig Micks	Public Works Superintendent	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	roads@melancthontownship.ca	Y		Y
Darren White	Mayor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	dwhite@melancthontownship.ca	Y		Y
James McLean	Deputy Mayor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	jmclean@melancthontownship.ca	Y		
Ralph Moore	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	rmoore@melancthontownship.ca	Y		
Bill Neilson	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	bneilson@melancthontownship.ca	Y		Y
Ruth Plowright	Councillor	Melancthon Township	157101 Highway #10, RR#6	Melancthon	ON	L9V 2E6	rplowright@melancthontownship.ca	Y		
Michael Dunmore	Chief Administrative Officer	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	mike.dunmore@townofmono.com	Y		
John Creelman	Mayor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	john.creelman@townofmono.com	Y		Y
Ralph Manktelow	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	ralph.manktelow@townofmono.com	Y		Y
Fred Nix	Deputy Mayor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	fred.nix@townofmono.com	Y		
Elaine Capes	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	elaine.capes@townofmono.com	Y		
Melinda Davie	Councillor	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	melinda.davie@townofmono.com	Y		
Simmi	Planning Technician	Town of Mono	347209 Mono Centre Road, RR#1	Mono	ON	L9W 6S3	Planning@townofmono.com	Y		Y
Tracey Atkinson	CAO/Depurty Clerk/Planner	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	tatkinson@mulmur.ca	Y		Y
Janet M. Horner	Mayor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	jhorner@mulmur.ca	Y		Y
Earl Hawkins	Deputy Mayor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	ehawkins@mulmur.ca	Y		Y
Kim Lyon	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	klyon@mulmur.ca	Y		
Patricia Clark	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	pclark@mulmur.ca	Y		Y
Andrew Cunningham	Councillor	Township of Mulmur	758070 2nd Line East, RR#2	Mulmur	ON	L9V 0G8	acunningham@mulmur.ca	Y		
Scott Burns	Director of Public Works	Dufferin County	55 Zina Street	Orangeville	ON	L9W 1E5	sburns@dufferincounty.ca	Y		
First Nations and Métis										
Donna Big Canoe	Chief	Chippewas of Georgina Island	RR#2 Box N-13	Sutton West	ON	L0E1 R0	donna.bigcanoe@georginaisland.com	Y		
Conrad Ritchie	Chief	Saugeen First Nation	6493 Highway 21, RR1	Southampton	ON	N0H 2L0	sfn@saugeen.org	Y		
Joanne P. Sandy	Chief	Beausoleil First Nation	11 O'Gemaa Miikaan	Christian Island	ON	L9M 0A9	jsandy@chimnissing.ca	Y		
Dan Monague	First Nation Administrator	Beausoleil First Nation	11 O'Gemaa Miikaan	Christian Island	ON	L9M 0A9	fnadmin@chimnissing.ca	Y		
Vanessa Keeshig	Office Clerk	Chippewas of Nawash Unceded First Nation	135 Lakeshore Boulevard	Neyaashiinigmiing	On	N0H 2T0	eaadminassist@nawash.ca	Y		
Gregory Nadjiwon	Chief	Chippewas of Nawash Unceded First Nation	135 Lakeshore Boulevard	Neyaashiinigmiing	ON	N0H 2T0	chief@nawash.ca	Y		
Michael Earl	Senior Administrative Officer	Chippewas of Nawash Unceded First Nation	135 Lakeshore Boulevard	Neyaashiinigmiing	ON	N0H 2T0	aao@nawash.ca	Y		
		Chippewas of Rama First Nation	5884 Rama Road, Suite 200	Rama	ON	L3V 6H6	consultation@ramafirstnation.ca	Y		Y
		Mississaugas of Scugog Island First Nation	22521 Island Road	Port Perry	ON	L9L 1B6	info@scugogfirstnation.com	Y	Email bounced back	
		Mississaugas of the New Credit First Nation	2789 Mississauga Road, R.R. #6	Hagersville	ON	N0A 1H0	communications@mncfn.ca	Y		Y
Jesse Fieldwebster	Manager, Lands, Resources and Consultations	Métis Nation of Ontario	P.O. Box 4, 355 Cranston Crescent	Midland	ON	L4R 4K6	consultations@metisnation.org	Y		
		Six Nations of the Grand River Territory	1695 Chiefswood Road, PO Box 5000	Oshweken	ON	N0A 1M0			Ian is looking into who the contact should be for Six Nations.	
	General EA notification email	Ministry of Environment, Conservation and Parks					eanotification.wcregion@ontario.ca	Y	All project notices, need to attach form!!!	Y
	Director, Environmental Assessment and Permissions	Ministry of Environment, Conservation and Parks	135 St. Clair Avenue West, 1st Floor	Toronto	ON	M4V 1P5			Only Notice of Completion	
		Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	grca@grandriver.ca	Y		Y
Sonja Strynatka	Senior Hydrogeologist	Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	sstrynatka@grandriver.ca	Y		
Ian Okenden	Manager, Watershed Science	Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre. 8195 8th Line	Utopia	ON	L0M 1T0	iockenden@nvca.on.ca	Y		
Nottawasaga Valley Conservation Authority		Nottawasaga Valley Conservation Authority	John Hix Conservation Administration Centre. 8195 8th Line	Utopia	ON	L0M 1T0	admin@nvca.on.ca	Y		
Mark Anderson, P. Eng.	Water Quality Engineer	Grand River Conservation Authority	400 Clyde Road, PO Box 729	Cambridge	ON	N1R 5W6	manderson@grandriver.ca	Y		

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Town of Shelburne

Water Supply Schedule 'B' Municipal Class Environmental Assessment

May 2024

Background

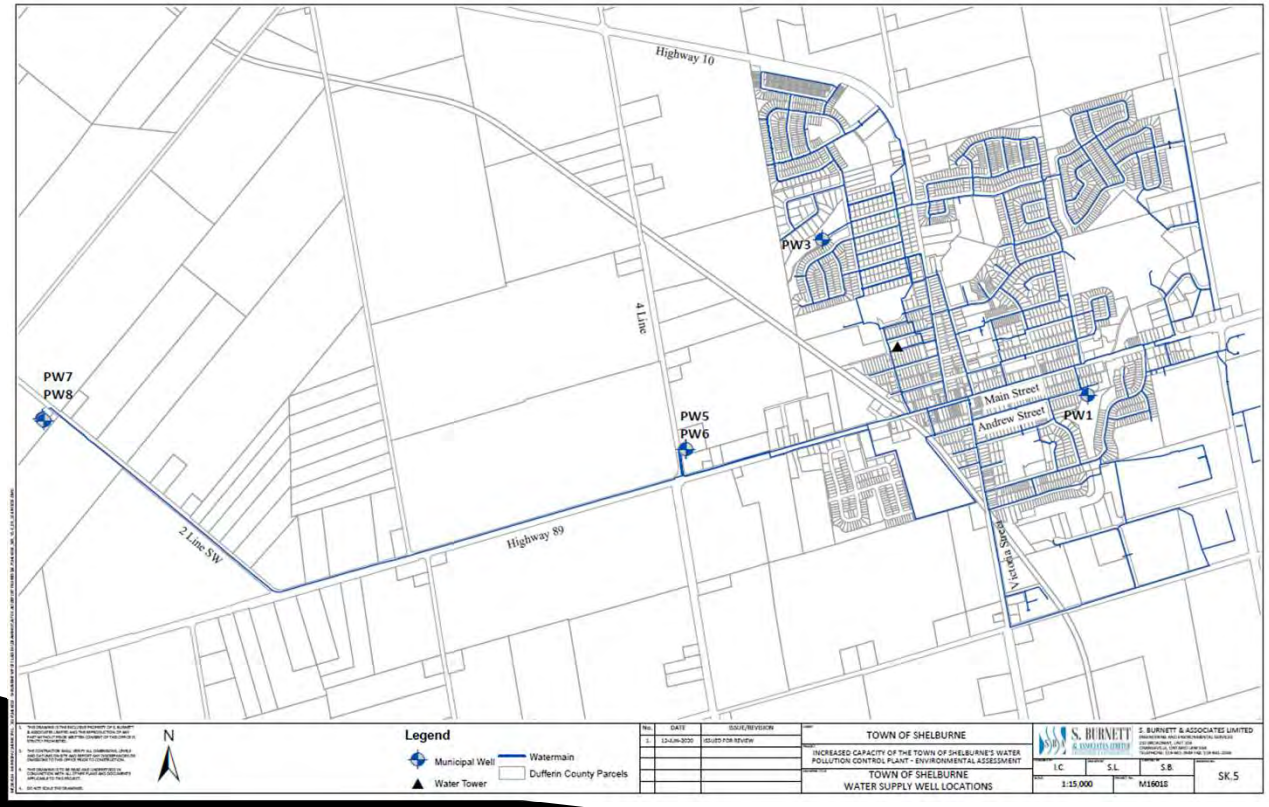
- The Town of Shelburne grew at a rate of 39% from 2011 to 2016 and at a rate of 10.7% from 2016 to 2021. With future planned developments, it is expected to continue to grow to over approximately 15,000 by 2041.
- The Town has initiated a Schedule ‘B’ Municipal Class Environmental Assessment (EA) to determine the best means of ensuring that residents have a safe and adequate water supply for the next 20 years.
- The EA will identify the most cost-effective, environmentally sound and sustainable approach to meeting the Town’s future water supply needs.

EA Status

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Phase 1	• Identify problems or opportunities
Phase 2	• Identify alternative solutions to address the problems or opportunities • Consideration of technical, environmental, economic and social impacts • Recommend an alternative solution • Consult review agencies and the public  • Select preferred solution to address problems or opportunities
Phase 5	• Proceed to detailed design and construction

Existing Water Supply

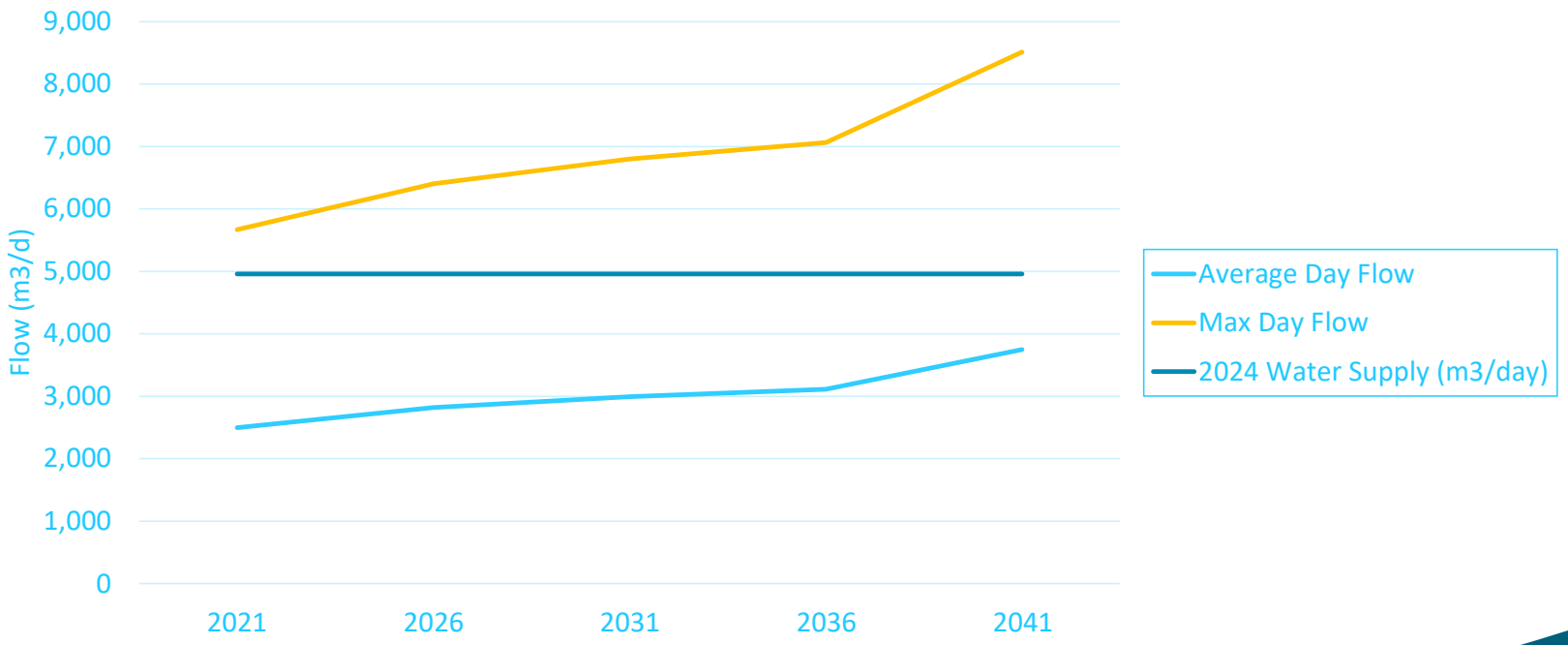


Water in Shelburne is currently supplied by six (6) production wells from four (4) pumphouses (PW1, PW3, PW5 & PW6, and PW7 & PW8)

Current Well Status

Well ID	Status	Projected Pumping Rate by end of 2024
PW1	Offline pending rehabilitation and addressing air entrainment issue.	1,210 m3/day
PW3	Was taken offline to add arsenic and UV treatment systems.	1,123 m3/day
PW5 & PW6	Operational. Requires blending water from PW7/PW8 to meet water quality objectives. Exceeds ½ Maximum Allowable Concentration for Arsenic,	994 (2,100) m3/day*
PW7 & PW8	Combined pumping cannot exceed 1635 m3/day	1,635 m3/day
	TOTAL	**4,962 m3/day**

Water Demand Compared to Supply



Alternatives Considered

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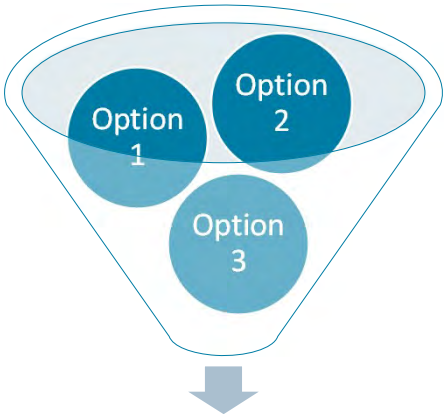
ENGINEERING & ENVIRONMENTAL

Alternative	Description
1. Do Nothing	If no action is taken to address the problem statement.
2. Water Conservation	Increasing water efficiency to reduce demand.
3. Pumping Wells 7/8 concurrently at 18.9 L/s each	Pumping Wells 7/8 concurrently at 18.9 L/s to double their contribution to the Town's water supply.
4. Adding Arsenic Treatment to Wells 5/6	Adding arsenic treatment at Wells 5/6 to allow a higher pumping rate, as blending with Well 7/8 would not be required to keep arsenic concentrations below provincial standards.
5. Locating and developing a new well	Locating a new well location and testing to confirm whether it is viable.

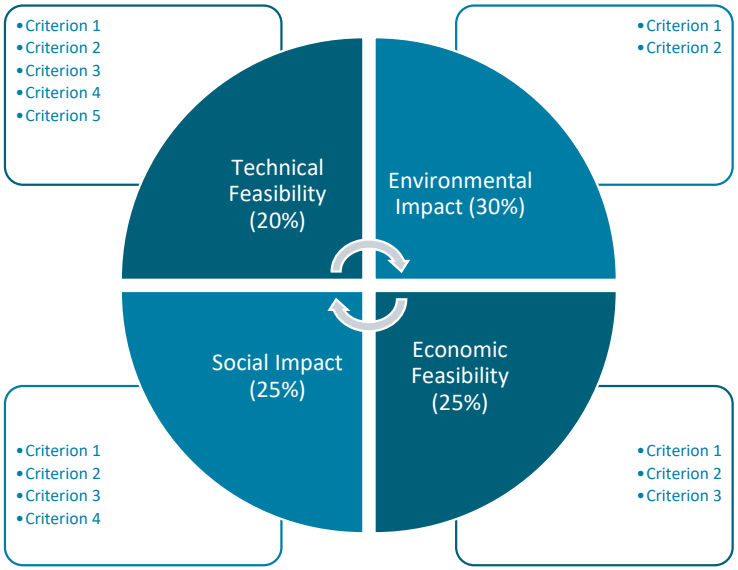
Preliminary Screening of Alternatives



Feasible alternatives to be further evaluated

☒	**1. Do Nothing**	Does not address capacity issues and system resilience and is incompatible with Town planning objectives.
☒	**2. Water Conservation**	Additional water conservation measures would not be sufficient.
☑	**3. Pumping Wells 7/8 concurrently at 18.9 L/s each**	Addresses capacity issues until approximately 2036.
☑	**4. Adding Arsenic Treatment to Wells 5/6**	Reduces arsenic concentrations below ½ Max. Allowable Concentration and increases system resilience.
☑	**5. Locating and developing a new well**	Would help address capacity issues.

Assessment of Alternatives



- Alternatives were evaluated based on Technical, Environmental, Social and Economic Feasibility criteria
- Criteria were weighted based on importance
- Alternatives were evaluated as completely meeting, partially meeting, or not meeting the criterion (e.g., completely avoids short-term impacts on terrestrial wildlife)

Results of Evaluation

Criteria		Alternative Solutions		
	Relative	3 – Pumping PW7/PW8 Concurrently	4 – Arsenic Treatment at PW5/6	5 – Locate and develop new well
Technical	20	23%	21%	11%
Environmental	30	25%	25%	25%
Economic	25	25%	17%	8%
Social	25	23%	25%	23%
TOTAL	100%	96%	88%	67%

Recommendations

- Increase pumping rate of PW7/PW8 to its sustainable rate of 3,270 m3/day and install a new backup well.
- Add arsenic treatment to PW5/PW6
- Start process of locating a new supply well in approximately 2033.

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ENGINEERING & ENVIRONMENTAL

Next Steps

- Finalize EA Report
- Submit Draft Report to MECP for review (early summer 2024)
- Notice of Completion (summer 2024)
- Amend Source Water Protection Plan
- Permitting (PTTW and MDWL)
- Increase Pumping rate of PW7/PW8 as required
- Design and Install a new backup well PW9 at the same location as PW7/PW8

Appendix A.4

Letters, Emails and Meeting Minutes

Ministry of the Environment, Conservation and Parks

Great Lakes and Inland Waters Branch
Land and Water Division

40 St. Clair Avenue West
10th Floor
Toronto, ON M4V 1M2

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Grands Lacs et des Eaux intérieures
Division des Terres et des Eaux

40, Avenue St. Clair Ouest
10e étage
Toronto, ON M4V 1M2

Ontario

September 17, 2020

Mr. Ian Callum
Sr. Environmental Project Manager, S. Burnett & Associates Limited
210 Broadway, Unit 203, Orangeville, ON, L9W 5G4

Re: Town of Shelburne Water Supply EA – Intra-basin Transfer Considerations

Mr. Ian Callum,

Thank you for your inquiry regarding intra-basin transfer requirements under the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement.

Ontario's obligations under the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement are implemented collaboratively by the Ministry of Natural Resources and Forestry and the Ministry of the Environment, Conservation and Parks.

The Agreement was signed by Ontario, Quebec and the eight U.S. Great Lakes States in 2005 to protect and conserve the shared waters of the Great Lakes-St. Lawrence River Basin and facilitate collaborative approaches to strengthen water management. The Agreement promotes cooperation through common processes for evaluating water diversions and transfers to prevent significant adverse impacts on the ecosystems and watersheds of the Basin.

In Ontario, the Agreement and implementing provisions in the *Ontario Water Resources Act* (OWRA) set out requirements for the transfer of water between the Great Lakes watersheds, for new or increased water withdrawals of 379,000 L/day or greater, averaged over any 90-day period. Based on the information provided to date, it has been assessed that the Town of Shelburne's proposed increase in pumping rate from wells in the Lake Erie watershed with the water being returned into the Lake Huron watershed would result in an increased intra-basin transfer of water greater than the identified threshold of 379,000 L/day.

As per the Town of Shelburne's existing Permit to Take Water 1353-AZHJCQ, the taking of 1,635,000 L/day is the permitted combined total for Well 7 and Well 8. Condition 3.3 further identifies 1,635,000 L/day as the deemed amount of intra-basin transfer that the Director determined in accordance with section 34.8 of the OWRA. This means that any increase of an intra-basin transfer beyond the "threshold amount" within

the meaning of section 34.5 of the OWRA must be approved by the Director. In order for the Director to amend a permit and authorize the increased intra-basin transfer, the applicant must demonstrate that the proposal meets requirements of subsection 34.6 (2) of the OWRA.

If this option is formally pursed under the Water Supply Municipal Class Environmental Assessment, the proposal would need to meet the requirements under *Article 201– Exceptions to the Prohibition of Diversions,* Paragraph 2.b under the Agreement. This section details environmental and water conservation requirements, including those captured under the Agreement's *Exception Standard* outlined in Article 201, Paragraph 4, and specifies Ontario's obligation to provide advanced notification of the proposal to other provincial and state jurisdictions that are party to the Agreement.

Often, technical information and studies required to support a Permit to Take Water may be used to satisfy requirements under both the Agreement and the OWRA. However, there may also be additional information required such as a demonstrated analysis that no feasible, cost effective and environmentally sound water supply alternatives exist.

Should this option formally proceed through the Water Supply Municipal Class Environmental Assessment process, both ministries would work closely with the Town of Shelburne to ensure that all requirements under the Agreement are sufficiently met and that prior notice of the proposal is provided to the Regional Body in advance of any approvals. Although it is focused on the Regional Review process rather than the Prior Notice process that would apply in this instance, the Great Lakes-St. Lawrence River Water Resources Regional Body Procedures provides some additional information on the type of information that should be used to demonstrate having met the Exception Standard of the Agreement.

As the Town of Shelburne's options continue to be assessed, please ensure that both the Ministry of Natural Resources and Forestry and the Ministry of the Environment, Conservation and Parks remain advised where requirements under the Agreement will need to be considered. Should you have any questions, please contact John Dungavell, Manager, Water Resources Section at 705-749-3880.

Thank you again for your inquiry regarding intra-basin transfer requirements under the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement.

Sincerely,

Ling Mark
Director, Great Lakes and Inland Waters Branch
Ministry of the Environment, Conservation and Parks

Jennifer Keyes
Director, Resources Planning and Development Policy Branch
Ministry of Natural Resources and Forestry

cc. Jennifer Keyes, Director, Resources Planning and Development Policy Branch, MNRF
Carolyn O'Neill, Manager, Great Lakes Office, MECP
John Dungavell, Manager, Water Resources Section, MNRF
Leo Luong, Manager, Water Policy Section, MECP
Gregory Meek, Supervisor, Permit To Take Water Unit, MECP
Abdul Quyum, Hydrogeologist, West Central Region, MECP

Date of Meeting:	October 30, 2020	**Start Time:** 9:00 a.m.	**End Time:** 10:00 a.m.
Project Name:	Town of Shelburne Water Supply Schedule 'B' Municipal Class EA		
Project No:	M17025		
Location:	Video Conference Call		
Regarding:	Intra-Basin Transfer Requirements		

Attendees:

1.	Jim Moss	Town of Shelburne	jmoss@shelburne.ca
2.	Barbary Slattery	MECP	Barbara.slattery@ontario.ca
3.	John Dungavell	MNRF	John.dungavell@ontario.ca
4.	Laura Gynane	MNRF	Laura.gynane@ontario.ca
5.	Julia Holder	MNRF	Julia.Holder@ontario.ca
6.	Jennifer McKay	MNRF	Jennifer.McKay@ontario.ca
7.	Bill Banks	Banks Groundwater Engineering	Bill.Banks@banksgroundwater.ca
8.	Ian Callum	S. Burnett & Associates	Ian.callum@sbaengineering.com

The following items were discussed:	**Action by:**
1. Municipal Class EA Overview • Ian provided a general overview of where the Town is at with regards to the Water Supply Municipal Class EA. The EA will determine the preferred means for the Town to meet its water supply needs for the next 20 years. Two of the Town's current production wells (PW7/8) lie within approximately 150 metres of the Grand River/Nottawasaga Valley Watershed divide. Water is pumped from the Grand River watershed, used by the Town, then discharged from its Water Pollution Control Plant to the Besley Drain and ultimately the Boyne River in the Nottawasaga Valley Watershed. The Town is currently confirming whether doubling the current pumping rate of Wells PW7/8 is the preferred alternative solution.	
2. Intra-basin Transfer General Overview • MNRF confirmed that they are the lead in terms of meeting Intra-basin transfer requirements and conveyed the need to uphold the spirit and intent of the Great Lakes St. Lawrence River Basin Sustainable Water Resources Agreement. • MNRF indicated that the application for the Permit to Take Water to MECP would be the catalyst for the MNRF to provide the parties to the	

The following items were discussed:	**Action by:**
Agreement with Prior Notice of the proposal for an inter-basin transfer. It is the Regional Body which triggers the intra-basin prior notice process. MNRF advised the work to support the Prior Notice (i.e., information and assessment for the application) can be done ahead of time so that the process could be initiated shortly following the application for a PTTW. • MNRF explained that the proposed application would be subject to the "lower bar" requirements of the Prior Notice Process, as opposed to a Regional Review. Timelines for the Prior Notice process are not set out under the Agreement, and MNRF advised that they will be recommending allowing 30 to 45 days following notification to the other parties for questions or comments to be received, to be confirmed in discussion with MECP.	
3. Next Steps • MNRF to provide examples (York Region and Waukesha, Wisconsin) of other intra-basin transfer applications. • MNRF to provide some clarification on the relevant parts of the 'Procedures' document, which helps explain how to meet the Exception Standard of the Agreement. • Based on guidance from MECP, the EA will include a section on intra-basin transfer. Information contained in the EA will help support the intra-basin transfer application. • The Town will consider circulating a draft EA to MNRF to ensure that it meets MNRFs information needs for the intra-basin transfer application, including maps showing the flow direction of the aquifer.	MNRF MNRF Ian Ian/Jim

The preceding are the minutes of the meeting as observed by the undersigned. Should there be a need for revision, please advise within seven (7) days. In the absence of notification to the contrary, these minutes will be deemed to be an accurate record of this meeting.

Minutes Prepared By:

Ian Callum
Senior Environmental Project Manager
S. Burnett & Associates Limited

Distribution – by e-mail only to: All Attendees

S. Burnett & Associates Limited, 210 Broadway, Unit 203, Orangeville, ON, L9W 5G4 T: (51) 941-2949 F: (519) 941-2036
www.sbaengineering.com

Date of Meeting:	June 12, 2020	**Start Time:** 1 pm	**End Time:** 2 pm
Project Name:	Town of Shelburne Water Supply EA		
Project No:	M17025		
Location:	MS Teams Call		
Regarding:	Source Water Protection Coordination		

Attendees:

1.	Martin Keller	GRCA	Email mkeller@grandriver.ca
2.	Sonja Strynatka	GRCA	Email sstrynatka@grandriver.ca
3.	Ryan Post	NVCA	Email rpost@nvca.on.ca
4.	Jim Moss	Town of Shelburne	Email jmoss@shelburne.ca
5.	Bill Banks	Banks Groundwater Engineering	Email Bill.Banks@banksgroundwater.ca
6.	Steve Burnett	SBA	Email stephen.burnett@sbaengineering.com
7.	Sarah Lionsbridge	SBA	Email Sarah.Lionsbridge@sbaengineering.com
8.	Ian Callum	SBA	Email ian.callum@sbaengineering.com

The following items were discussed:	**Action by:**
1. Purpose of the Meeting Ian provided the following context for the meeting: The Town of Shelburne is conducting an EA to determine the best means of meeting water supply for the next 20 years. One option under consideration is to double the pumping rate from Wells PW7/8. This call is to discuss source water protection requirements and timelines that would be required should this option be recommended.	None
2. Changes to Source Water Protection as of 2018: Martin outlined requirement for Section 48 Notification from GRCA prior to acquiring the drinking water license. Need to show source water protection work to let GRCA know things are complete. Plan updates must be approved by the Ministry before the tap can be turned on.	None
3. Modelling of new pumping rate Wells PW7/8 could have their pumping rate increased from 18.9 L/s to 37.8 L/s with both wells operating concurrently. New pumps will need to be installed to	Sonja will reach out to EarthFX to let them know that the

allow this higher pumping rate and a 72-hour pumping test will be completed in Summer 2020. The three (3) new monitoring well locations drilled in 2018 will be used during the test and will be used to confirm the 2015 modelling results from modelling conducted by EarthFX, which did consider the 37.8 L/s pumping rate. It was agreed that GRCA would likely take the lead, given the well location, and that the updated model would likely be submitted to GRCA in fall/late fall. Submission of early draft results will be helpful.	model will need to be updated after the pumping test, likely in early fall and to suggest they circulate a term of reference or workplan to MECP for early review.
4. Early MECP engagement MECP has two branches that are involved: the Technical Branch (Abdul Quyum) and The Source Water Protection Branch (Cynthia Doughty)	Martin will reach out to Cynthia to let her know about the project.
5. Review of Source Water Protection Plan Steps (workflow from Ryan) Martin anticipates a short turnaround after the updated model is provided, in the order of 1-2 weeks. Upon completion, GRCA will issue a Notice stating that the work is complete, and the Town can apply for a drinking water works permit. The remainder of Source Protection Plan Update Steps, including MECP review, will conservatively take 9-11 months, although hopefully that can be reduced.	None
6. Engagement with Melancthon Early engagement with Melancthon around source water protection is ideal and is required under Steps 5a and 5c from the workflow provided by Ryan.	Melancthon to be contacted by either Martin or Ryan.
7. Intrabasin Transfer Ian explained that the increased pumping rate may trigger additional intrabasin transfer requirements. The existing pumping rate is considered the intrabasin transfer baseline rate in the current permit to take water. SBA is in conversation with MECP to clarify any future requirements.	None

S. Burnett & Associates Limited, 210 Broadway, Unit 203, Orangeville, ON, L9W 5G4 T: (51) 941-2949 F: (519) 941-2036
www.sbaengineering.com

The preceding are the minutes of the meeting as observed by the undersigned. Should there be a need for revision, please advise within seven (7) days. In the absence of notification to the contrary, these minutes will be deemed to be an accurate record of this meeting.

Minutes Prepared By:

Ian Callum
Project Manager
S. Burnett & Associates Limited

Distribution – by e-mail only to: All Attendees

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www.sbaengineering.com

Ian Callum

From: Emily Hayman <ehayman@grandriver.ca>
Sent: March 8, 2022 8:49 AM
To: Ian Callum
Cc: Sarah Lionsbridge; Bill Banks
Subject: RE: Shelburne Wells 7/8 Update

Follow Up Flag: Follow up
Flag Status: Completed

Hi Ian,

Thank-you for sharing. The draft technical information will be brought to the March 31 Source Protection Committee meeting in the form of a high level report. I will also submit the draft report to the MECP (technical staff) as part of early engagement requirements. I will provide both the MECP and my own comments when we have completed our review.

I note that the draft report does not include calculations for managed lands, livestock density and impervious surfaces or a threats enumeration. These will need to be completed in order to move forward with pre-consultation (aiming for June 2022). Please advise on when these items will be completed.

Thank-you,
Emily

From: Ian Callum <ian.callum@sbaengineering.com>
Sent: March 7, 2022 2:06 PM
To: Emily Hayman <ehayman@grandriver.ca>
Cc: Sarah Lionsbridge <Sarah.Lionsbridge@sbaengineering.com>; Bill Banks <bill.banks@banksgroundwater.ca>
Subject: RE: Shelburne Wells 7/8 Update

Good afternoon Emily,

The Shelburne WHPA Modelling Report can be downloaded using the link below. The report covers the increased pumping rate at wells 7 and 8, as well as the WHPA-E for well 3. The report is provided to you as a draft report and SBA is still conducting a detailed review at our end.

https://ln5.sync.com/dl/17ded3c50/s9gwid5m-7k7kf5yx-f839ewee-adaxkf5v

Please advise if you have any questions as GRCA moves through its review.

Cheers,

Ian

From: Emily Hayman <ehayman@grandriver.ca>
Sent: February 28, 2022 4:46 PM
To: Ian Callum <ian.callum@sbaengineering.com>

Ian Callum

From: Emily Hayman <ehayman@grandriver.ca>
Sent: July 20, 2022 9:25 AM
To: Sarah Lionsbridge; Ian Callum
Cc: Ryan Post
Subject: RE: Shelburne Technical Work
Attachments: Amendments to Directors Technical Rules_March 2017.pdf; Grand River s.34 Melancthon-Brant_MECP Early Engagement Comments_27May2022.docx; LESPR_ARDB_Blank_Apr2020 (2).zip

Follow Up Flag: Follow up
Flag Status: Completed

Hello Sarah and Ian,

I have completed a high level review of the revised report to ensure that all the components required for the Grand River Source Protection Authority to issue a Section 48 notice are complete. Could you please pass along to EarthFX. The following items will need to be addressed to receive the section 48 notice:

1. The report references the 2017 Technical Rules for the vulnerability assessment; however it seems that the 2009 Technical Rules were used for the managed lands, livestock density, impervious surfaces calculations and threats enumeration. The MECP requires that the most recent Technical Rules be followed when completing source water technical work. There aren't too many differences between the 2009 and 2017 Technical Rules so I don't believe that updating this will be too labour intensive. The threats database in the source water protection information portal is a useful tool for determining where threats are significant (https://swpip.ca/) I have attached a pdf of the track changes version of the 2017 technical Rules for your reference. Please note that for future projects, consultants should use the 2021 Technical Rules for their analysis. Using the 2017 Technical Rules for the Shelburne work is fine since it started before the revised 2021 Technical Rules were released.
2. Please take a look at Figure 8.2 – it appears that the old vulnerability scoring was used in this map. Confirm that the revised vulnerability scoring was used for the threats assessment and review maps to ensure the correct vulnerability scoring was used.
3. Please check that the MECP early engagement comments have been addressed in the report as it pertains to the WHPA-E delineation and uncertainty assessment. I may be mistaken, but I didn't see any changes to the report around those comments. I have attached the comments to this e-mail for your reference.
4. Please provide the significant drinking water threat numbers as they are recorded in the assessment report (i.e. number of SDWTs for each threat category within the WHPA-A, B, C and D separately for the Grand River Watershed. The same will need to be done for Nottawasaga SPA). We will also need total number of properties that have SDWTs in each watershed. This does not need to be added to the report, but can be sent separately. Please take a look in the Grand River Assessment Report for reference on how we need to report the threat numbers.
5. We will require the data layers for the source water protection outputs in order to update the assessment report and plan. Please review our database template to know what layers/files need to be sent. I have attached the database template.

Please let me know if you have any questions.

Emily

Emily Hayman, M.Sc., P.Geo

Source Water Hydrogeologist
Grand River Conservation Authority

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext 2308
Toll-free: 1-866-900-4722
Email: ehayman@grandriver.ca
www.sourcewater.ca | Connect with us on social media

From: Emily Hayman
Sent: July 13, 2022 1:52 PM
To: 'Sarah Lionsbridge' <Sarah.Lionsbridge@sbaengineering.com>
Cc: Ian Callum <ian.callum@sbaengineering.com>
Subject: RE: Shelburne Technical Work

Hi Sarah,

Thank-you for passing along.
I am currently reviewing the report. Did you identify any major concerns from your review of the report?

Thank-you,
Emily

From: Sarah Lionsbridge <Sarah.Lionsbridge@sbaengineering.com>
Sent: July 8, 2022 1:48 PM
To: Emily Hayman <ehayman@grandriver.ca>
Cc: Ian Callum <ian.callum@sbaengineering.com>
Subject: FW: Shelburne Technical Work

Hi Emily,

Please see the link provided below to download the EarthFx WHPA report for Town of Shelburne.

Thanks,

Sarah Lionsbridge, P. Geo.
Hydrogeologist/Project Manager

S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON
L9W 5G4

Direct: 519.215.3709
Office: 519.941.2949 x 238
Fax: 519.941.2036
W: www.sbaengineering.com

From: Gabriel Bacca Cortes <gabrielbc@earthfx.com>
Sent: July 4, 2022 2:32 PM
To: Sarah Lionsbridge <Sarah.Lionsbridge@sbaengineering.com>
Cc: EJ Wexler <ejw@earthfx.com>; dirk@earthfx.com; Ian Callum <ian.callum@sbaengineering.com>
Subject: Re: Shelburne Technical Work

Hi Sarah,

EJ is not in today. I've placed a copy of the final report on this FTP site:

https://ln5.sync.com/dl/bb7b9a610/28t6yhtv-c944qad4-ktrzrqyd-5kbyrbjj

Thanks,

Gabriel Bacca
Earthfx Inc.

On Mon, Jul 4, 2022 at 1:17 PM Sarah Lionsbridge <Sarah.Lionsbridge@sbaengineering.com> wrote:

> Hi EJ,
>
> Thank you for providing that report and I'm happy to see if came through last week.
>
> Could you reshare the link with me? Dropbox is indicating the files have been deleted. With Ian out of the office, I'll be forwarding the link to GRCA and Banks Groundwater for downloading as well.
>
> Thanks,
>
> **Sarah Lionsbridge, P. Geo.**
>
> **Hydrogeologist/Project Manager**

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210 Broadway, Unit 203
Orangeville, ON
L9W 5G4

Direct: 519.215.3709
Office: 519.941.2949 x 238

Fax: 519.941.2036

W: www.sbaengineering.com

From: EJ Wexler <ejw@earthfx.com>
Sent: Thursday, June 30, 2022 1:06:33 PM
To: Ian Callum <ian.callum@sbaengineering.com>
Cc: gabrielbc@earthfx.com <gabrielbc@earthfx.com>; dirk@earthfx.com <dirk@earthfx.com>
Subject: RE: Shelburne Technical Work

Hi,

At long last, the final report is available at:

https://www.dropbox.com/s/s36drr08wfsi10m/Shelburne WHPA Report V18_final.pdf?dl=0

We have completed the Threats Assessment for the updated WHPA-A to WHPA—Ds and the updated WHPA-Es. There are an additional 80 pages in the report with numerous tables and maps. The vulnerability scores have been updated as well. It was a significant amount of work to prepare and under difficult circumstances. We thank you for your patience.

E.J. Wexler

Earthfx Inc.

From: Ian Callum [mailto:ian.callum@sbaengineering.com]
Sent: June-24-22 1:04 PM
To: EJ Wexler
Cc: gabrielbc@earthfx.com; dirk@earthfx.com
Subject: RE: Shelburne Technical Work

Thank you for the update E.J., much appreciated and have a good weekend.

Ian

From: EJ Wexler <ejw@earthfx.com>
Sent: June 24, 2022 12:16 PM
To: Ian Callum <ian.callum@sbaengineering.com>
Cc: gabrielbc@earthfx.com; dirk@earthfx.com
Subject: RE: Shelburne Technical Work

Hi,

Just to update you, in our internal review process we found an issue with the vulnerability scoring. This had an effect on the threats evaluation. Gabriel and I have been updating the threats table and re-doing the report figures. The good news is that there are smaller number of threats than initially.

Hopefully we will get this out early next week.

E.J.

From: Ian Callum [mailto:ian.callum@sbaengineering.com]
Sent: June-17-22 9:55 AM
To: EJ Wexler

Cc: dirk@earthfxcom; Lisa Johnson
Subject: RE: Shelburne Technical Work

Hi E.J.,

Are you able to provide a sense of when you will be ready to submit the revised report? I fully understand this is no small task, and that it has been further complicated by Gabriel's absence, but it is important that I understand the timeline so that I can communicate it to the Town.

Much appreciated and thank you for you work.

Ian

From: EJ Wexler <ejw@earthfx.com>
Sent: June 3, 2022 11:52 AM
To: Ian Callum <ian.callum@sbaengineering.com>
Cc: dirk@earthfx.com
Subject: RE: Shelburne Technical Work

Hi,

Just to let you know that we are still trying to wrap up the Threats Assessment. We have had three senior staff (Dirk, Gabriel, and I) working on this. It is orders of magnitude more difficult than the previous assessment where the setting was rural and the vulnerability scoring was simplified. There is a lot of digitizing and GIS work involved, but also, the interpretation of rules for threats that span WHPA zones and different vulnerability scoring areas.

We have reviewed the MECP comments and will incorporate suggested changes where needed. Other concerns can be addressed by adding text to the report.

E.J.

From: Ian Callum [mailto:ian.callum@sbaengineering.com]
Sent: June-01-22 8:41 AM
To: 'EJ Wexler'; dirk@earthfx.com
Subject: FW: Shelburne Technical Work

Hi EJ and Dirk,

Please find attached some early engagement comments from NVCA that we need to incorporate into the report. At a first glance, they all seemed pretty minor.

Cheers,

Ian

From: Emily Hayman <ehayman@grandriver.ca>
Sent: May 31, 2022 3:28 PM
To: Ian Callum <ian.callum@sbaengineering.com>
Cc: Ryan Post <rpost@nvca.on.ca>
Subject: RE: Shelburne Technical Work

Hello Ian,

We received MECP early engagement comments on the draft Shelburne WHPA Delineation report. I am passing them along to you for EarthFX to address in their updates to the report.

Thank-you,
Emily

From: Emily Hayman
Sent: May 30, 2022 9:55 AM

To: 'Ian Callum' <ian.callum@sbaengineering.com>
Subject: Shelburne Technical Work

Good morning Ian,

I hope you had a great weekend and were able to enjoy time outside.

Could you please provide me with an update on the revised technical work for the Shelburne WHPA delineation.

Thank-you,

Emily

Emily Hayman, M.Sc., P.Geo

Source Water Hydrogeologist

Grand River Conservation Authority

400 Clyde Road, PO Box 729

Cambridge, ON N1R 5W6

Office: 519-620-7595

Toll-free: 1-866-900-4722

Email: ehayman@grandriver.ca

www.sourcewater.ca | Connect with us on social media

--
Gabriel Bacca Cortes, PhD, P.E.
Earthfx | Earthfx.com | o:(416) 410-4260 ext. 105
3363 Yonge St | Toronto | Ontario

Ian Callum

From: Elisha Persaud <epersaud@grandriver.ca>
Sent: May 21, 2024 12:26 PM
To: Ian Callum
Cc: Shari Dahmer; Sonja Strynatka
Subject: Re: M17025 - Shelburne Well 7&8 Class EA - Letter & Notice

Follow Up Flag: Follow up
Flag Status: Completed

Hi Ian,

We've received feedback from the Ministry that you will still be able to adjust pumping rates if needed in anticipation of a dry summer.

It has been communicated to us that Source Protection Plan approval is not required to increase pumping rates in this case. From the Ministry's records, the new well PW8 was completed prior to Reg. 205/18. The increased water taking may also only require a change to the MDWL if allowances in the PTTW are exceeded. If this is the case, the prohibition on water supply in Reg. 205/18 would still not be triggered.

Let me know if this makes sense / if anything is contrary to your understanding.

Thanks,
Elisha

Elisha Persaud, PhD, P.Geo.
Source Water Hydrogeologist
Source Protection Program, Lake Erie Source Protection Region

c/o Grand River Conservation Authority
400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext. 2308
Toll-free: 1-866-900-4722
Email: epersaud@grandriver.ca
www.sourcewater.ca | Connect with us on social media

From: Ian Callum <ian.callum@sbaengineering.com>
Sent: Thursday, May 16, 2024 5:03 PM
To: Sonja Strynatka <sstrynatka@grandriver.ca>
Cc: Shari Dahmer <sdahmer@grandriver.ca>; Elisha Persaud <epersaud@grandriver.ca>
Subject: RE: M17025 - Shelburne Well 7&8 Class EA - Letter & Notice

Hi Sonja,

Yes the PIC is for PW7/PW8. It is unlikely that mid-June is attainable now given that we still need to hear back from MECP on source water protection, complete the EA, and then amend the PTTW. We are still hoping to have this done as soon as possible in case it is a dry summer.

Hope you are well also,

Cheers,

Ian

From: Sonja Strynatka <sstrynatka@grandriver.ca>
Sent: Thursday, May 16, 2024 3:40 PM
To: Ian Callum <ian.callum@sbaengineering.com>
Cc: Shari Dahmer <sdahmer@grandriver.ca>; Elisha Persaud <epersaud@grandriver.ca>
Subject: Fw: M17025 - Shelburne Well 7&8 Class EA - Letter & Notice

Hi Ian,

Following up on the notification we received earlier this week - can you confirm whether this PIC is for PW 7/8?

Also from past correspondence with Shari, we understood that the Township would be increasing pumping at these wells in mid-June. Is this still the timeline or has it been revised?

Thanks and hope all is well,
Sonja

Sonja Strynatka, P.Geo.
Senior Hydrogeologist
Grand River Conservation Authority

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Office: 519-621-2763 ext. 2276
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From: Info @ SBA <info@sbaengineering.com>
Sent: May 13, 2024 1:38 PM
To: Guy Gardhouse <ggardhouse@eastgarafraxa.ca>; jstirk@eastgarafraxa.ca <jstirk@eastgarafraxa.ca>; lbanfield@eastgarafraxa.com <lbanfield@eastgarafraxa.com>; dhalls@eastgarafraxa.com <dhalls@eastgarafraxa.com>; jzukowski@eastgarafraxa.com <jzukowski@eastgarafraxa.com>; Jessica Kennedy <jkennedy@eastgarafraxa.ca>; sstone@eastgarafraxa.ca <sstone@eastgarafraxa.ca>; planner@amaranth.ca <planner@amaranth.ca>; cgerrits@dufferincounty.ca <cgerrits@dufferincounty.ca>; glittle@amaranth.ca <glittle@amaranth.ca>; Holly Boardman <hboardman@amaranth.ca>; nmartin@amaranth.ca <nmartin@amaranth.ca>; svangerven@amaranth.ca <svangerven@amaranth.ca>; sgraham@amaranth.ca <sgraham@amaranth.ca>; bmetzger@amaranth.ca <bmetzger@amaranth.ca>; astirk@amaranth.ca <astirk@amaranth.ca>; dholmes@melancthontownship.ca <dholmes@melancthontownship.ca>; roads@melancthontownship.ca <roads@melancthontownship.ca>; dwhite@melancthontownship.ca <dwhite@melancthontownship.ca>; jmclean@melancthontownship.ca <jmclean@melancthontownship.ca>; rmoore@melancthontownship.ca <rmoore@melancthontownship.ca>; bneilson@melancthontownship.ca <bneilson@melancthontownship.ca>; rplowright@melancthontownship.ca <rplowright@melancthontownship.ca>; mike.dunmore@townofmono.com <mike.dunmore@townofmono.com>;

john.creelman@townofmono.com <john.creelman@townofmono.com>; ralph.manktelow@townofmono.com <ralph.manktelow@townofmono.com>; fred.nix@townofmono.com <fred.nix@townofmono.com>; elaine.capes@townofmono.com <elaine.capes@townofmono.com>; melinda.davie@townofmono.com <melinda.davie@townofmono.com>; Planning@townofmono.com <Planning@townofmono.com>; tatkinson@mulmur.ca <tatkinson@mulmur.ca>; jhorner@mulmur.ca <jhorner@mulmur.ca>; ehawkins@mulmur.ca <ehawkins@mulmur.ca>; klyon@mulmur.ca <klyon@mulmur.ca>; pclark@mulmur.ca <pclark@mulmur.ca>; acunningham@mulmur.ca <acunningham@mulmur.ca>; sburns@dufferincounty.ca <sburns@dufferincounty.ca>; donna.bigcanoe@georginaisland.com <donna.bigcanoe@georginaisland.com>; sfn@saugeen.org <sfn@saugeen.org>; jsandy@chimnissing.ca <jsandy@chimnissing.ca>; fnamin@chimnissing.ca <fnamin@chimnissing.ca>; eaadminassist@nawash.ca <eaadminassist@nawash.ca>; Chief@nawash.ca <Chief@nawash.ca>; aao@nawash.ca <aao@nawash.ca>; consultation@ramafirstnation.ca <consultation@ramafirstnation.ca>; info@scogogfirstnation.com <info@scogogfirstnation.com>; communications@mncfn.ca <communications@mncfn.ca>; consultations@metisnation.org <consultations@metisnation.org>; eanotification.wcregion@ontario.ca <eanotification.wcregion@ontario.ca>; Grand River Conservation Authority <grca@grandriver.ca>; Sonja Strynatka <sstrynatka@grandriver.ca>; iockenden@nvca.on.ca <iockenden@nvca.on.ca>; admin@nvca.on.ca <admin@nvca.on.ca>; Mark Anderson <manderson@grandriver.ca>
Cc: Ian Callum <ian.callum@sbaengineering.com>
Subject: M17025 - Shelburne Well 7&8 Class EA - Letter & Notice

Good afternoon,

Please find attached a stakeholder letter and notice of public information centre regarding the Town of Shelburne's Municipal Class Environmental Assessment – Increased Capacity of the Town of Shelburne's Water Supply. If you have any questions or concerns, please do not hesitate to contact Ian Callum, Senior Environmental Project Manager with S. Burnett & Associates Limited.

Thanks,
S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON L9W 5G4

T: 519.941.2949
F: 519.941.2036
W: www.sbaengineering.com

Shae Richter

From: Ian Callum
Sent: September 3, 2024 1:34 PM
To: 'EA Notices to WCRegion (MECP)'
Cc: Del Villar Cuicas, Joan (MECP); Weber, Martha (MECP); jmoss@shelburne.ca; Jennifer Willoughby; Carey Holmes; Stephen Burnett; Terrance Gole; Sarah Lionsbridge; 'Denyse Morrissey'
Subject: Town of Shelburne - Draft Water Supply EA - for review
Attachments: M17025 Class EA Report_MECP Review Draft_3Sep24.pdf

Good afternoon,

On behalf of the Town of Shelburne, please find attached the Increased Capacity of the Town of Shelburne's Water Supply Schedule 'B' Municipal Class Environmental Assessment. My understanding is that the Ministry will conduct a technical review of this report within 30 days of receipt of this report. After working with the Ministry to resolve any comments, our intent is to file a Notice of Completion for this project to initiate the 30-day Public, Agency, First Nations, and Métis review period. In consideration of the large file size, I've provided a separate link to the appendices:

https://www.dropbox.com/scl/fo/2k96ti1i2yf3nw7cb9yay/h?rlkey=6ytnfar5hq5gfpgmpzcxlbn83&st=gb5hiebp&dl=0

If you require any additional information or clarification during your review, please feel free to contact me.

Kind regards,

Ian

Ian Callum, M.Sc., PMP
Senior Environmental Project Manager

S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON L9W 5G4

T: 519-941-2949 ext. 240
C : 519-215-6893
W: www.sbaengineering.com

Shae Richter

From: Ian Callum
Sent: March 7, 2025 1:42 PM
To: Shae Richter
Subject: FW: Town of Shelburne - Draft Water Supply EA - for review
Attachments: M17025 M16020_MECP Response Ltr_VFINAL_10Dec24.pdf; M16020_Shelburne WCA Memo_FINAL_10Dec24.pdf

---

From: Sarah Lionsbridge <Sarah.Lionsbridge@sbaengineering.com>
Sent: December 10, 2024 8:30 PM
To: Joan.DelVillarCuicas@ontario.ca
Cc: Ian Callum <ian.callum@sbaengineering.com>; Stephen Burnett <stephen.burnett@sbaengineering.com>; Jim Moss <jmoss@shelburne.ca>; 'Bill Banks' <Bill.Banks@banksgroundwater.ca>; Laurel Yarenko <laurel.yarenko@sbaengineering.com>
Subject: RE: Town of Shelburne - Draft Water Supply EA - for review

Good evening Joan,

I hope this email finds you well, I was forwarded your email and review comments from Ian Callum and have prepared the attached summary letter.

We have updated the following report packages to help support the MECP's technical review on these studies:

- *Pumping Test and Monitoring Results of Production Wells PW7 and PW8 Report*
- *Summary of WCA Testing Results (2020 – 2023) Technical Memo.*

As the files are quite large, we have uploaded the updated reports, appendices and supporting documents to our file transfer site, please let me know if you have any issues accessing them.

Town of Shelburne
Clients Downloading (Web Browser):
http://shelburne.sbaengineering.com/
Web Username: SBAShelburne@sbaengineering.com
Web Password: sbashelburne2021

Kindly,

Sarah Lionsbridge, P. Geo.
Hydrogeologist

S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON
L9W 5G4

Direct: 519.215.3709
Office: 519.941.2949 x 238
Fax: 519.941.2036

From: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>
Sent: October 2, 2024 9:35 AM
To: Ian Callum <ian.callum@sbaengineering.com>
Subject: RE: Town of Shelburne - Draft Water Supply EA - for review

Good morning Ian,

Our technical support team is currently reviewing the Class EA and wellfield capacity assessments documents and requires the following additional information to complete the groundwater and surface water reviews. Please provide the following items:

Groundwater:

- *Pumping Test and Monitoring Results of Production Wells PW7 and PW8 Report, dated Nov. 2023*
  - Figure 3 does not show site topography. Please provide an updated figure
  - Figures 5 and 6 do not have a legend. Please update these figures
  - Appendix C1, please provide names of wells with tag numbers A076887 and A081584. Drawing 1 shows depths not elevations. Please update this figure to show elevations.
  - Appendix C2. Please add wells and monitors name to MECP well records.
  - Appendix H1, table H-7. What the units for arsenic concentration. Was water quality monitored in other deep bedrock aquifer monitors and private supply wells?
  - Please provide location and construction details for all wells and monitors listed in tables 3 and 4. This information should include UTM coordinates, ground elevation, total depth, screened or open interval hydrostratigraphic unit and static water level elevation.
  - Appendix G, in hydrographs for PW7, PW8 and other monitors there appears to be a reduction of pumping that caused water levels to rise then decline before end of the pumping test. Could you please provide explanation for this?
  - What does the red, almost horizontal line in Graph 7 represent?
  - How water levels in SW10 and other surface water monitoring locations were measured?

- *Summary of WCA Testing Results (2020 – 2023) Technical Memo., dated Dec 29. 2023*
  - Please provide location and construction details for all wells and monitors listed in tables 2 and 3. This information should include UTM coordinates, ground elevation, total depth, screened or open interval, hydrostratigraphic unit and static water level elevation
  - Have wells PW1, PW3, PW5, and PW6 been tested concurrently to assess the shallow bedrock aquifer (Guelph) sustainability?

Surface water:

- Regarding Dec 29, 2023 Technical Memorandum Re: Summary of WCA Testing Results (2020-2023):
    - Have any pumping test/well-field capacity studies been conducted with respect to PW5/PW6?
    - With regards to Table 3, could you please provide a map showing the removed piezometer/surface water stations and the existing piezometer/surface water station monitoring network around the wells (PW1, PW3, PW5/6, PW7/8).
    - Please indicate any nested piezometers where groundwater upwelling/downwelling was measured, if any.
    - Please indicate what is measured at each station (water levels, and any other information including temperature and water quality and include any periods where they are/were measured).
    - Please indicate any locations where surface water flow is monitored or has been monitored and the frequency of any such measurements and rating curves, if available.

Thanks,

Joan Del Villar Cuicas (she/her)
Regional Environmental Planner
Project Review Unit | Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
Joan.delvillarcuicas@ontario.ca | Phone: 365-889-1180

From: Ian Callum <ian.callum@sbaengineering.com>
Sent: Tuesday, September 3, 2024 1:34 PM
To: EA Notices to WCRegion (MECP) <eanotification.wcregion@ontario.ca>
Cc: Del Villar Cuicas, Joan (MECP) <Joan.DelVillarCuicas@ontario.ca>; Weber, Martha (MECP) <Martha.Weber@ontario.ca>; jmoss@shelburne.ca; Jennifer Willoughby <jwilloughby@shelburne.ca>; Carey Holmes <cholmes@shelburne.ca>; Stephen Burnett <stephen.burnett@sbaengineering.com>; Terrance Gole <terrance.gole@sbaengineering.com>; Sarah Lionsbridge <Sarah.Lionsbridge@sbaengineering.com>; Denyse Morrissey <dmorrissey@shelburne.ca>
Subject: Town of Shelburne - Draft Water Supply EA - for review

Good afternoon,

On behalf of the Town of Shelburne, please find attached the Increased Capacity of the Town of Shelburne's Water Supply Schedule 'B' Municipal Class Environmental Assessment. My understanding is that the Ministry will conduct a technical review of this report within 30 days of receipt of this report. After working with the Ministry to resolve any comments, our intent is to file a Notice of Completion for this project to initiate the 30-day Public, Agency, First Nations, and Métis review period. In consideration of the large file size, I've provided a separate link to the appendices:

https://www.dropbox.com/scl/fo/2k96ti1i2yf3nw7cb9yay/h?rlkey=6ytnfar5hq5gfpgmpzcxlbn83&st=gb5hiebp&dl=0

If you require any additional information or clarification during your review, please feel free to contact me.

Kind regards,

Ian

Ian Callum, M.Sc., PMP
Senior Environmental Project Manager

S. Burnett & Associates Limited
210 Broadway, Unit 203
Orangeville, ON L9W 5G4

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W: www.sbaengineering.com

TECHNICAL MEMORANDUM

Date: **Revised:**	December 29, 2023 December 10, 2024	**Project No:**	M16020
Project Name:	Town of Shelburne, Wellfield Capacity Assessment		
Re:	Summary of WCA Testing Results (2020 – 2023)		
To:	Denyse Morrissey, Chief Administrative Officer, Town of Shelburne Jim Moss, Director, Development and Operation, Town of Shelburne		
Email:	dmorrissey@shelburne.ca jmoss@shelburne.ca		
Company:	S. Burnett & Associates Limited Banks Groundwater Engineering Limited		

1. Introduction

The Town of Shelburne's current Permit to Take Water (PTTW No. P-300-1082818689) was issued December 10, 2020, by the Ontario Ministry of Environment, Conservation and Parks (MECP) for the municipal water supply and expires on August 31, 2030. Within the permit, Condition 4.2 states a well field capacity assessment report is to be completed in accordance with the approved scope of work dated May 16, 2016.

As summarized in the previous technical memorandum for this scope of work dated February 28, 2020, from Banks Groundwater Engineering Limited (BGE), the project team conducted a testing program in 2016 to 2017 following the approval of the program. Groundwater and surface water monitoring of the system was completed from 2016 to 2018. From the initial program, it was determined that capital upgrades to the Production Wells PW7 and PW8 infrastructure were required. The upgrades were to support a required increase in water supply to meet the Town's future demand and to determine the well field capacity. During the period from 2018 to 2020, additional rehabilitation and upgrades to PW1 and PW3 well sites were needed to determine capacity and condition of the system.

This technical memorandum presents the testing and monitoring work performed to complete the well field capacity assessment. It summarized the work to address issues related to the water supply system including 1) a required increase in water supply capacity, and 2) issues related to reduced yields in two (2) of the Town's municipal wells. From 2018 to 2023 capital upgrades were made to PW7 and PW8, and PW3 and PW1 well sites in order to address these two items related to water supply. The Project Team subsequently requested and were approved for extensions to Condition 4.2 and extended to December 31, 2023. This technical memorandum builds upon the results presented in the BGE technical

memorandum dated February 28, 2020, and summarizes the results for the following well field-testing programs for the Town's supply system:

- 2020: Groundwater Under the Direct Influence of Surface Water (GUDI) Study for Shelburne Production Well PW3 (SBA, 2021)
- 2018 – 2021: Pumping Test and Monitoring Results of Production Wells PW7 and PW8 (SBA, 2023)
- 2023: Pumping Test Results of Production Well PW1 (SBA, 2023)

2. Current Municipal Groundwater Supply System

As stated in the BGE Technical Memorandum, the Town of Shelburne production well system comprises of two well fields. Group 1 has been identified as municipal wells within the Town's boundary (PW1, PW3 and PW5/6), while Group 2 comprises PW7 and PW8, located approximately 5 km west of the Town of Shelburne. The permitted maximum taking and aquifer zone for each municipal well is listed in **Table 1**.

Table 1: Maximum Permitted Rates for Municipal Production Wells

Production Well ID	Maximum Permitted Rate (L/min)	Well Depth (m)	Groundwater classification of well	Bedrock Aquifer / Formation
PW1	1,140	22.9	GUDI	Guelph
PW3	909	18.6	GUDI	Guelph
PW5 PW6	1,364* 1,364*	23.5 24.4	Groundwater	Guelph
PW7 PW8	1,135** 1,135**	86.6 86.6	Groundwater	Lower Goat Island & Gasport

* Maximum permitted rate from either PW5 or PW6 or total combined.

** Maximum permitted rate from either PW7 or PW8 or total combined.

The locations of each municipal production well are shown on **Figure 1** in **Appendix A**.

PW1 and PW3 underwent rehabilitation programs in 2020 and 2021 to bring the production well's capacity closer to the permitted rates. The PW3 treatment system also required significant upgrades to meet the treatment requirements to bring well water to the regulation limits for arsenic. Both wells have been offline from supply due to these programs as summarized in the following section.

3. Well Field Testing 2020 to 2023

3.1 Groundwater and Surface Water Monitoring Network

Monitoring stations presented in **Table 2** and **Table 3** of BGE.57.161 were utilized for the additional testing and monitoring programs from 2020 to 2023. Some piezometer stations were removed from the study due to no access to the site or had been damaged and reinstalled at the same location. New stations were added to the network and characteristics are described in **Table 2** and **Table 3** below.

Table 2: Municipal Monitoring Well Characteristics

Monitoring Well ID	UTM Coordinates (Zone 17 N)	Grade Elevation (m)	Screened Interval (m)	Hydrostratigraphic Unit	Associated with Production Well	Approx. Distance to Production Well (m)
MW1-06	564353 E 4880884 N	484.857	3.6 - 6.0	Overburden	PW1	50
MW1-12	564355 E 4880886 N	484.739	10.2 - 11.6	Bedrock (Guelph)	PW1	50
MW2-04	562858 E 4881682 N	488.763	2.0 - 4.3	Overburden	PW3	190
MW2-10	562860 E 4881683 N	488.809	7.2 - 9.5	Overburden	PW3	190
MW2-16	562862 E 4881684 N	488.854	14.8 - 16.5	Bedrock (Guelph)	PW3	190
MW3-16	562364 E 4880691 N	492.621	13.8 - 15.9	Overburden	PW5 / PW6	50
MW3-20	562364 E 4880696 N	492.534	18.0 - 19.8	Bedrock (Guelph)	PW5 / PW6	50
MW4-6	562401 E 4880151 N	493.215	2.8 - 5.8	Overburden	PW5 / PW6	500
MW4-12	562401 E 4880153 N	492.908	9.5 - 11.5	Overburden	PW5 / PW6	500
MW4-17	562400 E 4880158 N	492.989	15.2 - 17.4	Bedrock (Guelph)	PW5 / PW6	500
MW5-10	562394 E 4880636 N	493.863	7.5 - 9.5	Overburden	PW5 / PW6	10
MW6-9	559273 E 4880802 N	497.017	5.8 - 8.8	Overburden	PW7 / PW8	7
MW7-30	559264 E 4880794 N	496.587	20 - 30	Bedrock (Guelph) Aquifer	PW7 / PW8	10

Monitoring Well ID	UTM Coordinates (Zone 17 N)	Grade Elevation (m)	Screened Interval (m)	Hydrostratigraphic Unit	Associated with Production Well	Approx. Distance to Production Well (m)
MW7-45	559264 E 4880794 N	496.587	39 – 45	Bedrock (Eramosa-Upper Goat Island Aquitard)	PW7 / PW8	10
MW7-75	559264 E 4880794 N	496.587	55 – 75	Bedrock (Lower Goat Island /Gasport Production Aquifer)	PW7 / PW8	10
***MW8-S**	558601 E 4880548 N	501.251	30.53 – 33.58	Bedrock (Guelph) Aquifer	PW7 / PW8	720
***MW8-I**	558601 E 4880548 N	501.251	48.72 - 51.77	Bedrock (Eramosa-Upper Goat Island Aquitard)	PW7 / PW8	720
***MW8-D**	558601 E 4880548 N	501.251	62.51 - 65.56	Bedrock (Lower Goat Island/Gasport Bedrock (Guelph) Production Aquifer)	PW7 / PW8	720
***MW9**	559050 E 4881097 N	497.773	7.9 – 41.6	Intermediate Bedrock	PW7 / PW8	370
***MW10-S**	559412 E 4881546 N	498.075	21.29 - 24.33	Bedrock (Guelph) Aquifer	PW7 / PW8	765
***MW10-I**	559412 E 4881546 N	498.075	51.79 - 54.84	Bedrock (Eramosa-Upper Goat Island Aquitard)	PW7 / PW8	765
***MW10-D**	559412 E 4881546 N	498.075	68.58 - 71.63	Bedrock (Lower Goat Island/Gasport Production Aquifer)	PW7 / PW8	765

* New monitoring wells incorporated into the monitoring network for 2018 to 2023 planned activities.

Table 3: Shallow Groundwater and Piezometers and Surface Water Stations

Piezometer	UTM Coordinates (Zone 17 N)	Grade Elevation (m)	Screened or Open Interval (m)	Location Type	Associated with Production Well	Approx. Distance to Production Well (m)
-MP1	559180 E 4880681 N	496.504	1.90 – 2.05	Wetland	PW7 / PW8	160
***MP1-2**	559275 E 4880865 N	496.397	1.90 – 2.05	Adjacent to Municipal Drain	PW7 / PW8	70
-MP2	560003 E 4881153 N	494.04	1.90 – 2.05	Wetland	PW7 / PW8	830
-MP3	559532 E 4881040 N	494.447	1.90 – 2.05	Adjacent to Municipal Drain	PW7 / PW8	200
-MP4	559703 E 4881253 N	493.911	1.90 – 2.05	Adjacent to Municipal Drain	PW7 / PW8	610
MP5	562401 E 4880526 N	491.772	1.90 – 2.05	Adjacent to Municipal Drain	PW5 / PW6	125
MP6	562891 E 4881503 N	484.925	1.90 – 2.05	Wetland	PW3	245
MP7	563161 E 4881849 N	482.032	1.90 – 2.05	Adjacent to Creek	PW3	220
-MP8	563865 E 4880273 N	487.083	1.90 – 2.05	Adjacent to Municipal Drain	PW1	820
MP9	564460 E 4881045 N	482.29	1.90 – 2.05	Adjacent to Municipal Drain	PW1	160
MP10	560475 E 4880021 N	490.424	1.90 – 2.05	Adjacent to Municipal Drain	PW7 / PW8	1470
Surface Water Monitor	**UTM Coordinates (Zone 17 N)**	**Grade Elevation (m)**	**Screened or Open Interval (m)**	**Location Type**	**Associated with Production Well**	**Approx. Distance to Production Well (m)**
SW5	562400 E 4880526 N	491.689	1.90 – 2.05	Municipal Drain	PW5 / PW6	125

SW7	563160 E 4881850 N	481.923	1.90 – 2.05	Creek	PW3	220
-SW8	563865 E 4880272 N	486.88	1.90 – 2.05	Municipal Drain	PW1	820
-SW9	564370 E 4880887 N	482.231	1.90 – 2.05	Municipal Drain	PW1	160
***SW9-2**	564370 E 4880887 N	482.231	1.90 – 2.05	Municipal Drain	PW1	160
SW10	560478 E 4880019 N	489.844	1.90 – 2.05	Municipal Drain	PW7 / PW8	1470

* New monitoring wells incorporated into the monitoring network for 2018 to 2023 planned activities.
- Stations removed from the study in 2018 due to no site access or condition.

Figure 2 and 3 shows the location of all monitoring stations and indicates if it was removed.

3.2 PW3 GUDI

The rehabilitation of PW3 was required after tests in late 2016 and 2017 indicated and later confirmed that PW3 had difficultly pumping at it's permitted rate. As part of the rehabilitation sediment buildup was removed from the open bedrock of the production zone and a stainless-steel liner was installed in accordance with regulations. While the inspection and rehabilitation work for the well was being completed, PW3 was flagged as potentially Groundwater Under the Direct Influence of Surface Water (GUDI) production well, particularly for a discovered connection to Walter's Creek. This led to additional sampling and testing to confirm the GUDI designation and required treatment.

A 72-hour pumping test was completed in September of 2020 where the flow was maintained at 13 L/s and all physical water quality parameters were within acceptable ranges. The results from this test also suggested water quality differences between Walter's Creek and PW3, which were furthered by separate tests of hardness, organics, and other surface water indicators. Thus, indicating that the well is drawing from a groundwater source with adequate in-situ filtration (Category 2).

The testing report has been included in **Appendix B**.

3.3 PW 7/8

An Environmental Assessment was initiated in 2007 and determined that projected water demand did not support both PW7 and PW8 being operated concurrently, thus the past assessment only investigated the impacts of either well being pumped at 18.9 L/s. In order to meet the long-term water demands of Shelburne, a Municipal Class Environmental Assessment (CEA) for Production Wells 7 and 8 was required.

The hydrogeological assessment was completed to determine whether the local aquifer that supplies water to PW7 and PW8 can support the combined rate of 37.8 L/s, a doubling of the current permitted rate of 18.9 L/s. This assessment included a study to determine any effect of increased pumping on local water resources.

In 2018 a 72-hour pumping test was conducted to determine if both wells could sustainably pump a combined rate of 37.8 L/s to meet projected future water demand. During this test, the pumping rate had to be reduced to 15.5 L/s as the existing pumping equipment could not maintain the rate, and thus a combined rate of 31.0 L/s was sustained for the remainder of the test. This led to the need for the pumps and equipment to be upgraded in 2021, and a 7-day pumping test subsequently completed in May 2021 at a combined rate of 37.8 L/s to confirm aquifer capacity.

The testing report has been included in **Appendix C**.

3.4 PW1

Rehabilitation of the well occurred from 2020 to 2021 and included video inspection of the well along with removal of sediment buildup from the open bedrock of the production zone. After rehabilitation of the well, issues with entrained air and high amount of sediment were discovered prior to capacity testing commencement. These issues were required to be addressed prior to the well-being returned to distribution, and capital upgrades were made to the pumphouse from 2021 to 2023, including an air-release valve and upgraded turbidity monitoring equipment. Sediment issues from the aged contact tanks still presented an issue through 2023, and the project team opted to install an isolation valve at the pumphouse to keep the system isolated from the Town's water distribution and to commence capacity testing.

Capacity testing was initiated on July 10, 2023, with a 72-hour pumping test. Groundwater, piezometer and surface water stations in the Group 1 cluster were monitored through the period for effects of pumping the well. The project team was able to confirm that the well could maintain 14.1 L/s for a period of 72-hours. Water quality samples were obtained and analyzed through the test period for potability and arsenic levels.

The testing report has been included in **Appendix D**.

4. Groundwater and Surface Water Monitoring Results

4.1 2020 PW3 GUDI

A report for Production Well PW3 was prepared by S. Burnett & Associates Limited and summarized the results of well capacity testing and GUDI determination. The report includes graphs of the municipal wells, monitoring wells, piezometers and surface water stations associated with PW3 outlined in **Table 2** and **3** above.

The testing report and graphs are presented in **Appendix B**.

4.2 2021 PW 7/8

A report for Production Wells PW7 and PW8 was prepared by S. Burnett & Associates Limited and Banks Groundwater Engineering Limited that summarized the results of well capacity testing and monitoring of the local water resources. The report includes graphs of the municipal wells, monitoring wells, piezometers and surface water stations associated with PW7 and PW8 (Group 2) well field as outlined in **Table 2** and **3** above.

The testing report and graphs are presented in **Appendix C**.

4.3 2023 PW1

A report for Production Well PW1 was prepared by S. Burnett & Associates Limited and summarized the results of well rehabilitation and well capacity testing. The report includes graphs of the municipal wells, monitoring wells, and piezometers associated with PW1 outlined in **Table 2** and **3** above.

The testing report and graphs are presented in **Appendix D**.

5. Status of Water Supply and Related Activities

The current permitted rates for each municipal production well and summary of the current well field capacities is presented in **Table 4** below.

Table 4: Summary of Municipal Production Well Permitted Rates and Well Field Capacities.

Well ID	Permitted Rate (L/min)	Well Capacity (L/min)
PW1	1,140	846***
PW3	909	780
PW5	1,364*	1,212
PW6	1,364*	240
PW7	1,135**	1,135
PW8	1,135**	1,135

* Maximum permitted rate from either PW5 or PW6 or total combined.

** Maximum permitted rate from either PW7 or PW8 or total combined.

*** Rated and tested for a 72-hour period.

As of this technical memorandum, the following activities related to the Town of Shelburne water supply system are planned to be completed:

1. The wellhouse and pumping infrastructure for PW3 is currently undergoing upgrades to treat the naturally occurring arsenic in the water supply. Construction is expected to be completed in early 2024.
2. The testing at PW7 and PW8 determined that the safe perennial yield for the well is confirmed to be 37.8 L/s when both pumping wells are pumped concurrently. It is recommended that a back-up to PW7 and PW8 be established at the well site “PW9”, as well as determining a future water supply “PW10” to meet future projected demand.
3. Outstanding testing issues with entrained air have been resolved at the PW1 pumphouse, however capital upgrades related to the sediment and contact tanks need to be completed before the water supply can return to distribution.
4. Completion and acceptance of the municipal water supply environmental assessment and application to increase permitted rates for production wells PW7 and PW8.

6. Conclusion

The well field capacity assessment for the Town of Shelburne's water supply has been completed in accordance with Condition 4.2 of the Permit to Take Water (PTTW No. P-300-1082818689).

Yours Truly,

FOR MECP REVIEW PURPOSES ONLY

Sarah Lionsbridge, P. Geo.
Project Geoscientist
S. Burnett & Associates Limited

William D. Banks, P. Eng.
Principal Hydrogeologist
Banks Groundwater Engineering Limited

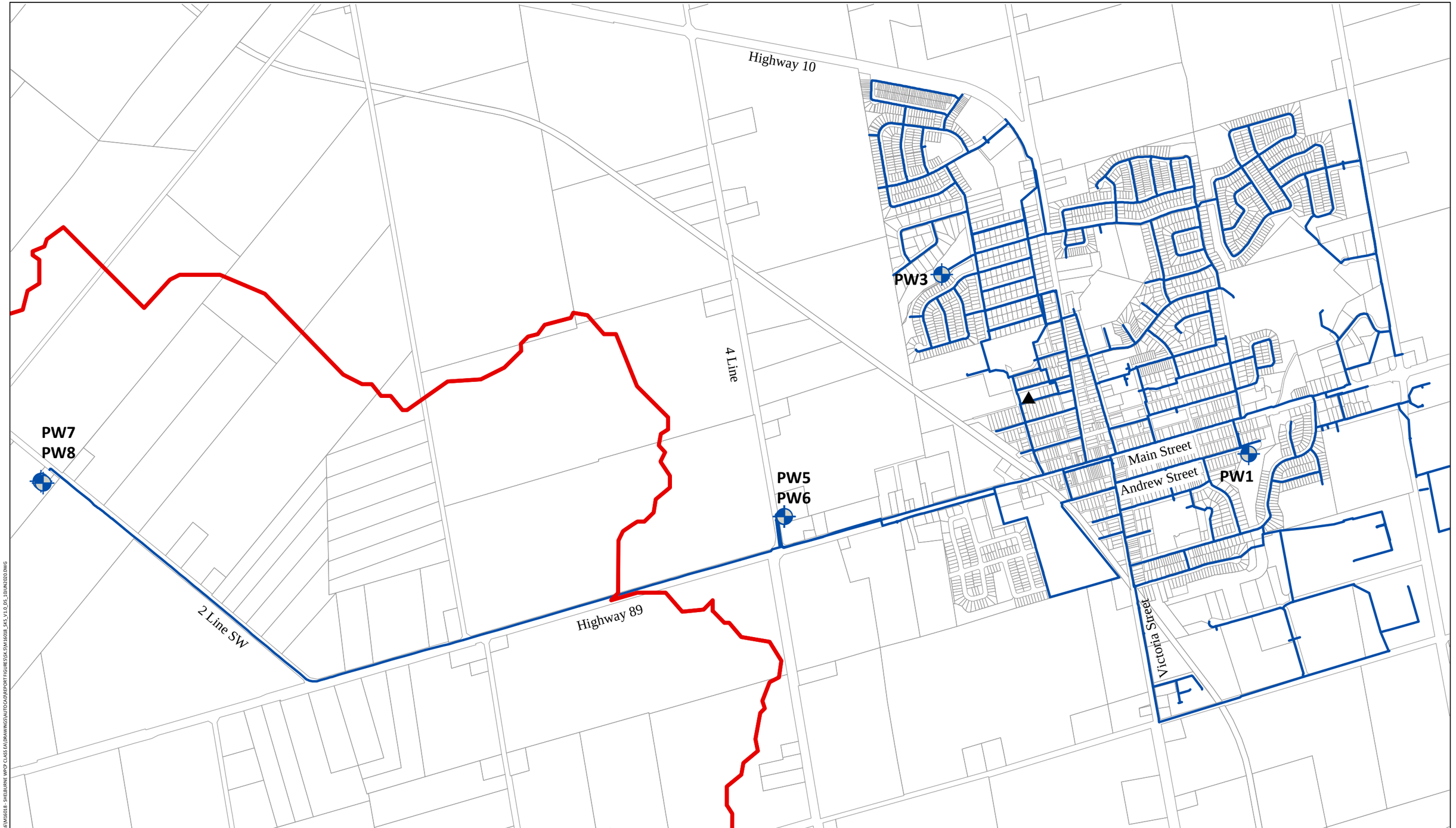
cc: Neil Taylor, M.Sc., MECP
Don Irvine, OCWA
Stephen Burnett, P. Eng., SBA

M16020_Shelburne WCA Memo_FINAL_10Dec24

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix A

Figures



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N

Legend

- Conservation_Authority_Administrative_Area
- Watermain
- Dufferin County Parcels
- Municipal Well
- Water Tower

No.	DATE	ISSUE/REVISION
1.	25-JUN-20	ISSUED FOR REVIEW
2.	23-AUG-23	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: WELL FIELD CAPACITY ASSESSMENT

DRAWING TITLE: TOWN OF SHELBURNE
WATER SUPPLY WELL LOCATIONS

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING AND ENVIRONMENTAL SERVICES
210 BROADWAY, UNIT 203
ORANGEVILLE, ONTARIO L9W 5G4
TELEPHONE: 519-941-2949 FAX: 519-941-2036

DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
S.L	S.L.	S.L	FIGURE 1

SCALE	PROJECT No.
1:15,000	M16020

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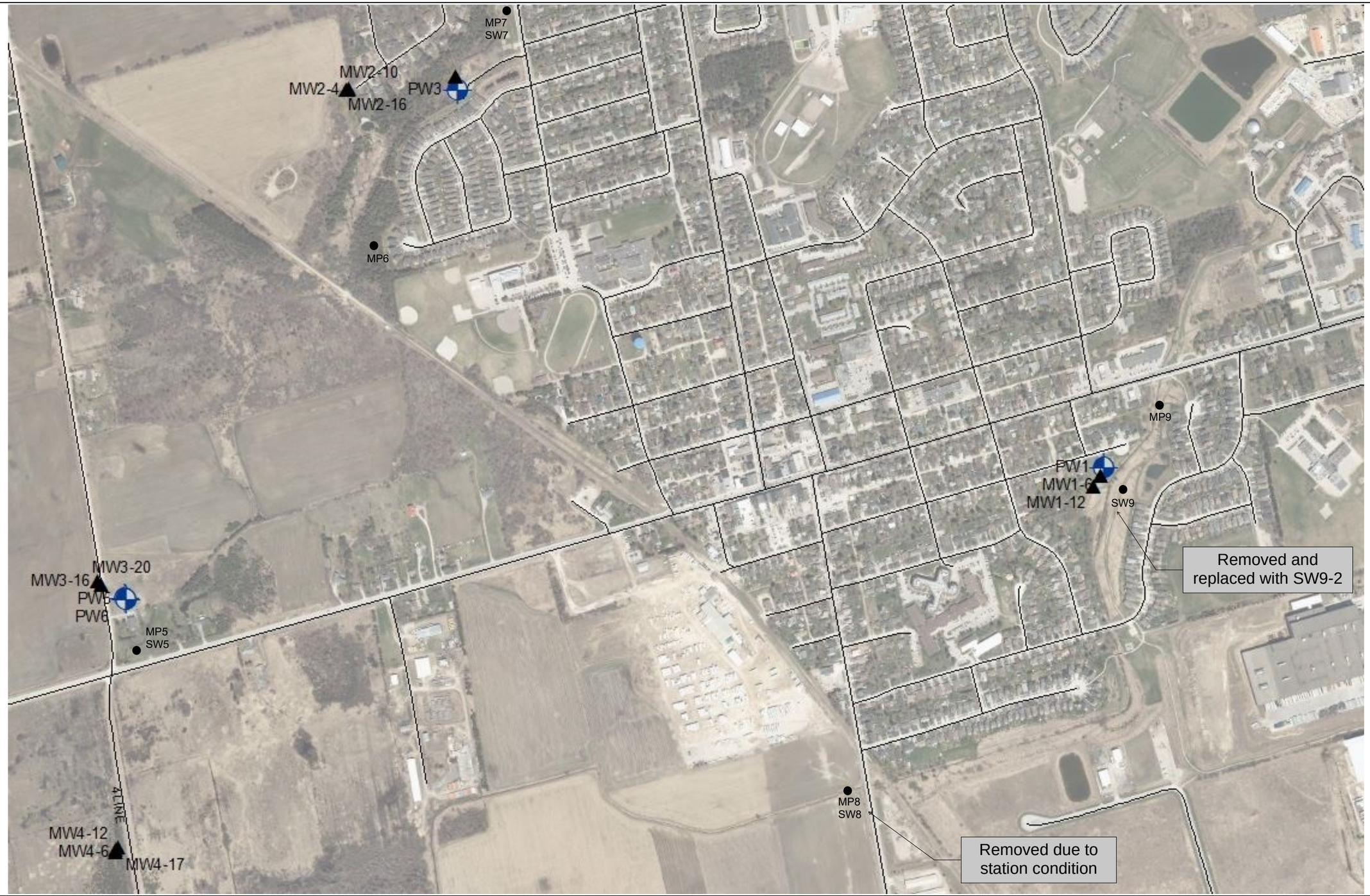

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N

Legend

- Municipal Well
- Monitoring Well
- Dufferin County Parcels
- Piezometer / Surface Water Station

No.	DATE	ISSUE/REVISION
1.	25-JUN-20	ISSUED FOR REVIEW
2.	23-AUG-23	ISSUED FOR REPORT
3.	10-DEC-24	ISSUED FOR MECP REVIEW

CLIENT: TOWN OF SHELBURNE

PROJECT: WELL FIELD CAPACITY ASSESSMENT

DRAWING TITLE: PIEZOMETER AND SURFACE WATER STATION LOCATION - GROUP 1

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING AND ENVIRONMENTAL SERVICES
210 BROADWAY, UNIT 203
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TELEPHONE: 519-941-2949 FAX: 519-941-2036

DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
S.L	S.L.	S.L	FIGURE 2

SCALE: 1:15,000 | PROJECT No.: M16020

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N

Legend

- Municipal Well
- Monitoring Well
- Dufferin County Parcels
- Piezometer / Surface Water Station

No.	DATE	ISSUE/REVISION
1.	25-JUN-20	ISSUED FOR REVIEW
2.	23-AUG-23	ISSUED FOR REPORT
3.	10-DEC-24	ISSUED FOR MECP REVIEW

CLIENT: TOWN OF SHELBURNE

PROJECT: WELL FIELD CAPACITY ASSESSMENT

DRAWING TITLE: PIEZOMETER AND SURFACE WATER STATION LOCATION - GROUP 2

S. BURNETT & ASSOCIATES LIMITED
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DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
S.L	S.L.	S.L	FIGURE 3

SCALE: 1:15,000 | PROJECT No.: M16020

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December 10, 2024

Ontario Ministry of the Environment, Conservation and Parks
5th Floor, 777 Bay Street
Toronto, Ontario M7A 2J3

Attn: Joan Del Villar Cuicas, Regional Environmental Planner

Re: Town of Shelburne, Water Supply EA
Groundwater and Surface Water Reviews
Comment / Response Letter
SBA File No: M17025 & M16020

Dear Joan,

This letter is in response to the comments provided from MECP, dated October 2, 2024, concerning the Class EA and wellfield capacity assessments documents on the Town of Shelburne Water Supply EA project. All required details and supporting documents have been included in this submission for review purposes. For ease of review, the comments from MECP have been included in **bold**, followed by our response to each comment.

1. Groundwater

1.1 Comment and Response for *Pumping Test and Monitoring Results of Production Wells PW7 and PW8 Report, dated Nov. 2023*

Figure 3 does not show site topography. Please provide an updated figure

Figure 3 has been updated to reflect site topography at the Well 7/8 location.

Figures 5 and 6 do not have a legend. Please update these figures

Figure 5 has been updated to include a legend.

Figure 6 has been updated to include a legend.

Appendix C1, please provide names of wells with tag numbers A076887 and A081584. Drawing 1 shows depths not elevations. Please update this figure to show elevations.

Appendix C1 has been updated to include well ID, tag numbers and figures to show elevations for production wells.

Appendix C2. Please add wells and monitors name to MECP well records.

Appendix C2 has been updated to include well ID and monitor names.

Removed record 1700070, as access to monitor was rescinded (116113 2 Line SW).

Appendix H1, table H-7. What the units for arsenic concentration. Was water quality monitored in other deep bedrock aquifer monitors and private supply wells?

The correct unit for arsenic concentration results is microgram/L or µg/L.

Water quality in other monitoring well locations was not obtained during the 2021 pumping test. In previous studies, (Shelburne Well #7 CEAA 5-Year Monitoring Program) completed from 2014-2021, arsenic concentrations were monitored in surrounding private wells and surface water features while PW7 and PW8 were in operation. No appreciable increase in arsenic concentration was observed in private wells or surface water features over the 5-year period of the CEAA monitoring program when compared to the initial background phase.

This report has been included as part of this comment response submission. The monitoring was required as part of the initial Federal CEAA and Provincial EA process for the construction of PW7 and PW8. Private wells were sampled when residents authorized access and in later stages some residents did not authorize continued sampling. The final reporting was submitted to Infrastructure Canada on December 1, 2022.

Please provide location and construction details for all wells and monitors listed in tables 3 and 4. This information should include UTM coordinates, ground elevation, total depth, screened or open interval hydrostratigraphic unit and static water level elevation.

Tables 3 and 4 have been updated to include all requested information.

Appendix G, in hydrographs for PW7, PW8 and other monitors there appears to be a reduction of pumping that caused water levels to rise then decline before end of the pumping test. Could you please provide explanation for this?

Section 5.1 of the report notes, “Pumping continued at this constant rate for a period of seven (7) days (10,080 minutes) and ended on May 18, 2021, at 12:01 p.m. At approximately 5:00 a.m. on May 18 (9,660 minutes into test), both wells stopped pumping temporarily due to a communication alarm on the SCADA system. Pumping of the wells was restarted at approximately 7:30 a.m. the same day; however, maximum drawdown for the duration of the test was observed prior to the shutdown.”

What does the red, almost horizontal line in Graph 7 represent?

The red line on Graph 7 of station MP1-2 was included in error while exporting final graph. However, the line represents a visually interpreted static water level trendline of the water levels recorded on datalogger instrumentation prior to test start. The trendline aids in determining a reasonable

interpreted static water level at this station specifically, given the wells operates in a cyclical fashion and there may be a gradual increase and decrease in water level due to seasonal trends.

The graph has been updated to remove the trendline.

How water levels in SW10 and other surface water monitoring locations were measured?

Section 4.2.1 notes "All of the monitoring locations were equipped with Solinst dataloggers that recorded water level and temperature." The surface water stations have a datalogger suspended above channel bottom in a protective casing with slotted end. The datalogger measures the change in water level of the of the surface water feature and is calibrated using barometric pressure, manual water level measurements in the casing, and depth to creek bottom.

This method is considered sufficient for monitoring water level changes in the stream feature that would signify an observed change from aquifer pumping.

1.2 Comment and Response for *Summary of WCA Testing Results (2020 – 2023) Technical Memo., dated Dec 29. 2023*

Please provide location and construction details for all wells and monitors listed in tables 2 and 3. This information should include UTM coordinates, ground elevation, total depth, screened or open interval, hydrostratigraphic unit and static water level elevation

Tables 2 and 3 have been updated to include all requested information.

Have wells PW1, PW3, PW5, and PW6 been tested concurrently to assess the shallow bedrock aquifer (Guelph) sustainability?

Municipal wells PW1, PW3, PW5 and PW6 were concurrently tested in 2016 and 2017 and subsequently individually tested after necessary remediation and infrastructure upgrades were completed for PW3 in 2020 and PW1 in 2023. In all test programs, the wells were monitored for mutual interference and based on the conditions at the time of test, the data showed that pumping of each well did not show mutual interference between municipal wells in Shelburne. In the 2016/17 test program (BGE Technical Memorandum, February 28, 2020) pumping of PW 5/6, PW1 and PW3 did not show mutual interference when pumped together. The pumping of PW3 at 13 L/s (below the current permitted rated) in 2020 did not show an effect on Well 5/6 normal operation and in 2023 the pumping of PW1 at 14 L/s (below the current permitted rated) did not show mutual interference on Well 5/6 normal operation. In the later studies, PW1 and PW3 were determined to be pumping at their maximum capacities post-well rehabilitation.

2. Surface Water

2.1 Comment and Response for *Summary of WCA Testing Results (2020 – 2023) Technical Memo., dated Dec 29. 2023*

Have any pumping test/well-field capacity studies been conducted with respect to PW5/PW6?

In 2016/2017, PW5/PW6 were tested and results reported in the Technical Memorandum dated February 28, 2020, Well Field Capacity Assessment Status Report.

With regards to Table 3, could you please provide a map showing the removed piezometer/surface water stations and the existing piezometer/surface water station monitoring network around the wells (PW1, PW3, PW5/6, PW7/8).

Figure 2 and 3 have been included to show existing and removed stations.

Please indicate any nested piezometers where groundwater upwelling/downwelling was measured, if any.

The study did not include constructed nested piezometers, only individual piezometers driven in as far as could be manually installed and through to the approximate depth below organic matter of the wetland or streambed.

Periods of upwelling in the piezometer stations was observed in stations excepting MP1 and MP1-2. This is likely due to the these piezometer stations being installed in seasonally dry channels and wetland locations. The fluctuation in water level above grade would be expected in these locations due to seasonal fluctuations in the Spring and Fall periods or when precipitation amounts increase bringing shallow water table levels higher in the channel. MP1 and MP1-2 are located near an agricultural field that may have differing drainage patterns.

Please indicate what is measured at each station (water levels, and any other information including temperature and water quality and include any periods where they are/were measured).

For purposes of the wellfield capacity groundwater study, surface water stations were constructed in 2016 in various stream features in the study area (Figure 2 and 3). All of the monitoring locations were equipped with Solinst dataloggers that recorded water level and temperature. The surface water stations have a datalogger suspended above channel bottom in a protective casing with slotted end submerged in water. The datalogger measures the change in water level of the of the surface water feature and is calibrated using barometric pressure, manual water level measurements in the casing, and depth to creek bottom. Temperature is also recorded by the dataloggers.

The dataloggers provided a continuous profile of changes in water level and temperature with frequency of measurements ranging from 1 minute (active test periods) to 1 hour measurements (ambient monitoring periods). Manual water levels were taken daily during test periods and quarterly or bi-annually during ambient periods.

Please indicate any locations where surface water flow is monitored or has been monitored and the frequency of any such measurements and rating curves, if available.

For purposes of the wellfield capacity groundwater study surface water stations were constructed in 2016 in various stream features in the study area (Figure 2 and 3). All of the monitoring locations were equipped with Solinst dataloggers that recorded water level and temperature." The surface water stations have a datalogger suspended above channel bottom in a protective casing with slotted end submerged in water. The datalogger measures the change in water level of the of the surface water feature and is calibrated using barometric pressure, manual water level measurements in the casing, and depth to creek bottom. Temperature is also recorded by the dataloggers.

The dataloggers provided a continuous profile of changes in water level and temperature with frequency of measurements ranging from 1 minute (active test periods) to 1 hour measurements (ambient monitoring periods). Manual water levels were taken daily during test periods and quarterly or bi-annually during ambient periods.

When stations were constructed in 2016, stream profiles were measured but flow not actively correlated during monitoring. No water samples were reported on for the surface water features during the WCA.

This is method is considered to be sufficient for monitoring water level changes in the stream feature that would signify an observed change from aquifer pumping and influence the capacity of the wellfield.

Thank you for reviewing the document and for your comments. All updates will be provided in the revised report documents for MECP review purposes. Please do not hesitate to contact us with any further questions or concerns.

Yours truly,

Sarah Lionsbridge, P. Geo.
Hydrogeologist
S. Burnett & Associates Limited

Incl. Shelburne Well #7 CEAA 5-Year Monitoring Program, SBA, 2022
Well Field Capacity Assessment Status Report, BGE, 2020

cc: Jim Moss, Director, Development and Operations, Town of Shelburne
William D. Banks, P.Eng. Principal Hydrogeologist, Banks Groundwater Engineering Limited
Ian Callum, Project Manager, S. Burnett & Associates Limited
Stephen Burnett, P. Eng. Principal, S. Burnett & Associates Limited

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Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

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135 St. Clair Avenue W
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Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
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Tél. : 416 314-8001
Téléc. : 416 314-8452

Via E-mail Only

February 28, 2025

Ian Callum
Senior Environmental Project Manager
S. Burnett & Associates Limited
ian.callum@sbaengineering.com

Re: INCREASED CAPACITY OF THE TOWN OF SHELBURNE'S WATER SUPPLY
TOWN OF SHELBURNE
Municipal Class Environmental Assessment – Schedule B
Project Review Unit Comments – Draft Project File Report

Dear Project Team,

Thank you for providing the ministry with an opportunity to comment on the draft Project File Report (Report) for the above noted Class Environmental Assessment (EA) project. Our understanding is that in order to update the current water supply in the town of Shelburne to meet anticipated population demands in the next 20 years, the City of Shelburne (the proponent) has determined that the preferred alternative is Alternative Solution 3 – Pumping PW7/PW8 Concurrently in combination with alternative 4 - Increasing the pumping rate of PW5/PW6 by adding arsenic treatment. The Ministry of the Environment, Conservation and Parks (ministry) provides the following comments for your consideration.

General:

1) References to consultation with ministry staff are made in section 7 Review of draft report, "A draft version of this Class EA was provided to Western-Central branch of the MECP for review on [DATE]. A summary of the comments received from the MECP on June 15, 2023, and how they were addressed in the Final Report, is provided in Appendix A." Limited

information was found in Appendix A except an excerpt which was contained in an email sent May 31, 2022 from GRCA. " Please review this section and revise accordingly.

2) Section 2.5 of the report indicates that a list of stakeholders was developed for the project and is referenced in Appendix A. However, the list is currently omitted from Appendix A.

3) Section 4.5 of the Report, requires a typing error to be fixed in the sentence, *"pumping PW7 and **PW9** concurrently"* which should be *"pumping PW7 and **PW8** concurrently"*

4) Mitigation sections should be reviewed as there seems to be some word repetition.

5) Section 7 of the EA refers to submission of a draft EA sent to MECP with comments provided by the ministry that were incorporated into the final report. Confirmation regarding the date of June 15, 2023 weather should be updated to align with the comments provided herein. The ministry's source protection branch seems to have only commented previously on the Shelburne WHPA Delineation report.

Evaluation of Alternatives:

6) One of the key principles of successful environmental assessment planning is the systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects. Section A.2.3 of the Municipal Class EA document, available online at www.municipalclassea.ca/manual/page12.html, further describes the evaluation step of Phase 2 of the Class EA planning process. In order to best meet the requirements of the Class EA process, the evaluation of alternative solutions provided in Section 4 of the Report should demonstrate how the magnitude of net positive and negative effects on all natural, social and economic components of the environment was considered during the evaluation of alternatives.

7) Table E1: Summary of Assessment of Alternative Solutions on pg. ii of vii has confusing scoring for the preferred alternative solutions, for clarity include a section explaining the scoring criteria and how the numbers were generated.

8) Section's 4.5 and pg. iii of vii of the report, discusses that two solutions would be preferred. For clarity the ministry recommends including a new alternative solution that combines the alternatives 3: Pumping wells PW7 and PW8 concurrently and 4: Increasing the pumping rate of PW5/Pw6 by adding arsenic treatment. This recommendation is in reference to section A.2.3 Phase 2: Alternative Solutions Step 6 of the Municipal Class EA, 2024 document, "Selection or confirmation of the preferred solution to the problem or opportunity taking into consideration input and comment received from the review agencies, Indigenous Communities and the public and after evaluation of the net environmental effects of the various alternatives. Depending on the situation, the preferred solution may involve a combination of alternative solutions rather than a single outcome."

Indigenous Engagement:

9) The draft Project File Report does not include records of Indigenous consultations (emails, meeting minutes, phone call records). All correspondence and follow-up efforts by the

proponent should be documented in the consultation record accompanying the Class EA documentation. Please include these records in an Appendix of the Report. Additionally, the Report should specify which communities were consulted during the Class EA process. The ministry recommends including a summary of questions, comments, and concerns raised by communities, along with how they have been or will be addressed. If no feedback was received, this should also be documented in the Report

Public Consultation:

10) Section 2.5 and 4.3.1 of the Report discusses the existence of a public consultation process. Ensure that the records of public interaction are included in the consultation appendix. If no public feedback was received, then it should be documented in the Report.

Agency Consultation:

11) All correspondence with ministry staff should be documented in the PFR as per the last sentence of Section A.3.6 of the Municipal Class EA, 2024 document, "Review agency responses are to be documented in the Project File or the ESR." The ministry requests that the proponent include in the PFR documentation of all correspondence with ministry staff, including all email correspondence related to the development of effluent criteria, either in email format or as a summary in an Overview of Agency Comments table designated for stakeholder and agency consultation material.

Species at Risk:

12) Section *3.2.2.5 Species at Risk* of the Report indicates that there are several species at risk that have the potential to be present within the study area. It is the responsibility of the proponent to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the Endangered Species Act (ESA). If the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.

Climate Change:

13) Climate change considerations have not been documented in the PFR. The document "Considering Climate Change in the Environmental Assessment Process" (Guide) (www.ontario.ca/page/considering-climate-change-environmental-assessment-process) is now a part of the EA program's Guides and Codes of Practice. The Guide sets out the ministry's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. The proponent should review this Guide in detail. The ministry expects proponents of Class EA projects to:

    a. Include a discrete section in the Report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

Surface Water:

Please note this surface water review does not include a review of source water protection or intra-basin transfer considerations

14) EA Comments:

- Suggest updating text in the report in section 1.1 to note that "The wellfield capacity assessment for the Town of Shelburne was submitted to the ministry in December 2023.
- Please provide an update on activities associated with PW1\PW3. Have the upgrades been conducted to date and have PW1/PW3 been returned to service (section 1.1)?
- Option 4. Arsenic Treatment at PW5/6. Presently the pumping rates at PW5/6 are restricted to meet ODWQS. If treatment is implemented at PW5/6, pumping rates have the potential to increase. Is there the potential to cause an impact to nearby surface water features as a result of this increased pumping? Was this considered in the Critical Importance Rankings for the Environmental Criteria Scoring for short- and long-term impacts to water quality and aquatic life (row 1 and 2 of Table 8)? Consider updating the Table 8 entries for Option 4 (row 1 and 2) with reference to any testing or monitoring data, similar to the entries for Option 3, if available.
- Table 9, row 7 entry for Option 4, "Is simple in terms of constructability", is incomplete.
- Regarding Table 9, row 8 entry for Option 5, "Is straight forward from a permitting and approval standpoint, including delayed construction timeline", please note that pumping tests may be eligible for a water taking Environmental Activity and Sector Registry (EASR). Please refer Part II.2 and O.Reg. 63/16 under the Environmental Protection Act and associated guidance documents. If ineligible, a Permit to Take Water will be required, as indicated.
- Section 4.6 Monitoring, notes that a surface water monitoring station will remain in place for intermittent monitoring as required by the permit to take water. Suggest including the existing surface water monitoring network and frequency for reference.

15) Future PTTW Comments

Please note that surface water comments regarding the future Permit to Take Water (PTTW) amendment application are being provided at this stage to help ensure a complete package is submitted for review to aid in the approval process.

<u>Background:</u>

A Final Terms of Reference (TOR) for a Well Field Capacity Assessment (WCA) was submitted to the Ministry in 2016. The report outlined the WCA testing procedure as well as outlined surface water and groundwater monitoring to be conducted during the WCA testing. The

contents of the future WCA report were outlined with requirements to include future recommendations based on the results of the WCA for incorporation into a future PTTW instrument (on-going monitoring program, for example).

The WCA testing as proposed in the 2016 TOR has not been carried out as originally outlined to date due to some issues encountered at the wells. The early attempts in Oct 2016 and March 2017 indicated that rehabilitation and updates were required at PW3 and PW1. Individual well testing was subsequently conducted (PW1, July 2023 and PW3, Sept 2020) to assess the improvements. PW3 and PW1 were also identified as GUDI wells.

Additionally, the Town of Shelburne initiated an Environmental Assessment (EA) and found that the water supply from wells PW7 and PW8 needs to double to meet the Town's demand with a new backup well (PW9) required for redundancy. Pumping tests were carried out at PW7 and PW8 at the higher rates in August 2017 and May 2021. The EA also concluded that arsenic treatment should be added to PW5 and PW6 to reduce the requirement to blend with pumped water from PW7/8 to meet ODWQS, thereby increasing the volume of water pumped from PW5/6.

Given the recent upgrades and proposed increases to pumping from PW7/8, an amendment to the PTTW will be required. The PTTW will require an on-going monitoring program be incorporated into the conditions to ensure any impacts from the pumping are monitored and reported on. As outlined in the 2016 TOR, the future on-going monitoring program should be based on recommendations from the WCA as well as the recommendations based on the analysis and interpretation of data from the existing on-going monitoring program.

<u>Comments:</u>

Please see comments below on work conducted to date. Where possible, comments should be considered and addressed (where possible) in completion of future work.

- Regarding the Summary of Technical Memorandum Re: Summary of WCA Testing Results (2020-2023), updated in Dec 2024 for ministry review (SBA, 2023):
    a. This report is noted to build upon the results presented in the BGE 2020 technical memorandum, however, the referenced report notes that a complete analysis was not included (see comment 5 below).
    b. Further, some elements of the 2016 TOR were not addressed in the WCA and its appendices (SBA, 2023) and the WCA Status Report (BGE, 2020). Please find some pertinent sections relating to surface water listed below (N.B. this is not a complete list):
        i. Summaries and findings regarding fish and fish habitat (as per section 1.3.4 of the 2016 TOR) were not included,
        ii. Potential concerns/issues and data gaps in terms of area surface waters and shallow groundwater interactions were not identified, and future recommendations for ongoing surface water monitoring and shallow groundwater monitoring were not included.

iii. Flow monitoring was not carried out as proposed (section 1.5).

c. MP11, MP12 and SW12 were not shown in or listed in Table 3. These should be assessed and referred to in recommendations for future work (see comment 6 below).

- The Dec 10, 2024 response to surface water comments (SBA, 2024) indicates that periods of upwelling were observed at piezometer stations (not including MP1 and MP1-2 as these are in seasonally dry channels). Please provide an assessment of this data as per comment 6 below above as well as outline the seasonally dry periods where they exist.
- Regarding the Pumping Test Results of PW1 (SBA, 2023):
    a. The test discharge location is noted to have impacted the monitoring results for MP9 and SW9-02 (section 5.2). The pumping test discharge location should be positioned an adequate distance away in future so that any potential drawdown in the shallow groundwater or surface water can be measured without interference.
    b. The y1-axis on graph 14 for SW9-02 appears to be incorrect.
    c. Please provide more background information on the shallow groundwater gradient and baseflow for Besley Drainage Works. Further work/monitoring may be required to determine the effects of pumping (nested piezometers?). I leave further comment on this to the groundwater reviewer.
    d. Recommend assessment of including an upstream shallow groundwater/surface water monitoring station as well as a downstream surface water monitoring station. Please also assess the inclusion of an additional shallow groundwater monitoring station near MW1/SW9-02 and upstream/downstream flow monitoring.
- Regarding the GUDI Study for PW3 (SBA, 2021):
    a. It is difficult to discern from Figure 2 and it is not discussed in the report, but the test discharge location may have impacted the results of MP7/SW7. The pumping test discharge location should be positioned an adequate distance away in future so that any potential drawdown in the shallow groundwater or surface water can be measured without interference.
    b. The test caused the piezometers located at MP11 and MP12 to go dry. Prior to the test, the piezometers indicated an upward gradient. Please provide more background information on the shallow groundwater gradient into Walter's Creek as well as the baseflow. Further work/monitoring may be required to determine the effects of pumping (nested piezometers?). I leave further comment on this to the groundwater reviewer.
    c. Recommend assessment of including a surface water monitoring station at upstream location as well as upstream/downstream flow monitoring stations

- Regarding the Technical Memorandum Re: WCA Status Report (BGE, 2020):
    a. As above, some elements of the 2016 TOR were not addressed in this status report and the report notes (section 5) that a complete analysis was not included due to the on-going water supply activities associated with each municipal well and well field. This analysis should be completed and included in the PTTW amendment application as per comment 6 below.

Future work:

- The PTTW amendment application should include a surface water assessment report that assesses whether there are any long-term impacts occurring as a result of the historic water taking on the area surface waters and an assessment of the potential for future impacts to occur. The assessment should incorporate previously collected data such as the information obtained from the WCA pumping tests and can also include supplemental data collected under other programs such as the water pollution control plant expansion studies, or by the conservation authority (flows for example).

Please note the ministry is most interested in the GUDI well areas with respect to surface water, however the other areas should also be presented and discussed. The report should outline seasonal/annual characteristics within the area surface waters (baseflow contributions, changes to shallow groundwater hydraulic gradient and any impacts that may result – changes in temperature, water quality and any impacts on fish species).

Recommendations on how to improve the ongoing surface water monitoring program for incorporation into the future permit conditions should also be included.

Mitigation:

16) The ministry recommends that the EA Project File include a description of impact mitigation measures for construction activities associated with the proposed Schedule B projects at a minimum. If there is no construction involved with the preferred solutions the report should state so.

MECP Approvals:

17) Further future approvals may be appreciated and will be communicated accordingly.

Additional information on ESAR and PTTW can be found on links below:

Environmental Activity and Sector Registry | ontario.ca

Permits to take water | ontario.ca

Thank you for circulating this draft Report for the ministry's consideration. Please document the provision of the draft Report to the ministry as well as this Project Review Unit Comments letter in the final report, and please provide an accompanying response letter to support our review

of the final report. A copy of the final Notice should be sent to the ministry's West Central Region EA notification email account (eanotification.wcregion@ontario.ca).

Should you or any members of your project team have any questions regarding the material above, please contact me at joan.delvillarcuicas@ontario.ca@ontario.ca.

Sincerely,

Silva Yousif
Project Review Unit, Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks

S.BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

May 12, 2025

Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
1st Floor, 135 St. Clair Avenue W.
Toronto, Ontario, M4V 1P5

Attn: Chunmei Liu, MECP, Environmental Resource Planner & EA Coordinator, Project Review Unit
chunmei.liu@ontario.ca

Re: Town of Shelburne
Addressing Review Comments - Increased Capacity of the Town of Shelburne's Water Supply Schedule 'B' Municipal Class Environmental Assessment
SBA File No: M17025

Dear Chunmei,

This letter includes a Comment Disposition Table that explains how Ministry of the Environment, Conservation and Parks comments from review of the Increased Capacity of the Town of Shelburne's Water Supply Schedule 'B' Municipal Class Environmental Assessment were reflected in the updated report. This letter will be included with the revised report as part of the record of consultation.

#	Comment / Issue Identified	Resolution
1	References to consultation with ministry staff are made in section 7 Review of draft report, "A draft version of this Class EA was provided to Western-Central branch of the MECP for review on [DATE]. A summary of the comments received from the MECP on June 15, 2023, and how they were addressed in the Final Report, is provided in Appendix A." Limited information was found in Appendix A except an excerpt which was contained in an email sent May 31, 2022, from GRCA. " Please review this section and revise accordingly.	Noted. This section has been revised and additional consultation records added to Appendix A.

2	Section 2.5 of the report indicates that a list of stakeholders was developed for the project and is referenced in Appendix A. However, the list is currently omitted from Appendix A.	Noted. The list of stakeholders has been added to Appendix A.
3	Section 4.5 of the Report, requires a typing error to be fixed in the sentence, "pumping PW7 and PW9 concurrently" which should be "pumping PW7 and PW8 concurrently".	Noted. This sentence has been corrected.
4	Mitigation sections should be reviewed as there seems to be some word repetition.	Mitigation sections have been reviewed. No word repetition was found.
5	Section 7 of the EA refers to submission of a draft EA sent to MECP with comments provided by the ministry that were incorporated into the final report. Confirmation regarding the date of June 15, 2023, weather should be updated to align with the comments provided herein. The ministry's source protection branch seems to have only commented previously on the Shelburne WHPA Delineation report.	Submission date has been updated and a summary provided for the correspondence regarding the technical comments received for the hydrogeological report.
6	One of the key principles of successful environmental assessment planning is the systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects. Section A.2.3 of the Municipal Class EA document, available online at: www.municipalclassea.ca/manual/page12.html, further describes the evaluation step of Phase 2 of the Class EA planning process. In order to best meet the requirements of the Class EA process, the evaluation of alternative solutions provided in Section 4 of the Report should demonstrate how the magnitude of net positive and negative effects on all natural, social and economic components of the environment was considered during the evaluation of alternatives.	Noted. Updates to the report have been made concerning the Alternatives and Combination of Alternatives. See #8.
7	Table E1: Summary of Assessment of Alternative Solutions on pg. ii of vii has confusing scoring for the preferred alternative solutions, for clarity include a	Noted. A paragraph explaining the scoring has been added.

	section explaining the scoring criteria and how the numbers were generated.	
8	Section's 4.5 and pg. iii of vii of the report, discusses that two (2) solutions would be preferred. For clarity the ministry recommends including a new alternative solution that combines the alternatives 3: Pumping wells PW7 and PW8 concurrently and 4: Increasing the pumping rate of PW5/Pw6 by adding arsenic treatment. This recommendation is in reference to section A.2.3 Phase 2: Alternative Solutions Step 6 of the Municipal Class EA, 2024 document, "Selection or confirmation of the preferred solution to the problem or opportunity taking into consideration input and comment received from the review agencies, Indigenous Communities and the public and after evaluation of the net environmental effects of the various alternatives. Depending on the situation, the preferred solution may involve a combination of alternative solutions rather than a single outcome."	Noted. Combinations of Alternative Solutions, including Alternatives 3 and 4, Alternatives 3 and 5, Alternatives 4 and 5, and Alternatives 3, 4, and 5 have been added to the report.
9	The draft Project File Report does not include records of Indigenous consultations (emails, meeting minutes, phone call records). All correspondence and follow-up efforts by the proponent should be documented in the consultation record accompanying the Class EA documentation. Please include these records in an Appendix of the Report. Additionally, the Report should specify which communities were consulted during the Class EA process. The ministry recommends including a summary of questions, comments, and concerns raised by communities, along with how they have been or will be addressed. If no feedback was received, this should also be documented in the Report.	First Nation and Métis communities were sent the Notice of Commencement and invited to participate in both Public Information Centres. No correspondence from First Nation or Métis communities was received throughout the project. Section 2.5 has been updated to reflect the names of the communities contacted.

10	Section 2.5 and 4.3.1 of the Report discusses the existence of a public consultation process. Ensure that the records of public interaction are included in the consultation appendix. If no public feedback was received, then it should be documented in the Report.	Noted. Section 2.5 has been updated. Section 4.3.1 indicates that there were no questions asked during the PIC and the attendees indicated that they were pleased with the presentation.
11	All correspondence with ministry staff should be documented in the PFR as per the last sentence of Section A.3.6 of the Municipal Class EA, 2024 document, “Review agency responses are to be documented in the Project File or the ESR.” The ministry requests that the proponent include in the PFR documentation of all correspondence with ministry staff, including all email correspondence related to the development of effluent criteria, either in email format or as a summary in an Overview of Agency Comments table designated for stakeholder and agency consultation material.	Additional agency correspondence has been added to Appendix A.
12	Section 3.2.2.5 Species at Risk of the Report indicates that there are several species at risk that have the potential to be present within the study area. It is the responsibility of the proponent to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities cannot avoid impacting protected species and their habitats, then the proponent will need to apply for an authorization under the Endangered Species Act (ESA). If the proponent believes that their proposed activities are going to have an impact or are uncertain about the impacts, they should contact SAROntario@ontario.ca to undergo a formal review under the ESA.	Noted. No adverse effects on species at risk are expected and Section 3.2.2.5 has been updated to reflect this.
13	Climate change considerations have not been documented in the PFR. The document "Considering Climate Change in the Environmental Assessment Process" (Guide) (www.ontario.ca/page/considering-climate-change-environmental-assessment-process) is	Noted. A Climate Change section has been added to the report.

	now a part of the EA program's Guides and Codes of Practice. The Guide sets out the ministry's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. The proponent should review this Guide in detail. The ministry expects proponents of Class EA projects to: a. include a discrete section in the Report detailing how climate change was considered in the EA. How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.	
14	• Suggest updating text in the report in section 1.1 to note that "The wellfield capacity assessment for the Town of Shelburne was submitted to the ministry in December 2023. • Please provide an update on activities associated with PW1\PW3. Have the upgrades been conducted to date and have PW1/PW3 been returned to service (section 1.1)? • Option 4. Arsenic Treatment at PW5/6. Presently the pumping rates at PW5/6 are restricted to meet ODWQS. If treatment is implemented at PW5/6, pumping rates have the potential to increase. Is there the potential to cause an impact to nearby surface water features as a result of this increased pumping? Was this considered in the Critical Importance Rankings for the Environmental Criteria Scoring for short- and long-term impacts to water quality and aquatic life (row 1 and 2 of Table 8)? Consider updating the Table 8 entries for Option 4 (row 1 and 2) with	• Noted. This has been updated in the report. • Noted. The report has been updated to reflect the current situation for PW1 and PW3. Wellfield Capacity testing in 2016/2017 confirmed that this increased pumping rate is sustainable and will not impact nearby surface water features. Additional text has been added to the environmental criteria table, stating "Wellfield Capacity testing in 2016/2017 confirmed that this increased pumping rate is sustainable

	reference to any testing or monitoring data, similar to the entries for Option 3, if available. • Table 9, row 7 entry for Option 4, "Is simple in terms of constructability", is incomplete. • Regarding Table 9, row 8 entry for Option 5, "Is straight forward from a permitting and approval standpoint, including delayed construction timeline", please note that pumping tests may be eligible for a water taking Environmental Activity and Sector Registry (EASR). Please refer Part II.2 and O.Reg. 63/16 under the Environmental Protection Act and associated guidance documents. If ineligible, a Permit to Take Water will be required, as indicated. • Section 4.6 Monitoring notes that a surface water monitoring station will remain in place for intermittent monitoring as required by the permit to take water. Suggest including the existing surface water monitoring network and frequency for reference.	and will not impact nearby surface water features." The table has been revised to state that either a PTTW or water taking EASR would be required. • Noted. This has been updated.
15	Please note that surface water comments regarding the future Permit to Take Water (PTTW) amendment application are being provided at this stage to help ensure a complete package is submitted for review to aid in the approval process. <u>Background:</u> A Final Terms of Reference (TOR) for a Well Field Capacity Assessment (WCA) was submitted to the Ministry in 2016. The report outlined the WCA testing procedure as well as outlined surface water and groundwater monitoring to be conducted during the WCA testing. The contents of the future WCA report were outlined with requirements to include future recommendations based on the results of the WCA for incorporation into a future PTTW instrument (on-going monitoring program, for example). The WCA testing as proposed in the 2016 TOR has not been carried out as originally outlined to date due to	Noted. These comments will be addressed with the PPTW.

	some issues encountered at the wells. The early attempts in Oct 2016 and March 2017 indicated that rehabilitation and updates were required at PW3 and PW1. Individual well testing was subsequently conducted (PW1, July 2023 and PW3, Sept 2020) to assess the improvements. PW3 and PW1 were also identified as GUDI wells. Additionally, the Town of Shelburne initiated an Environmental Assessment (EA) and found that the water supply from wells PW7 and PW8 needs to double to meet the Town's demand with a new backup well (PW9) required for redundancy. Pumping tests were carried out at PW7 and PW8 at the higher rates in August 2017 and May 2021. The EA also concluded that arsenic treatment should be added to PW5 and PW6 to reduce the requirement to blend with pumped water from PW7/8 to meet ODWQS, thereby increasing the volume of water pumped from PW5/6. Given the recent upgrades and proposed increases to pumping from PW7/8, an amendment to the PTTW will be required. The PTTW will require an on-going monitoring program be incorporated into the conditions to ensure any impacts from the pumping are monitored and reported on. As outlined in the 2016 TOR, the future on-going monitoring program should be based on recommendations from the WCA as well as the recommendations based on the analysis and interpretation of data from the existing on-going monitoring program. <u>Comments:</u> Please see comments below on work conducted to date. Where possible, comments should be considered and addressed (where possible) in completion of future work.	

	• Regarding the Summary of Technical Memorandum Re: Summary of WCA Testing Results (2020-2023), updated in Dec 2024 for ministry review (SBA, 2023): a. This report is noted to build upon the results presented in the BGE 2020 technical memorandum, however, the referenced report notes that a complete analysis was not included (see comment 5 below). b. Further, some elements of the 2016 TOR were not addressed in the WCA and its appendices (SBA, 2023) and the WCA Status Report (BGE, 2020). Please find some pertinent sections relating to surface water listed below (N.B. this is not a complete list): i. Summaries and findings regarding fish and fish habitat (as per section 1.3.4 of the 2016 TOR) were not included, ii. Potential concerns/issues and data gaps in terms of area surface waters and shallow groundwater interactions were not identified, and future recommendations for ongoing surface water monitoring and shallow groundwater monitoring were not included. iii. Flow monitoring was not carried out as proposed (section 1.5). c. MP11, MP12 and SW12 were not shown in or listed in Table 3. These should be assessed and referred to in recommendations for future work (see comment 6 below). • The Dec 10, 2024, response to surface water comments (SBA, 2024) indicates that periods of upwelling were observed at piezometer stations (not including MP1 and MP1-2 as these are in seasonally dry channels). Please provide an assessment of this data as per comment 6 below above as well as outline the seasonally dry periods where they exist. • Regarding the Pumping Test Results of PW1 (SBA, 2023):	

	a. The test discharge location is noted to have impacted the monitoring results for MP9 and SW9-02 (section 5.2). The pumping test discharge location should be positioned an adequate distance away in future so that any potential drawdown in the shallow groundwater or surface water can be measured without interference. b. The y1-axis on graph 14 for SW9-02 appears to be incorrect. c. Please provide more background information on the shallow groundwater gradient and baseflow for Besley Drainage Works. Further work/monitoring may be required to determine the effects of pumping (nested piezometers?). I leave further comment on this to the groundwater reviewer. d. Recommend assessment of including an upstream shallow groundwater/surface water monitoring station as well as a downstream surface water monitoring station. Please also assess the inclusion of an additional shallow groundwater monitoring station near MW1/SW9-02 and upstream/downstream flow monitoring. • Regarding the GUDI Study for PW3 (SBA, 2021): a. It is difficult to discern from Figure 2 and it is not discussed in the report, but the test discharge location may have impacted the results of MP7/SW7. The pumping test discharge location should be positioned an adequate distance away in future so that any potential drawdown in the shallow groundwater or surface water can be measured without interference. b. The test caused the piezometers located at MP11 and MP12 to go dry. Prior to the test, the piezometers indicated an upward gradient. Please provide more background information on the shallow groundwater gradient into Walter's Creek as well as the baseflow. Further work/monitoring may be required to determine the effects of pumping	

	(nested piezometers?). I leave further comment on this to the groundwater reviewer. c. Recommend assessment of including a surface water monitoring station at upstream location as well as upstream/downstream flow monitoring stations • Regarding the Technical Memorandum Re: WCA Status Report (BGE, 2020): a. As above, some elements of the 2016 TOR were not addressed in this status report and the report notes (section 5) that a complete analysis was not included due to the on-going water supply activities associated with each municipal well and well field. This analysis should be completed and included in the PTTW amendment application as per comment 6 below. <u>Future work:</u> • The PTTW amendment application should include a surface water assessment report that assesses whether there are any long-term impacts occurring as a result of the historic water taking on the area surface waters and an assessment of the potential for future impacts to occur. The assessment should incorporate previously collected data such as the information obtained from the WCA pumping tests and can also include supplemental data collected under other programs such as the water pollution control plant expansion studies, or by the conservation authority (flows for example). Please note the ministry is most interested in the GUDI well areas with respect to surface water, however the other areas should also be presented and discussed. The report should outline seasonal/annual characteristics within the area surface waters (baseflow contributions, changes to shallow groundwater hydraulic gradient and any impacts that	

	may result – changes in temperature, water quality and any impacts on fish species). Recommendations on how to improve the ongoing surface water monitoring program for incorporation into the future permit conditions should also be included.	
16	The ministry recommends that the EA Project File include a description of impact mitigation measures for construction activities associated with the proposed Schedule B projects at a minimum. If there is no construction involved with the preferred solutions the report should state so.	Noted. Section 4.5 – Mitigation Measures for Preferred Solution has been updated.
17	Further future approvals may be appreciated and will be communicated accordingly. Additional information on ESAR and PTTW can be found on links below: Environmental Activity and Sector Registry | ontario.ca Permits to take water | ontario.ca	Noted.

I trust the responses above address the comments provided and the guidance the MECP was able to provide during our meeting on April 28, 2025.

Yours truly,

Ian Callum
Senior Environmental Project Manager
S. Burnett & Associates Limited

Incl. Increased Capacity of the Town of Shelburne's Water Supply Schedule 'B' Municipal Class Environmental Assessment Draft Report (May 2025)

cc: Jim Moss, Town of Shelburne, jmoss@shelburne.ca
Rachel Roblin, MECP, rachel.roblin@ontario.ca
Sarah Day, MECP, sarah.day@ontario.ca

M17025_Shelburne Water EA_MECP Comments_FINAL_2025-05-12

Appendix B

Pumping Test and Monitoring Results of Production Wells PW7 and PW8

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Town of Shelburne

Pumping Test and Monitoring Results of Production Wells PW7 and PW8

A People Place, A Change of Pace
SHELBURNE
ONTARIO, CANADA

November 2023
SBA File No. M17025

REPORT PREPARED BY:

S. BURNETT & ASSOCIATES LIMITED

www.sbaengineering.com |
Tel (519) 941-2949 | Fax (519) 941-2036 | info@sbaengineering.com
210 Broadway, Unit 203 Orangeville, ON L9W 5G4

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

November 8, 2023

Town of Shelburne
203 Main Street East
Shelburne, ON L9V 3K7

Attn: Jim Moss, Director, Development and Operations

Re: Town of Shelburne
Pumping Test and Monitoring Results of Production Wells PW7 and PW8
SBA File No: M17025.1
PTTW No. P-300-1082818689

Dear Jim,

As you are aware, S. Burnett & Associates Limited (SBA) and Banks Groundwater Engineering Limited (BGE) were retained to provide engineering services for the Shelburne Production Wells 7 and 8 Municipal Class Environmental Assessment (CEA). The CEA is necessary for the increase in water taking that is required to meet the long-term water demands of Shelburne. This CEA includes a hydrogeological study to determine any negative consequences that could result from increased pumping rates at Production Wells 7 and 8 (PW7 and PW8).

The hydrogeological assessment was completed to determine whether the local aquifer that PW7 and PW8 draws water from can support the combined rate of 37.8 L/s. This rate is being proposed as an increase to the current permitted rate of 18.9 L/s. A seven (7) day pumping test was completed in May 2021, to determine the effects of increased pumping in the vicinity around PW7 and PW8.

Please find the Pumping Test and Monitoring Results of Production Wells PW7 and PW8 enclosed. The results will be used to support the Town's Water Supply Class EA Report and comments received will be incorporated.

Thank you for this opportunity to work with the Town of Shelburne once again. Should you have any questions, please do not hesitate to contact us.

Yours Truly,

Sarah Lionsbridge, P.Geo.
Hydrogeologist, Project Manager
S. Burnett & Associates Limited

William D. Banks, P. Eng.
Principal Hydrogeologist
Banks Groundwater Engineering Limited

cc: Don Irvine, OCWA
Niel Taylor, MECP

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Tables

Figures

Appendices

1. Introduction

The Town of Shelburne's municipal drinking water is supplied by six (6) production wells from four (4) pumphouses, as shown in **Figure 1** in **Appendix A**. Production Wells PW7 and PW8 are located at 116138 2nd Line SW, Township of Melanchthon, to the west of the Town of Shelburne municipal boundaries. The pumphouse is located within a rural agricultural setting and near a locally significant wetland, Willow Brook Swamp. All wells are in the shallow Guelph Formation Aquifer, except for Wells PW7 and PW8, which are in the deeper Gasport Formation Aquifer. In Shelburne, the shallow aquifer, contains arsenopyrite, which under aerobic conditions is broken down by microbes, resulting in water with arsenic concentrations that require treatment or dilution to meet Provincial Drinking Water Standards.

A Federal / Provincial Environmental Assessment (EA) was initiated in 2007 (Golder Associates Ltd., 2013) to determine the best means of meeting water supply and water quality needs at the time. Based on research by the Ontario Geological Survey (OGS), the EA included investigation of a new well site in the deeper Gasport Formation Aquifer. Early in 2010, the Golder project team constructed a test production well (TW7-10) to determine the water supply potential at this location and to confirm that its pumping would not result in adverse impacts to natural environment and neighboring well owners. TW7-10 was converted to a production well in 2013 at the conclusion of the EA and was renamed PW7. PW8 was subsequently constructed in 2014 to provide redundancy to PW7.

During the EA process, it was determined that water from PW7 and PW8 could be blended with water from Production Wells PW5 and PW6 to meet the Ontario Drinking Water Quality Standard maximum allowable concentration for arsenic (10 µg/L). Although the EA discussed the possibility of running wells PW7 and PW8 concurrently, projected water demand did not support the need and accordingly, the EA only assessed the impacts of either Well 7 or 8 being pumped at 18.9 L/s (300 US gpm), but not the concurrent pumping of both wells.

A pumping test on Production Well PW7 was initiated in 2016 as a part of the on-going well field capacity assessment at a rate of 18.9 L/s and additional groundwater and surface water monitoring locations were added to the locations used in testing during the EA. The new stations included shallow piezometers installed adjacent to streambeds and municipal drains and in wetlands. Surface water stations were installed in streams, municipal drains and wetlands and a nest of deeper bedrock monitoring wells was installed adjacent to wells PW7 and PW8. During the 72-hour pumping test the following monitoring observations were made:

- Significantly more drawdown was observed in the deep, semi-confined, pumped bedrock aquifer compared to the shallow bedrock aquifer;
- Drawdown in the intermediate bedrock interval, which is interpreted to be a leaky aquitard, was observed to be less than the deep aquifer, but more than the shallow bedrock aquifer;

- Drawdown in all monitored local private wells was less than 1.0 m, which at the time of testing included the two (2) private wells closest to PW7 (i.e., OW1 and OW2), and water supplies were not affected during the testing periods;
- There was no observed drawdown in the shallow wetland piezometers;
- There was no observed reduction in surface water stage at SW10; and,
- The sustainable pumping rate of the deep aquifer is at least 18.9 L/s and is interpreted to be higher, which is the purpose of the planned testing and monitoring program (Banks Groundwater Engineering Limited, 2017).

The 2016 test results supported the application for a Category 2 PTTW to test pumping wells PW7 and PW8 at a combined rate of 37.8 L/s. The testing would be completed as part of a Municipal Class Environment Assessment (MCEA), which the Town is currently undertaking to determine the best means of meeting the Town's water demand for the next 20 years. Based on known planned developments and historic population growth, Shelburne's population is projected to grow to 15,000 by 2041. As shown in **Figure 2** in **Appendix A**, the Town currently cannot meet Maximum Daily Flow demand and by 2041 won't be capable of meeting the Average Daily Flow of 3,750 m^3/d, nor the Maximum Daily Flow demand of 8,025 m^3/day.

PW7 and PW8 are currently permitted to pump at a combined rate of 18.9 L/s under Permit to Take Water (PTTW) Number P-300-1082818689, which was issued on December 10, 2020, and is provided in **Appendix B1**. The temporary permit issued for the testing in 2018 is included in **Appendix B2**. As discussed further in **Section 4**, a temporary PTTW was issued for testing the wells at a combined rate of 37.8 L/s for testing in 2021 and is included in **Appendix B3**.

In support of the ongoing MCEA, the Town retained S. Burnett & Associates Limited (SBA) and Banks Groundwater Engineering Limited (BGE) to complete a hydrogeological study (the "Study") assess the capability of PW7 and PW8 to be concurrently pumped at a sustainable rate of 18.9 L/s each and to assess any impacts on adjacent environmental features and residential wells. The results of this assessment are presented in this report.

2. Hydrogeological Setting

The Town of Shelburne is located in the Upper Nottawasaga Valley River Watershed, and approximately 2.8 km to the west is the boundary with the Grand River Watershed. Production wells PW7 and PW8 are located at 116138 2nd Line SW, on Lot 14 and Concession 3, Melancthon within the Grand River Watershed on the eastern boundary with NVCA and in the Township of Melancthon as shown in **Figure 1** in **Appendix A.**

The Town of Shelburne is currently supplied by six (6) production wells (PW1, PW3, PW5, PW6, and PW7 and PW8) from four (4) pumphouses. The location of each well is shown in **Figure 1**. All wells are in the shallow Guelph Formation Aquifer, except for PW7 and PW8, which are in the deeper Gasport Formation Aquifer. PW1 and PW3 are both classified as Groundwater Under the Direct Influence of Surface Water (GUDI) and are both currently offline post-rehabilitation to complete improvements to the pumphouse infrastructure. Currently, only one (1) of PW7 and PW8 can operate at a given time, with a permitted pumping rate of 18.9 L/s. Due to its lower arsenic concentrations, water from PW7 and PW8 is blended with water from PW5 and PW6 to meet Provincial Water Quality Objectives. Although the permitted rate for PW5 and PW6 is 22.7 L/s, there is a need to limit the flowrate from those wells to 67% of its permitted rate (i.e., 15.2 L/s) to achieve an acceptable blended arsenic rate below 10 ug/L from the combined supply. **Table 1** below is a summary of the general information of the wells.

Table 1: Municipal Well Information Summary for Town of Shelburne

ID	Const. Year	Depth (m bgl)	Type of Well / Formation	Well Tag Number	MECP Identifier
PW1	1951	23.5	Shallow Guelph Formation Aquifer	N/A	1700846
PW3	1979	18.6	Shallow Guelph Formation Aquifer	A294165	7378335
PW5	1993	23.5	Shallow Guelph Formation Aquifer	N/A	1704712
PW6	1989	24.4	Shallow Guelph Formation Aquifer	N/A	1704107
PW7	2012	86.6	Deep Gasport Formation Aquifer	A071535	7199677
PW8	2014	86.6	Deep Gasport Formation Aquifer	A081584	7375666

N/A – Wells constructed prior to Ontario tagging system.

The well records for production wells PW7 and PW8 are included in **Appendix C1**. Well records for monitoring stations discussed further in **Section 4** are found in **Appendix C2**.

2.1 Topography and Drainage

The topography of the local area surrounding PW7 and PW8 generally has high elevations associated with the divide between Nottawasaga Valley River Watershed and Grand River Watershed to the west of the Town. Ground elevations range from approximately 420 m amsl to the northeast of the Town, and approximately 500 m amsl within the Town boundary and to the northwest. PW7 and PW8 are located to the west of the Town of Shelburne, with a relatively high finished floor elevation of approximately 498 m amsl. The topology and drainage of the local area around wells PW7 and PW8 is shown in **Figure 3** in the **Appendix A**.

2.2 Soils and Physiography

A portion of the quaternary geology mapping for the Town is included in **Figure 4** in the **Appendix A**. The site is mapped within the Dundalk Till Plain Physiographic Region, characterized by gently undulating, drumlinized and fluted till plain (Chapman & Putman, 1984). The Town is located in the Upper Nottawasaga Valley River Basin and is generally uniform in physiography of rolling hills and upland.

The soil complexes surround the Town of Shelburne are comprised of tills, alluvial deposits, and glaciofluvial deposits. The local tills are generally considered lacustrine silt and clay sediments that are generally considered semi-permeable, along with fluvial sands and gravels that are considered permeable. The alluvial deposits consist of clay, silt and fine sand material and organic material. The glaciofluvial deposits consist of stratified silt, sand, and gravel that form kames in the local area (Chapman & Putman, 1984).

Local overburden thickness ranges from approximately 30 m in the central part of Town, to approximately 10 m to the west of the Town and at the PW7 and PW8 location. The physiography at wells PW7 and PW8 is drumlinized till plains, which is generally referred to as Tavistock Till, a brown silty to clayey till. Tills are generally considered to be semi-permeable and do not readily transmit water. Clay, silt, and fine sand alluvial deposits characterize the recent stream terraces.

2.3 Quaternary and Bedrock Geology

Overburden is underlain by Paleozoic bedrock of the Guelph Formation whose eastern boundary is represented by the Niagara Escarpment. The Silurian bedrock formations underlying the Town comprise of one of the most extensive bedrock aquifers in Ontario. The dolostone and shale sequences range from 20 to 40 m in thickness (Golder Associates Ltd., 2013). Local bedrock stratigraphy, beginning with the youngest bedrock formation, includes the following.

Guelph Formation

The Guelph Formation consist of open marine, medium to thickly bedded, cross-stratified, crinoidal grainstones and wackestones and lagoonal, thinly bedded, megalodont–gastropod-dominated wackestones and packstones, and lesser biostromal and biohermal reefal complexes (Brunton, 2020). It is the uppermost bedrock unit in the Town, including in the vicinity of PW7 and PW8. Due to its reefal structure, the Guelph Formation is generally recognized as a moderately permeable, water bearing aquifer.

Eramosa Formation

The Eramosa Formation consists of three (3) members, including the Stone Road Member, the Reformatory Quarry Member, and the Vinemount Member (listed from youngest to oldest). This bedrock formation is generally recognized as cream-coloured, coarsely crystalline dolostone. The thickness of the upper Stone Road Member is approximately 5.5 m. The Reformatory Quarry Member possesses exceptionally preserved soft-bodied biota (fauna and flora) and the lower Vinemount Member of the formation acts as a local to regional aquitard (Brunton, 2020).

Goat Island Formation

The Goat Island Formation consists of two (2) members, the lower Niagara Falls Member, and the upper Ancaster Member. The basal member of the Goat Island Formation is the crinoidal grainstone facie of the Niagara Falls Member, which is commonly finely crystalline and cross laminated with a distinctive pin-striped appearance. The overlying Ancaster Member of the Goat Island Formation is a chert-rich, finely crystalline dolostone that is medium to ash-grey in colour, thin to medium bedded and bioturbated (Brunton, 2020). Due to its crystalline structure, the Goat Island Formation is generally regarded to have low vertical hydraulic conductivity and is not significantly water bearing.

Gasport Formation

The Gasport Formation consists of a basal cross-bedded crinoidal grainstone-packstone succession with sequences of microbial-crinoidal reef mound and coquina (shell bed) lithofacies. This unit has been referred to as the Amabel Formation in previous hydrogeological investigations. The Gasport Formation is generally recognized as a permeable water bearing confined bedrock aquifer (Brunton, 2020).

Bedrock Underlying the Gasport Formation

Under the Gasport Formation are a series of bedrock deposits, including the Irondequoit and Rockway Formation, with marginal thickness of 1 m or less. These bedrock deposits and underlain by the Merritton Formation, which is referred to as the upper Fossil Hill Formation in previous hydrogeological investigations. Merritton Formation is generally less than a meter thick and possesses pentamerid brachiopods and tabulate corals. The formation underlying the Merritton Formation is the Cabot Head Formation, which represents the base of the active groundwater flow system and referred to as the regional aquitard (Brunton, 2020).

2.4 Local Hydrogeology

2.4.1. Bedrock Aquifers

Bedrock formations have the ability to collect and transport groundwater, depending on the rock type, structure and interaction with the overlying overburden. Within the study area, unconfined bedrock aquifers are likely to form in shallow depths of fractured and weathered bedrock that have good hydraulic contact with overlying overburden composed predominantly of transmissive soil, such as sand and gravel. Confined aquifers are likely to form at deeper bedrock depths between two aquitard formations, with the layer in between having a high hydraulic conductivity.

In the study area, the bedrock layers closest to the surface belong to the dolostones of the Guelph, Eramosa, Goat Island and Gasport formation. Most of the upper 10 m of these formations are fractured and weathered, making them porous and permeable, which allows them to serve as a productive aquifer. Production wells located within the Town of Shelburne (PW1, PW3, PW5 and PW6) have been drilled to the shallow bedrock formation depths, with most being in Guelph Formation due to its relatively high bulk conductivity and good hydraulic communication with overlying aquifers. Under these shallow bedrock layers are Eramosa and Goat Island Formations, which act as an aquitard that restricts the movement of groundwater between the overlaying aquifers to the underlying confined Gasport formation. There is a major groundwater flow zone situated underneath the Goat Island Formation and the upper portion of the Gasport Formation due to diastema and disconformities at the formational contacts, which allows for a confined productive aquifer zone in the Gasport Formation (Brunton, 2020). Underlying the Gasport Formation is a series of bedrock aquitards belonging to the Clinton Cataract groups with significant thickness, providing underlying confinement of the productive zone in the Gasport formation aquifer. In order to access the semi-confined productive aquifer, production wells PW7 and PW8 were drilled deep into the Gasport Formation, a significantly greater depth than previous wells supplying the Town of Shelburne.

Figure 5 depicts the bedrock cross-section near the PW7 and PW8 site and is included in the **Appendix A**.

Bedrock compositions and properties are generalized into geologic layers based on formational conditions and interpolation of areas between sites of collected data. However, there is always an aspect of variability in depth, thickness, and condition within the generalized layers as they are not perfectly uniform. **Section 4** provides a detailed description of the monitoring methodology of production wells, monitoring wells and piezometers within the study location. Which illustrate the spatial and depth range of groundwater monitoring, allowing for the interpretation of bedrock aquifers and aquitard layers.

As described previously, a video log was completed by Well Initiatives Limited (WIL) in April 2021 for Production Wells PW7 and PW8. The video log notes four (4) fractures in the bedrock at PW7 in the interval of 49.60 m btoc to 62.70 m btoc, with water flowing into the well. The video log for PW8 indicates

two (2) fractures in the bedrock in the interval of 58.0 m btoc and 76.80 m btoc with water flowing into the well. The results of each video log completed by WIL are included in **Appendix D**.

2.4.2. Overburden Aquifers

The variability in composition of overburden materials within the study area contribute to variability in hydraulic properties and aquifers formation. Local aquifers are found in areas primarily composed of fluvial sands and gravels, and coarse-grained lacustrine sand deposits. This is a result of the high porosity and permeability of these materials, allowing for the capacity to store and transmit large quantities of groundwater. On the other hand, tills, silt, and clay are generally considered to be semi-permeable and have a lower capacity to transmit water. Areas primarily composed of these materials are less likely to form aquifers due to a lack of permeability which tend to have slower recharge rates. In fact, layers composed of these materials will often impend the flow of groundwater and act as a semi-confining layer to formations below.

The local overburden layers surrounding the Town of Shelburne include the following glacial formations: glacio-lacustrine sediments, fluvial and glaciofluvial deposits and ice-deposited drift. The central and eastern parts of the study area are dominated by fluvial and glacio-fluvial outwash deposits and glacio-lacustrine sediments. The glacio-lacustrine sediments are composed of medium to fine grained sand, silt, and clay, while the materials in fluvial and glaciofluvial outwash deposits vary from well-bedded and sorted sand and gravel to irregularly stratified sand and gravel. This high composition of sand and gravel has potential for the central and eastern area to form aquifers. Production wells previous to PW7 and 8 (PW 1-6) were located within this central area. They were drilled into shallow bedrock layers, relying on the overlying overburden aquifers to have good hydraulic contact with the bedrock to form an aquifer system. The small amount of clay present provides a semi-confining layer that provides protection from surface contamination. The western portion of the study area, where production wells PW7 and PW8 are located, is dominated by the ice-deposited drift: Tavistock Till. Tavistock Till is composed of what can be described as a silt to clayey silt textured till lending to the formation of a confining layer in the overburden.

Figure 6 presented in **Appendix A** represents the surficial geology of the study area.

2.4.3. Surface Water

Production wells PW7 and PW8 are located within separate watersheds from the other production wells located within the Town boundary. PW7 and PW8 fall within the Grand River watershed (GRCA), approximately 120 m away from the watershed divide with the Nottawasaga River watershed (NVCA), where the Town of Shelburne is situated. The ground surface elevation around the Town varies from as low as 464.5 m above mean sea level (amsl) to as high as 507.5 m amsl. The elevated areas are located on the northwest side of Shelburne, forming slopes that define the regional watershed divide which separates the Grand River and the Nottawasaga River watershed zones. Surface watercourses in the

vicinity of the well have limited catchment areas due to their proximity to the regional watershed divide. As a result, seasonal weather patterns affect the water surpluses of local surface catchments. On a local scale of the area within the Town of Shelburne, groundwater typically flows from the southwest to the northeast toward the Boyne River with vertical upward gradients occurring along topographic low points.

The local physiography around Production Wells PW7 and PW8 is composed of gently rolling land, with low ridges dividing poorly drained depressions of wetlands, swamps, and bogs. Located to the west side of Shelburne is the Willow Brook Swamp, a locally significant wetland situated adjacent to production Wells PW7 and PW8. To manage overland runoff towards Willow Brook tributaries, several drains have been engineered within surrounding wetland regions. These drains primarily compose the surface water courses across PW7 and PW8's zone of influence. Surface water flows through the Willow Brook Swamp in a south-westerly direction, ultimately discharging into the Grand River. The flow direction is generally towards south from the production wells to Highway 89. Surface water monitoring station SW10 and shallow groundwater piezometer MP10 were constructed and have been monitored since 2016 in the location.

Figure 3 in **Appendix A** shows the extent of the Willowbrook Creek Complex and local drainage channels surrounding the Town of Shelburne.

3. Well Construction and Condition

3.1 Well Construction

Both wells are 300 mm (12'' diameter) bedrock wells. PW7 was originally constructed in 2012 and the well casing was installed to a depth of 47.24 m below grade level [m bgl], according to the original well record. The original open bedrock interval for PW7 was from 47.24 m bgl to 86.56 m bgl. PW8 was originally constructed in 2014 and the well casing was installed to a depth of 47.55 m bgl, with an open bedrock interval from 47.24 m to 86.56 m bgl.

Table 2: Well Construction and Equipment Summary of Production Wells PW7 & PW8

	PW7	PW8
Tag No.	A071535	A081584
Bottom of pump motor (m btoc)	48.10	48.00
Crown elevation of pump motor (m btoc)	47.10	47.00
Pump make and model	Grundfos 300S400-10	Grundfos 300S400-10
Pump discharge diameter	4''	4''
Top of casing above grade (m)	0.68	0.85
Probe setting (m btoc)	45.70	45.45
Manual water level reading (m btoc)	16.58	16.58
Pitless adaptor depth (m btoc)	2.55	2.68

3.2 Well Condition and Pump Replacement

In March and April 2021, pumps in PW7 and PW8 were replaced with larger submersible pumps by Well Initiatives Limited (WIL), which are capable of pumping 18.9 L/s each when operated together. The variable frequency drives (VFD) were replaced along with a defective check valve. Pump specifications are summarized in **Table 2** above and pump installation records are included in WIL report in **Appendix D**.

Additionally, as part of the pump replacement, video inspections were conducted for both wells to verify well dimensions and to ascertain the physical condition of the pitless adapter and integrity of the bedrock/casing interface. The video inspection confirmed the construction details reported on the well record for both wells and they are generally in good overall condition. It should be noted that the well casings have started to show signs of mineral accumulation and small accumulations of debris was noted at the bottom of both wells. It was also observed that the pitless adapter in PW8 was leaking during the inspection, and replacement with a new Boshart HD barrel style pitless unit was recommended by WIL.

A well inspection was conducted by SBA in May 2021 prior to the pumping test to confirm the current well setting as well as to calibrate the level transducer of the pumping wells PW7 and PW8.

4. Test Methodology

4.1 2018 Study Area and Location

In advance of the planned aquifer testing, monitoring stations were established in a 1.5-km radius around the PW7 and PW8 site, shown in **Figure 7** in **Appendix A.** The stations were within and beyond the anticipated area of influence (i.e., the area where groundwater levels could be reasonably expected to respond to pumping of the wells based on previous test results). Within the study area, the monitoring stations included monitoring wells, mini piezometers, surface water monitoring stations and domestic wells.

The groundwater monitoring stations for the aquifer test included the following:

- Overburden monitoring well MW6-9;
- Shallow bedrock monitoring wells MW7-30;
- Intermediate bedrock monitoring wells MW7-45, MW8-45, MW9, and MW10-45;
- Deep bedrock monitoring wells MW7-75, MW8-75, and MW10-75;
- Overburden piezometers MP1-2 and MP10;
- Domestic Wells 116278, 116203, 116139, 116116, 116063, 522186, 504336, 504326 and 504224;
- Surface water monitoring station SW10; and,
- Pumping wells PW7 and PW8 (the pumped wells).

4.1.1. Monitoring Locations

Table 3 below summarizes details of all monitoring stations during the 2018 aquifer test, and their locations relative to the pumping wells PW 7 and PW8 are shown in **Figure 7** in **Appendix A**.

Table 3: Groundwater & Surface Water Monitors within 1.5 km radius for 2018 72-hour Pumping Test

Monitoring Station	Type of Well	Distance to PW7 (m)	Well Depth (m btoc)	Static Level August 28, 2018 (m btoc)
PW7	Municipal Production Well / Pumping Well	5.7	86.56	3.17
PW8	Municipal Production Well / Pumping Well	5.7	86.56	3.23
MW6-9	Overburden Monitoring Well	7.4	9.75	3.12
MW7-30	Shallow Bedrock Monitoring Well	10.2	29.9	3.02
MW7-45	Intermediate Bedrock Monitoring Well	10.2	45.1	2.82
MW7-75	Deep Bedrock Monitoring Well	10.2	75.0	3.16
MW8-45	Intermediate Bedrock Monitoring Well	720	52.2	4.56
MW8-75	Deep Bedrock Monitoring Well	720	66.0	4.55
MW9	Intermediate Bedrock Monitoring Well	370	41.6	7.10
MW10-45	Intermediate Bedrock Monitoring Well	765	55.4	4.61
MW10-75	Deep Bedrock Monitoring Well	765	72.2	4.61
MP1-2	Overburden piezometer	70	2.05	D
MP10	Overburden piezometer	1440	2.05	N/A
SW10	Surface Water Monitoring Station	1440	2.05	N/A
116278	Shallow Bedrock Domestic Well*	1305	17.2	6.99
116203	Shallow Bedrock Domestic Well	605	29.87	7.70
116139	Shallow Bedrock Domestic Well	155	23.8	3.26
116116	Overburden Domestic Well*	290	5.1	3.57
116063	Shallow Bedrock Domestic Well*	825	29.6	1.92
522186 300 Sideroad	Shallow Bedrock Domestic Well*	430	24.8	4.20
504336	Shallow Bedrock Domestic Well	1430	25.9	1.54
504326	Shallow Bedrock Domestic Well	1440	16.5	1.81
504224	Shallow Bedrock Domestic Well	1290	12.2	2.97

Note: MP2, MP3, and MP4 are inaccessible during the pumping test.
* Inferred from available MOE Well Records and depth of well at location.
D MP1-2 was dry during August 2018.
N/A MP10 and SW10 were flooded in August 2018 due to debris build-up in the highway culvert.

To augment the groundwater monitoring plan, four (4) bedrock monitoring wells were constructed at an intermediate depth (45 m) and deep depth (75 m) to isolate bedrock intervals in August 2018, which are referred to as monitoring wells MW8-45/75 and MW10-45/75. The monitors were installed in the intermediate and deep bedrock aquitard / aquifer, i.e., Eramosa-Upper Goat Island Aquitard and Lower Goat Island / Gasport Production Aquifer, respectively. All monitoring locations were equipped

with Solinst dataloggers that recorded water level and temperature. A summary table of the well construction details for each new monitoring well is included in **Table 4.**

Table 4: Well Construction Details for the New Monitoring Wells (2018)

Monitoring Well	Type of Well	Stratigraphic Unit	Well Depth (m btoc)
MW8-45	Groundwater Monitoring Well	Bedrock (Eramosa-Upper Goat Island Aquitard)	45.0
MW8-75	Groundwater Monitoring Well	Bedrock (Lower Goat Island/Gasport Production Aquifer)	75.0
MW10-45	Groundwater Monitoring Well	Bedrock (Eramosa-Upper Goat Island Aquitard)	45.0
MW10-75	Groundwater Monitoring Well	Bedrock (Lower Goat Island/Gasport Production Aquifer)	75.0

A water well survey was conducted in the vicinity of the well site. A total of 26 surveys were issued to well owners and approval to access nine (9) wells was received. The domestic wells used for the monitoring were wells that the owner granted permission to the project team to inspect and monitor over the course of the test period.

4.1.2. 2018 Aquifer Test Results

In August 2018, SBA, BGE and the Town's water system operations staff from OCWA conducted a 72-hour pumping test of well PW7 and PW8 to determine if wells PW7 and PW8 could be sustainably pumped at a combined rate 37.8 L/s. The test was conducted in accordance with requirements set out in PTTW No. 1120-AU6NAZ (issued on December 18, 2017) and is included in **Appendix B2**. Throughout the test period, pumped water was treated and pumped into the Shelburne distribution system. To maintain a constant pumping rate from PW7 and PW8, excess water was discharged from a fire hydrant located in the eastern part of the Town near the wastewater treatment plant and allowed to flow in a controlled manner to the Beasley Drain.

The pumping test began on August 28, 2018, at 10:00 a.m. (local time) and was set at a pumping rate of 18.9 L/s in each well. However, the pumping rate was reduced to 15.5 L/s because the pumps were not sized to support the higher pumping rate. Pumping continued at this constant rate for an uninterrupted period of 4,319 minutes. Pumping ceased at 9:58 a.m. on August 31, 2018. It was concluded that the pumps would need to be replaced and a new pumping test completed at the increased pumping rate.

The results from the 72-hour pumping test demonstrated the bedrock aquifer at this location could sustain the test rate of 15.5 L/s for each well with a combined rate of 31.0 L/s. However, testing at the projected rate of 37.8 L/s was required to confirm the long-term sustainability of the increased rate. As such, the existing pumps and some of the associated equipment were upgraded.

4.2 2021 Test Methodology

In advance of the planned aquifer testing, monitoring stations from the previous testing were reviewed and confirmed in the 1.5 km radius around the PW7 and PW8 site, shown in **Figure 8**. Within the study area monitoring wells, mini piezometers, surface water monitoring stations and domestic wells were used to assess changes in groundwater levels resulting from the increased pumping from PW7 and PW8.

The groundwater monitoring stations for the 2021 aquifer test included the following:

- Overburden monitoring well MW6-9;
- Shallow bedrock monitoring wells MW7-30, MW8-S, and MW10-S;
- Intermediate bedrock monitoring wells MW7-45, MW8-I, MW9, and MW10-I;
- Deep bedrock monitoring wells MW7-75, MW8-D, and MW10-D;
- Overburden piezometers MP1-2 and MP10;
- Domestic Wells 116278, 116203, 116139, 116116, 116063, 504336, and 504224;
- Surface water monitoring station SW10; and
- Pumping wells PW7 and PW8 (the pumped wells).

4.2.1. Monitoring Locations

Table 5 below summarizes details of all monitoring stations during the 2021 aquifer test, and their locations relative to the pumping wells PW7 and PW8 are shown in **Figure 8**.

Table 5: Groundwater & Surface Water Monitors within 1.5 km radius for 2021 Aquifer Test

Monitoring Station	Coordinates (UTM 17N)	Type of Well	Distance to PW7 (m)	Well Depth (m btoc)	Static Level May 11, 2021 (m btoc)
PW7	559266 E 4880803 N	Municipal Production Well/ Pumping Well	5.7	86.56	2.52
PW8	559274 E 4880795 N	Municipal Production Well/ Pumping Well	5.7	86.56	2.57
MW6-9	559273 E 4880802 N	Overburden Monitoring Well	7.4	9.75	1.70
MW7-30	559264 E 4880794 N	Shallow Bedrock Monitoring Well	10.2	29.9	1.96
MW7-45	559264 E 4880794 N	Intermediate Bedrock Monitoring Well	10.2	45.1	2.22
MW7-75	559264 E 4880794 N	Deep Bedrock Monitoring Well	10.2	75.0	2.67
MP1-2	559275 E 4880865 N	Overburden piezometers	70	2.05	1.13
MW9	559050 E 4881097 N	Intermediate Bedrock Monitoring Well	370	41.6	2.13
MW8-S	558601 E 4880548 N	Shallow Bedrock Monitoring Well	710	34.0	2.47
MW8-I	558601 E 4880548 N	Intermediate Bedrock Monitoring Well	710	52.2	2.67
MW8-D	558601 E 4880548 N	Deep Bedrock Monitoring Well	710	66.0	2.69
MW10-S	559412 E 4881546 N	Shallow Bedrock Monitoring Well	765	24.9	3.74
MW10-I	559412 E 4881546 N	Intermediate Bedrock Monitoring Well	765	55.4	4.44
MW10-D	559412 E 4881546 N	Deep Bedrock Monitoring Well	765	72.2	4.78
MP10	560475 E 4880021 N	Overburden Piezometer	1,455	2.05	0.53
SW10	560478 E 4880019 N	Surface Water Monitoring Station	1,455	2.05	1.34
116278	558263 E 4881625 N	Shallow Bedrock Domestic Well *	1300	17.2	5.18

Monitoring Station	Coordinates (UTM 17N)	Type of Well	Distance to PW7 (m)	Well Depth (m btoc)	Static Level May 11, 2021 (m btoc)
116203	558906 E 4881280 N	Shallow Bedrock Domestic Well	610	29.87	6.54
116139	559402 E 4880823 N	Shallow Bedrock Domestic Well	135	23.8	2.04
116116	559448 E 4880568 N	Overburden Domestic Well *	290	5.1	3.03
116063	559984 E 4880383 N	Shallow Bedrock Domestic Well	825	29.6	1.53
504336	560351 E 4879866 N	Shallow Bedrock Domestic Well	1430	25.9	1.39
504224	559243 E 4879512 N	Shallow Bedrock Domestic Well	1270	12.2	2.44

Note: MP2, MP3, and MP4 were inaccessible during the pumping test. 522186 300 Sideroad was only monitored during 2018 testing and was not accessible for 2021 testing.

* Inferred from available MOE Well Records and depth of well at location.

To augment the groundwater monitoring plan, six (6) bedrock monitoring wells were permanently constructed at selected depths in the bedrock in 2018. The monitors were installed in the same shallow bedrock aquifer that all local private bedrock wells are completed in (i.e., Guelph Formation), along with the intermediate formation and deep formation. The six (6) additional monitoring wells sufficiently augment the spatial coverage of monitored locations around the production wells. All of the monitoring locations were equipped with Solinst dataloggers that recorded water level and temperature. A summary table of the well construction details for each new monitoring well is included in **Table 6**. The geophysics logs for the six (6) additional monitoring wells are included in **Appendix E**. SBA has also conducted inspection and confirmed the as-constructed record of the monitoring wells in April 2021 and the report is included in **Appendix F**.

Table 6: Multi-Level Monitoring Well Construction Summary (SBA, 2021)

Monitoring Station	Type of Well	Stratigraphic Unit	Screen Interval (m bgl)
MW8-S	Groundwater Monitoring Well	Bedrock (Guelph) Aquifer	30.53 – 33.58
MW8-I	Groundwater Monitoring Well	Bedrock (Eramosa-Upper Goat Island Aquitard)	48.72 – 51.77
MW8-D	Groundwater Monitoring Well	Bedrock (Lower Goat Island/Gasport Production Aquifer)	62.51 – 65.56
MW10-S	Groundwater Monitoring Well	Bedrock (Guelph) Aquifer	21.29 – 24.33
MW10-I	Groundwater Monitoring Well	Bedrock (Eramosa-Upper Goat Island Aquitard)	51.79 – 54.84
MW10-D	Groundwater Monitoring Well	Bedrock (Lower Goat Island/Gasport Production Aquifer)	68.58 – 71.63

Prior to the test start date in May 2021, seven (7) residents granted permission for further monitoring, with two (2) of the former 10 residents declining and one (1) resident not having an accessible well to monitor. A licenced well technician assessed the ability to install and monitor the well on 522186 300 Sideroad, but it was deemed inaccessible for this test. As a result, a total of seven (7) domestic wells were used as monitoring stations for the 2021 aquifer test.

5. Well and Aquifer Testing

The results of the combined constant rate pumping test of PW7 and PW8 is presented graphically in **Appendix G**. Each graph provides data regarding the test pumping rate, manual measurements, water levels in each well prior to, during, and after the 7-day pumping test.

5.1. Aquifer Test

In preparation for the aquifer test, the SBA and BGE staff worked with the system operators to calibrate the pumping rate measured with the aid of a mechanical meter, which was confirmed by the Town's water operations staff. Datalogger operation was verified, and manual water level readings were taken and recorded in all stations prior to the pumping test.

The aquifer test began on May 11, 2021, at 12:00 p.m. (local time) and was set at a pumping rate of 18.9 L/s (1,633 m^3/day) at each pumping well (i.e., PW7 and PW8), with a combined rate of 37.8 L/s (3,266 m^3/day). The test was conducted in accordance with requirements set out in the temporary PTTW No. 3677-BZMJSU (issued on March 31, 2021) and is included in **Appendix B3**. The PTTW was issued to Town of Shelburne to operate the wells at a rate higher than the current permit. Pumping continued at this constant rate for a period of seven (7) days (10,080 minutes) and ended on May 18, 2021,

at 12:01 p.m. At approximately 5:00 a.m. on May 18 (9,660 minutes into test), both wells stopped pumping temporarily due to a communication alarm on the SCADA system. Pumping of the wells was restarted at approximately 7:30 a.m. the same day; however, maximum drawdown for the duration of the test was observed prior to the shutdown.

Throughout the aquifer test, the pumping rate was monitored by OCWA staff and the Town's SCADA system, with manual checks of the calibrated meter inside the water treatment plant daily. The water pumped from the wells was transmitted through the distribution system, with an overflow outlet opened at the end of the distribution system near the WPCP, approximately 5.3 km from the test site. The locations of all monitoring stations in relation to the pumping wells as well as the discharge location are shown on **Figure 1** in **Appendix A**.

Prior to, during, and following the aquifer testing, groundwater levels were measured and recorded in each monitoring station. Dataloggers were installed and calibrated in all stations and recorded groundwater levels at a minimum of 10-minute intervals. Barometric pressure was also recorded by an on-site datalogger (i.e., barologger installed at PW5 and PW6) for subsequent compensation of groundwater levels (i.e., pressure readings), which is approximately 2.9 km from PW7 and PW8. Manual measurements were also taken and recorded throughout the testing period in the adjacent wells. Manual measurements of groundwater levels at all locations taken at key times prior to and during the testing program were used to calibrate the respective datalogger readings relative to measuring points (i.e., meters below top of well casing [m btoc]).

5.2. Aquifer Performance

The evaluation of well and aquifer parameters is an iterative process that includes consideration of the following factors:

- Well design and location;
- Geology;
- Response of other local wells during the test period; and,
- Response of the pumped wells and aquifer during the test period.

5.2.1. Aquifer Test Results

The groundwater level data recorded manually and by dataloggers was compiled for each monitoring station and plotted for analysis. Hydrographs of water levels measured below the top of each well for the monitoring period, are presented in **Graphs 1 to 23** in **Appendix G**. Precipitation data for the area from the Mono Centre Environment Canada Station is represented in **Graph 24**. Interpretations of these results are described below relative to the respective types of groundwater monitoring stations.

Test Production Wells

Plots of drawdown and recovery were prepared for the pumped wells PW7 and PW8, for analysis of aquifer characteristics and sustainable yields. The semi-logarithmic plots illustrate the drawdown (i.e., reduction in water level from static) from the start of the pumping period, and recovery (i.e., increase in water level from the level at the end of pumping) following the pumping period. These semi-logarithmic plots are presented in **Graphs 25** and **Graph 26** for PW7 and PW8, respectively. Interpretations of these results are described below. Some of the data referenced is included in **Table 7**.

Table 7: Summary of Aquifer Test Results for PW7 & PW8

Test Well	PW7	PW8
Test Date	11 May 2021	11 May 2021
Well Record ID	A071535	A081584
Static Level (m bgl)	1.89	1.81
K (Calculated) (m/s)	4 x 10-4	
T (Estimated by Hantush-Jacob - AQTESOLV) (m^2/d)	65	
S (Estimated by Hantush-Jacob - AQTESOLV)	6 x 10-7	
Bottom of Well Casing (m btoc)	48.05	48.20
Est. Available Drawdown (AD) (m)	45.53	45.63
Pumping Rate (L/s)	18.92	18.92
Maximum Drawdown (m)/% AD	45.53 / 86.3	45.63 / 89.2

Pumping Well PW7

The plot of drawdown/recovery for the pumped well PW7 is presented in **Graph 25**, and indicates the following:

- Drawdown increased from the start of the pumping period to a maximum of about 39.3 m, by about 8,790 minutes (6.1 days), and then remained almost constant until the pump shut down at 9,660 minutes (6.7 days);
- The period of constant drawdown is interpreted as evidence of a recharge boundary and possibly some slow drainage of the aquifer;
- Recovery water levels lagged the drawdown trend until approximately 150 minutes;
- The maximum drawdown of 39.31 m during the aquifer test represents 86 percent (86%) of the 45.48 m of available drawdown (at the time of testing), as illustrated by the bottom of casing depicted on **Graph 1**, indicating the pumping rate of 18.9 L/s (1,633 m^3/day) is sustainable; and,
- The aquifer did not fully recover (recovery of 81 percent (81%) of available drawdown) before the well had to return to normal operation after 245 minutes of recovery.

Pumping Well PW8

The plot of drawdown/recovery for the pumped well PW8 is presented in **Graph 26**, and indicates the following:

- Drawdown increased from the start of the pumping period to a maximum of about 40.7 m, by about 9,090 minutes (6.3 days), and then remained almost constant until the pump shut down at 9,660 minutes (6.7 days);
- The period of constant drawdown is interpreted as evidence of a recharge boundary and possibly some slow drainage of the aquifer;
- Recovery water levels lagged the drawdown trend until approximately 200 minutes.
- The maximum drawdown of 40.71 m during the aquifer test represents 89 percent (89%) of the 45.54 m of available drawdown (at the time of testing), as illustrated by the bottom of casing depicted on **Graph 2**, indicating the pumping rate of 18.9 L/s (1,633 m^3/day) is sustainable; and
- The aquifer did not fully recover (recovery of 81 percent (81%) of available drawdown) before the well had to return to normal operation after 245 minutes of recovery.

5.3. Monitoring Well and Piezometer Interference

The groundwater level data recorded by dataloggers at a frequency of every 1-10 minutes was compiled for each water well. Hydrographs of water levels for the monitoring period (i.e., from May 2 to May 22, 2021) were prepared for each well as an initial step in the analysis. These are presented in **Graphs 1 to 16**. Relevant aspects of each hydrograph are summarized in **Table 9**.

Table 8: Summary of Monitoring Well Locations During May 11 to 18, 2021

Graph No.	Monitoring Station ID	Static Level 11 May 2021 (Pre-Test) (m btoc)	Estimated Distance from Pumped Well PW7/8 (m)	Estimated Observed Max. Drawdown (m) After Pumping PW7/8 for 7 Days
1	PW7	2.57	5.7	39.31
2	PW8	2.66	5.7	40.71
3	MW6-9	1.60	7.4	1.56
4	MW7-30	1.83	10.2	7.97
5	MW7-45	2.03	10.2	15.31
6	MW7-75	2.43	10.2	37.67
7	MP1-2	1.11	70	0.07
8	MW9	2.08	370	5.89
9	MW8-S	2.58	720	0.26
10	MW8-I	2.65	720	0.43
11	MW8-D	2.68	720	0.41
12	MW10-S	3.71	765	1.55
13	MW10-I	4.20	765	7.01
14	MW10-D	4.35	765	10.12
15	MP10	0.52	1440	0.07
16	SW10	1.34	1440	0.07

Observations for each of the 16 monitoring wells and piezometer stations are described below, beginning with those located closest to the pumping wells and continuing to the furthest radial distance. Distance was calculated from the midpoint between the two (2) pumping wells (i.e., 5.7 m). Comparison of the daily precipitation data was also evaluated in each station hydrograph, to evaluate if there was an effect on groundwater levels in the wells due to precipitation during the pumping and recovery periods. A total of 2.0 mm precipitation was recorded during the seven (7) days of the pumping test (May 11 to May 18, 2021). Precipitation for the area is shown in **Graph 24**. Drawdown at the end of the test is shown on **Figures 9, 10,** and **11.**

- **MW6-9**: The recorded water levels in MW6-9, the well closest to PW7 and PW8 (distance of 7.4 m), are presented in Graph 3. This graph illustrates that pumping of the production wells had an effect on water levels in the nearby overburden monitoring well. The maximum observed drawdown just prior to the end of pumping was 1.56 m. The well did not recover within four (4) days of the end of the test. The well does not appear to have been affected by precipitation during the test period.

- **MW7**: The monitoring well cluster MW-7, located approximately 10.2 m from PW7 and PW8, includes three (3) monitors completed at specified depths in the bedrock (30, 45, 75 m btoc). The recorded water levels in each monitor are presented in Graphs 4, 5, and 6. The observed changes in water levels in each monitor illustrates significant effects in response to pumping the production wells. The maximum observed drawdown just prior to the end of pumping was 7.97 m in the shallow monitor, 15.31 m in the intermediate monitor, and 37.67 m in the deep monitor. The results of the shallow and intermediate monitors showed the effects of pumping the deeper aquifer in the shallow and intermediate units above. The wells did not recover within four (4) days of the end of the test, as PW7 and PW8 were put back into cyclical operation within less than five hours of the end of the test. The wells do not appear to have been affected by precipitation during the test period.
- **MP1-2**: The recorded water levels in MP1-2, located about 70 m from PW7 and PW8, are presented in Graph 7. The observed changes in water level in the monitor illustrates minor effects in the shallow overburden in response to pumping the production wells. The maximum observed drawdown was 0.07 m approximately midway through the test on May 14, with a small amount of recovery by the end of the test. This graph also illustrates that the static water level declined gradually from May 6 through to May 21, which may account for a portion of the drawdown calculated. This monitor may have been affected by the precipitation observed on May 14-16 during the test, accounting for the recovery observed during the test period.
- **MW9**: The recorded water levels in MW9, located approximately 370 m from pumped well PW7 and PW8, are presented in Graph 8. The observed changes in water levels, in this shallow to intermediate monitoring well, illustrate the effects of pumping both production wells, but are considerably less in magnitude. The maximum observed drawdown just prior to the end of pumping was 5.89 m, showing effects of pumping the deeper aquifer in the shallow and intermediate units above. The well did not recover within four (4) days of the end of the test, as PW7 and PW8 were put back into cyclical operation within less than five (5) hours of the end of the test. The well does not appear to have been affected by precipitation during the test period.
- **MW8**: The monitoring well cluster MW-8, located approximately 720 m from pumping wells PW7 and PW8, includes three (3) monitors completed at various depths in the bedrock. The recorded water levels in each monitor are presented in Graphs 9, 10, and 11. The observed changes in water levels in each monitor illustrate minor effects in response to pumping the production wells. The maximum observed drawdown just prior to the end of pumping was 0.26 m in the shallow monitor, 0.43 m in the intermediate monitor, and 0.41 m in the deep monitor. The wells did not recover within four (4) days of the end of the test, as PW7 and PW8 were put back into cyclical operation within less than five (5) hours of the end of the test. The wells do not appear to have been affected by precipitation during the test period.
- **MW10**: The monitoring well cluster MW10, located approximately 765 m from PW7 and PW8, includes three monitors completed at various depths to monitor individual bedrock units. The recorded water levels in each monitor are presented in Graphs 12, 13, and 14. The observed changes in water levels in each monitor illustrates significant effects in response to pumping the

test well in the intermediate and monitors. The maximum observed drawdown just prior to the end of pumping was 1.55 m in the shallow monitor, 7.01 m in the intermediate monitor, and 10.12 m in the deep monitor. The results of the shallow and intermediate monitors show effects of pumping the deeper aquifer in the shallow and intermediate units above. The wells did not recover within four (4) days of the end of the test, as PW7 and PW8 were put back into cyclical operation within less than five (5) hours of the end of the test. The wells do not appear to have been affected by precipitation during the test period.

- **MP10**: The recorded water levels in MP10, located about 1440 m southeast from PW7 and PW8, located near the intersection of Highway 89 and 2 Line SW are presented in Graph 15. There was minimal observed decrease in shallow groundwater levels in this area during pumping of the production wells. Drawdown of 0.07 m was observed during the first portion of the test with an increase in water level observed during the later half of the test. This monitor appears to be affected by rainfall events and the increase in water level observed on May 14 corresponds to minor precipitation observed during the test period. Rainfall that occurred during the beginning of the monitoring period from May 2 to May 6 could also contribute to elevated static water levels prior to the test and trends show water levels steadily declined from May 6 to May 21.
- **SW10**: The recorded water levels in SW10, located about 1440 m from PW7 and PW8, located near the intersection of Highway 89 and 2 Line SW are presented in Graph 16. There was minimal observed decrease in water levels in the surface water monitor well during pumping of the production wells. Drawdown of 0.07 m was observed during the first portion of the test with an increase in water level observed during the later half of the test. This monitor appears to be affected by rainfall events and the increase in water level observed on May 14 corresponds to minor precipitation observed during the test period. Rainfall that occurred during the beginning of the monitoring period from May 2 to May 6 could also contribute to elevated static water levels prior to the test and trends show water levels steadily declined from May 6 to May 21.

5.4. Domestic Wells

The following section summarizes the results of domestic wells monitored during the test period. Prior to the test commencing, it was requested that the owners limit water usage during the test, however some usage was observed through the test period.

Table 9: Summary of Domestic Well Monitoring Locations during May 11-18, 2021

Graph No.	Monitoring Station ID	Static Level May 11, 2021 (Pre-Test) (m btoc)	Estimated Distance from Pumped Well PW7/8 (m)	Interpreted Maximum Drawdown (m) (Post-Test)
17	116139	2.02	155	2.84
18	116116	2.99	290	2.01
19	116203	6.50	605	1.63
20	116063	1.44	825	0.76
21	504224	2.38	1290	0.19
22	116278	5.17	1305	0.30
23	504336	1.38	1430	0.00

- **Domestic Well 116139:** The recorded water levels in domestic well 116139, located about 155 m east of the production wells across 2 Line SW, are presented in **Graph 17**. The observed changes in water levels during the test pumping period clearly illustrate a response to pumping of the production wells. The maximum observed drawdown prior to the end of pumping was 2.84 m. Some fluctuation in water levels is observed through the test period and is attributed to domestic well usage for short intervals. The well did not recover within four (4) days of the end of the test, as PW7 and PW8 were put back into cyclical operation within less than five (5) hours of the end of the test. The well does not appear to have been affected by precipitation during the test period.
- **Domestic Well 116116:** The recorded water levels in domestic well 116116, located about 290 m southeast along 2 Line SW from the production wells are presented in **Graph 18**. Approval to proceed with monitoring was received from the well owner on May 10 and began on May 11. The observed changes in water levels during the test pumping period clearly illustrate a response to pumping of the production wells. The maximum observed drawdown just prior to the end of pumping was also 2.01 m and is inferred to be the bottom depth of the well. The overburden water supply near the production wells appears to be affected by the increased pumping of the aquifer, and the water level recovery lagged during the recovery period after pumping ceased. Some fluctuation in water level is observed through the test period and is attributed to domestic well usage for short intervals. The well did not recover within four (4) days of the end of the test. The well appears to have been affected by precipitation during the test period, with a slight recovery in water level observed on May 16.
- **Domestic Well 116203:** The recorded water levels in domestic well 116203, located about 605 m northwest along 2 Line SW from the production wells are presented in **Graph 19**. The observed changes in water level during the test pumping period clearly illustrate a response to pumping of the production wells. The maximum observed drawdown just prior to the end of pumping was 1.63 m. Some fluctuation in water level is observed through the test period and is attributed to

domestic well usage for short intervals. The well did not recover within four (4) days of the end of the test. The well does not appear to have been affected by precipitation during the test period.

- **Domestic Well 116063:** The recorded water levels in domestic well 116063, located about 825 m southeast along 2 Line SW from the production wells, are presented in **Graph 20**. The observed changes in water levels during the test pumping period illustrate a minor response to pumping of the production wells. The maximum observed drawdown just prior to the end of pumping was 0.76 m. Some fluctuation in water level is observed through the test period and is attributed to domestic well usage for short intervals, which were significantly greater than the changes in the static water level. The well did not recover within four (4) days of the end of the test. The well does not appear to have been affected by precipitation during the test period.
- **Domestic Well 504224:** The recorded water levels in domestic well 504224, located about 1290 m south of the production wells are presented in **Graph 21**. Drawdown of 0.19 m was observed through the test period. The graph illustrates a downward trend of the static water level in this well over the monitoring period that can be attributed to Spring seasonal decline, and it can be interpreted that pumping of the test production wells had little to no effect on water levels in this domestic well. Some fluctuation in water level is observed through the test period and is attributed to domestic well usage for short intervals. The well did not recover within four (4) days of the end of the test. The well does not appear to have been affected by precipitation during the test period.
- **Domestic Well 116278:** The recorded water levels in domestic well 116278, located about 1305 m northwest along 2 Line SW from production wells PW7 and PW8, are presented in **Graph 22**. The maximum observed drawdown just prior to the end of pumping was about 0.29 m, and the observed changes in water levels during the test pumping period indicate a possible minor response to pumping of the test production wells. The graph illustrates a downward trend of the static water level in this well over the monitoring period that can be attributed to spring seasonal decline, and it can be interpreted that pumping of the test production wells had little to no effect on water levels in this domestic well. Some fluctuation in water level is observed through the test period and is attributed to domestic well usage for short intervals. The well did not recover within four (4) days of the end of the test. The well does not appear to have been affected by precipitation during the test period.
- **Domestic Well 504336**: The recorded water levels in domestic well 504336, located about 1430 m southeast along 2 Line SW of the production wells are presented in Graph 23. This graph clearly illustrates that pumping of the test production wells had no effect on water levels in this domestic well. The graph also illustrates the static water level increased several centimeters leading up to and during the test period. This increase in local groundwater levels is interpreted to be a response to the rainfall that occurred from May 2 to May 6 as well as May 14 to May 16. Soon after, the water level continued to decline gradually through to May 21 and can be attributed to spring seasonal decline. Some fluctuation in water level is observed through the test period and is attributed to domestic well usage for short intervals. The well does not appear to have been affected by precipitation during the test period.

Well Owner Response

There were two (2) complaints of low water level received from the resident at 116116 2 Line SW immediately following the aquifer test period. On the basis of the test results, it can be concluded that the shallow overburden water supply in proximity of Well 7/8 was affected by the increased pumping of the aquifer, and the water level recovery lagged during the recovery period after pumping ceased.

The well owner at 504336 Highway 89 submitted a complaint at the end of the test regarding electrical issues with the existing pumping equipment. No effect on well water level was observed due to this issue, and the electrical and equipment issue was resolved with the homeowner and a well technician.

6. Interpretation of Test Results

The results of the pumping test for PW 7/8 at the combined pumping rate of (36 L/min) demonstrate the safe perennial yield for the wells and aquifer. The analysis is presented in this Section to support this conclusion.

As described previously, the aquifer performance test began on May 11, 2021, at 12:00 p.m. local time, with PW7 and PW8 each pumping at a rate of 18.9 L/s, and a combined rate of 37.8 L/s. Pumping continued at this combined constant rate for an uninterrupted period of approximately seven (7) days (10,080 minutes), with one pumping interruption on May 18, 2021 (Day 7) at 5:00 a.m. (9,660 minutes), where pumps were restarted at approximately 7:30 a.m. (150 minutes after shutdown). The constant pumping rate continued until the end of the test at 12:01 p.m. on May 18, 2021.

The aquifer assessment considers multiple parameters including well design, local geology, response of local wells, and response of the pumped wells and monitoring wells during the test period. These factors along with key two (2) hydrogeological interpretations will be described in the following sections, these interpretations are:

- The production wells are completed in a semi-confined “leaky” bedrock aquifer; and,
- Towards the end of the pumping period, the pumping level was approaching a recharge boundary where aquifer recharge was nearing the same rate as the pumping rate.

Plots of drawdown and recovery were prepared for the monitoring stations that showed effects of pumping the production wells. These plots were analyzed to estimate aquifer characteristics and sustainable yields. The semi-logarithmic plots illustrate the drawdown until the end of the pumping period, and the recovery measurements illustrate the increase in water level following the pumping period. These plots are presented in **Graphs 24** and **Graph 25** in **Appendix G** and interpretations of these results are described below.

6.1. Production Wells

6.1.1. Seven-Day Aquifer Test Response

PW7: The plot of drawdown / recovery for production well PW7 is presented in **Graph 24** and the combined pumping test model is presented in **Graph 26.** The plots indicated the following trends:

- The drawdown observed reflects the response of the aquifer to the combined pumping rate and mutual interference of the two (2) production wells, PW7 and PW8.
- A total of 39.31 m of drawdown was observed after 6.7 days of continuous pumping, representing 86% of the available drawdown of 45.48 m.
- The aquifer did not fully recover (recovery of 81% of available drawdown) before the well returned to normal operation after 245 minutes of recovery.
- A steepening slope in the earlier time data (i.e., doubling of the slope Δs) during the pumping period is interpreted as the mutual interference between the two production wells. The flattening of the slope by approximately 8,790 minutes (6.1 days) is interpreted as a recharge boundary to the aquifer. This graph indicates an aquifer transmissivity of PW7 is estimated as 39 m^2/day from the test data of PW7, using a straight-line Cooper-Jacob method of analysis. However, as two (2) wells were pumping concurrently, this method underestimates transmissivity.
- For semi-confined, leaky aquifers the method to determine aquifer transmissivity must be estimated using the Hantush-Jacob (1955) method with the principal of superposition incorporated into the analysis for two pumping wells. The test was modelled using AQTESOLV Standard (Version 4.50.002). Applying this approach and with the interpreted leaky, semi-confined aquifer condition, the aquifer transmissivity value of 65 m^2/day was estimated using the combined test data from PW7/8 and deep monitoring well data (MW7-75, MW8-D, and MW10-D). The results from this program are presented in **Graph 27** in **Appendix G**.

PW8: The plot of drawdown / recovery for production well PW8 is presented in **Graph 25** and the combined pumping test model is presented in **Graph 26**. The plot indicated the following trends:

- The drawdown observed reflects the response of the aquifer to the combined pumping rate and mutual interference of the two (2) production wells, PW7 and PW8.
- A total of 40.71 m of drawdown was observed after 6.7 days of continuous pumping, representing 89% of the available drawdown of 45.54 m.
- The aquifer did not fully recover (recovery of 81% of available drawdown) before the well returned to normal operation after 245 minutes of recovery.
- Similar to PW7, a steepening slope in the PW8 earlier time data (i.e., Doubling of the slope Δs) during the pumping period is interpreted as the mutual interference between the

two (2) production wells. The flattening of the slope is interpreted as a recharge boundary to the aquifer. The aquifer transmissivity of PW8 is estimated as 41 m^2/day from the test data of PW8, but similar to PW7, is considered to be underestimated.

- As explained for PW7, with mutual well interference as in when more than one well is pumped, for semi-confined, leaky aquifers the method to determine aquifer transmissivity must be estimated using the Hantush-Jacob (1955) method with the principal of superposition incorporated into the analysis for two (2) pumping wells. The test was modelled using AQTESOLV Standard (Version 4.50.002) and the aquifer transmissivity value of 65 m^2/day was estimated using the combined test data from PW7/8 and deep monitoring well data (MW7-75, MW8-D, and MW10-D). The results from this program are presented in **Graph 27** in **Appendix G**.

6.1.2. Projected Long-term Aquifer Response and Production Well Available Drawdown

To project the long-term response of the deep, bedrock aquifer due to the combined rate of the production wells, the observed drawdown trend was projected forward for a duration of twenty years (i.e., using a straight-line projection on the semi-logarithmic time axis). This method assumes a worst-case scenario in which no groundwater recharge occurs in the aquifer over this period. The available drawdown in PW7 at the time of testing in May 2021 was 45.48 m. Applying the safety factor of 5 percent (5%), the effective available drawdown at that time would be 43.21 m. If the observed drawdown trend in PW7 during the aquifer test was extended for a duration of 20 years, the estimated drawdown would remain at approximately 41.5 m (**Graph 28**). Even under this condition the estimated drawdown is within the recommended safety factor.

Following the same analytical method for PW8, the available drawdown in May 2021 was 45.54 m. Applying the safety factor of 5 percent (5%), the effective available drawdown at that time would be 43.26 m (**Graphs 29**). If the observed drawdown trend in PW8 during the aquifer test was projected for a duration of 20 years, the estimated drawdown would be approximately 42.5 m. Even under this condition the estimated drawdown is within the recommended safety factor.

6.2. Observed Drawdown at Monitoring Locations

The maximum drawdown at all groundwater monitoring locations is presented in **Table 8** and **Table 9** in **Section 5.3** and **5.4**, respectively. Locations where no drawdown was observed are denoted as a zero value, indicating no observed effects from pumping the production wells. **Figures 9**, **10**, and **11** in **Appendix A** represent the observed drawdown at each monitoring station based on depth of the monitor (surface or overburden; shallow or intermediate bedrock; deep bedrock). The extent of drawdown in all monitored locations is noted as drawdown observed at the end of the 6.7 days (9,660 minutes) of pumping.

Graphs 30 to **44** in **Appendix G** represent the plots of drawdown / recovery for each monitoring location where drawdown was observed. The analysis of the results is summarized as follows:

- The earlier time drawdown data for the monitoring wells MW7-75, MW10-D and MW8-D, located in the supply aquifer, were used to determine the aquifer transmissivity of 65 m^2/day, estimated using Hantush-Jacob (1955), and with the principal of superposition incorporated into the analysis for two (2) pumping wells, PW7 and PW8. The test was modelled using AQTESOLV Standard (Version 4.50.002) and the results from this program are presented on **Graph 27** in **Appendix G**.
- Transmissivity (T) is a function of aquifer thickness (b) and hydraulic conductivity (K); therefore, a higher T value can represent either a potentially thicker aquifer in a monitoring location or materials that transmit water more easily, it can also indicate a hydraulic gradient from the monitoring location. Conversely, a lower T value can potentially indicate a thinner aquifer and hydraulic gradient from the monitoring location.
- A steeping of slope at two points (i.e., doubling of delta s) during the early time data of the pumping period (0-1000 minutes) for MW7-75, MW8-D, and MW-75 indicates mutual interference of the pumping wells, and again at approximately 1000 minute to 1500 minutes and then onward to the end of the test indicates a recharge boundary to the aquifer.
- Drawdown observed in 116139 2 Line SW (**Graph 41**) in domestic well closest to the production wells by the end of the pumping period, indicates a potential hydraulic gradient in this direction due to the reduction in the shallow overburden and bedrock groundwater levels occurred in the semi-confined aquifer south of the production wells, supporting the interpretation that the aquifer is leaky and semi-confined.
- Drawdown observed in the 116116 2 Line SW (**Graph 42**) monitoring location (overburden) near the well indicates a potential hydraulic gradient in this location, supporting the interpretation that the aquifer is leaky and semi-confined.

The extent of drawdown observed at the end of the pumping period is illustrated by a plot of drawdown versus distance in **Graph 45**. This graph illustrates that there was no drawdown at a distance beyond about 850 m. At approximately 1,430 m no drawdown was observed in the domestic well located at 504336 Highway 89. An estimate of transmissivity is also shown in **Graph 45,** for comparison to the analysis discussed above for pumping wells PW7 and PW8. The area of influence is interpreted as being irregularly shaped and is discussed further in **Section 7.**

6.3. Sustainable Well and Aquifer Yield

To establish a safe perennial yield for the pumping wells and the aquifer, the response of the wells and aquifer is estimated for a prolonged period of pumping. This is achieved by extending the drawdown trends in the pumped well and monitored wells, exhibited during an aquifer performance test, for a period of 20 years on the semi-logarithmic plot. The maximum pumping rate of the well is also limited by the

well dimensions and other factors. The safe perennial yield for the pumped well is the continuous pumping rate that would consume about 80 percent (80%) of the available drawdown in the well, if the well was pumped continuously for 20 years, with the conditions prevailing at the time of the test. This is a very conservative, perhaps unrealistic, method of analysis, because it does not account for any recharge to the supply aquifer over the 20-year period. Therefore, a safety factor of 5 percent (5%) has been incorporated into this analysis as discussed in the preceding section.

By applying these criteria, conclusions can be made with respect to the safe perennial yield of wells PW7 and PW8, and the safe perennial yield of the aquifer (otherwise referred to as the sustainable yield). It is important to note the safe perennial yield for the pumping wells is the rate the well can sustain when the two (2) wells are pumped concurrently.

Based on the pumping rate of the aquifer test, the projected response of the well and aquifer, the effective available drawdown, and the well dimensions, the safe perennial yield for the well is confirmed to be of 37.8 L/s (3,266 m^3/day) when the two (2) pumping wells PW7 and PW8 are pumped concurrently.

7. Effects of Increased Municipal Water Supply Production on Local Water Resources

The effects on local water resources as a result of pumping production wells PW7 and PW8 is examined in conjunction with the interpretation of the results of the aquifer performance test. As discussed in the previous section, the sustainable yield of the aquifer has been confirmed to be 37.8 L/s (3,266 m^3/day) when the two (2) pumping wells PW7 and PW8 are pumped concurrently. The maximum drawdown at each monitoring station observed during the May 2021 pumping test is summarized in **Table 10** below.

7.1. Inferred Area of Influence in Supply Aquifer

To assess the potential effects of increasing the pumping rate of the municipal production wells on local water resources, the area of influence within the semi-confined bedrock aquifer at the end of the seven (7) day pumping test must be considered. For each monitoring location, the observed drawdown during the pumping test was determined from the individual hydrographs (**Appendix G**). The results are presented in **Table 10** noting the maximum observed drawdown at the end of the pumping period and sorted by distance from the closest pumping municipal production well.

Table 10: Summary of Distance vs Drawdown Observed in Supply Aquifer during May 11-18, 2021

Station	Monitor Type / Formation	Distance from Production Wells	Maximum Observed Drawdown (m btoc)
PW7	Production Well	5.7	39.31
PW8	Production Well	5.7	40.71
MW7-75	Deep Bedrock Well	10.2	37.67
MW8-D	Deep Bedrock Well	720	0.41
MW10-D	Deep Bedrock Well	765	10.12

The maximum observed drawdown values in **Table 10** have been interpreted to estimate the area of influence as well as using the information from the plot of distance from pumping well versus maximum observed drawdown (**Graph 45**).

Figure 12 shows the inferred area of influence surrounding PW7 and PW8 represented with 5.0 m inferred groundwater contour intervals in the supply aquifer. As noted previously most of the domestic wells in the study area obtain water from either the overlying shallow bedrock (Guelph Formation) or overburden aquifers and do not draw water from the supply aquifer. Therefore, the contours have been inferred from the deep monitoring stations, MW7-75, MW8-D, and MW10-D.

7.2. Effects on Groundwater Supplies

The inferred area of influence in the semi-confined bedrock aquifer (supply aquifer) due to pumping PW7 and PW8 is presented in **Figure 12**. This area indicates drawdown for the supply aquifer only and not the drawdown that occurs in the overlying bedrock and overburden layers, as they are separated by geologic aquitard layers that are known to have vertical and horizontal fractures contributing the "leaky" semi-confined model of the supply aquifer. The overburden layer above the bedrock at this location is overlaid with clay intermixed with stone as noted in the well record, in varying thickness and composition. This distinction is important to note for the potential impacts on surface water features as discussed in the following sections.

Due to the leaky status of the supply aquifer, it is interpreted from the results of the pumping test that groundwater supplies in the 1.5 km study area will experience varying effects from increased pumping. The majority of domestic wells monitored during this study terminated in the shallow bedrock (Guelph Formation) excluding 116116 2 Line SW. The domestic wells located closest to the pumping wells experienced a minor reduction in water level during the test, which is not expected to have long-term impacts on the owner's usage and available supply. The other domestic wells in the study area had similar trends with decreasing effects the farther from the pumping wells.

The well located at 116116 2 Line SW is suspected to be terminated above the Guelph formation (based on available well records of the area and measured well depth). This well experienced low water level that impacted the occupant's available water supply at the time of the test and recovery of water level lagged through the recovery period.

7.3. Effects on Willowbrook Creek Complex

7.3.1. Surface Water

Graph 15 shows the results of the shallow groundwater mini-piezometer station MP10, during the pumping test. The stations also show minimal effect of pumping on the stations during seven (7) days of continuous pumping. There was 0.07 m of observed drawdown at station MP10 during the test period,

with the period of greatest drawdown observed on May 14, approximately mid-way through the test, followed by a period of increased water level in the station due to a minor precipitation event on May 14 to 16, 2021.

Graph 16 shows the results of monitoring surface water station SW10 during the pumping test. The station shows that during the test there is a minimal effect of pumping on the surface water station during seven (7) days of continuous pumping. There was 0.07 m of observed drawdown at station SW10 during the test period, with the period of greatest drawdown observed on May 14, approximately mid-way through the test, followed by a period of increased water level in the station due to a minor precipitation event on May 14 to 16, 2021.

7.3.2. Aquatic Habitat

At this time there are no anticipated effects on aquatic habitat as the results of monitoring SW10 and MP10 are within the expected seasonal fluctuations and can be observed that this station responds to precipitation events and continues to decline post-test with season expectations for early Spring. The amount of drawdown observed did not significantly decrease the quantity of water in Willowbrook Creek Complex during and is more likely to be impacted by seasonal fluctuations or alterations or obstructions to the channel.

8. Groundwater Quality

The Town of Shelburne has had groundwater samples collected yearly from production wells PW7 and PW8 from 2016 to 2020 (5 years). Each year, the samples taken were given the following tests:

- **Microbiological Tests** – Evaluated with reference to the respective parameters listed under Schedule 10, 11 or 12 of *Ontario Regulation 170/03.*
- **Operational Tests** - Evaluated with reference to the respective parameters listed under Schedule 7, 8 or 9 of *Ontario Regulation 170/03.*
- **Inorganic Tests** - Evaluated with reference to the respective parameters listed under Schedule 23 of *Ontario Regulation 170/03.*
- **Organic Tests** - Evaluated with reference to the respective parameters listed under Schedule 24 of *Ontario Regulation 170/03.*
- **Bacteriological Testing** - Evaluated with reference to the respective parameters listed under Schedule 10 of *Ontario Regulation 170/03.*

Ontario Regulation 170/03 is the Drinking Water Systems regulation under the *Safe Drinking Water Act, 2002*. The concentrations of the parameters analyzed were below the applicable criteria of the schedules listed above. The data and results of the testing can be found in **Appendix H1** and the laboratory

reports are included in **Appendix H2**. In summary, the following points highlight the key parameters of the testing:

- No presence of E. coli or Total Coliforms was reported during weekly testing from 2016 – 2020, as well as the May 2021 testing.
- There were no exceedances in the following inorganic parameters: antimony, arsenic, barium, boron, cadmium, chromium, mercury, selenium, uranium, fluoride, nitrite, nitrate, and sodium, which were tested annually.
- The maximum turbidity in the grab samples from both PW7 and PW8 are 0.86 NTU during testing from 2016 – 2020, which is constantly below the ODWQS limit of 1.0 NTU in the treated water.
- There were never any exceedances in nitrite and nitrate which was tested on a quarterly basis.
- The residual chlorine ranges from 0.54 - 3.11 mg/L and 0.50 - 2.38 mg/L at PW7 and PW8 treated water, respectively during testing from 2016 - 2020.

The wells located within the Town of Shelburne (PW1, PW3, PW5/6) contain elevated levels of arsenic concentrations higher than legal drinking standards (0.01 mg/L) in the water being obtained. Groundwater found in the shallow bedrock aquifers contain high arsenic levels. Once wells PW7 and PW8 were drilled, it was found that groundwater obtained from the deeper Gasport Formation aquifer had much more desirable water chemistry, specifically much lower levels of naturally occurring arsenic. Due to its lower arsenic concentrations, water from PW7 and PW8 is blended with water from PW5 and PW6 to meet Provincial Water Quality Objectives.

On May 10 and May 19, 2021, routine bacteriological testing was conducted by OCWA staff before and after the pumping test of the production wells. No instances of E. Coli or total coliforms were detected in the raw water samples from each production well.

9. Source Water Protection

The results of the pumping testing and monitoring results presented in this report can be used to support the Town of Shelburne Water Supply Schedule ‘B’ Municipal Class Environmental Assessment, as required for the completion of the Municipal Class Environmental Assessment (CEA). A Well Field Capacity Assessment is currently being conducted as a condition in the Town of Shelburne’s Permit to Take Water. These studies cumulatively support the Town of Shelburne’s request to increase the water takings from Well 7/8 as prescribed in the Permit to Take Water (P-300-1082818689).

10. Conclusions

Based on the information and analysis presented in this report, the following conclusions are made regarding the aquifer test and groundwater characteristics of production wells PW7 and PW8 for the Town of Shelburne.

1. PW7 and PW8 have been upgraded to accommodate rates of 18.9 L/s from each well. It was noted that the pitless adapter is leaking in PW8 and the ground around the wellhead is saturated.

2. A monitoring network of bedrock monitoring wells, overburden wells, shallow groundwater and surface water stations was established in a 1.5 km radius around the well site. Drawdown was observed in the bedrock monitoring wells, however minimal effect on the bedrock wells was observed and is estimated to not impact the supply to local domestic wells. The overburden well located at 116116 2 Line SW had a significant effect during the pumping and recovery periods combined with usage by the resident.

3. Each of the production wells can sustain 18.9 L/s for a period of seven (7) days of continuous pumping, for a combined rate of 37.8 L/s from the aquifer.

11. Recommendations

The following recommendations regarding the aquifer test and groundwater characteristics of production wells PW7 and PW8 for the Town of Shelburne have been made concerning the increase to demand on the aquifer surrounding PW7 and PW8 for the Town of Shelburne's water supply.

1. It is recommended that this report be submitted to the MECP for review and comment and to the source water protection committees for GRCA and NVCA watersheds.

2. Upon review and acceptance, this report should be used to support the increased permit to take water at a rate of 37.8 L/s for the Town of Shelburne's expected increase in demand.

3. It is recommended that further upgrades be undertaken by the Town to repair the leaking pitless adapter in PW8, as recommended through previous work. This will extend the lifecycle of the well and reduce further maintenance to the well site due to saturated conditions.

4. It is recommended to construct a back-up supply to Production Wells PW7 and PW8. The addition of Production Well PW9 to the Town of Shelburne water supply system at this location will provide redundancy to the system to continue to meet population demand, should one of the wells go offline due to equipment or process issues in the future.

5. Increased pumping from the aquifer appears to influence the groundwater levels in the overburden well located at 116116 2 Line SW. During the pumping test, water levels in the well were observed to decrease through the test. In the days immediately after the test was concluded, the resident at the property noted low water levels requiring additional supply to be trucked to the property.

   Communication should be maintained with this well owner as to the effects on the well when pumping rates are increased or any observed seasonal effects. If effects are due to increased pumping of the municipal wells, action may involve periodically supplying water to the well during low water seasons, or construction of a deeper, drilled well to provide adequate supply to the property owner.

   In 2023, it was noted during field monitoring around the PW7 and PW8 monitoring well network, that the property usage at 116116 2 Line SW had changed from primarily residential to a livestock operation. In discussion with NVCA, a Risk Management Plan and Nutrient Management Strategy through OMAFRA had been prepared for the property in 2022 through consultation with the owner. It is recommended that these plans be regularly reviewed based on current number of livestock and agricultural activities at the property for any increased risk to source water protection. Agency stakeholders should continue to communicate with the owner as to any recommended changes to the existing plans.

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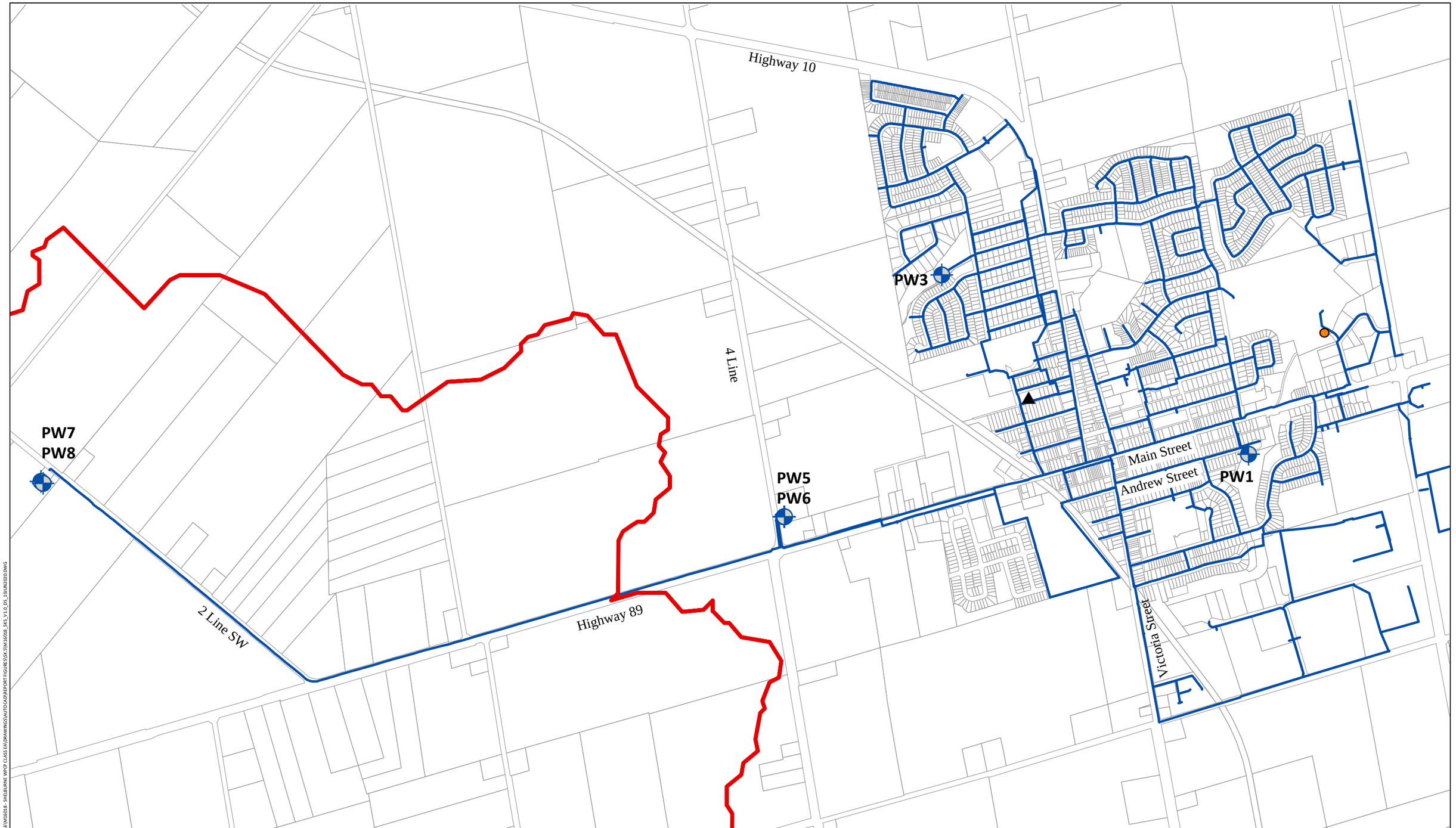
Appendix A

Figures



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Legend

- Conservation_Authority_Administrative_Area
- Municipal Well
- Water Tower
- Watermain
- Dufferin County Parcels
- Discharge Location

No.	DATE	ISSUE/REVISION
1.	25-JUN-20	ISSUED FOR REVIEW
2.	23-AUG-23	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST AND MONITORING RESULTS OF PRODUCTION WELLS PW7/PW8

DRAWING TITLE: TOWN OF SHELBURNE WATER SUPPLY WELL LOCATIONS

S. BURNETT & ASSOCIATES LIMITED
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TELEPHONE: 519-941-2949 FAX: 519-941-2036

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I.C.	S.L.	S.B.	FIGURE 1

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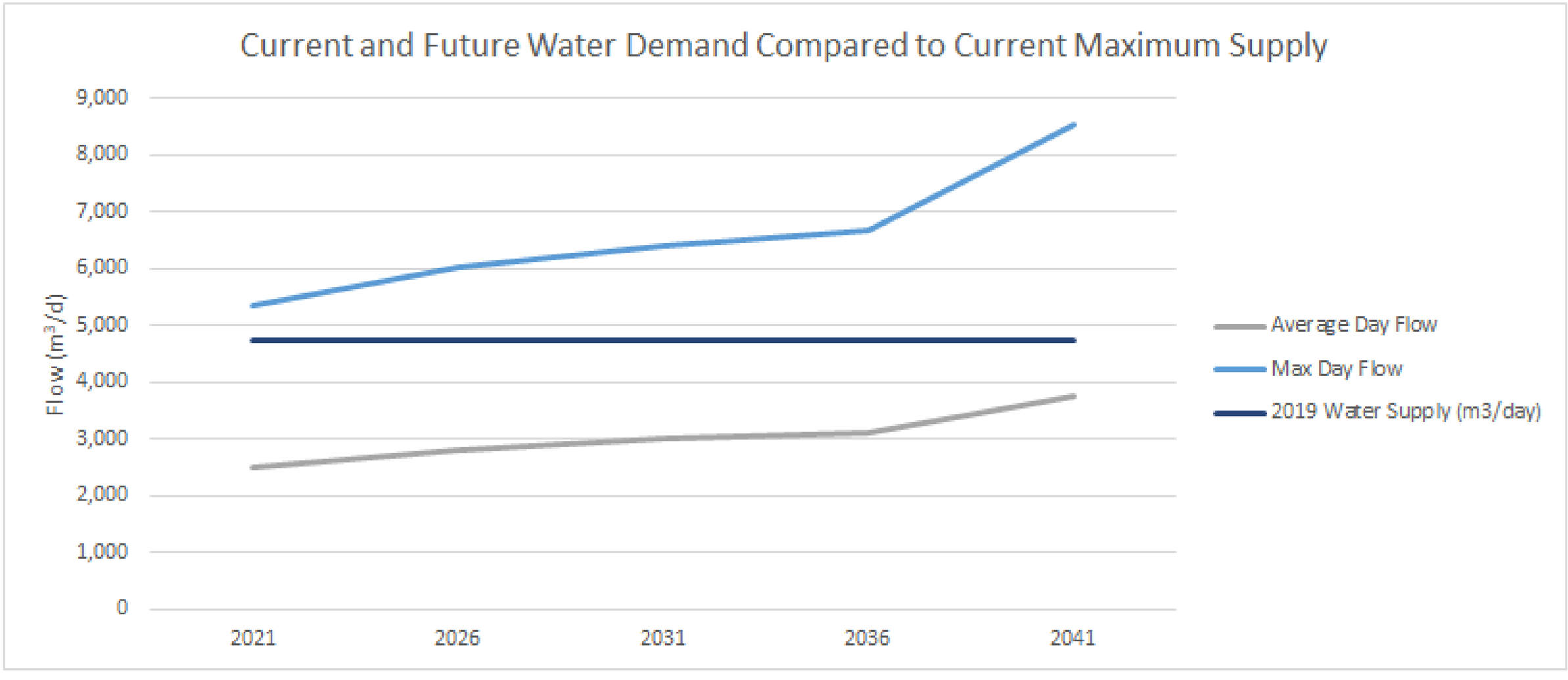

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2.	23-AUG-23	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST AND MONITORING RESULTS OF PRODUCTION WELLS PW7/PW8

DRAWING TITLE: CURRENT AND FUTURE WATER DEMAND

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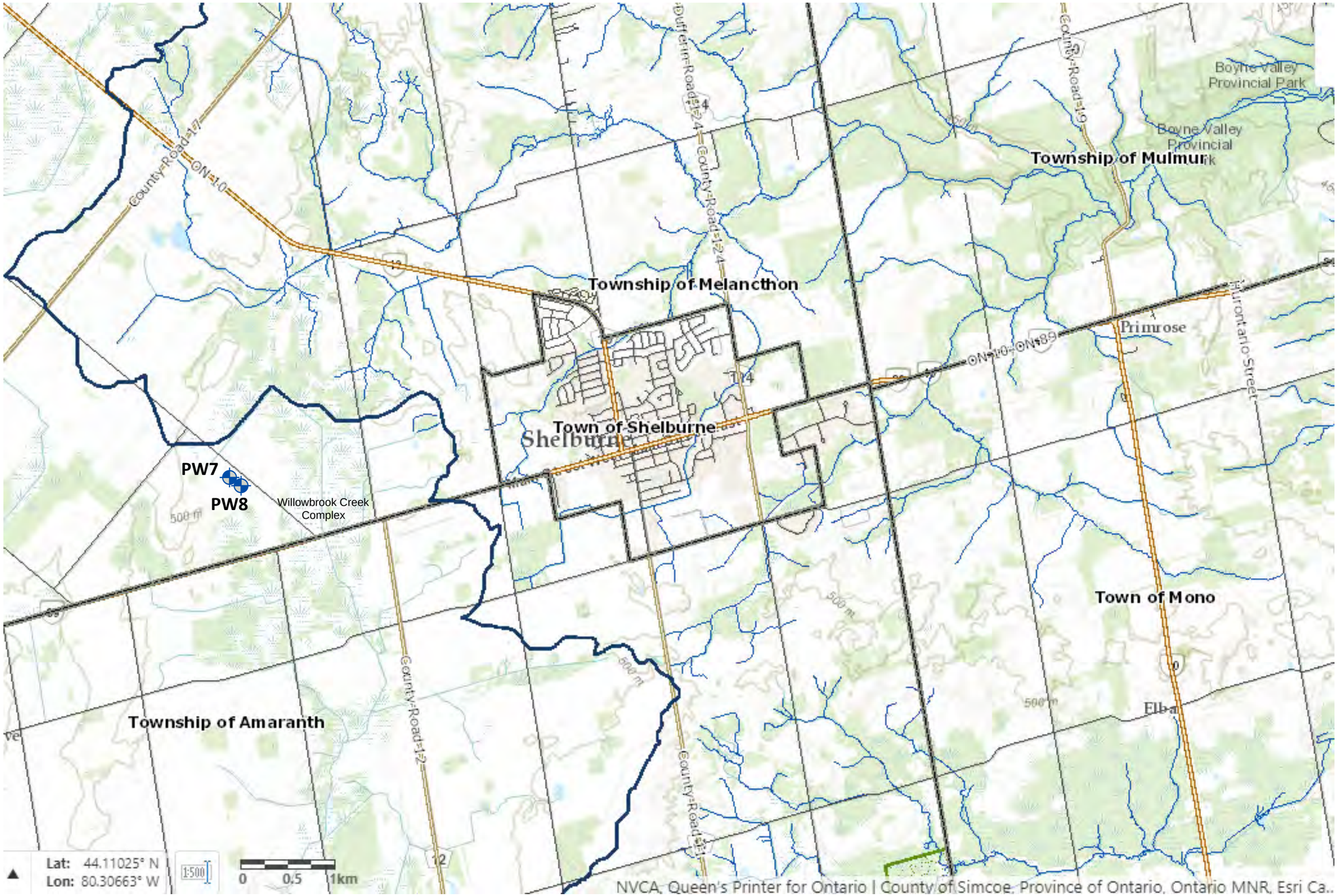

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Legend

- Production Well
- GRCA/NVCA Watershed Boundary

Source: NVCA - Interactive Mapping

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CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST AND MONITORING RESULTS OF PRODUCTION WELLS PW7/PW8

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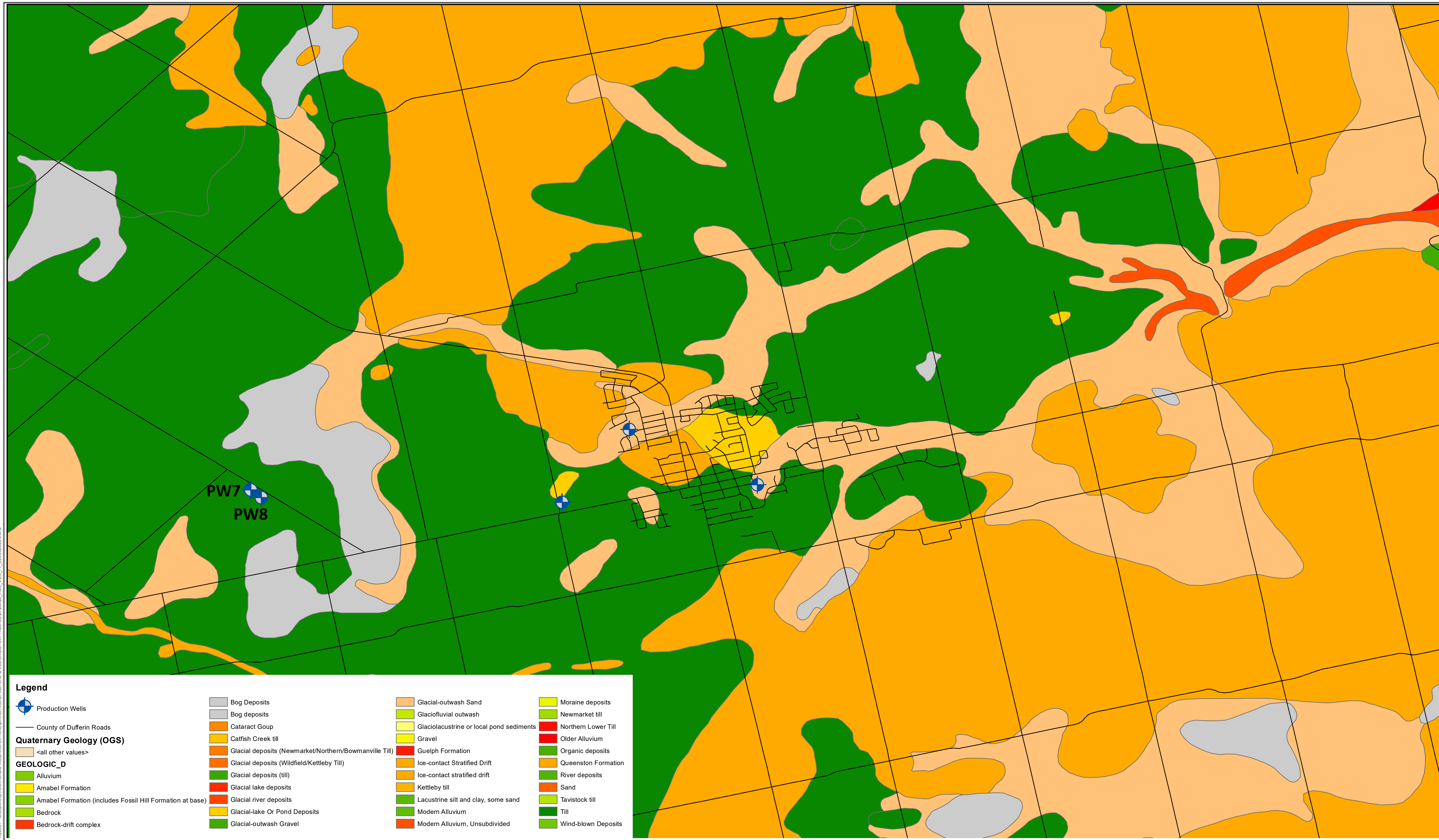

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PROJECT: PUMPING TEST AND MONITORING RESULTS OF PRODUCTION WELLS PW7/PW8

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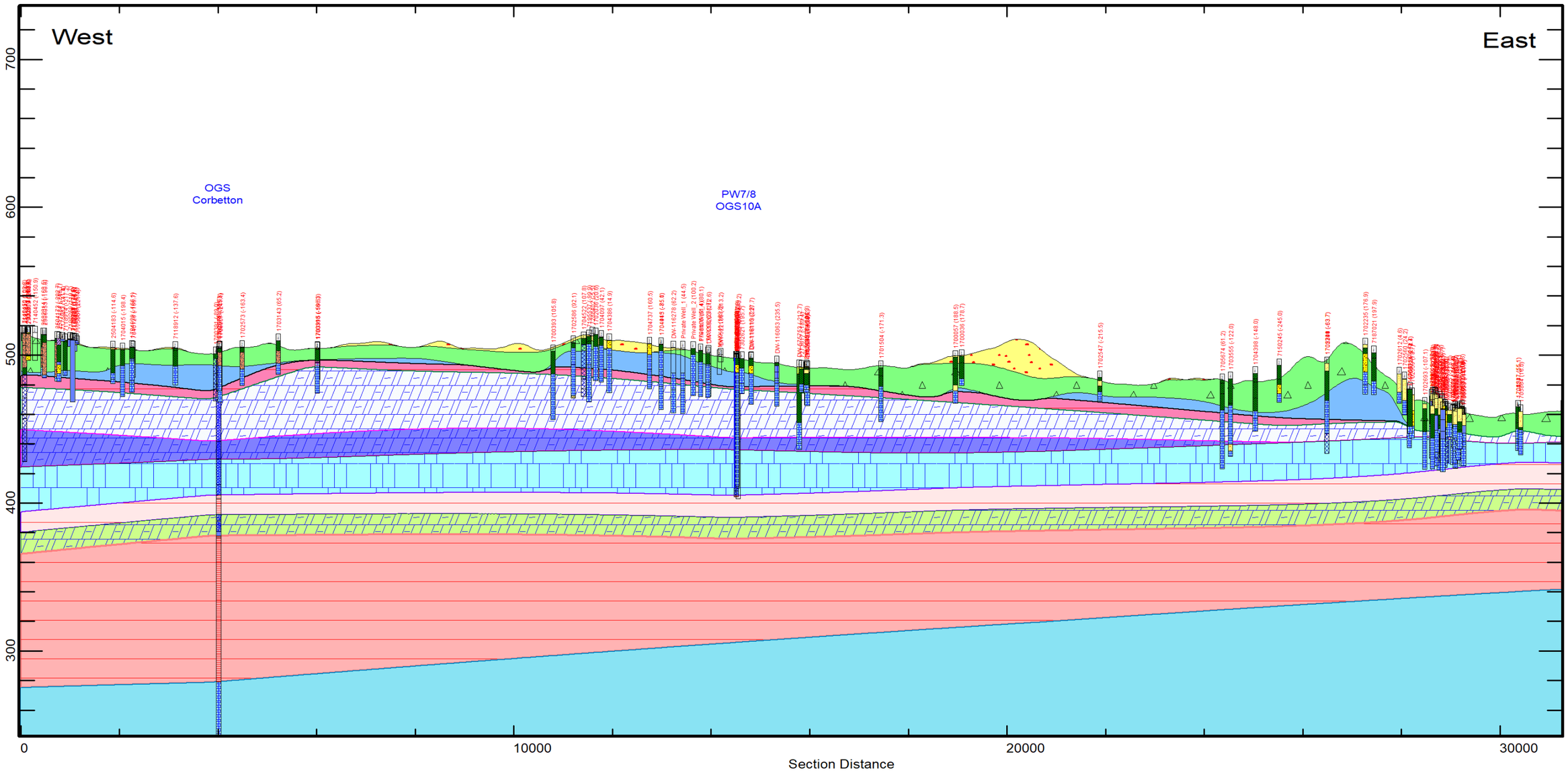

Source: Figure 3.6 of Updated Wellhead Protection Area Delineation, Vulnerability Scoring, and Threats Assessment for the Town of Shelburne, Ontario, EarthFX, 2022

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CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST AND MONITORING RESULTS OF PRODUCTION WELLS PW7/PW8

DRAWING TI: GEOLOGIC CROSS SECTION OF PW 7 & 8

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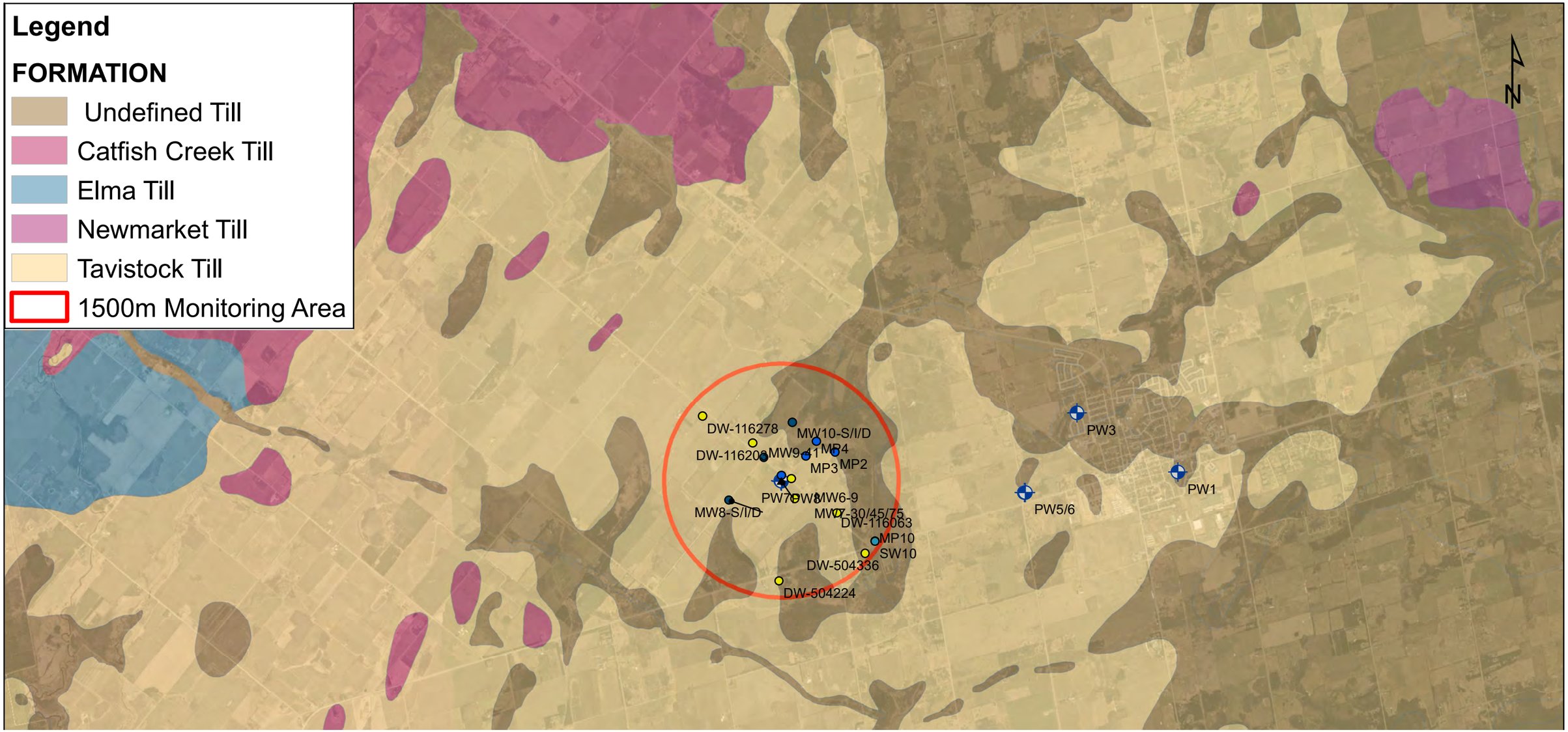

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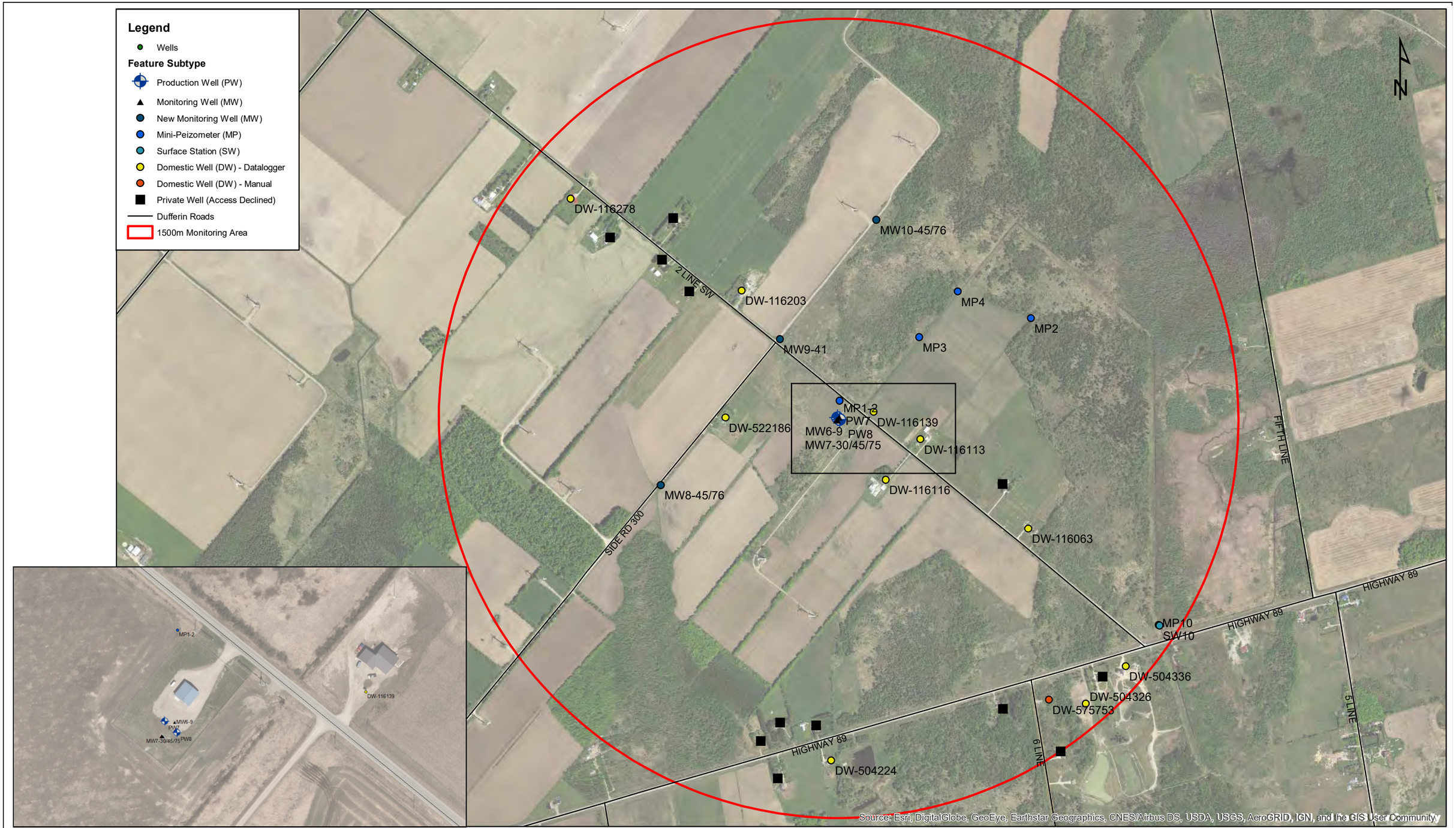

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CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST AND MONITORING RESULTS OF PRODUCTION WELLS PW7/PW8

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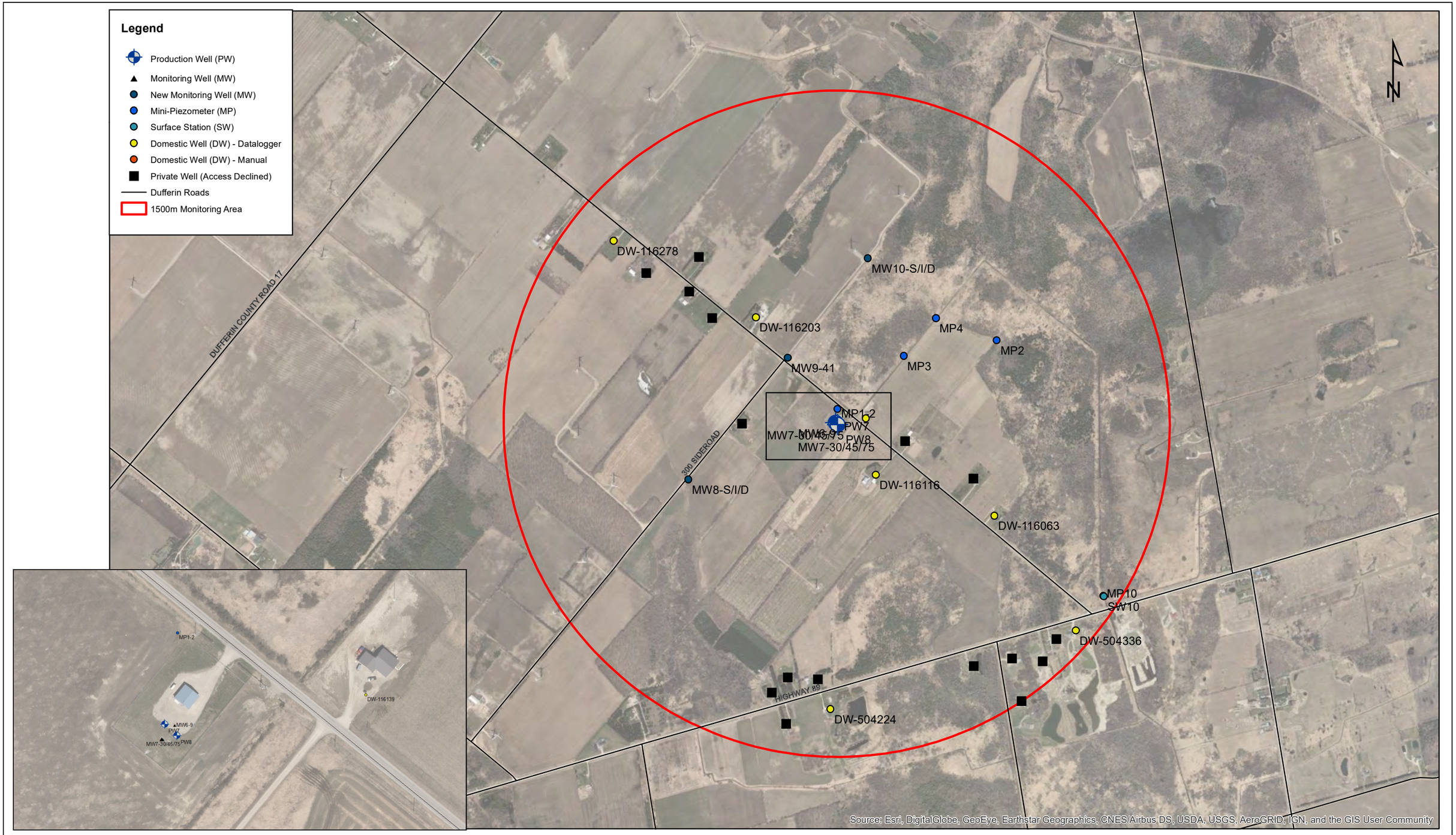

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DRAWING TITLE: 2021 MONITORING LOCATIONS

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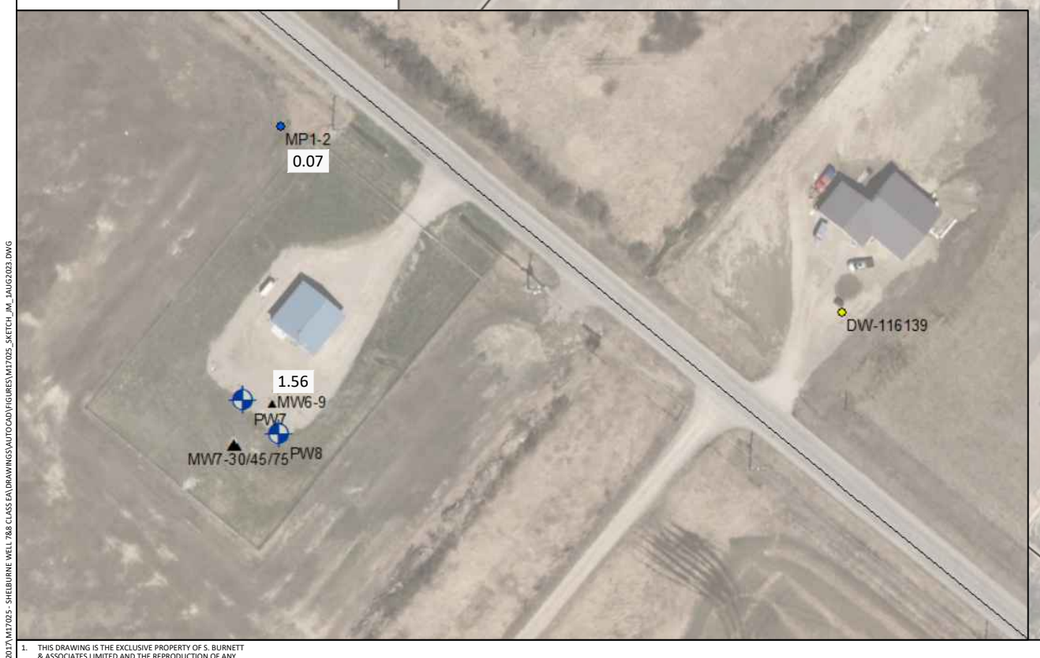
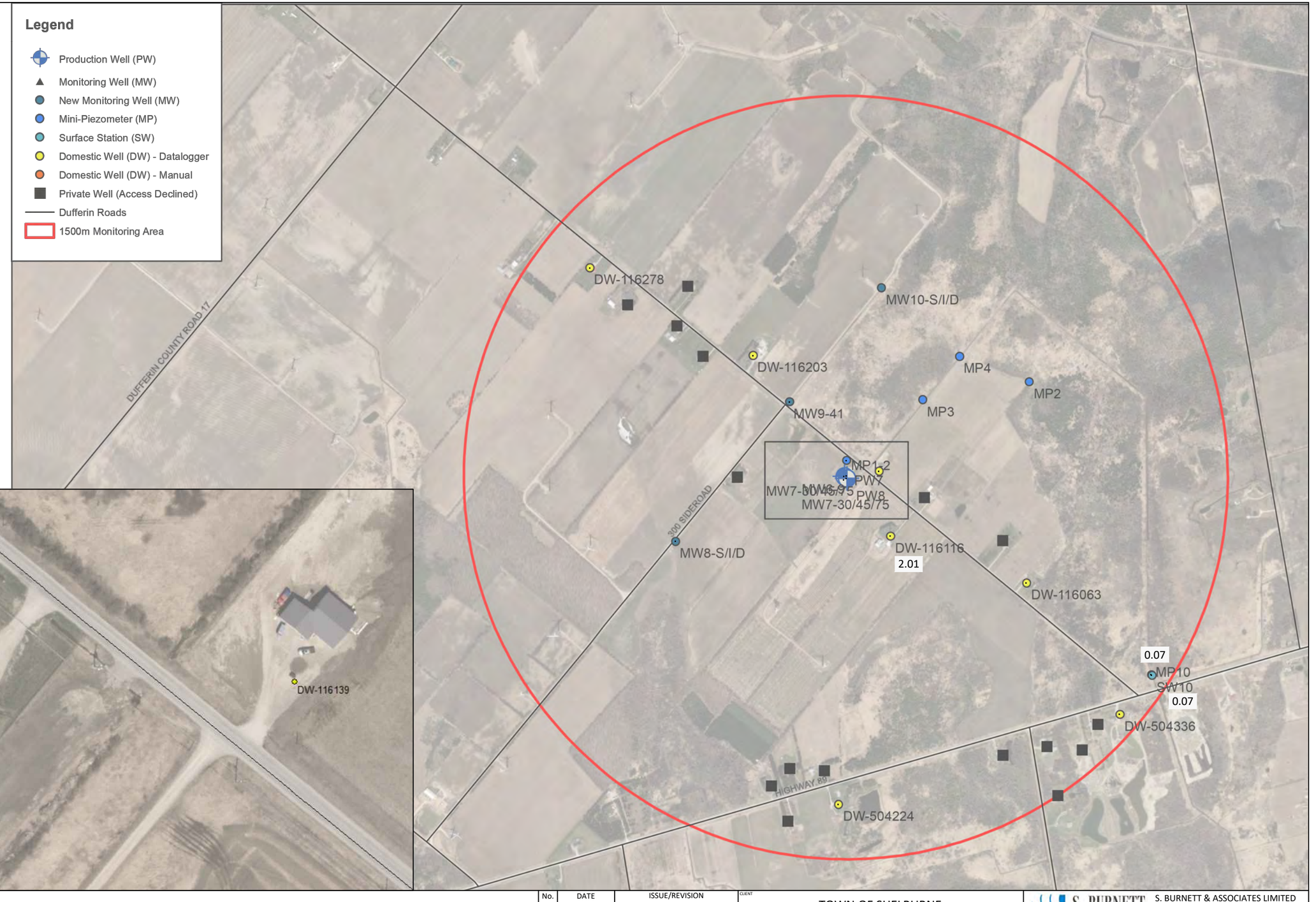
Legend

- Production Well (PW)
- Monitoring Well (MW)
- New Monitoring Well (MW)
- Mini-Piezometer (MP)
- Surface Station (SW)
- Domestic Well (DW) - Datalogger
- Domestic Well (DW) - Manual
- Private Well (Access Declined)
- Dufferin Roads
- 1500m Monitoring Area





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2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS AND DATUMS ON-SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.

No.	DATE	ISSUE/REVISION
1.	01-AUG-2023	ISSUED FOR REVIEW
2.	23-AUG-2023	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST & MONITORING RESULTS OF PRODUCTION WELLS PW7 & PW8

DRAWING TITLE: OBSERVED DRAWDOWN IN OVERBURDEN AND SURFACE STATIONS

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING AND ENVIRONMENTAL SERVICES
210 BROADWAY, UNIT 203
ORANGEVILLE, ONTARIO L9W 5G4
TELEPHONE: 519-941-2949 FAX: 519-941-2036

DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
A.W./S.L.	J.M.	S.B.	FIG. 9

SCALE	PROJECT No.
N.T.S.	M17025

M:\M - MUNICIPAL_2017\M17025 - SHELBURNE WELL 7&8 CLASS EA\DRAWINGS\AUTOCAD\FIGURES\M17025_SKETCH_JM_14AUG2023.DWG

Legend

- Production Well (PW)
- Monitoring Well (MW)
- New Monitoring Well (MW)
- Mini-Piezometer (MP)
- Surface Station (SW)
- Domestic Well (DW) - Datalogger
- Domestic Well (DW) - Manual
- Private Well (Access Declined)
- Dufferin Roads
- 1500m Monitoring Area

DUFFERIN COUNTY ROAD 17

DW-116278
0.30

MW10-S/I/D
S-1.55/I-7.01

DW-116203
1.63

MP4

MP2

MP3

MW9-41
5.89

MP1-2

PW7

MW6-9

MW7-30/45/75 PW8

MW7-30/45/75

300 SIDEROAD

MW8-S/I/D
S-0.26/I-0.43

DW-116116

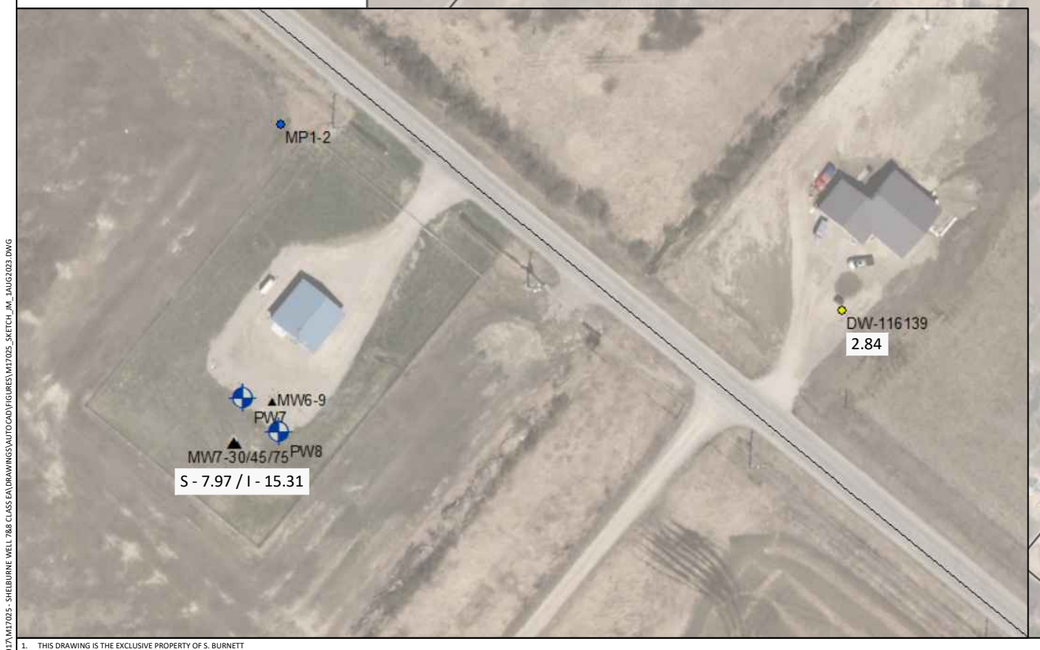
DW-116063
0.76

MP10
SW10

DW-504336
0.00

HIGHWAY 89

DW-504224
0.19



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4. DO NOT SCALE THE DRAWINGS.

No.	DATE	ISSUE/REVISION
1.	01-AUG-2023	ISSUED FOR REVIEW
2.	23-AUG-2023	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST & MONITORING RESULTS OF PRODUCTION WELLS PW7 & PW8

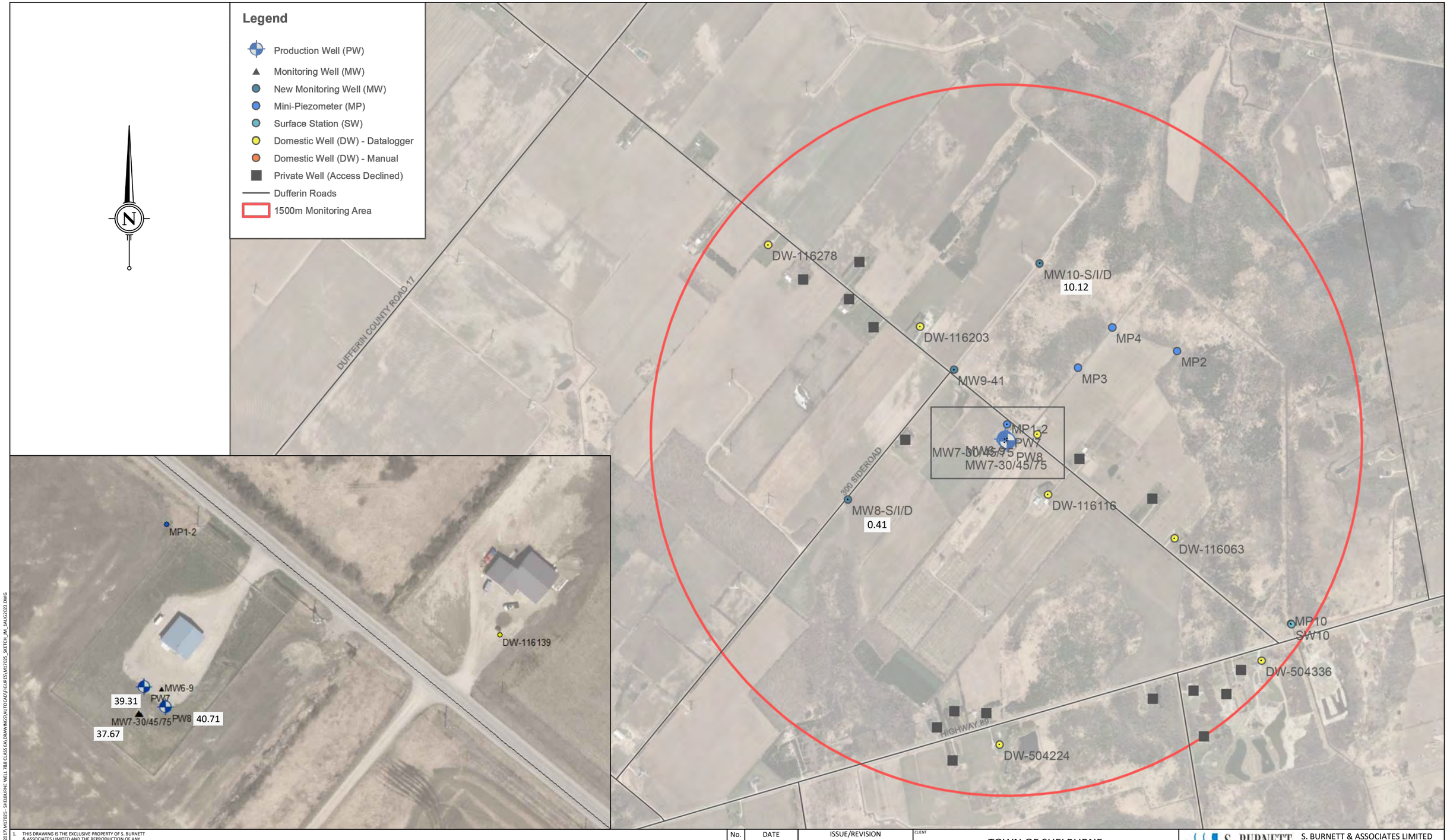
DRAWING TITLE: OBSERVED DRAWDOWN IN SHALLOW/INTERMEDIATE BEDROCK STATIONS

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING AND ENVIRONMENTAL SERVICES
210 BROADWAY, UNIT 203
ORANGEVILLE, ONTARIO L9W 5G4
TELEPHONE: 519-941-2949 FAX: 519-941-2036

DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
A.W./S.L.	J.M.	S.B.	FIG. 10

SCALE	PROJECT No.
N.T.S.	M17025

M:\M - MUNICIPAL_2017\M17025 - SHELBURNE WELL 7&8 CLASS EA\DRAWINGS\AUTOCAD\FIGURES\M17025_SKETCH_JM_1AUG2023.DWG



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4. DO NOT SCALE THE DRAWINGS.

No.	DATE	ISSUE/REVISION
1.	01-AUG-2023	ISSUED FOR REVIEW
2.	23-AUG-2023	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST & MONITORING RESULTS OF PRODUCTION WELLS PW7 & PW8

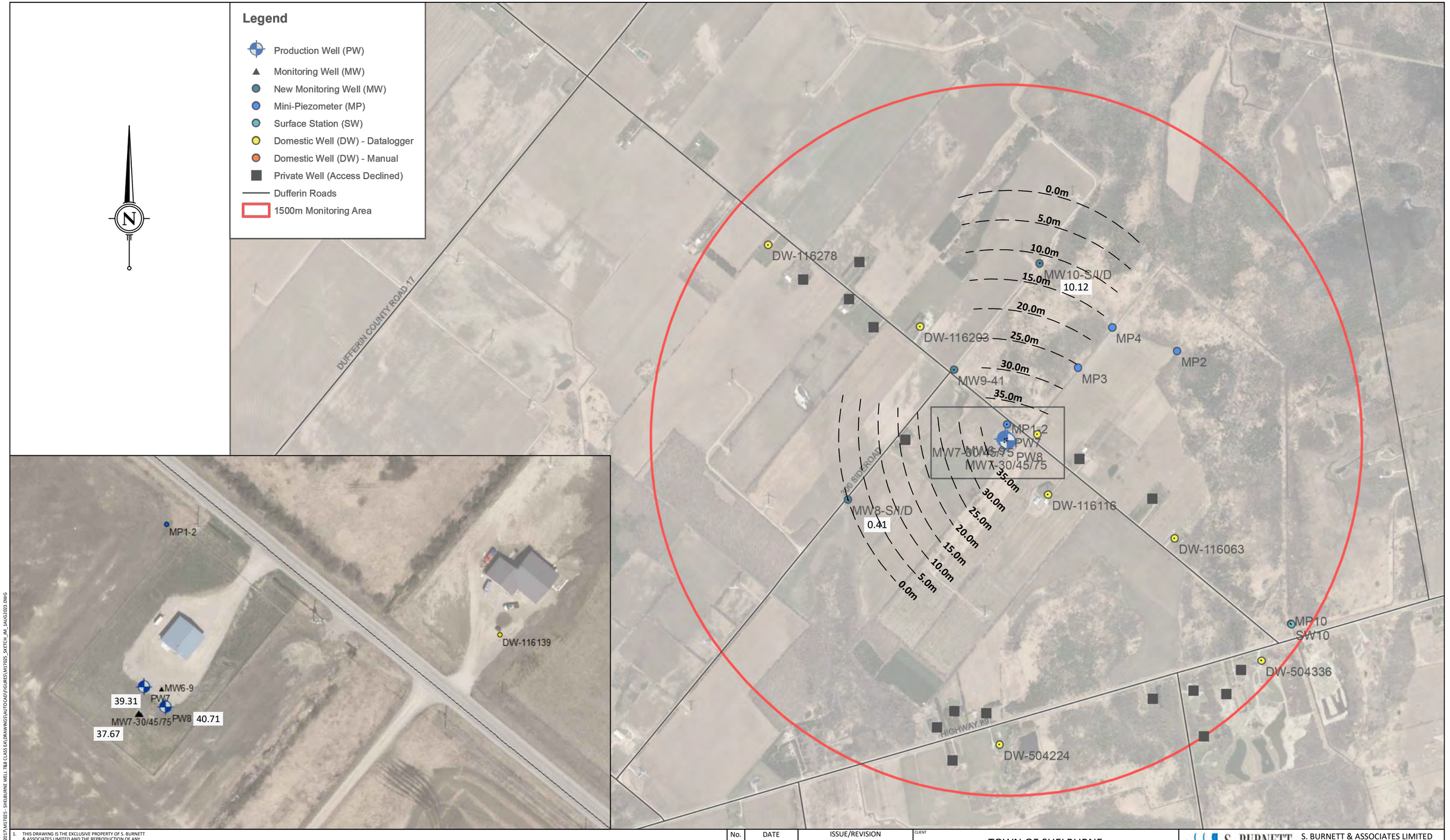
DRAWING TITLE: OBSERVED DRAWDOWN IN SUPPLY AQUIFER (DEEP BEDROCK) STATIONS

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING AND ENVIRONMENTAL SERVICES
210 BROADWAY, UNIT 203
ORANGEVILLE, ONTARIO L9W 5G4
TELEPHONE: 519-941-2949 FAX: 519-941-2036

DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
A.W./S.L.	J.M.	S.B.	FIG. 11

SCALE	PROJECT No.
N.T.S.	M17025

M:\M - MUNICIPAL_2017\M17025 - SHELBURNE WELL 7&8 CLASS EA\DRAWINGS\AUTOCAD\FIGURES\M17025_SKETCH_JM_1AUG2023.DWG



M:\M - MUNICIPAL\MUNICIPAL - 2017\M17025 - SHELBURNE WELL 7&8 CLASS EA\DRAWINGS\AUTOCAD\FIGURES\M17025_SKETCH_JM_1AUG2023.DWG

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2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS AND DATUMS ON-SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
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4. DO NOT SCALE THE DRAWINGS.

No.	DATE	ISSUE/REVISION
1.	01-AUG-2023	ISSUED FOR REVIEW
2.	23-AUG-2023	ISSUED FOR REPORT

CLIENT: TOWN OF SHELBURNE

PROJECT: PUMPING TEST & MONITORING RESULTS OF PRODUCTION WELLS PW7 & PW8

DRAWING TITLE: INFERRED AREA OF INFLUENCE IN SUPPLY AQUIFER (DEEP BEDROCK) STATIONS

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING AND ENVIRONMENTAL SERVICES
210 BROADWAY, UNIT 203
ORANGEVILLE, ONTARIO L9W 5G4
TELEPHONE: 519-941-2949 FAX: 519-941-2036

DESIGNED BY	DRAWN BY	VERIFIED BY	DRAWING No.
A.W./S.L.	J.M.	S.B.	FIG. 12

SCALE	PROJECT No.
N.T.S.	M17025

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix B1

Permit to Take Water (PTTW) Number P-300-1082818689

PERMIT TO TAKE WATER
Ground Water
NUMBER P-300-1082818689
Version: 1.0
Effective Date: December 10, 2020
Expiry Date: August 31, 2030

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

CORP OF THE TOWN OF SHELBURNE

203 MAIN Street East
SHELBURNE
SHELBURNE
ONTARIO
Canada
L9V3K7

For the water taking from

PW6

PW3

PW1

PW5

PW7

PW8

Located at:

Lot Number: 1, Concession Number: 3, Geographic Township: MELANCTHON, Municipality: SHELBURNE, County/District: DUFFERIN, State/Province: Ontario

Lot Number: 2, Concession Number: 3, Geographic Township: MELANCTHON, Municipality: SHELBURNE, County/District: DUFFERIN, State/Province: Ontario

Lot Number: 32, Concession Number: 2, Geographic Township: AMARANTH, Municipality: SHELBURNE, County/District: DUFFERIN, State/Province: Ontario

Lot Number: 1, Concession Number: 3, Geographic Township: MELANCTHON, Municipality: SHELBURNE, County/District: DUFFERIN, State/Province: Ontario

Lot Number: 301, Concession Number: 3, Geographic Township: MELANCTHON, Municipality: MELANCTHON, County/District: DUFFERIN, State/Province: Ontario

Lot Number: 301, Concession Number: 3, Geographic Township: MELANCTHON, Municipality: MELANCTHON, County/District: DUFFERIN, State/Province: Ontario

This Permit cancels and replaces Permit Number 1353-AZHJCQ, issued on June 7, 2018.

DEFINITIONS

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

a. "Director" means any person appointed in writing as a director pursuant to section 5 of the OWRA for the purposes of section 34.1 of the OWRA.

b. "Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the OWRA.

c. "Ministry" means the ministry of the government of Ontario responsible for the administration of the OWRA, currently named the Ministry of the Environment, Conservation and Parks.

d. "District Office" means the Guelph District Office
Guelph District Office
Guelph District Office
Guelph District Office
Guelph District Office
Guelph District Office
of the Ministry.

e. "Permit" or "PTTW" means this Permit to Take Water No. P-300-1082818689 including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA, as may amended.

f. "Permit Holder" means CORP OF THE TOWN OF SHELBURNE.

g. "OWRA" means the *Ontario Water Resources Act*, R.S.O. 1990, c. O. 40.

TERMS AND CONDITIONS

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

1. **Compliance with Permit**

1.1. Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, attested to by Jim Moss, on March 26, 2020, and all Schedules included in this Permit.

1.2. The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3. Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4. This Permit is not transferable to another person.

1.5. This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6. The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

1.7. The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. **General Conditions and Interpretation**

2.1. Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the Environmental Protection Act, R.S.O. 1990, the Pesticides Act, R.S.O. 1990, or the Safe Drinking Water Act, S. O. 2002.

2.2. Other Approvals

The issuance of, and compliance with this Permit, does not:
(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the Ontario Water Resources Act, and the Environmental Protection Act, and any regulations made thereunder; or
(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3. Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:
(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or
(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4. Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5. Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6. Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. **Water Takings Authorized by This Permit**

3.1. Expiry

This Permit expires on August 31, 2030. No water shall be taken under authority of this Permit after the expiry date.

3.2. Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A (litres)

	Source Name / Description	Source Type	Purpose Category	Specific Purpose	Activity	Max. Taken per minute	Max. No. of Hrs Taken per day	Max. volume per Day	Max. days in a year	Zone / Easting / Northing
1	PW3 (PW3)	Well	Public administration	Municipal Supply	Water Supply	909	24	1309000	365	17 / 563062 / 4881674
2	PW5 (PW5)	Well	Public administration	Municipal Supply	Water Supply	1364	24	1964000	365	17 / 562403 / 4880654
3	PW6 (PW6)	Well	Public administration	Municipal Supply	Water Supply	1364	24	1964000	365	17 / 562399 / 4880653
4	PW1 (PW1)	Well	Public administration	Municipal Supply	Water Supply	1140	24	1642000	365	17 / 564350 / 4880932
5	PW7 (PW7)	Well	Public administration	Municipal Supply	Water Supply	1135	24	1635000	365	17 / 559170 / 4880847
6	PW8 (PW8)	Well	Public administration	Municipal Supply	Water Supply	1135	24	1635000	365	17 / 559171 / 4880849
Total Taking								**6550000**		

3.3. Notwithstanding the amount permitted in Table A for Well 7 and Well 8, Well 8 is a backup well for Well 7 and when one or both are in operation, the total amount of taking from one or both sources shall not exceed 1,635,000 litres per day.

3.4. For the purpose of section 19 of O. Reg. 387/04 for setting a transfer baseline and as per the town of Shelburne letter to the Director, s. 34 of the Permit to Take Water dated November 16, 2015 the amount of taking of 1,635,000 litres per day permitted for Well 7/Well 8 is identified as a “transfer baseline volume”. This amount of water was considered in the Environmental Assessment that was completed in September 2013.

4. **Monitoring**

4.1. The Permit Holder shall maintain a record of all water takings. This record shall include the dates and times of water takings, the rates of pumping, and an estimated calculation of the total amounts of water pumped per day for each day that water is taken under the authorization of this Permit. A separate record shall be maintained for each source. The Permit Holder shall keep all required records up to date and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request.

4.2. By March 31, 2021, the Permit Holder shall submit to the Director for approval, a final well field capacity assessment report in accordance with the Director approved scope of work dated May 16, 2016. Upon acceptance of the report, this permit shall be amended accordingly.

5. **Impacts of the Water Taking**

5.1. Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2. Impacts for Water Situation Type

For Surface-Water Takings

The taking of water (including the taking of water into storage and the subsequent or simultaneous withdrawal from storage) shall be carried out in such a manner that streamflow is not stopped and is not reduced to a rate that will cause interference with downstream uses of water or with the natural functions of the stream.

For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. **Director May Amend Permit**

6.1. The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the Ontario Water Resources Act, Section 100 (4).

REASONS

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.
2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.
3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

APPEAL PROVISIONS

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written notice served upon me, the Environmental Review Tribunal and the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, as amended, provides that the Notice requiring a hearing shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

a. The name of the appellant;

b. The address of the appellant;

c. The Permit to Take Water number;

d. The date of the Permit to Take Water;

e. The name of the Director;

f. The municipality within which the works are located

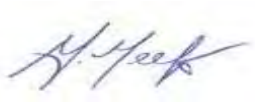
This notice must be served upon:

The Secretary *Environmental Review Tribunal* *655 Bay Street, 15th Floor* *Toronto ON* *M5G 1E5* *Fax: (416) 326-5370* *Email:* *ERTTribunalsecretary@ontario.ca*	*AND*	*The Director, Section 34.1,* *Ministry of the Environment, Conservation and Parks* *135 St.Clair Avenue West, 1st Floor* *Toronto, ON* *M4V 1P5*

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by Telephone at *(416) 212-6349* *Toll Free 1(866) 448-2248*	*by Fax at* *(416) 326-5370* *Toll Free 1(844) 213-3474*	*by e-mail at* *www.ert.gov.on.ca*

Dated at Hamilton this 9th day of December, 2020



Gregory Meek

Director, Section 34.1

Ontario Water Resources Act , R.S.O. 1990

c: Jim Moss, CORP OF THE TOWN OF SHELBURNE

SCHEDULE 1

This Schedule "A" forms part of Permit To Take Water P-300-1082818689 Version Number 1.0, dated December 9, 2020.

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix B2

Temporary PTTW for 2018 Testing - No. 1120-AU6NAZ

PERMIT TO TAKE WATER
Pumping Test
NUMBER 1120-AU6NAZ

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

The Corporation of the Town of Shelburne
203 Main St E
Shelburne, Ontario
L9V 3K7

For the water taking from: Two Bedrock Wells (PW 7 & PW 8)

Located at: Lot 301, Concession 3 SWT & SR, Geographic Township of Melancthon
Melancthon, County of Dufferin

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34.1, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment and Climate Change.

(d) "District Office" means the Guelph District Office.

(e) "Permit" means this Permit to Take Water No. 1120-AU6NAZ including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means The Corporation of the Town of Shelburne.

(g) "OWRA " means the *Ontario Water Resources Act,* R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated November 22, 2017 and signed by Carol Sweeney, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

2. General Conditions and Interpretation

2.1 Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act*, R.S.O. 1990, the *Pesticides Act*, R.S.O. 1990, or the *Safe Drinking Water Act,* S. O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act*, and the *Environmental Protection Act*, and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial

Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **August 31, 2018**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken:	Zone/ Easting/ Northing:
1	PW 7	Well Drilled	Pumping Test	Miscellaneous	1,500	24	2,160,000	8	17 559266 4880803
2	PW 8	Well Drilled	Pumping Test	Miscellaneous	1,500	24	2,160,000	8	17 559274 4880795
						Total Taking:	4,320,000		

3.3 Notwithstanding the individual amount permitted in Table A for Well 7 and Well 8, one or both wells can be operated at rate and amount not to exceed 3,000 litres per minute and 4,320,000 litres per day.

4. Monitoring

4.1 Notification to Well Owners

Prior to commencement of the pumping test, the Permit Holder shall identify all wells within the area of the anticipated potential cone of influence, or within 500 metres of the test site, whichever is greater. At least 24 hours prior to beginning the pumping test, the Permit Holder shall provide written notification to the owners of the wells identified within the potential cone of influence. The notification shall include the expected date, time and duration of the pumping test, and a contact telephone number that may be used to report any interferences with water supplies.

4.2 Measuring Water Depths

To establish baseline conditions, well depths and depths to water levels for identified representative wells in the area of the water taking shall be recorded by the Permit Holder. During the pumping test, water levels in the identified wells shall be recorded. The pumping test must be of sufficient duration to accurately predict the long term impacts of the proposed water taking. Water levels in the identified wells shall continue to be monitored beyond the water taking period until at least 85% recovery is achieved.

4.3 Prior to the commencement of the pumping test and upon completion of a door to door survey, the Permit Holder shall submit to the Director for concurrence a detailed groundwater and surface water monitoring plan. The monitoring plan shall identify groundwater and surface water monitoring locations, monitoring frequency and all other pertinent details relevant to the monitoring wells construction details and their relevance to the pumping wells. The monitoring plan shall also identify discharge point/location accepting pumped water discharge and discussion on potential for artificial overburden aquifer recharge as a result of discharge water disposal on water level within the anticipated zone of influence of the pumping wells.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising

from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 Restoration of Water Supply

Where the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of doing so.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act* , Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, as amended, provides that the Notice requiring the hearing shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

a. The name of the appellant;
b. The address of the appellant;
c. The Permit to Take Water number;
d. The date of the Permit to Take Water;
e. The name of the Director;
f. The municipality within which the works are located;

This notice must be served upon:

The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 326-5370
Email: ERTTribunalsecretary@ontario.ca

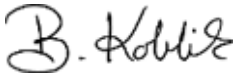
AND

The Director, Section 34.1, Ministry of the Environment and Climate Change
12th Floor
119 King St W
Hamilton ON L8P 4Y7
Fax: (905) 521-7820

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by Telephone at	by Fax at	by e-mail at
(416) 212-6349	(416) 326-5370	www.ert.gov.on.ca
Toll Free 1(866) 448-2248	Toll Free 1(844) 213-3474	

Dated at Hamilton this 18th day of December, 2017.



Belinda Koblik
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix B3

Temporary PTTW for 2021 Testing - No. 3677-BZMJSU

PERMIT TO TAKE WATER

Pumping Test
NUMBER 3677-BZMJSU

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

The Corporation of the Town of Shelburne
203 Main St E
Shelburne, Ontario
L9V 3K7

For the water taking from: Two Drilled Wells; PW7 and PW8

Located at: Lot 301, Concession 3 SW Toronto & Sydenham Road, Geographic Township of Melancthon
Melancthon, County of Dufferin

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34.1, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment, Conservation and Parks.

(d) "District Office" means the Guelph District Office.

(e) "Permit" means this Permit to Take Water No. 3677-BZMJSU including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means The Corporation of the Town of Shelburne.

(g) "OWRA " means the *Ontario Water Resources Act,* R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated November 30, 2020 and signed by Jim Moss, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

2. General Conditions and Interpretation

2.1 Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act*, R.S.O. 1990, the *Pesticides Act*, R.S.O. 1990, or the *Safe Drinking Water Act,* S. O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act*, and the *Environmental Protection Act*, and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any

further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **September 30, 2021**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken:	Zone/ Easting/ Northing:

1	PW7	Well Drilled	Pumping Test	Miscellaneous	1,500	24	2,160,000	7	17 559266 4880803
2	PW8	Well Drilled	Pumping Test	Miscellaneous	1,500	24	2,160,000	7	17 559274 4880795
						Total Taking:	4,320,000		

3.3 Water taking under the authorization of this Permit shall only occur for one seven (7) consecutive day period between the date of issuance and September 30, 2021.

3.4 Notwithstanding the individual amount permitted in Table A for Well 7 and Well 8, one or both wells can be operated at rate and amount not to exceed 3,000 litres per minute and 4,320,000 litres per day.

4. Monitoring

4.1 Notification to Well Owners

Prior to commencement of the pumping test, the Permit Holder shall identify all wells within the area of the anticipated potential cone of influence, or within 500 metres of the test site, whichever is greater. At least 24 hours prior to beginning the pumping test, the Permit Holder shall provide written notification to the owners of the wells identified within the potential cone of influence. The notification shall include the expected date, time and duration of the pumping test, and a contact telephone number that may be used to report any interferences with water supplies.

4.2 Measuring Water Depths

To establish baseline conditions, well depths and depths to water levels for identified representative wells in the area of the water taking shall be recorded by the Permit Holder. During the pumping test, water levels in the identified wells shall be recorded. The pumping test must be of sufficient duration to accurately predict the long term impacts of the proposed water taking. Water levels in the identified wells shall continue to be monitored beyond the water taking period until at least 85% recovery is achieved.

4.3 Under section 9 of O. Reg. 387/04, and as authorized by subsection 34(6) of the *Ontario Water Resources Act* , the Permit Holder shall, on each day water is taken under the authorization of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter or calculated in accordance with the method described in the application for this Permit, or as otherwise accepted by the Director. A separate record shall be maintained for each source. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the records required by this condition to the ministry's Water Taking Reporting System.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 Restoration of Water Supply

Where the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of doing so.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act* , Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, as amended, provides that the Notice requiring the hearing shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

a. The name of the appellant;
b. The address of the appellant;
c. The Permit to Take Water number;
d. The date of the Permit to Take Water;
e. The name of the Director;
f. The municipality within which the works are located;

This notice must be served upon:

The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 326-5370
Email: ERTTribunalsecretary@ontario.ca

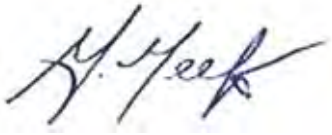
AND

The Director, Section 34.1,
Ministry of the Environment, Conservation and Parks
Floor 1, 135 St Clair Ave W
Toronto, ON
M4V 1P5

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by Telephone at	by Fax at	by e-mail at
(416) 212-6349	(416) 326-5370	www.ert.gov.on.ca
Toll Free 1(866) 448-2248	Toll Free 1(844) 213-3474	

Dated at Toronto this 31st day of March, 2021.



Gregory Meek
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix C1

Well Records – PW7 and PW8

Ontario — Ministry of the Environment

Measurements recorded in: ☑ Metric ☐ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A076997

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Town of Shelburne		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
203 Main Street	Shelburne	ON	L0N1S0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	Melancthon	303	2

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	559269	4880805		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay			0	4.72
	Gravel	Coarse		4.72	9.75

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	4.27	Bentonite	0.068
4.27	9.75	Chlorinated Sand	0.088

Method of Construction

☐ Cable Tool ☑ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, *specify*
☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
5.20	PVC	0.39	+0.91	5.79

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
6.03	PVC	10	5.79	8.84

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☑ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, *specify* ☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
9.75	☐ Fresh ☒ Untested	☐	
	☐ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	9.75	15.2

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, *specify*

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

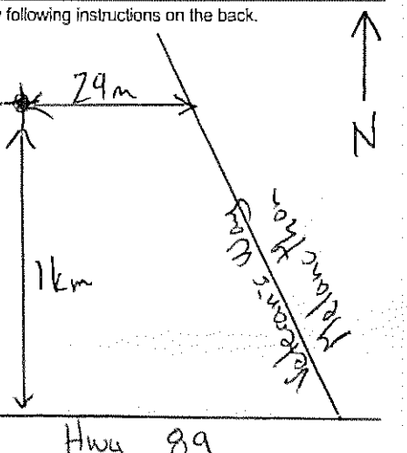
Well production *(l/min / GPM)*

Disinfected? ☑ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Gerrie Drilling & Engineering Ltd.	3406

Business Address (Street Number/Name)	Municipality
215154 10th Line, R.R. #1	

Province	Postal Code	Business E-mail Address
Grand Valley, Ontario	L0N 1G0	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
	Steve Gerrits

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2464		2012/09/20

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☑ Yes ☐ No	2012/09/20	2012/09/20

Ministry Use Only

Audit No. Z153334

Received

Ministry's Copy

Ontario — Ministry of the Environment

Measurements recorded in: ☑ Metric ☐ Imperial

Well T ... Below)

A 081584

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Town of Shelburne		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
203 Main Street E	Shelburne	ON	L9V3K7	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	Melancthon	303	2

County/District/Municipality	City/Town/Village	Province	Postal Code
Dufferin		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	559274	4880798		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay	Stones		0	9.14
Brown	Clay	Limestone		9.14	10.36
	Limestone			10.36	86.56

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	45.7	Portland Cement	9.83

Method of Construction

☐ Cable Tool ☐ Diamond
☒ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☒ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
30.5	Steel	0.953	+0.50	47.55
30.5	Open Hole		47.55	86.56

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
70.4 (m/ft) ☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify	0	10.67	50.8
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	10.67	47.55	45.7
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	47.55	86.56	30.5

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 10.0m

Pumping rate (l/min / GPM): 45.4

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): +0.20

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 47.5

Recommended pump rate (l/min / GPM): 909.0

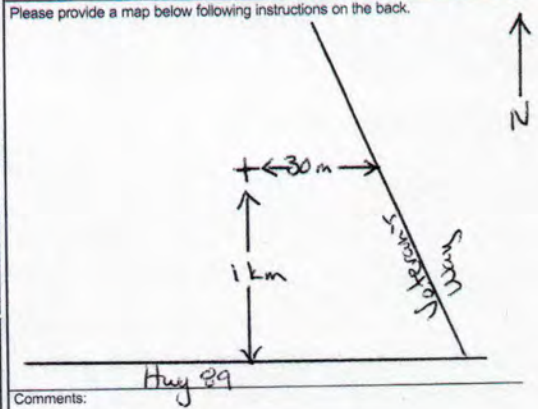
Well production (l/min / GPM): UK

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	+0.20		
1	+0.20	1	
2	+0.20	2	
3	+0.20	3	
4	+0.20	4	
5	+0.20	5	
10	+0.20	10	
15	+0.20	15	
20	+0.20	20	
25	+0.20	25	
30	+0.20	30	
40	+0.20	40	
50	+0.20	50	
60	+0.20	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Gerrits Drilling & Engineering	3406

Business Address (Street Number/Name)	Municipality
215154 10th Line	Amaranth

Province	Postal Code	Business E-mail Address
ON	L9W0G8	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
	Steve Gerrits

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2964		2014/11/25

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2014/11/25	2014/11/25

Ministry Use Only

Audit No. Z 197089

Received

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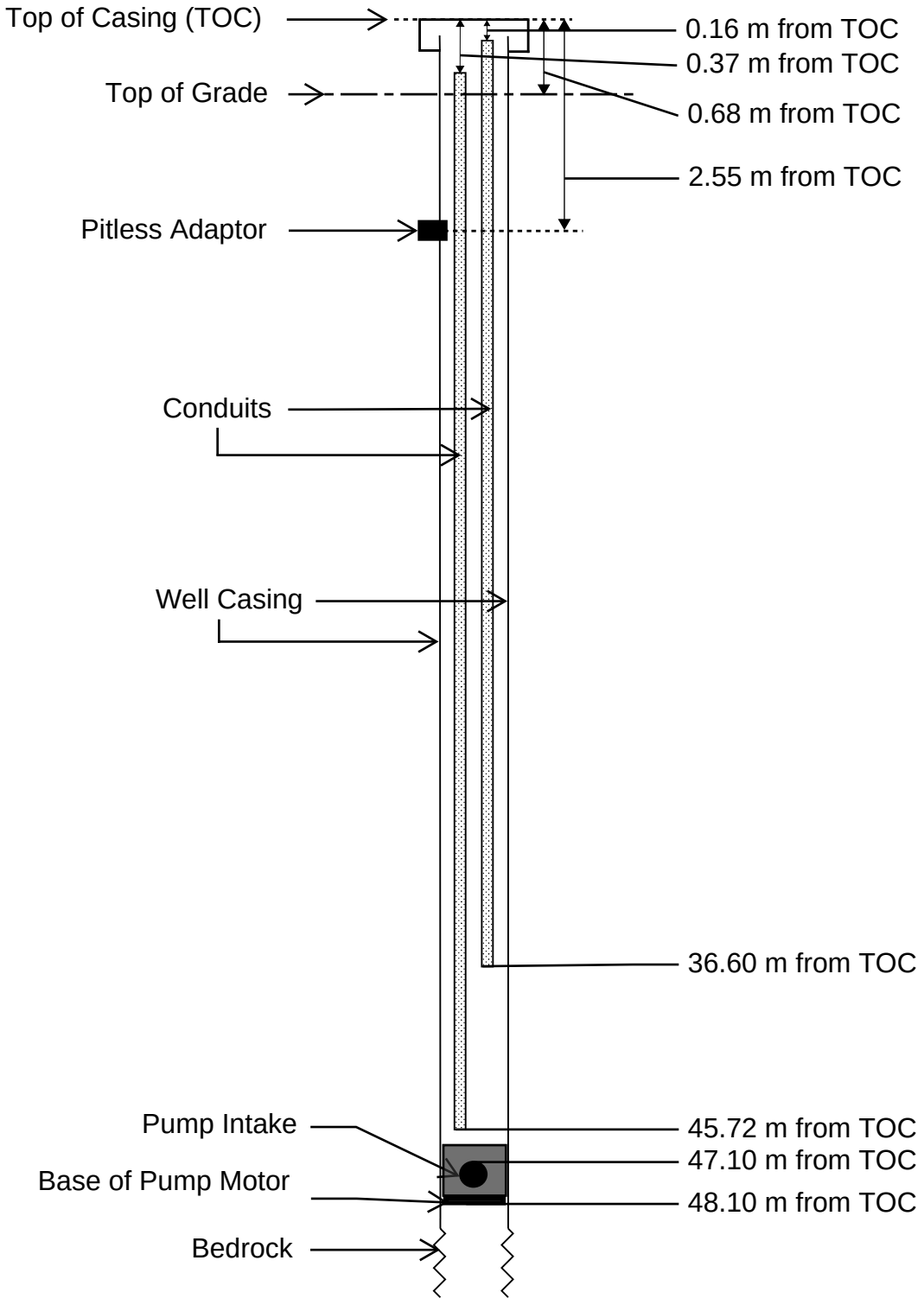
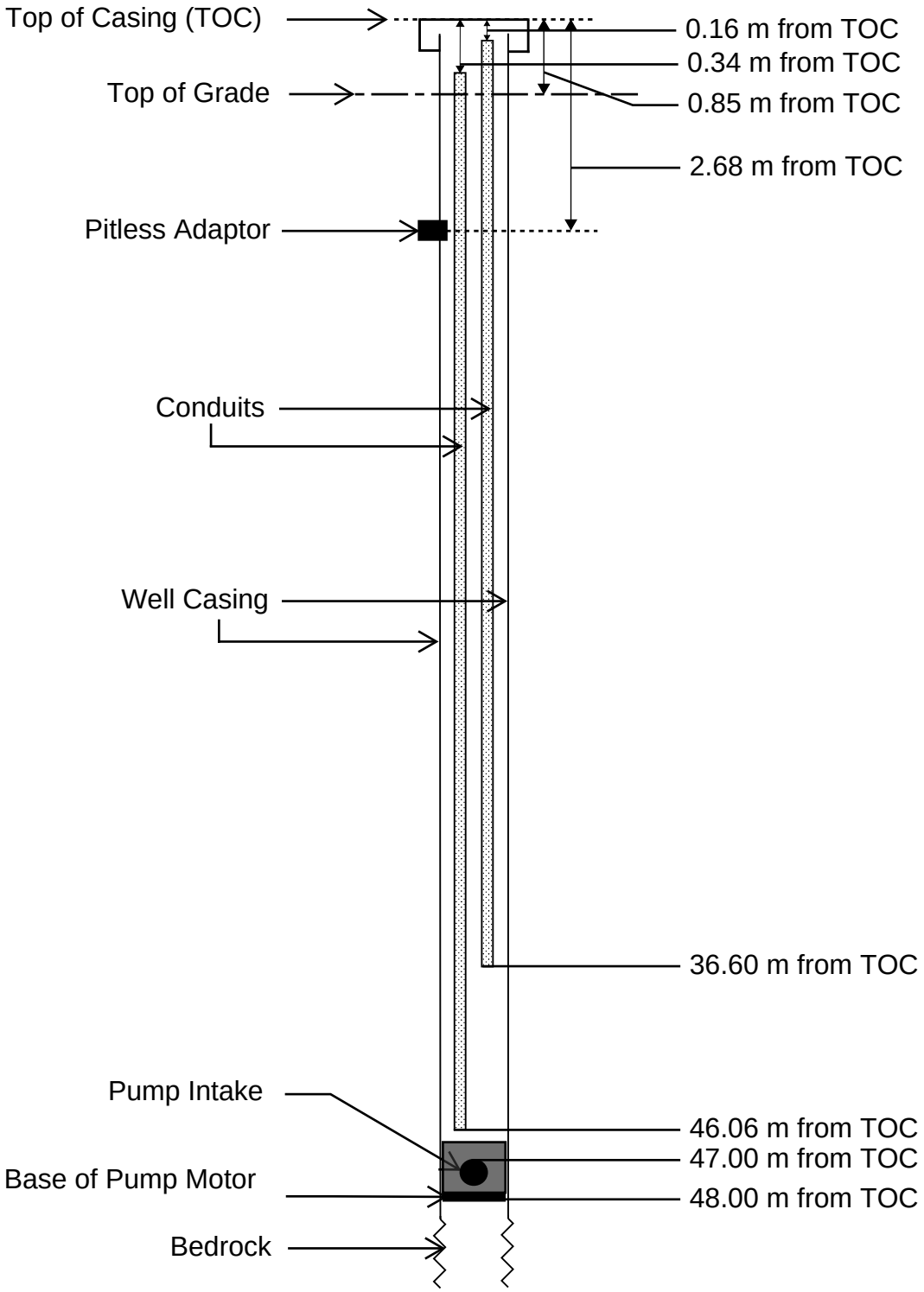
Ministry's Copy



Well 7

CLIENT NAME: TOWN OF SHELBURNE	S. BURNETT & ASSOCIATES LIMITED ENGINEERING AND ENVIRONMENTAL SERVICES 210 BROADWAY, UNIT 203 ORANGEVILLE, ONTARIO L9W 5G4 TELEPHONE: 519-941-2949 FAX: 519-941-2036		
DRAWING TITLE: WELL 7 ELEVATIONS	DRAWN BY: AG	DATE: 07-07-21	DRAWING No. 1
	SCALE: N.T.S.	PROJECT No.: M20013	



Well 8

CLIENT NAME: TOWN OF SHELBURNE	S. BURNETT & ASSOCIATES LIMITED ENGINEERING AND ENVIRONMENTAL SERVICES 210 BROADWAY, UNIT 203 ORANGEVILLE, ONTARIO L9W 5G4 TELEPHONE: 519-941-2949 FAX: 519-941-2036		
DRAWING TITLE: WELL 8 ELEVATIONS	DRAWN BY: AG	DATE: 07-07-21	DRAWING No. 1
	SCALE: N.T.S.	PROJECT No.: M20013	

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix C2

Well Records – Monitoring Stations

Ontario — Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: A071535

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	TOWN OF SHELBURNE		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
203 MAIN ST. SHELBURNE		ON	L0N1S0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	MELANCTHON	303	2

County/District/Municipality	City/Town/Village	Province	Postal Code
DUFFERIN		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	559266	4880808		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	TOP SOIL			0	0.30
BROWN	CLAY	STONES		0.30	7.62
BROWN	CLAY	LIMESTONE	LAYERED / FRAGMENTED	7.62	9.14
BROWN/GREY	LIMESTONE / DOLOSTONE		LAYERED	9.14	86.56

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	47.24	NEAT CEMENT	7.57

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, *specify*

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [X] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
30.48	STEEL	0.711	+0.60	47.24
30.48	OPEN HOLE		47.24	86.56

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, *specify*
[ ] Other, *specify*

Water Details

Water found at Depth	Kind of Water	
14 (m/ft)	[ ] Gas	[ ] Fresh [X] Untested [ ] Other, *specify*
36 (m/ft)	[ ] Gas	[ ] Fresh [X] Untested [ ] Other, *specify*
54 (m/ft)	[ ] Gas	[ ] Fresh [X] Untested [ ] Other, *specify*

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	47.24	50.8
47.24	86.56	30.48

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, *specify*

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping: 72 hrs + 0 min

Final water level end of pumping *(m/ft)*: 17.69

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

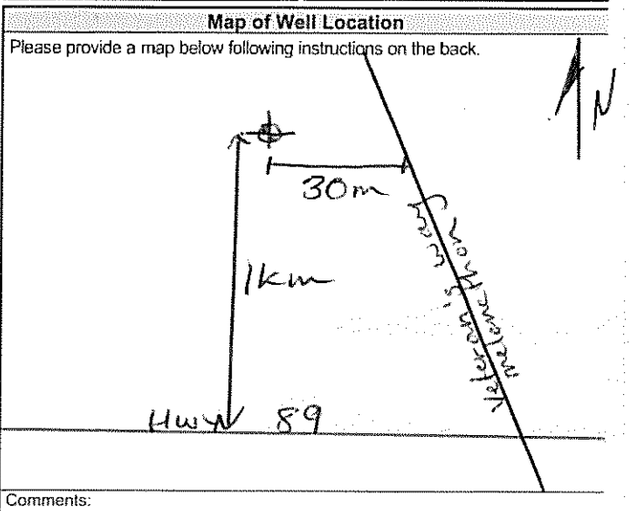
Well production *(l/min / GPM)*

Disinfected? [X] Yes [ ] No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	0.94			17.69
1			1	
2			2	
3			3	
4			4	
5	5.40		5	12.89
10	6.43		10	11.77
15	7.06		15	11.09
20	7.56		20	10.95
25	8.01		25	10.11
30	8.38		30	9.72
40	9.04		40	9.06
50	9.61		50	8.51
60	10.07		60	8.02

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Gerrits Drilling & Engineering Ltd.	3406

Business Address (Street Number/Name)	Municipality
215154 10th Line, R.R. #1	

Province	Postal Code	Business E-mail Address
Grand Valley, Ontario	L0N 1G0	

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
	GERRITS, STEVE

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2964		2012/09/20

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
[X] Yes [ ] No	2012/09/20	Audit No. Z153333
	Date Work Completed: 2012/09/12	Received

0506E (2007/12)

Ministry's Copy

Ontario Ministry of the Environment

Well Tag Number A 002797
A 002797

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
Dufferin	Melancthon	303	2

RR#/Street Number/Name | City/Town/Village | Site/Compartment/Block/Tract etc.

GPS Reading NAD 83 Zone 17 Easting 558919 Northing 4881295 Unit Make/Model Magellan Mode of Operation: ☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	Clay	boulders gravel	Till	0	7.46
Brown	Limestone	Clay		7.46	8.22
Brown	Limestone		medium hard	8.22	19.5
Brown	Limestone		soft	19.5	21.33
Brown	Limestone		medium hard	21.33	29.87

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	6.1	25.4
6.1	29.8	22.2

Water Record

Water found at ___ Metres | Kind of Water

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was
☑ Clear and sediment free
☐ Other, specify

Chlorinated ☑ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
~~477~~ 15.8	☑ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.477	.60	8.99
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☑ Open hole		8.99	29.87

Test of Well Yield

Pumping test method: pump
Pump intake set at - (metres) 18.2
Pumping rate - (litres/min) 22.7
Duration of pumping 1 hrs + 0 min
Final water level end of pumping 5.51 metres
Recommended pump type. ☐ Shallow ☑ Deep
Recommended pump depth. 18 metres
Recommended pump rate. (litres/min) 9
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	5.48		
1	5.50	1	5.49
2	5.50	2	5.48
3	5.50	3	5.48
4	5.50	4	5.48
5	5.50	5	5.48
10	5.50	10	
15	5.50	15	
20	5.51	20	
25	5.51	25	
30	5.51	30	
40	5.51	40	
50	5.51	50	
60	5.51	60	

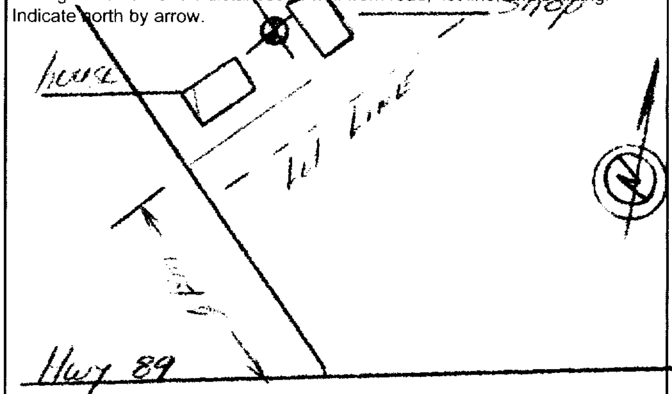
Plugging and Sealing Record

☑ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	7.62	Bentonite	0.31

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Method of Construction

☐ Cable Tool ☑ Rotary (air) ☐ Diamond ☐ Digging
☑ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☑ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Audit No. Z 02886 Date Well Completed 2003 11 20

Was the well owner's information package delivered? ☑ Yes ☐ No Date Delivered YYYY MM DD

Well Contractor/Technician Information

Luckey ... Div of

Name of Well Contractor: Gerritts Well Drilling Inc. | Well Contractor's Licence No. 3406
Business Address (street name, number, city etc.) 1171 Grand Valley
Name of Well Technician (last name, first name) Terry Thompson | Well Technician's Licence No.
Signature of Technician/Contractor X [signature] | Date Submitted 2003 11 20

Ministry Use Only

Data Source | Contractor 3406
Date Received MAR 2 5 2004 | Date of Inspection YYYY MM DD
Remarks CSS.ES5 | Well Record Number 1706208

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☑ Well Owner's Copy ☐ *Cette formule est disponible en français*

Ontario

Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

A233179

Tag#: A 233179

Well Record

n 903 Ontario Water Resources Act

Page ____ of ____

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
116139 2ND LINE SW	MELANCTHON	303	2 SRW

County/District/Municipality	City/Town/Village	Province	Postal Code
DUFFERIN COUNTY		Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	559417	4880819		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	TOPSOIL			0	1
BRN	CLAY			1	22
BRN	LIMESTONE			22	56
GREY	LIMESTONE			56	78

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	29	Bentonite Grout	1.3 m³

Method of Construction

☐ Cable Tool ☐ Diamond
☑ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☒ Other, *specify* AIR

Well Use

☐ Public ☐ Commercial ☐ Not used
☑ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify*

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6¼	STEEL	.158	+2½	29
6⅛	OPEN HOLE		29	78

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

☑ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, *specify*
☐ Other, *specify*

Water Details

Water found at Depth	Kind of Water	
34 (m/ft) ☐ Gas	☑ Fresh ☐ Untested	☐ Other, *specify*
56 (m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify*
65 (m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☑ Clear and sand free
☐ Other, *specify*

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*: 13 GPM

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping *(m/ft)*: 11.3

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*: 50 FT

Recommended pump rate *(l/min / GPM)*: 10-15 GPM

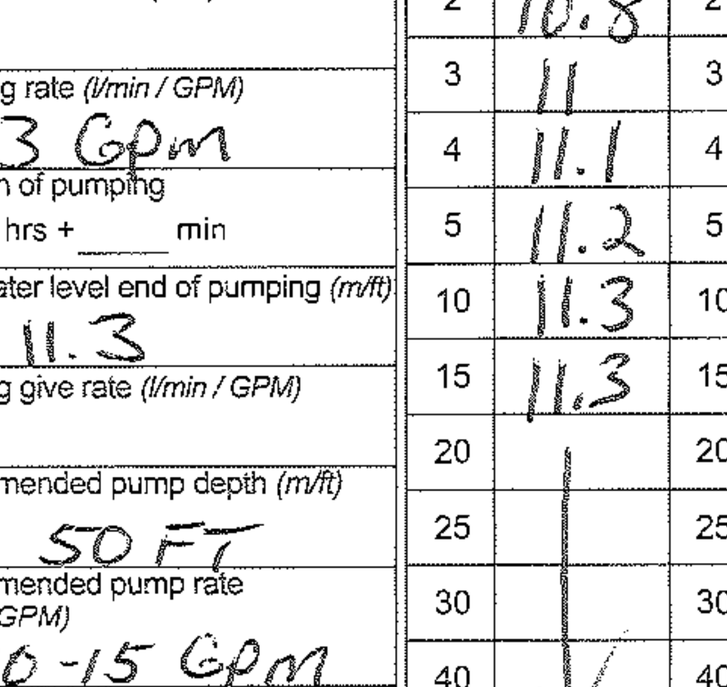
Well production *(l/min / GPM)*

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	7.7		11.3
1	10.4	1	8.4
2	10.8	2	8.0
3	11	3	7.8
4	11.1	4	7.7
5	11.2	5	7.7
10	11.3	10	
15	11.3	15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

AIR LIFT 30 GPM

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
NEUMANN WELL DRILLING LTD	7015

Business Address (Street Number/Name)	Municipality
453022 GREY Rd 2 BOX 700	DUNDALK

Province	Postal Code	Business E-mail Address
ONT	N0C 1B0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5199233205	GILLIES TOM

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted (Y Y Y Y M M D D)
1958		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☑ Yes ☐ No	2017 10 16	2017 10 16

Ministry Use Only

Audit No. Z267693

JAN 03 2018

Received

0506E (2014/11)

Ministry's Copy

Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 | **1705538** | Municipality 17004 | Con. SR W 02

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
[redacted]	MELANCTHON TWP	CON 2 WEST	302/303
	Address RR#6 Shelbourne ~~133 STONEHOUSE~~ W LON 1S9	Date completed	17 day 08 month 2000 year

21 | Northing | RC | Elevation | 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
	TOP SOIL			0	1
	BROWN CLAY			1	7
GREY	SILTY CLAY			7	21
BROWN	SILT	GRAVEL		21	35
BROWN	LIMESTONE			35	40
GREY	LIMESTONE			40	47
LT GREY	LIMESTONE			47	97

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41 WATER RECORD

Water found at - feet	Kind of water
45	☑ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas — UNTESTED
93	☑ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas — UNTESTED
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6"	☑ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic	.188	+1	39
6"	☐ Steel ☐ Galvanized ☐ Concrete ☑ Open hole ☐ Plastic		39	97
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter	Length
N/A	inches	feet
Material and type		Depth at top of screen: feet

61 PLUGGING & SEALING RECORD

☑ Annular space ☐ Abandonment

Depth set at - feet From	To	Material and type (Cement grout, bentonite, etc.)
0	39	BENSEAL

71 PUMPING TEST

Pumping test method: ☐ Pump ☑ AIR ☐ Bailer	Pumping rate: 20 GPM	Duration of pumping: 1 Hours ... Mins		
Static level: 2½ feet	Water level end of pumping: feet	Water levels during ☐ Pumping ☑ Recovery		
		15 minutes: 27 feet	30 minutes: 2½ feet	45 minutes: feet / 60 minutes: feet
If flowing give rate: — GPM		Pump intake set at: 45-50 feet	Water at end of test: ☑ Clear ☐ Cloudy	
Recommended pump type: ☐ Shallow ☑ Deep		Recommended pump setting: 45-50 feet	Recommended pump rate: 20 GPM	

FINAL STATUS OF WELL

☑ Water supply
☐ Observation well
☐ Test hole
☐ Recharge well
☐ Abandoned, insufficient supply
☐ Abandoned, poor quality
☐ Abandoned (Other)
☐ Dewatering
☐ Unfinished
☐ Replacement well

WATER USE

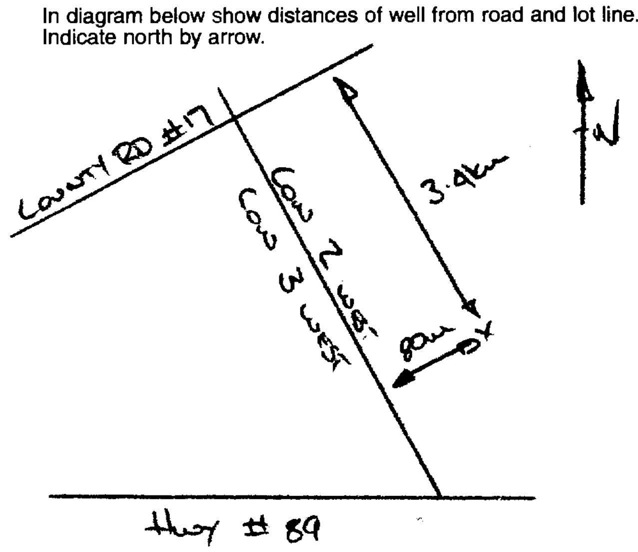
☑ Domestic
☐ Stock
☐ Irrigation
☐ Industrial
☐ Commercial
☐ Municipal
☐ Public supply
☐ Cooling & air conditioning
☐ Not use
☐ Other ....

METHOD OF CONSTRUCTION

☐ Cable tool
☐ Rotary (conventional)
☐ Rotary (reverse)
☑ Rotary (air)
☐ Air percussion
☐ Boring
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging
☐ Other ....

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



219617

Name of Well Contractor: HIGHLAND WATER WELLS	Well Contractor's Licence No.: 2576
Address: BOX 141, DURHAM, ONT, N0G 1R0	
Name of Well Technician: NIGEL POPPLETON	Well Technician's Licence No.: T2130
Signature of Technician/Contractor: [signature]	Submission date: day 17 mo 08 yr 2000

MINISTRY USE ONLY

Data source	Contractor 2576	Date received SEP 21 2000
Date of inspection	Inspector	
Remarks		CSS.ES0

0506 (11/98) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

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 — 1703913 — MUNICIP. 17001 — CON. CON. W 05

COUNTY OR DISTRICT: DUFFERIN [redacted] — TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: AMARANTH — CON, BLOCK, TRACT, SURVEY, ETC: V — LOT: 32 — DATE COMPLETED: DAY 17 MO 7 89

[redacted] SHELBURNE HGY 89

OVERBURDEN — RC — ELEVATION — 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
BLACK			BOGG	0	5
BROWN	SAND	CLAY	MIXTURE	5	10
GREY	CLAY	STONES	STONEY CLAY	10	35
"	"	GRAVEL	MIX	35	45
WHITE	SHALE	"	MIX	45	51
"	LIMESTONE		HARD SLABS.	51	85

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
80	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
85	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	+2	51
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE — DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
6	16	Benseal

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER — PUMPING RATE: 25 GPM — DURATION OF PUMPING: 1 HOURS ___ MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
0 FEET	80 FEET	1 ☒ PUMPING 2 ☐ RECOVERY	FEET	FEET	FEET	FEET

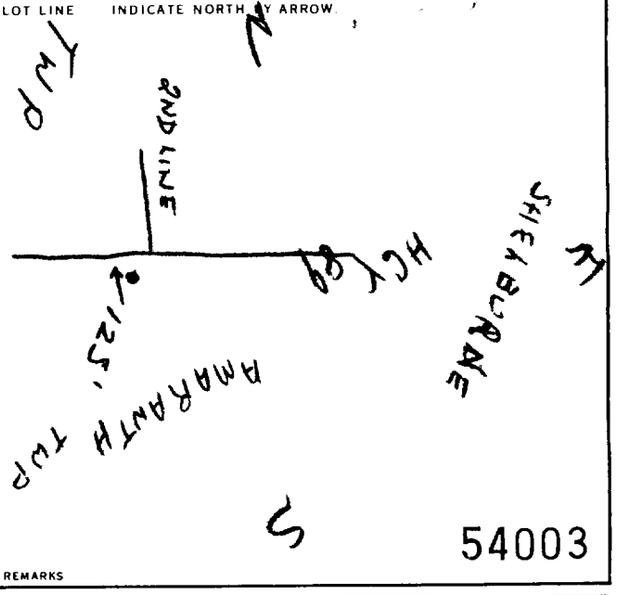
IF FLOWING GIVE RATE: ___ GPM — PUMP INTAKE SET AT: ___ FEET — WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP — RECOMMENDED PUMP SETTING: 25 FEET — RECOMMENDED PUMPING RATE: 10 GPM

60 — 20

LOCATION OF WELL

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



54003

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 ☐ DEWATERING

WATER USE

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Mighton's Well drilling Ltd — WELL CONTRACTOR'S LICENCE NUMBER: 3602

ADDRESS: #2 Stayner

NAME OF WELL TECHNICIAN: Larry Mighton — WELL TECHNICIAN'S LICENCE NUMBER: 7029

SIGNATURE OF TECHNICIAN/CONTRACTOR: Kenneth A. Mighton — SUBMISSION DATE: DAY 24 MO 7 YR. 89

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR: 3602 — DATE RECEIVED: JUL 27 1989

DATE OF INSPECTION — INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

UTM 18 Z [ ] E
5 R [ ] N

Elev. 5 R 1625

Basin 23

WATER WELL RECORD

The Ontario Water Resources Commission Act

WATER RESOURCES DIVISION
17 AUG 25 1967 070
ONTARIO WATER RESOURCES COMMISSION

County or District DUFFERIN Township, Village, Town or City AMARANTH

Con. 5 Lot 32 Date completed 8 (day) JULY (month) 67 (year)

[redacted] ess 787 QUEENSWAY TOR. 18

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 53'

Type of screen —

Length of screen —

Depth to top of screen —

Diameter of finished hole 4"

Pumping Test

Static level 10'

Test-pumping rate 12 G.P.M.

Pumping level 12'

Duration of test pumping 5 HRS.

Water clear or cloudy at end of test CLOUDY.

Recommended pumping rate 10 G.P.M.

with pump setting of 15 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
GREY CLAY	0	19		
FINE SAND	19	30		
GREY CLAY	30	51		
LIMESTONE	51	53	53	FRESH

For what purpose(s) is the water to be used? HOUSE

Is well on upland, in valley, or on hillside? HILLSIDE

Drilling or Boring Firm LONNEY WELL DRILLING

Address 38 BUENA VISTA DR. ORANGEVILLE 941-2783

Licence Number 2701

Name of Driller or Borer Gerald Lunney

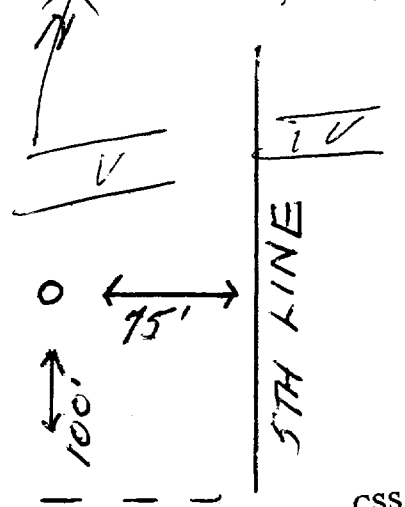
Address SAME AS ABOVE

Date 8/7/67

G. Lunney
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7 15M-60-4138

OWRC COPY

CSS.S8

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☐ Imperial

Well Tag (Place Sticker and/or Print Below) **Tag#: A140275**

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	TMARANTH	32	5
County/District/Municipality	**City/Town/Village**	**Province**	**Postal Code**
DUFFERIN		Ontario	
UTM Coordinates NAD 8 3 / Zone / Easting 560190 / Northing 4879704	**Municipal Plan and Sublot Number**	**Other**	

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	CLAY	STONES	HARD	0	3
BROWN	SAND	GRAVEL	LOOSE	3	11
GREY	CLAY	SILT	LAYERED	11	37
WHITE	LIMESTONE	GRAVEL	LOOSE	37	47
WHITE	LIMESTONE	—	HARD	47	54

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	20	HOLEPLUG	4

Method of Construction

☐ Cable Tool ☑ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, specify _____

☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

Well Use

☐ Public ☑ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, specify _____

☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning

☐ Not used ☐ Dewatering ☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4	STEEL	.188	+2	49

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☑ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify _____ ☐ Other, specify _____

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Hole Diameter Depth To	Diameter (cm/in)
17-54 (m/ft) ☐ Gas	☑ Fresh ☐ Untested ☐ Other, specify _____	0	20	10 in
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify _____	20	49	8 3/4
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify _____	49	54	6 1/8

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☑ Other, specify CLOUDY

If pumping discontinued, give reason:

Pump intake set at (m/ft): 20 FT

Pumping rate (l/min / GPM): 30 GPM

Duration of pumping: 1 hrs + _____ min

Final water level end of pumping (m/ft): 11 FT

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 20 FT

Recommended pump rate (l/min / GPM): 15 GPM

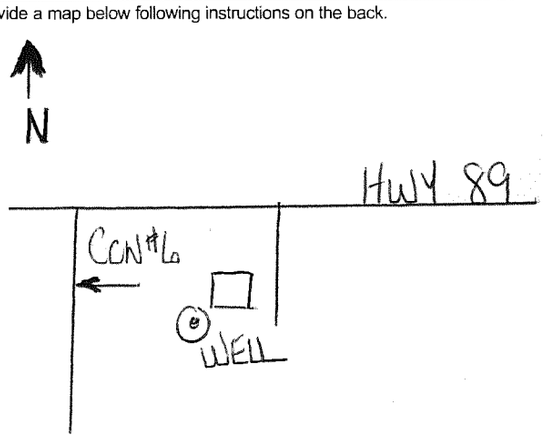
Well production (l/min / GPM): 50 GPM

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	5		
1	7	1	6
2	9	2	5
3	11	3	5
4	11	4	5
5	11	5	5
10	11	10	5
15	11	15	5
20	11	20	5
25	11	25	5
30	11	30	5
40	11	40	5
50	11	50	5
60	11	60	5

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
R & B WELL DRILLING LTD	4615

Business Address (Street Number/Name)	Municipality
3569 SIDEROAD 10, BEETON	NEW TECUMSETH

Province	Postal Code	Business E-mail Address
ON	L0G1A0	RBWELLDRILLING@HOTMAIL.COM

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
9057292950	KWALSKI, ROBERT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2425		2012/11/13

Well owner's information package delivered ☑ Yes ☐ No — Date Package Delivered 2012/11/13

Date Work Completed 2012/11/11

Ministry Use Only

Audit No. Z 152333

DEC 04 2012 Received

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 1703796 MUNICIP [redacted] CON. CON 06

COUNTY OR DISTRICT [redacted] | TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE [redacted] Shelburne | CON. 6 | BLOCK, TRACT, SURVEY, ETC. | LOT 32

[redacted] RR#1

DATE COMPLETED DAY 29 MO 09 YR 88

HYDROLOGY OF WELL | RC | ELEVATION | 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	Clay	Boulders		0	14
White	Limestone			14	40

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
37	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS — NOT TESTED
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
006	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	41	21
006	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC		21	40
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT FEET FROM	DEPTH SET AT FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
0	21	Holeplug & Slurry

71 PUMPING TEST

PUMPING TEST METHOD 1 ☐ PUMP 2 ☐ BAILER — AIR

PUMPING RATE 12 GPM

DURATION OF PUMPING HOURS 30 MINS

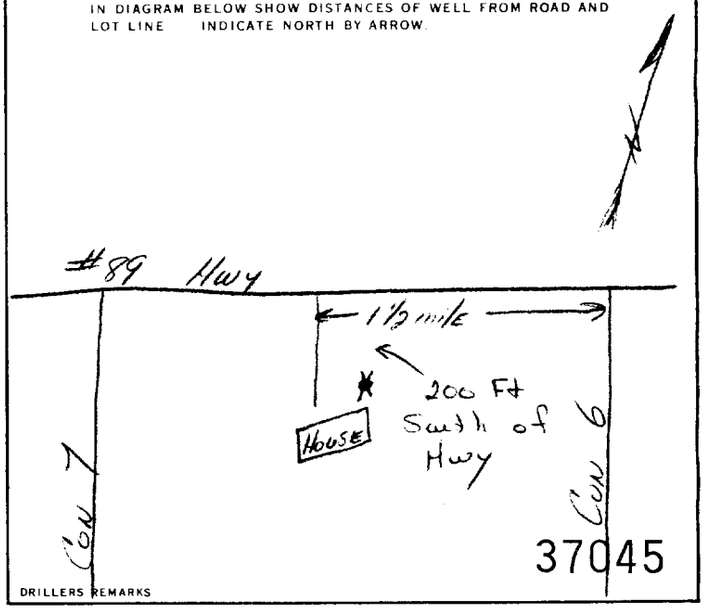
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (1 ☐ PUMPING 2 ☑ RECOVERY)	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
8 FEET	30 FEET		8 FEET	FEET	FEET	FEET

IF FLOWING GIVE RATE GPM | PUMP INTAKE SET AT FEET | WATER AT END OF TEST 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☑ DEEP | RECOMMENDED PUMP SETTING 30 FEET | RECOMMENDED PUMPING RATE 10 GPM

LOCATION OF WELL

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



37045

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 9 ☐ DEWATERING

WATER USE

1 ☑ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Lunney Well Drilling | WELL CONTRACTOR'S LICENCE NUMBER: 3406

ADDRESS: Gen. Delivery Laurel

NAME OF WELL TECHNICIAN: T. Gerrits | WELL TECHNICIAN'S LICENCE NUMBER: T-0080

SIGNATURE OF TECHNICIAN/CONTRACTOR | SUBMISSION DATE DAY 29 MO 09 YR 88

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 3406 | DATE RECEIVED MAR 17 1989

DATE OF INSPECTION | INSPECTOR

REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix D

WIL Construction Report (April 2021)

Well Initiatives Limited 7461 County Road 18, P.O. Box 416, Elora, Ontario, Canada N0B 1S0
telephone (519) 846 8289 **fax** (519) 846 8281 **web** info@wellinitiatives.com

WELL INITIATIVES

April 12, 2021
Ref: 300051381

Town of Shelburne
Municipal Office
203 Main Street East
Shelburne, ON
L0N 1S0

Attention: To whom it may concern
Private and Confidential

RE: Town of Shelburne Well #7 & #8
SBA File No. M20013

Introduction

Well Initiatives Limited (WIL) was awarded a contract to supply and install new submersible pumping assemblies and VFD's for Shelburne Well 7 & 8. This report documents the work completed over the period of March 23 - 24, 2021 and April 6 - 7, 2021.

Background

Both wells are completed as 300 mm (12" diameter) bedrock wells and have MECP well tags attached to them. Well 7 was completed in 2012 and the original well record (Audit Z153333) indicates that the well casing was installed to a depth of 47.24m below ground surface (BGS) and has an open bedrock interval from 47.24 m to 86.56 m BGS. This well record has been included with this report.

Well 8 was completed in November of 2014, but there is no well record for this well on the MECP database. A formal well record request was made on Dec 10, 2021 but unfortunately there is currently no well record on file with the MECP. After inquiring with the client a well record was obtained as provided by the original well contractor. The original construction details are presented on Audit Z19708. This well record indicates that the well casing was installed to a depth of 47.55 m BGS and has an open bedrock interval from 47.55 m to 86.56 m BGS. WIL will submit a copy of Audit Z19708 to the MECP so that it is available to the public on their database. Currently the wells are permitted to operate at a combined rate of 18.9 L/s.

Prior to beginning our work a discussion was had with the MECP to develop a modified chlorination plan as the limitations on the towns water supply and close proximity of Well 7 to Well 8 limited our allowable contact time to a period of 4 hours. With approval from the MECP we proceeded with our work.

Work Program

We mobilized to the site on March 23, 2021 and removed the clients pumping assembly from Well 7. On the same day, a video inspection of the well was completed to verify the well dimensions and ascertain the physical condition of the pitless adapter and integrity of the bedrock/casing interface. A copy of this video and video notes have been included with this report.

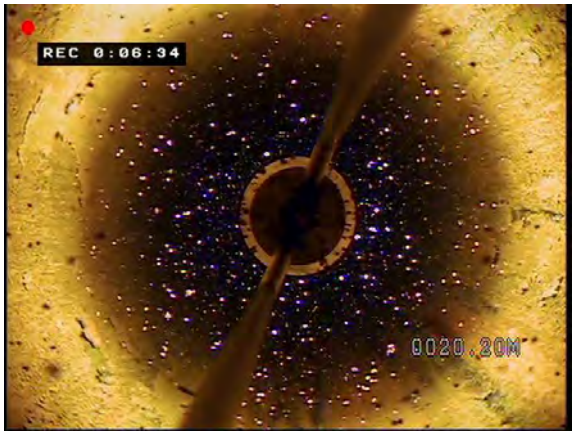
On March 24, the well was chlorinated. The well was brought to an initial concentration of 100 mg/L using granular calcium hypochlorite (Sterilene) mixed into solution. Once the solution was introduced to the well it was circulated for a period of 1 hour using a small submersible pump. After the preapproved amount of contact time was over the chlorinated solution was removed from the well and neutralized in our on site 9,000L bin before being discharged to a grassy area near by. The well was operated to waste for a period of several hours to clear any residual turbidity before operations staff could collect samples.

We returned to the site on April 6 and removed the existing pumping assembly from Well 8. Iron staining was noted on the upper portion of the stainless-steel column pipe upon removal form the well. A video inspection was attempted but the well water was too turbid (iron precipitate) to complete the video. The well was left to sit over night in hopes that visual quality would be better.

On April 7, the video inspection was reattempted and successfully completed. Copies of both videos and video notes have been included with this report. Following the video inspection, the well was chlorinated to an initial concentration of 100 mg/L. Once the solution was introduced to the well it was circulated for a period of 1 hour using a small submersible pump. After the preapproved amount of contact time was over the chlorinated solution was removed from the well and neutralized in our on site 9,000L bin before being discharged to a grassy area near by. The well was operated to waste for a period of several hours to clear any residual turbidity before operations staff could collect samples.

Video Inspections

The video inspection for Well 7 confirmed the construction details reported on the well record. Bottom of the well casing was measured at 48.16 m and total well depth was measured at 86.01m. The pitless adapter and base of the well casing appear to be in good condition, as no deficiencies were noted for either of them. The bedrock fractures at 49.60, 52.00, 54.90 and 62.70 m were noted to have water flowing into the well. A small accumulation of debris was noted at the bottom of the well. See pictures below of the well casing and bottom of well.



As noted previously in this report, the initial video inspection for Well 8 could not be completed due to poor visibility in the well. By allowing the well to sit overnight the iron particles that were in suspension were able to settle out to the bottom of the well. The video inspection completed the next day confirmed the construction details reported on the well record. Bottom of the well casing was measured at 48.00 m and the bottom of the well was measured at 86.33 m. The pitless adapter and base of the well casing appear to be in good condition, with no deficiencies noted for either of them, but there appeared to be a large amount of iron staining present on the well casing. The bedrock fractures at 58.0 m and 76.80 m were noted to have water flowing into the well. A small accumulation of debris was noted at the bottom of the well. See pictures below.

Pump Installation

We installed a new Grundfos 40 HP 300S400-10 pump and Grundfos MS6000 40 HP 575 V 3 Phase motors in each well as per the contract specifications. New #4-3 TWU pump wire was also installed in each well. The existing stainless steel 100 mm column pipe was reused for both wells. It was noted that the poppet on the external 100 mm check valve in Well 7 was defective. After review with SBA it was decided to change this for a new check valve as well as one of the couplings which was noted to have damaged threads. No changes were made to the existing pump intake depth for either well. The external check valve on Well 8 was suitable for reuse and was reinstalled. Shop drawings and revised pump installation records have been included with this report.

Prior to installation the wells were chlorinated to an initial concentration of 100 mg/L using Sterilene mixed into solution. This solution was poured into the well and circulated for a period of 1 hour before the permanent assembly was installed at each well. Each permanent assembly was sprayed down with a 200 mg/L chlorine solution as it was installed in the well. The same day each well was operated to waste to establish operating parameters and verify the manufactures specifications for performance. The chlorinated water was contained in a 9,000L bin and neutralized before being discharged to a grassy area. The well was operated to waste until the chlorine residual was measured at 0 mg/L at which time samples were collected by water works staff. Chlorination records have been included with this report.

Conclusions & Recommendations

Shelburne Well 7 and 8 appear to be in good overall condition, although the well casings are starting to show signs of mineral accumulation on them. The vermin proof lid on Well 7 has a defective O-ring and this will be replaced when the part arrives from our supplier. Well 8 also has a defective O-ring on the vermin proof lid.

During our performance check on Well 8 the pitless adapter was leaking. It was initially theorized that the O-ring on the Model J pitless adapter had become damaged during re-installation but was later determined to be leaking due to alignment issues with the receiver of the pitless adapter. The adapter is permanently attached below grade to the well casing and can not be repaired without being entirely removed from the well and replaced. We recommend completing this repair as soon as possible and that the Model J pitless adapter be replaced with a new Boshart HD barrel style pitless unit.

The wells should be tested in 3-5 years time unless capacity declines are noted sooner. When that occurs, it is advised that the well casing be brushed, and the wells be airlifted to remove the accumulated debris at the bottom of each.

Respectfully

Dwayne Graff
President

Patrick Weed B. Comm.
Well Technician

PUMP INSTALLATION RECORD

TECHNICIAN: DR, JD **DATE: 2021/03/24**

CLIENT: Town of Shelburne
WELL I.D. /LOCATION: Well 7 (2nd Line SW)

PUMP INFORMATION

MAKE: Grundfos	**MODEL: 300S400-10**	**No.: B14B60010-P121010**
BOWL DIA.: 6”	**NO. STAGES: 10**	**DISCHARGE DIA: 4”**
BOWL MAT’L: SS	**IMP. MAT’L: SS**	**INTAKE BTOC: 47.10 m**

MOTOR INFORMATION

MAKE: Grundfos	**MODEL NO.: MS6000QFT40**	**SN: 00264777**	**PC NO.: 22049**
DATE CODE:	**MOTOR DIA.: 6”**		**HP: 40**
VOLTS: 575	**PHASE: 3**		**MAX. AMPS.: 48**
S.F.: 1.15	**KVA CODE: J**		**BASE OF MOTOR: 48.08 m**

COLUMN PIPE INFORMATION

PIPE DIA.: 4”	**THREAD TYPE: 8V**	**WALL THICKNESS: Sched 40**
PIPE MAT’L:SS	**TOTAL PIPE : 42.6m**	**CHECK VALVE: Integral and on top of Pump**

WIRE INFORMATION

WIRE SIZE: 4-3 AWG	**WIRE TYPE: TWU**	**TOTAL LENGTH: 50.3 m**

WELL INFORMATION

WELL DEPTH: 86 m	**DIAMETER: 12”**	**CONSTRUCTION: Bedrock**
STATIC W.L.: 3.61 m	**CASING DEPTH: 48.2**	

PERFORMANCE CHECK

PUMPING RATE	WATER LEVEL	HERTZ	CURRENT DRAW (A)
18.9 L/s	13.52 m	39.0	R 24.0, Y 23.5, B 23.0

NOTES:
Two runs of 32 mm PVC Water Level Tube. 45.6 M and 36.5 M

PUMP INSTALLATION RECORD

TECHNICIAN: DR, JD **DATE: 2021/04/07**

CLIENT: Town of Shelburne
WELL I.D. /LOCATION: Well 8 (2nd Line SW)

PUMP INFORMATION

MAKE: Grundfos	**MODEL: 300S400-10**	**No.: B14B60010-P121010**
BOWL DIA.: 6”	**NO. STAGES: 10**	**DISCHARGE DIA: 4”**
BOWL MAT’L: SS	**IMP. MAT’L: SS**	**INTAKE BTOC: 47.0 m**

MOTOR INFORMATION

MAKE: Grundfos	**MODEL NO.: MS6000QFT40**	**SN: 78397220**	**PC NO.: P22036**
DATE CODE:	**MOTOR DIA.: 6”**	**HP: 40**	
VOLTS: 575	**PHASE: 3**	**MAX. AMPS.: 48**	
S.F.: 1.15	**KVA CODE: J**	**BASE OF MOTOR: 48.0 m**	

COLUMN PIPE INFORMATION

PIPE DIA.: 4”	**THREAD TYPE: 8V**	**WALL THICKNESS: Sched 40**
PIPE MAT’L:SS	**TOTAL PIPE : 43.0m**	**CHECK VALVE: Integral and on top of Pump**

WIRE INFORMATION

WIRE SIZE: 4-3 AWG	**WIRE TYPE: TWU**	**TOTAL LENGTH: 50.3 m**

WELL INFORMATION

WELL DEPTH: 86.3 m	**DIAMETER: (35cm) 12”**	**CONSTRUCTION: Bedrock**
STATIC W.L.: 3.93 m	**CASING DEPTH: 48.5m**	

PERFORMANCE CHECK

PUMPING RATE	WATER LEVEL	HERTZ	CURRENT DRAW (A)
16.3 L/s	14.43 m	35.0	R 21.7, Y 21.6, B 21.5

NOTES:
Two runs of 32 mm PVC Water Level Tube. 45.6 M and 36.5 M

Video Log Summary

Client: Town of Shelburne
Well ID: Shelburne Well 7
Date: March 23, 2021
Static Video Inspection

Time (hr:min)	Depth (M)	Event/Notes
0:00	0.79	0.79 m Below top of casing
0:00	2.50	Pitless adaptor
0:04	15.76	Water level
0:23	48.16	Base of casing
0:23	49.60	Bedrock fracture (flow in)
0:25	52.00	Bedrock fracture (flow in)
0:26	54.90	Bedrock fracture (flow in)
0:28	59.70	Bedrock fracture
0:30	62.70	Bedrock fracture (flow in)
0:32	66.70	Bedrock fracture
0:33	71.00	Bedrock fracture
0:34	72.80	Bedrock fracture
0:35	75.00	Bedrock fracture
0:36	77.90	Bedrock fracture
0:39	86.01	Bottom of well with sediment observed
0:43	81.51	Bedrock fracture
0:44	81.41	Bedrock fracture
0:46	79.28	Bedrock fracture
0:47	78.20	Bedrock fracture
0:48	77.94	Bedrock fracture
0:50	75.42	Bedrock fracture
0:51	73.50	Bedrock fracture
0:51	73.20	Bedrock fracture
0:53	71.55	Bedrock fracture
0:57	67.06	Bedrock fracture
0:59	63.10	Bedrock fracture (flow in)
1:03	59.18	Bedrock fracture

1:04	57.34	Bedrock fracture
1:06	55.17	Bedrock fracture (flow in)
1:07	53.43	Bedrock fracture
1:08	52.13	Bedrock fracture (flow in)
1:10	48.93	Bedrock fracture (flow in)
1:11	48.16	Base of casing
1:16	35.53	Welded casing joint
1:22	23.08	Welded casing joint
1:25	17.04	Welded casing joint
1:26	16.35	Water level
1:27	10.99	Welded casing joint
1:31	4.99	Welded casing joint
1:33	2.60	Pitless adaptor
1:35	1.00	Below top of casing

Video Log Summary

Client: Town of Shelburne
Well ID: Shelburne Well 8
Date: April 7, 2021
Static Video Inspection

Time (hr:min)	Depth (M)	Event/Notes
0:00	0.79	0.79 m Below top of casing
0:00	2.60	Pitless adapter
0:00	3.80	Casing Joint
0:02	10.30	Casing Joint
0:04	14.87	Water Level
0:11	48.00	Base of casing
0:14	58.00	Bedrock fracture (flow in)
0:17	70.89	Bedrock fracture
0:18	75.80	Bedrock fracture
0:19	76.80	Bedrock fracture (flow in)
0:21	86.33	Bottom of well with sediment observed
0:22	86.04	Bedrock fracture
0:23	84.00	Bedrock fracture
0:28	76.88	Bedrock fracture
0:29	76.08	Bedrock fracture
0:31	71.15	Bedrock fracture
0:38	48.50	Base of Casing
0:47	15.20	Water Level
0:50	2.77	Pitless adapter
0:53	0.79	0.79 m Below top of casing

WELL INITIATIVES

CHLORINATION RECORD

Well ID:	Shelburne Well 7
Client:	Town of Shelburne
Project #:	300051381

Well Diameter (cm):	25
Well Depth (m):	86
Static Water Level (m):	3.53
Well Volume(L):	4,048.24

Type of Chlorine:	Calcium Hypochlorite
Concentration (%):	55
Desired Chlorine (mg/L):	100
Quantity Needed (Grams):	736.04

Date Chlorine Added:	March 24, 2021
Time Chlorine Added:	9:30 AM

Date Chlorine Purged:	March 24, 2021
Time Chlorine Purged:	1:30 PM

Initial Residual:	>50 mg/L
Test method:	High range test strips

WELL INITIATIVES

.

CHLORINATION RECORD

Well ID:	Shelburne Well 8
Client:	Town of Shelburne
Project #:	300051381

Well Diameter (cm):	25
Well Depth (m):	86.3
Static Water Level (m):	3.61
Well Volume(L):	4,059.04

Type of Chlorine:	Calcium Hypochlorite
Concentration (%):	55
Desired Chlorine (mg/L):	100
Quantity Needed (Grams):	738.01

Date Chlorine Added:	April 7, 2021
Time Chlorine Added:	9:15 AM

Date Chlorine Purged:	April 7, 2021
Time Chlorine Purged:	1:30 PM

Initial Residual:	>70 mg/L
Test method:	High range test strips

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix E

Geophysics Logs of MW8 and MW10

Borehole Geophysical Logging Report
Boreholes MW-08 and MW-10
Shelburne, Ontario

Prepared for:

The Town of Shelburne

Project No. 431-001

Lotowater
TECHNICAL SERVICES INC.

Mail: P.O. Box 451, Paris, ON N3L 3T5
Office: 92 Scott Avenue, Paris, ON N3L 3R1

Date: March 3, 2021
Reference: 431-001

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1.0 INTRODUCTION

This report is to provide a description and interpretation of the geophysical logging conducted in monitoring wells Well MW-08 and MW-10 located approximately 4 km west of Shelburne, Ontario (Figure 1). The wells were logged as part of a larger hydrogeological investigation in support of a new nearby Town of Shelburne Water supply well. Lotowater understands that both wells are scheduled to be made into multi level monitor wells by others.

The boreholes were logged for natural gamma, optical televiewer and caliper on December 22, 2020 and January 6, 2021. Additional logging consisting of fluid temperature and fluid conductivity and flow logging (Spinner tool) was carried out on January 28, 2021 and February 11, 2021. The list of logs is summarized in Table 1 below.

A Mount Sopris MGX-II ("slim-hole") logging system was used to record the borehole geophysical data. All of probes were manufactured by Mount with the exception of the televiewers that were manufactured by ALT of Luxembourg.

The borehole geophysical logs (attached) have been grouped to provide a summary of the well condition, for interpreting stratigraphy, to show the structure of the bedrock formations and to help with the understanding of the hydrostratigraphy.

2.0 METHODS

The log types are described in the following sections and the logging parameters for the various tools are presented in the following table.

Table 1: Logs and Logging Parameters

Log Type	Sample Interval (m)	Radial Resolution	Purpose	Comment
Natural Gamma (γ_n)	0.02	NA	stratigraphy and geology	- passive nuclear
3-Arm Caliper (C)	0.01	3 pts at 120 degrees	structure	- borehole diameter, fractures and washouts
Optical Televiewer (OBI)	0.00035	0.4 degree	structure / Geology	- borehole wall imaging
Fluid Temperature (T_f)	0.025	NA	flowing fractures	- fluid interaction – formation to borehole
Fluid Conductivity (C_f)	0.025	NA	flowing fractures	- fluid interaction – formation to borehole
Flow Logging	discrete – see log	NA	flowing fractures	- fluid movement in borehole with spinner tools

2.1 Natural Gamma

The natural gamma log provides a measurement (recorded in counts per second – cps) that is proportional to the natural radioactivity of the formation. The sample volume for the γ_n log is typically a 25 to 30 cm radius. The log is used principally for lithologic identification and stratigraphic correlation. The log can also be used to delineate the vertical extent of annular clay (bentonite) seals.

The tool used for logging employs a scintillation NaI detector. The gamma–emitting radio- isotopes that naturally occur in geologic materials are Potassium 40 and nuclides in the Uranium 238 and Thorium 232 decay series. Potassium 40 occurs with all potassium minerals including potassium feldspars. Uranium 238 is typically associated with dark shale's and uranium mineralization. Thorium 232 is typically associated with biotite, sphene, zircon and other heavy minerals. The logs can be collected in any open borehole although it may be necessary to "side-wall" the probe in large diameter holes. Steel casing will attenuate the gamma response.

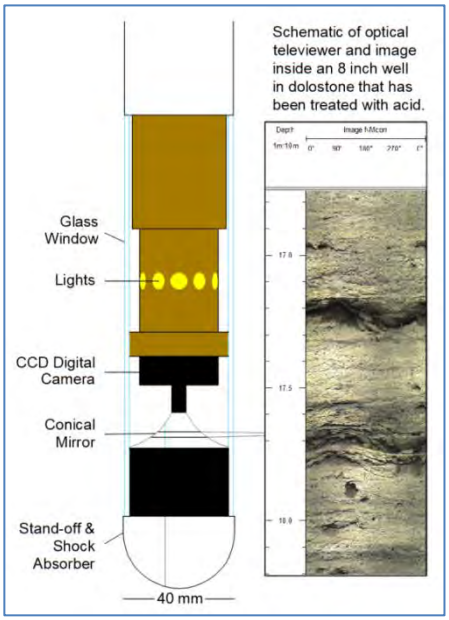
The usual interpretation of the γ_n log in overburden and sedimentary rock is that measured counts are proportional to the quantity of clay minerals present. This assumes that the natural radioisotopes of potassium, uranium and thorium occur as exchange ions attached to the clay particles, so that the correlation is between gamma counts and the cation exchange capacity (CEC).

2.2 3-Arm Caliper

Caliper data are measured with a three-arm caliper tool which provides a direct measure of borehole diameter. The primary applications are fracture location and characterization and to indicate intervals where there are rough borehole walls or washouts due to, for example, the circulation of drilling fluids. The caliper log anomalies could represent fractures, bedding planes, drill-bit scour and solution openings. These logs can be acquired in any open borehole greater than 2 inches in diameter as long as the caliper arms span the diameter.

2.3 Image Log – Optical and Acoustic Televiewers

The optical televiewer (QL40-OBI-2G) generates a scanned image of the inside of the borehole wall with detail for resolving fractures as narrow as 0.1 mm and with radial resolutions of 120 to 1800 pixels per scan. Applications for this tool include inspecting casings for defects, characterization of bedrock fractures in either air or water-filled boreholes and, in combination with traditional core logging, can be used for mineralogy and foliation studies. The schematic below shows the components of the OBI camera head and an example of a 360 degree scan inside a borehole.

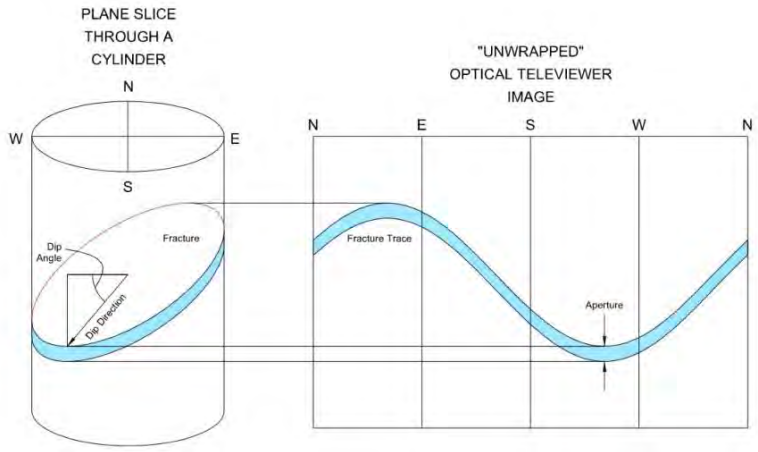


2.3.1 Image Orientation

Images acquired by televiewers are oriented by collecting simultaneous data from a 3-component fluxgate magnetometer and a 3-component tilt meter incorporated into the tool. Prior to interpretation, the image is rotated to a common reference direction, either magnetic north or the high-side of the borehole. Planar features which intersect the borehole wall produce sinusoidal traces in the "unwrapped" televiewer image. Using the reference direction recorded during logging, sinusoids can be analyzed to produce dip and dip directions of structural features.

Experience has shown that the key for quality control is ensuring the accuracy of the orientation system within the televiewer, which should be checked with a calibration device prior to logging. In the presence of magnetic materials (minerals, metal) in the drill hole, the tool's azimuth readings will be influenced. This can be overcome by applying a correction to the magnetometer data over affected portions of the log – either by:

- orienting the image to high side in inclined holes using the inclinometer data collected by the televiewer and then using ancillary information from a borehole deviation tool (gyroscope or maxibore), which is unaffected by magnetic materials to rotate the image to north; or,
- using the roll data acquired by the inclinometers to correct the magnetic roll data. The magnetic roll data can then be used to orient the image to north. Typically, this technique can be usefully applied if short sections of the borehole are affected by magnetic materials or steel casing.



Schematic showing a fracture intersection of a borehole wall and the resultant unwrapped televiewer image

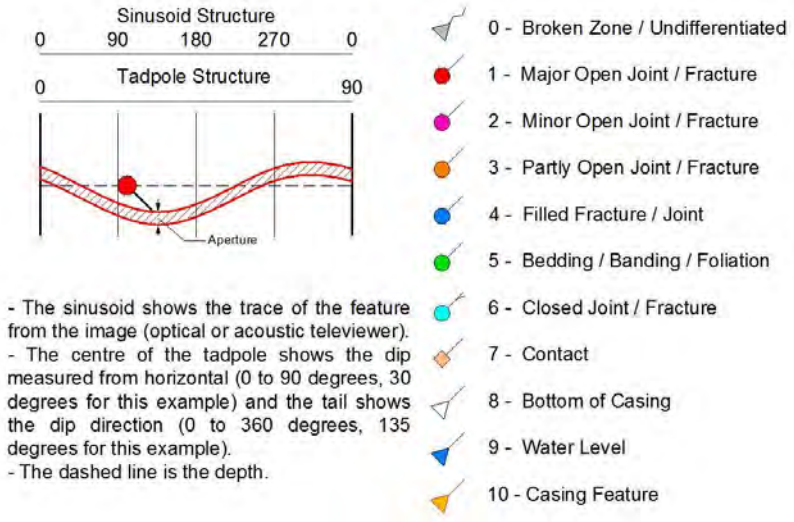
The schematic above is to represent a fracture with aperture intersecting a borehole wall and the appearance of the same fracture in a televiewer image. Interpretation software (WellCAD) allows for the calculation of dip, dip direction and aperture by fitting a sinusoid to the structure in the televiewer image.

2.3.2 Image Processing

Processing steps for the televiewer log data include the following:

- Importing the raw data into WellCAD – a software package designed for manipulation and presentation of geophysical log data.

- Depth corrections are applied to account for casing stickup for the various log runs so that all depths are related to distance in the borehole from ground surface. As part of this, checks are completed to ensure that features common to the various logs match for depth.
- The televiewer log images are aligned with either high side in the borehole or magnetic north. At this point, the televiewer telemetry data were corrected over portions of the borehole clearly affected by magnetic interference – specifically the casing.
- Features on the televiewer logs were then identified and analyzed for azimuth and dip.
- Sinusoidal features on the optical log were interpreted according to the following system of classification.



0. Broken Zone / Undifferentiated: A broken zone in the borehole wall that is indistinguishable as a specific type of structure or where the sinusoids are incomplete or distorted.
1. Major Open Joint / Fracture: Continuous televiewer sinusoids with aperture greater than 1 cm and associated caliper or acoustic log travel time anomalies.
2. Minor Open Joint / Fracture: Continuous televiewer sinusoids with less than 1 cm of aperture but with associated caliper or travel time anomalies.
3. Partially Open Joint / Fracture: Continuous televiewer sinusoid with discontinuous aperture.
4. Filled Fracture / Joint: Continuous or discontinuous sinusoids with no aperture that are parallel or at an angle to the foliation. Typically, filling may be calcite, gypsum, or quartz depending on the geology.
5. Bedding / Banding / Foliation: Generally appear as a series of parallel or sub-parallel sinusoids. These can be misinterpreted as Filled Fractures / Joints and vice-versa.
6. Closed Joint / Fracture: Continuous or discontinuous sinusoids with no aperture that are parallel or at an angle to the foliation with no indication of fracture filling.

7. Contact: These are interpreted from review of the televiewer data together with the stratigraphic logs (natural gamma and apparent conductivity) and marked if there is no obvious associated mechanical structure.
8. Bottom of Casing: Picked to check borehole orientation data in angled holes and as a depth reference.
9. Water Level: The water level in the borehole – generally most obvious in the acoustic televiewer log.
10. Casing Feature: Featured in the casing such as joints or pitless adaptors.

The structure features shown above and included in the logs ("Structure" column) are digitized by hand and referenced to the "high-side" or "magnetic north-oriented" borehole images.

2.4 Fluid Temperature and Conductivity

Geothermal gradients in the near surface are usually dominated by conduction and are generally linear due to the relative constancy of the thermal conductivity of the earth materials. Deviations from the linear thermal gradient are attributed to convective heat flow. Most commonly, this convective heat flow is within the borehole fluid and is caused by formation fluid entering or leaving the borehole at some permeable interval. Abrupt changes in the temperature log (degrees Celsius, °C) are evidence of fluid flow between the formation and the borehole and subtle changes in the thermal gradient may be attributed to fluid flow within the borehole.

Fluid Conductivity (µS/cm) in the borehole is controlled primarily by salinity and salinity changes within the borehole can be attributed to fluid flow. Often fluid exchange between the formation and the borehole affects both the temperature and the fluid conductivity such that the response is evident in both logs.

The probe contains a seven-electrode, mirrored Wenner-type array for measuring borehole fluid conductivity and a temperature sensor based on a fast-response semiconductor whose output voltage changes linearly with temperature. The two sensors are deployed in an opening at the bottom of the probe so that borehole fluid passes the sensors as the probe is lowered down the borehole.

2.5 Flow Distribution Profile

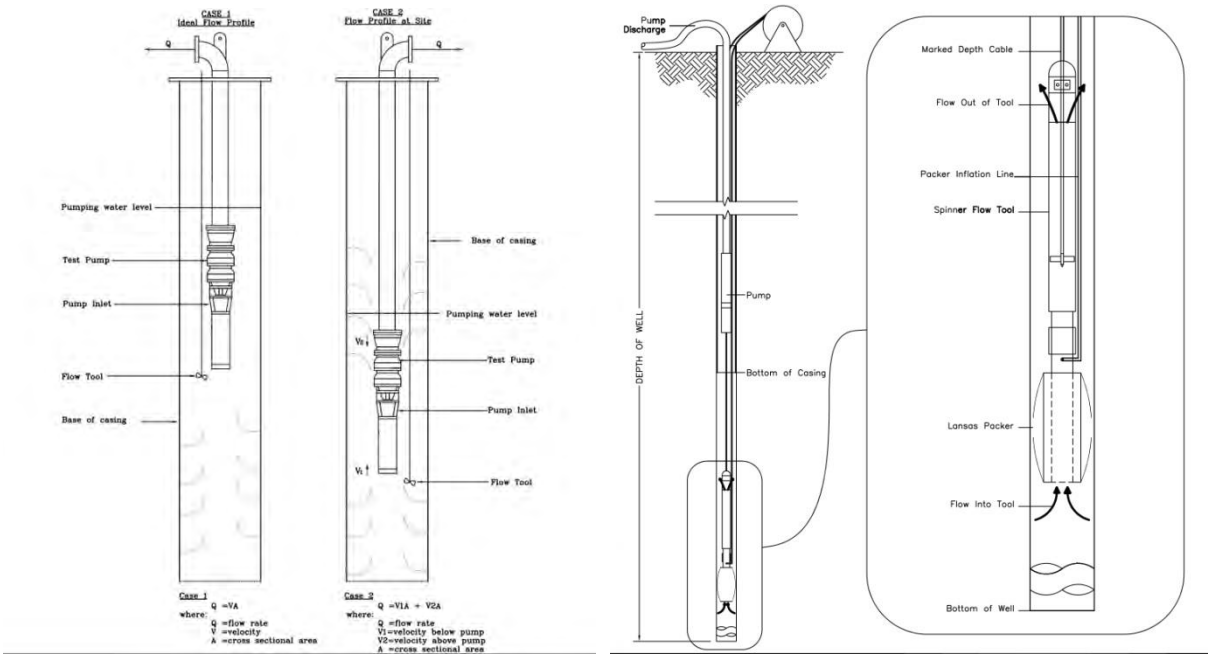
Lotowater uses a spinner device manufactured by Swoffer with custom modifications for application in boreholes and wells. The tool has a small impeller that is oriented vertically. Vertical flow in the well activates the impeller which transmits a signal to a digital readout at the surface for every ½ revolution of the impeller. The velocity of fluid is directly proportional to the rotational speed of the spinner tool. The spinner tool is regularly calibrated such that its readout is reported as a velocity in metres/second (m/s).

Flow profiling is typically conducted under non pumping conditions to indicate natural water movement in the borehole as well as under induced pumping conditions. The spinner flow tool has a minimum threshold velocity of 0.02 m/s required to overcome internal friction and activate the tool. In most cases there is not a strong enough vertical flow in the well to activate the flow tool so a small submersible pump is installed to induce flow. When used in pumping conditions the pump is ideally set above all the water producing zones in the well while the spinner is raised from the bottom of the well to the bottom of the pump. Flow measurements are recorded at a specified depth interval or whenever a change in flow is indicated.

In some cases, non-pumping water levels are below the base of the well casings and it may be necessary to install a pump in the open borehole below the casing so that sufficient quantities of water can be pumped to

provide the velocities required to produce adequate resolution for the flow tool. This creates a condition whereby some of the potential water producing features are situated above the pump. Since physical restrictions often do not allow flow tool to fit past the pump and discharge pipe, it is not possible to flow profile across the entire borehole. Despite not being able to flow log all potential flow zones, an assessment of the total well flow above the pump can be made by calculating the difference in the flow measured from below the pump and subtracting this from the measured flow at the pump discharge. Details of this are shown in the schematic (left) below.

In some cases where flow velocities are, low a modified spinner flow tool is used. This flow tool uses the identical spinner and optical sensor as the previous tool but incorporates a small inflatable packer to seal the well bore and concentrate the entire well flow into a 60mm diameter bore as shown in the schematic (right) below. This increases the velocity considerably allowing the flow tool to measure low flows in larger diameter bore holes.



3.0 FIELD WORK

Geophysical logging was completed during December, 2020 and January, 2021. For the first visit to each borehole, the logs collected included natural gamma, 3-arm caliper and optical televiewer. Subsequently, additional logging consisted of fluid temperature and fluid conductivity and flow logging with a spinner tool under static and pumping conditions.

For the flow testing under pumping conditions, a small, submersible pump was used to generate flows on the order of 2.6 L/s which translates to a flow rate of 0.13 m/s in the 160mm internal diameter of the cased portion of the borehole.

4.0 RESULTS

The overall purpose of the logging was to assemble a focused set of data to describe, as much as possible with the time and budget constraints, the condition of the well and the geology, structure and hydrostratigraphy of the bedrock intersected by the well bore.

The log data are of good quality and the equipment performed without any issues:

- Depth encoding was consistent between the log runs and corrections apart from slight depth shifts were not required.
- The natural gamma log (not centralized) was side-walled due to the slight tilt of the borehole and has generated a good formation signal albeit somewhat attenuated due to the large (8") borehole diameter and the low natural gamma radiation of the bedrock.
- The 3-arm caliper data were consistent and repeatable between runs. Minor differences between the runs are ascribed to the vuggy nature of the bedrock in that an arm of the caliper tool may encounter a vug on one up-run and miss it on the next due to a rotation of the probe in the borehole.
- The optical televiewer data quality is excellent due to clear water in the borehole and a well centralized logging tool.
- The telemetry data acquired with the televiewer probe were corrected for the effect of the casing so that the images could be oriented to magnetic north for the full length of the logging run.
- The fluid temperature data are consistent with the results from the flow logging and are discussed further below.

The logs for the two monitoring wells MW-08 and MW-10 are attached and presented at a 1:50 scale on Figures 2 and 3 respectively. The logs have been organized to show the following:

- tilt and azimuth of the well bore – note that the azimuth data have not been corrected for magnetic interference from the steel casing,
- natural gamma and the optical image to assess the geology. The geology column has been left blank pending input from the OGS regarding formation contacts,
- well construction
- caliper logs.
- bedrock structure and,
- logs acquired to assess the hydrostratigraphy – spinner flow log and the fluid temperature log for static and pumping conditions.

The logs are discussed in the following subsections.

4.1 Stratigraphy

The bedrock stratigraphy has been assigned based on review of the logs and published material by Frank Brunton of the OGS in Sudbury. The stratigraphy is described as consisting of the Gasport, Goat Island and, Guelph formations in the Lockport Group from bottom to top in the well bore. It does not appear that the wells have intersected the IRM (Irondequoit, Rockway, Merritton in the upper part of the Clinton Group below the

Lockport Group as there is no significant positive deflection of the natural gamma log at the bottoms of either of the well bores.

4.2 Well Condition

The monitoring well condition logs include the telemetry data from the optical televiewer and the caliper logs. Summaries of the construction for each monitoring well are presented in the completion logs.

MW-08 was drilled to a depth of approximately 76.3 m-bgl and cased to a depth of 7.71 m-bgl. The water level in the borehole at the time of logging was 1.53 m-bgl. MW-10 was also drilled to an approximate depth of 76.3 m-bgl and cased to a depth of 9.22 m-bgl. The water level in the borehole at the time of logging was 3.02 m-bgl.

The casings in both monitoring wells are steel as indicated by the Mag Field logs overlain on the completion logs. The normal total magnetic field should be about 54 µT but the Mag Field log deviates significantly (> +/- 30 µT) from this value in the steel casing.

The tilt data for each well are variable – likely due to the roughness of the borehole walls. The azimuth data are also variable due to the low tilt angles in that slight variations in tilt near zero result in large variations in azimuth. Closure distance for either well was not calculated as pumps will not be set in these monitoring wells.

4.3 Structure

For Monitoring Wells MW-08 and MW-10 (Figures 2 and 3 respectively), the optical televiewer data together with the caliper data were analyzed to generate structure data. Sinusoids apparent on the optical image logs were digitized and categorized (Feature Picks) according to the scheme presented in Section 2.3.2. The structure sinusoids are also presented as tadpoles oriented to true north based on a declination of 9.99 degrees (ref: Natural Resources Canada Magnetic Declination Calculator). Stereonets for the structure data are presented on Figures 4 and 5 for MW-08 and MW-10 respectively together with the tadpole, caliper spinner and natural gamma logs.

The stereo nets for both monitoring wells indicate that the geology (bedding planes and contacts) is dipping predominantly to the west at angles varying from 0 to 15 degrees but with some obvious outliers. Dips (up to 30+ degrees) in MW-08 are more variably steeper than in MW-10.

There are more significant differences in the fracture (or joint) orientations between the two monitoring wells. Fracture dips (up to >60 degrees) and dip directions are more scattered in MW-08. The low angle (<15 degrees) structure trend in MW-08 is towards the west consistent with the geological planes (bedding and contacts). For MW-10, the trend in the fracture structure is aligned from northeast to southwest with only a few structure features with dips greater than 30 degrees encountered in the borehole.

4.4 Hydrogeophysical Data

The logs used for showing flow to the well from the bedrock are the flow velocity log and the fluid temperature logs. These logs are shown in columns 8 and 9 on Figures 2 and 3 for MW-08 and MW-10 respectively.

For MW-08, under pumping conditions, the majority of flow is due to groundwater entering the borehole between 31 and 32.5 m depth from a series of low aperture fractures but with associated solution cavities. The fluid temperature log shows that the effect of pumping is to flatten the temperature profile above 70 m depth. This suggests that there is contribution to flow from depth in the well bore – possibly the partially open fracture at a depth of 65.4 m.

Also, in MW-08, the initial static level was 4.02 m-btc which dropped to 8.18 m-btc after one hour of pumping with pumping rate of 2.65 L/s. The specific capacity for the well was calculated as 0.73 L/s/m.

For MW-10, under pumping conditions, the majority of flow originates from a zone with major open fractures just below the bottom of the casing (9.6 m to 9.8 m below ground level). As with MW-08, it appears that the effect of pumping is to flatten the fluid temperature profile above 70 m depth in the well bore. This suggests that there is contribution to flow from depth in the well bore – possibly the partially open fracture at a depth of 70.1 m.

Also, in MW-10, the initial static level was 2.84 m-btc which dropped to 5.25 8 m-btc after an hour of pumping with pumping rate of 2.27 L/s. The specific capacity for the well was calculated as 0.94 L/s/m

5.0 CONCLUSIONS

The borehole geophysical log data have yielded a significant amount of information about the monitoring wells (MW-08 and MW-10) which is presented on Figures 2 through 5.

Main points regarding the well condition are:

- MW-08 was drilled to a depth of 76.3 m-bgl and cased to a depth of 7.71 m-bgl. MW-10 was drilled to a depth of 76.3 m-bgl and cased to a depth of 9.22 m-bgl.
- The casing and open bedrock portion of both monitoring wells have a measured inside diameter of approximately 16 cm (6.3 in).

Main points concerning the geology and hydrostratigraphy are:

- The monitoring wells are completed for the most part in the Guelph, Goat Island and Gassport formations. The formation contacts shown on the logs (Figures 2 and 3) are to be revised pending review by the Ontario Geological Survey.
- The majority of flow in both monitoring wells appears to be from karst features in the upper Goat Island (MW-08) and Guelph (MW-10) – likely solution enlarged fractures.

6.0 LIMITATIONS OF GEOPHYSICAL METHODS

Lotowater services are conducted in a manner consistent with the level of care and skill ordinarily exercised by other members of the geophysical community currently practicing under similar conditions subject to the time limits and financial and physical constraints applicable to the services. The data presented reflect the monitoring well conditions at the time of logging and conclusions drawn from the data may be interpretive to some degree.

Report Signature Page

We trust that the contents of this report are sufficient to your current needs. Please do not hesitate to contact the undersigned if you need additional information or clarification.

LOTOWATER TECHNICAL SERVICES INC.

Mark Monier-Williams, M.Sc., P. Geo.
Sr. Geophysicist

Boyd Pendleton, , P.Geo.
Vice President

MMW/BP/ntf

c:\users\joan\desktop\lotowater\156-049 carlisle testing fdc03r, fdc05\8. logging\fdc05\mmw proc\carlisle fdc-05 156-049 borehole geophysics report.docx

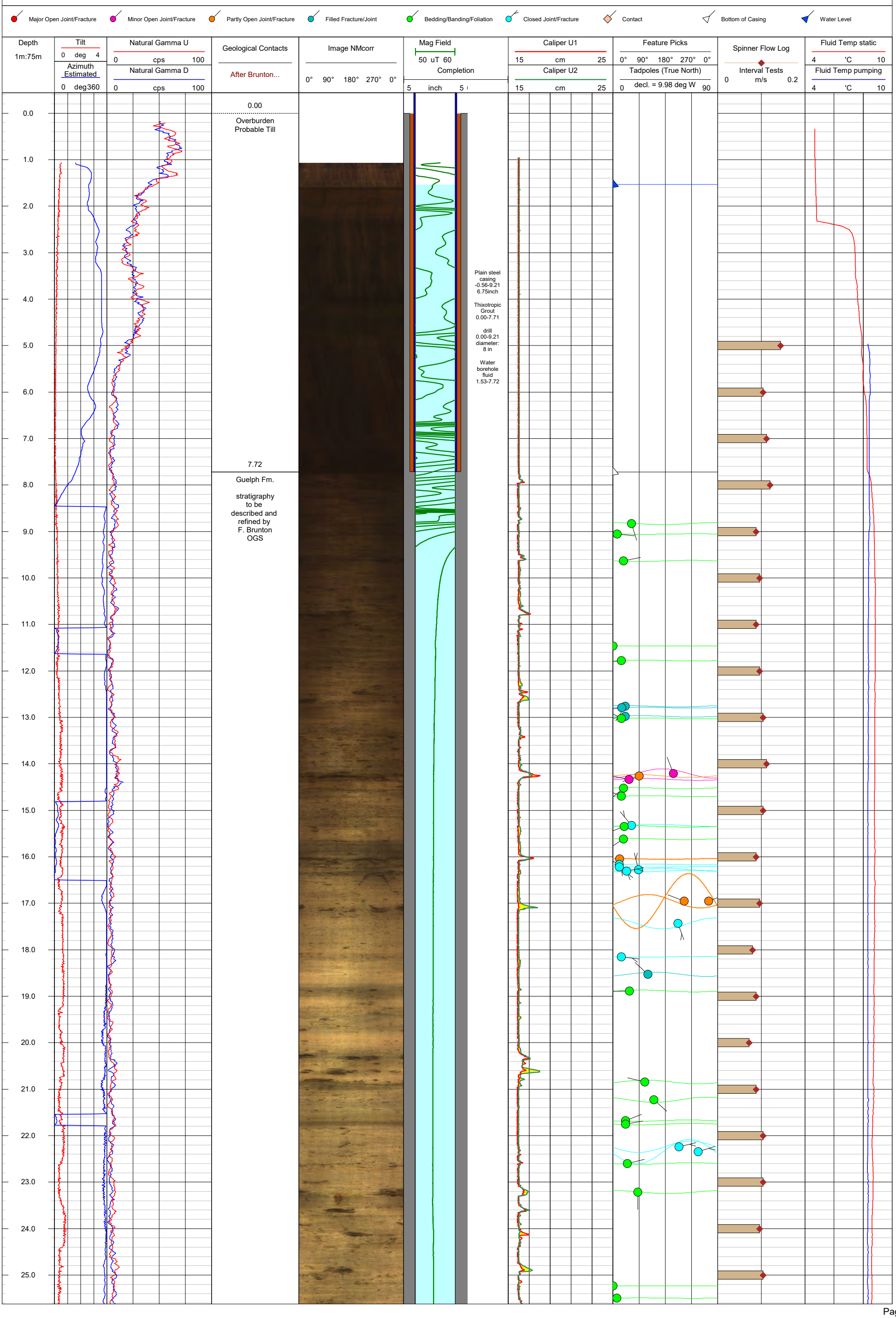
FIGURES


Figure 1
Monitoring Well Locations
Legend
MW-08
MW-10
Shelburne
MW-10
MW-08
Owen Sound St
County Rd 124
Main St E
Shelburne
30 Side Rd
Google Earth
Image © 2021 Maxar Technologies
N
2 km

Lotowater TECHNICAL SERVICES INC.

CLIENT
Town of Shelburne, Ontario

LOCATION	*Shelburne, ON*	**BOREHOLE**	**MW-08**	**Figure 2**
DEPTH REF.	*"0" at Ground Surface*	**PROJECT #**	*431-001*	**Open Hole**
WATER LEVEL	*1.53 m - bgl*	**LOG DATE**	*Dec/Jan, 2020/2021*	**Geophysical**
DRILL METHOD	*Conventional Rotary*	**LOGGED BY**	*R. Hettinga*	**Logs**



Depth
1m:75m

Tilt
0 deg 4
Azimuth Estimated
0 deg360

Natural Gamma U
0 cps 100
Natural Gamma D
0 cps 100

Geological Contacts
After Brunton...

26.71
Goat Island - Ancaster

44.26
Goat Island - Niagara Fa

Image NMcorr
0° 90° 180° 270° 0°

Mag Field
50 uT 60
Completion
5 inch 5

drill
9.21-77.00
diameter:
6.25 in

Water
borehole
fluid
7.72-76.30

Caliper U1
15 cm 25
Caliper U2
15 cm 25

Feature Picks
0° 90° 180° 270° 0°
Tadpoles (True North)
0 decl. = 9.98 deg W 90

Spinner Flow Log
Interval Tests
0 m/s 0.2

Fluid Temp static
4 'C 10
Fluid Temp pumping
4 'C 10

26.0
27.0
28.0
29.0
30.0
31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0
39.0
40.0
41.0
42.0
43.0
44.0
45.0
46.0
47.0
48.0
49.0
50.0
51.0
52.0
53.0
54.0

Depth	Tilt	Natural Gamma U	Geological Contacts	Image NMcorr	Mag Field	Caliper U1	Feature Picks	Spinner Flow Log	Fluid Temp static
1m:75m	0 deg 4	0 cps 100	After Brunton...	0° 90° 180° 270° 0°	50 uT 60	15 cm 25	0° 90° 180° 270° 0°	Interval Tests	4 'C 10
	Azimuth Estimated	Natural Gamma D			Completion	Caliper U2	Tadpoles (True North)	0 m/s 0.2	Fluid Temp pumping
	0 deg 360	0 cps 100			5 inch 5	15 cm 25	0 decl. = 9.98 deg W 90		4 'C 10

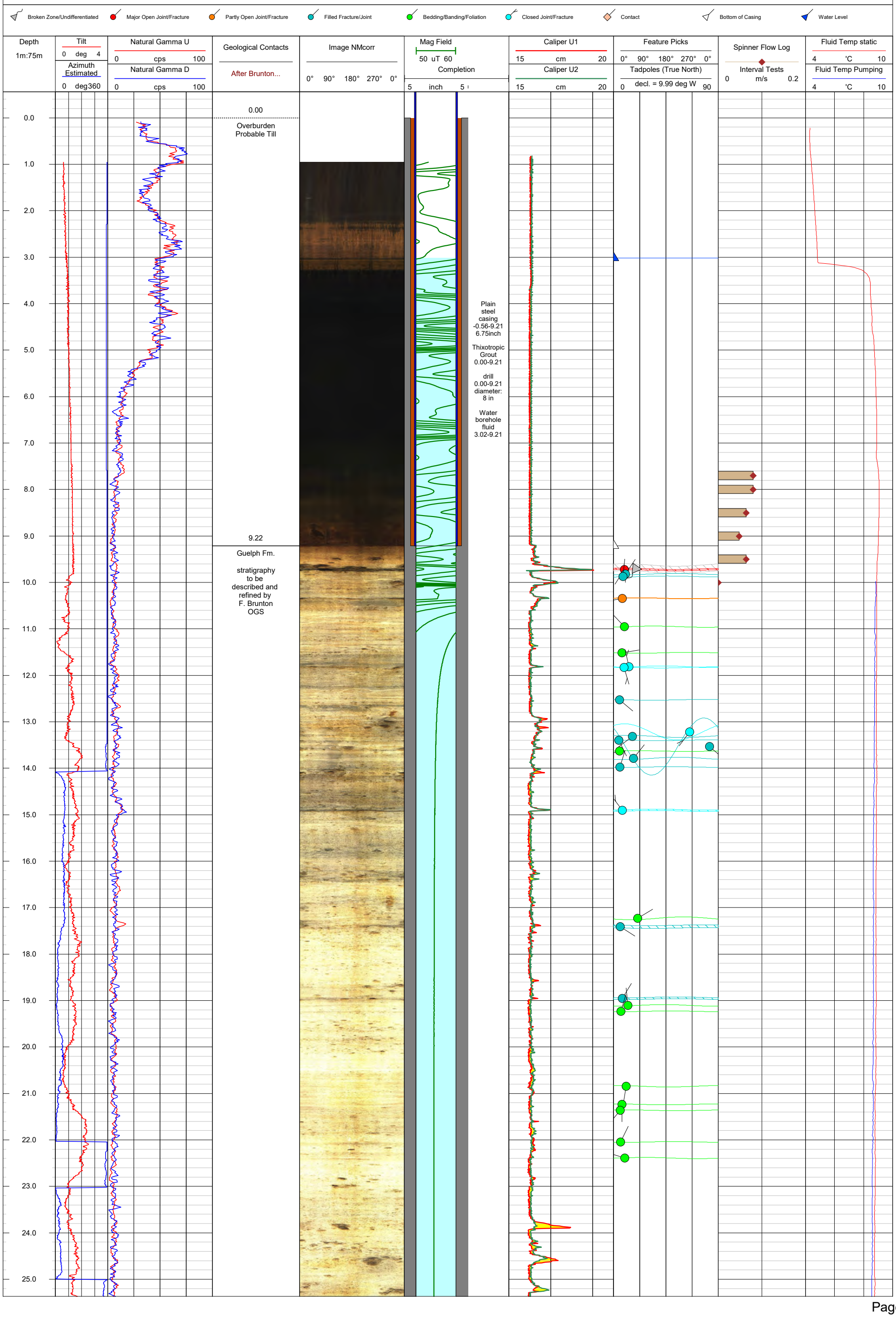
55.0
56.0
57.0
58.0
59.0
60.0
61.0
62.0
63.0
64.0
65.0
65.21
Gassport
66.0
67.0
68.0
69.0
70.0
71.0
72.0
73.0
74.0
75.0
76.0

Depth	Tilt	Natural Gamma U	Geological Contacts	Image NMcorr	Mag Field	Caliper U1	Feature Picks	Spinner Flow Log	Fluid Temp static
1m:75m	0 deg 4	0 cps 100	After Brunton...	0° 90° 180° 270° 0°	50 uT 60	15 cm 25	0° 90° 180° 270° 0°	Interval Tests	4 'C 10
	Estimated Azimuth	Natural Gamma D			Completion	Caliper U2	Tadpoles (True North)	0 m/s 0.2	Fluid Temp pumping
	0 deg 360	0 cps 100			5 inch 5	15 cm 25	0 decl. = 9.98 deg W 90		4 'C 10

Lotowater TECHNICAL SERVICES INC.

CLIENT
Town of Shelburne, Ontario

LOCATION	*Shelburne, ON*	**BOREHOLE**	**MW-10**	**Figure 3**
DEPTH REF.	*"0" at Ground Surface*	**PROJECT #**	*431-001*	**Open Hole**
WATER LEVEL	*3.02 m - bgl*	**LOG DATE**	*Dec/Jan, 2020/2021*	**Geophysical**
DRILL METHOD	*Conventional Rotary*	**LOGGED BY**	*R. Hettinga*	**Logs**



Depth
1m:75m

Tilt
0 deg 4
Azimuth Estimated
0 deg 360

Natural Gamma U
0 cps 100
Natural Gamma D
0 cps 100

Geological Contacts
After Brunton...

Image NMcorr
0° 90° 180° 270° 0°

Mag Field
50 uT 60
Completion
5 inch 5

Caliper U1
15 cm 20
Caliper U2
15 cm 20

Feature Picks
0° 90° 180° 270° 0°
Tadpoles (True North)
0 decl. = 9.99 deg W 90

Spinner Flow Log
Interval Tests
0 m/s 0.2

Fluid Temp static
4 'C 10
Fluid Temp Pumping
4 'C 10

26.0
27.0
28.0
29.0
30.0
31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0
39.0
40.0
41.0
42.0
43.0
44.0
45.0
46.0
47.0
48.0
49.0
50.0
51.0
52.0
53.0
54.0

28.94
Goat Island - Ancaster

47.59
Goat Island - Niagara Fa

Water
borehole
fluid
9.21-76.50

drill
9.21-77.00
diameter:
6.25 in

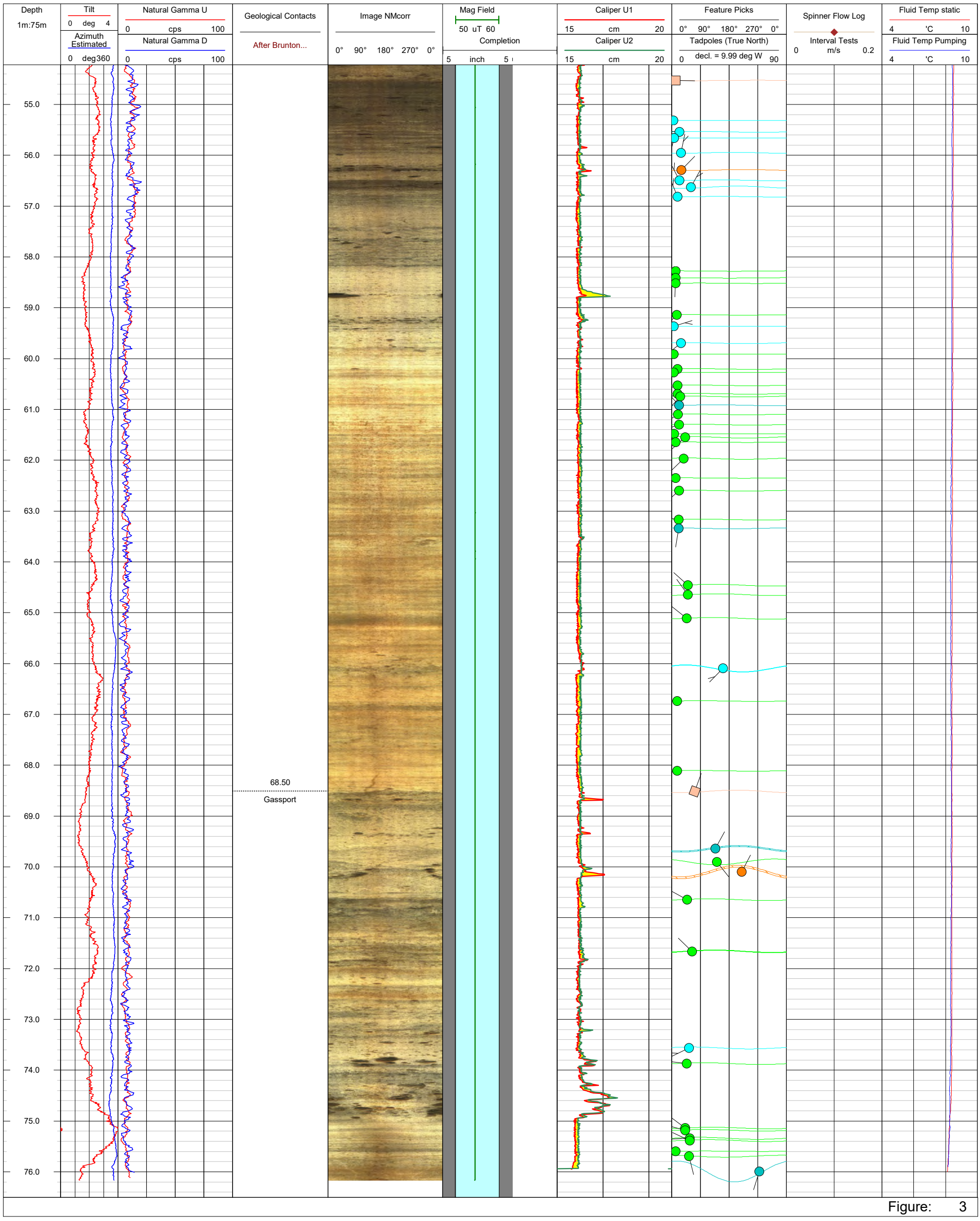

Depth
1m:75m
Tilt
0 deg 4
Azimuth Estimated
0 deg 360
Natural Gamma U
0 cps 100
Natural Gamma D
0 cps 100
Geological Contacts
After Brunton...
Image NMcorr
0° 90° 180° 270° 0°
Mag Field
50 uT 60
Completion
5 inch 5
Caliper U1
15 cm 20
Caliper U2
15 cm 20
Feature Picks
0° 90° 180° 270° 0°
Tadpoles (True North)
0 decl. = 9.99 deg W 90
Spinner Flow Log
Interval Tests
0 m/s 0.2
Fluid Temp static
4 'C 10
Fluid Temp Pumping
4 'C 10
55.0
56.0
57.0
58.0
59.0
60.0
61.0
62.0
63.0
64.0
65.0
66.0
67.0
68.0
69.0
70.0
71.0
72.0
73.0
74.0
75.0
76.0
68.50
Gassport

Figure: 3

Lotowater TECHNICAL SERVICES INC.

CLIENT *Town of Shelburne, Ontario*

BOREHOLE MW-08
PROJECT # *431-001*
LOG DATE *2020-12-??*
LOCATION *Shelburne, ON*

Figure 4
Structure Logs and Stereonets

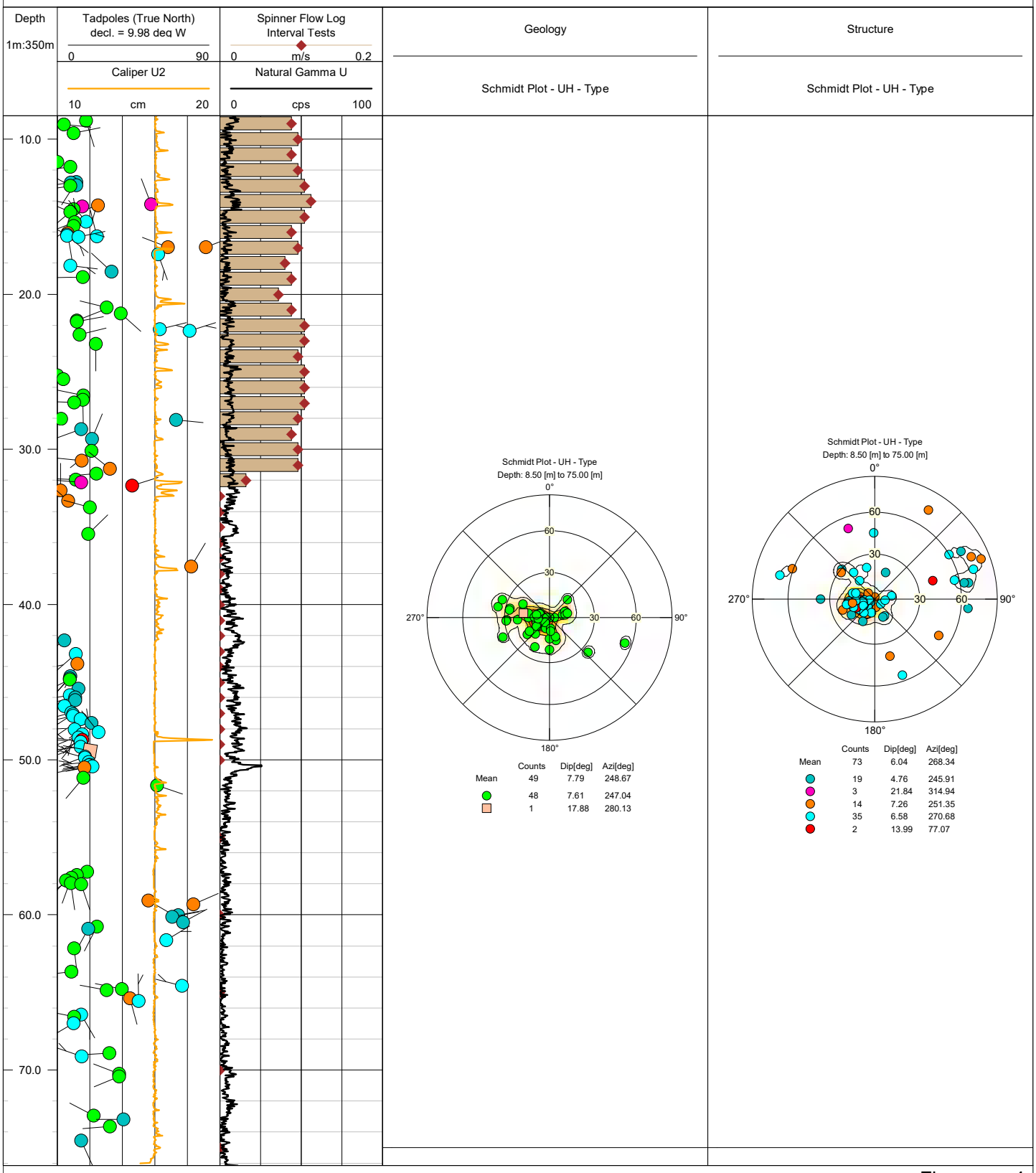


Figure: 4

Lotowater TECHNICAL SERVICES INC.

CLIENT *Town of Shelburne, Ontario*

BOREHOLE **MW-10**
PROJECT # *431-001*
LOG DATE *2020-12-??*
LOCATION *Shelburne, ON*

Figure 5

Structure Logs and Stereonets

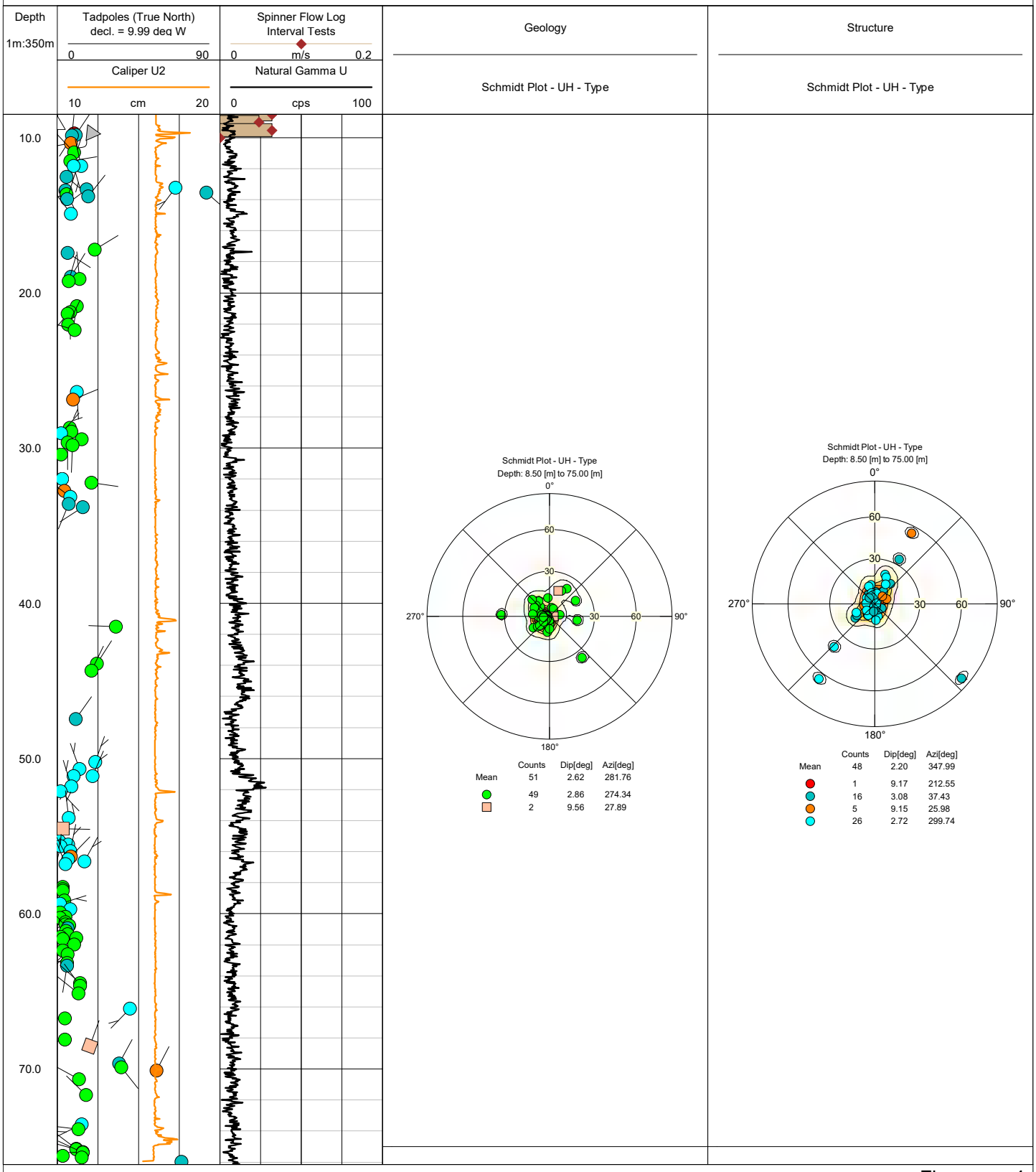


Figure: 4

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Appendix F

SBA Monitoring Well Construction Report (SBA, 2021)

S. BURNETT & ASSOCIATES LIMITED
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2021-04-19

Town of Shelburne
203 Main Street East
Shelburne, ON
L9V 3K7

Re: Town of Shelburne, Well 7 & 8 Class EA
Monitoring Well Installation – As Constructed Record
SBA File No: M17025

Monitoring Well 8: Tag No. A294041

MEDIA	DEPTH (fbg)
Well Sand #3	251' – 189'11"
Grout	189'11" – 184'
Well Sand #3	184' – 150'1"
Grout	150'1" – 140'1"
Well Sand #3	140'1" – 20'2"
Grout	20'2" – 10'2"
Well Sand #3	10'2" – 0'

MW	SCREEN DEPTH (fbg)
Deep	205'1" – 215"1'
Intermediate	159'10" - 169'10"
Shallow	100'2" – 110'2"

Notes: Water level @ 1.14m below grade (April 13th @ 8:10 AM)
1" MW's raised using couplers to allow for easier access.

Monitoring Well 10: Tag No. A323472

MEDIA	DEPTH (fbg)
Well Sand #3	250'8" – 210'1"
Grout	210'1" – 200'
Well Sand #3	200' – 160'3"
Grout	160'3" – 150'
Well Sand #3	150' – 24'11"
Grout	24'11" – 10'
Well Sand #3	10' – 0'

MW	SCREEN DEPTH (fbg)
Deep	225' – 235'
Intermediate	179'11" – 169'11"
Shallow	79'10" –69'10"

Notes: Water level @ 2.36m below grade (April 13th @ 9:25 AM)

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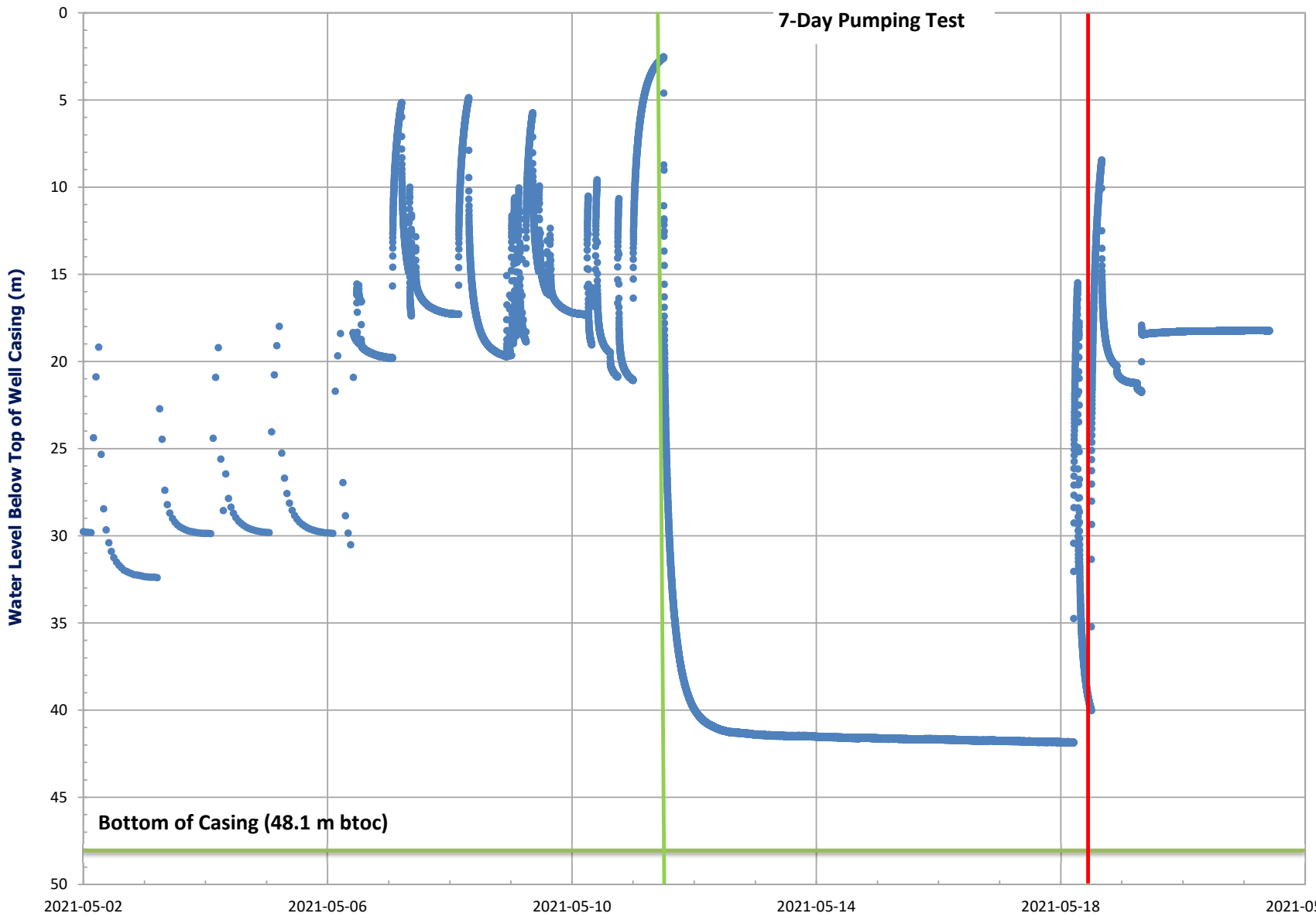
Appendix G

Graphs

Hydrograph - Production Well PW7 (May 2-22, 2021)



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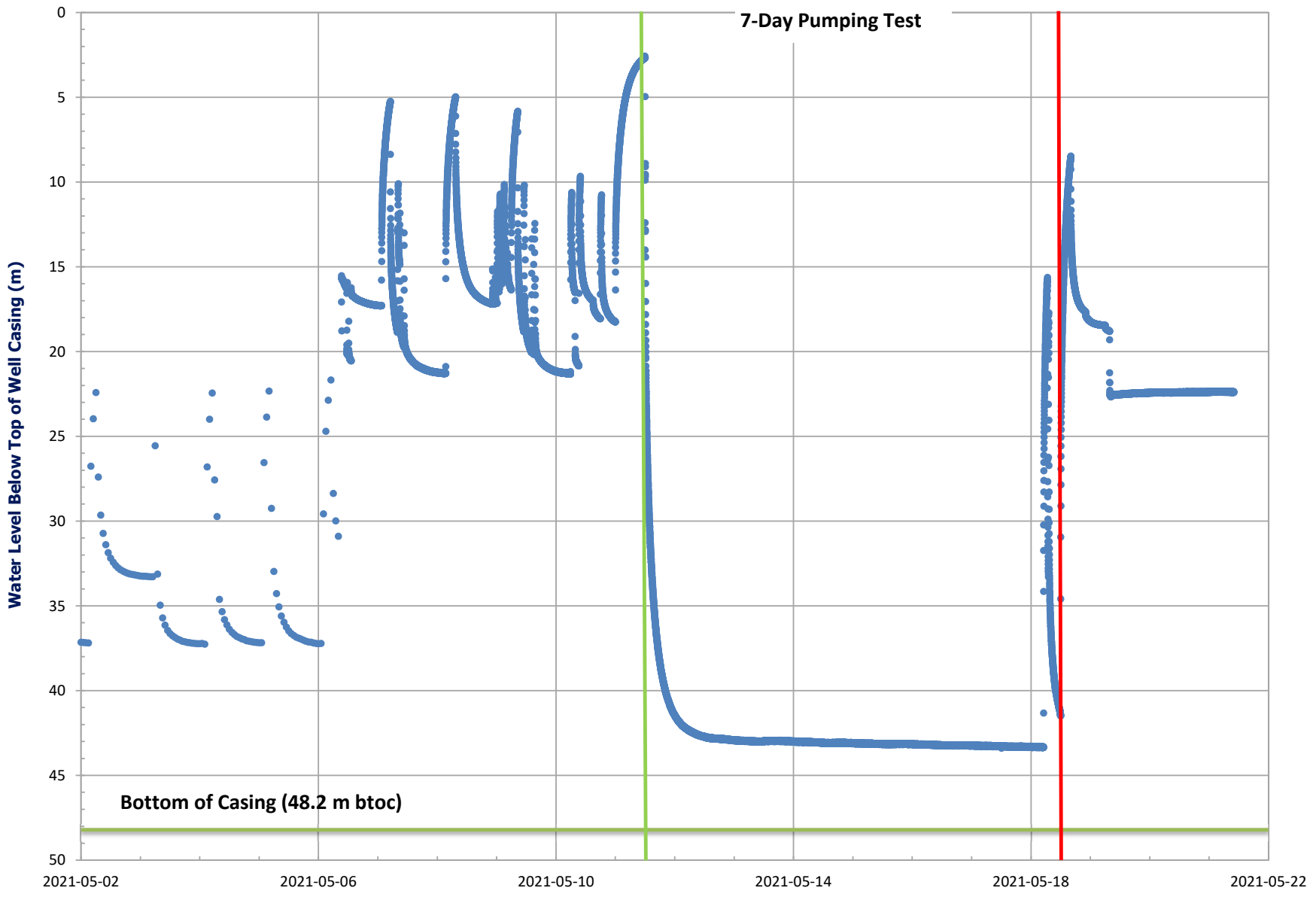
Banks Groundwater Engineering Limited

Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 1**

Hydrograph - Production Well PW8 (May 2-22, 2021)



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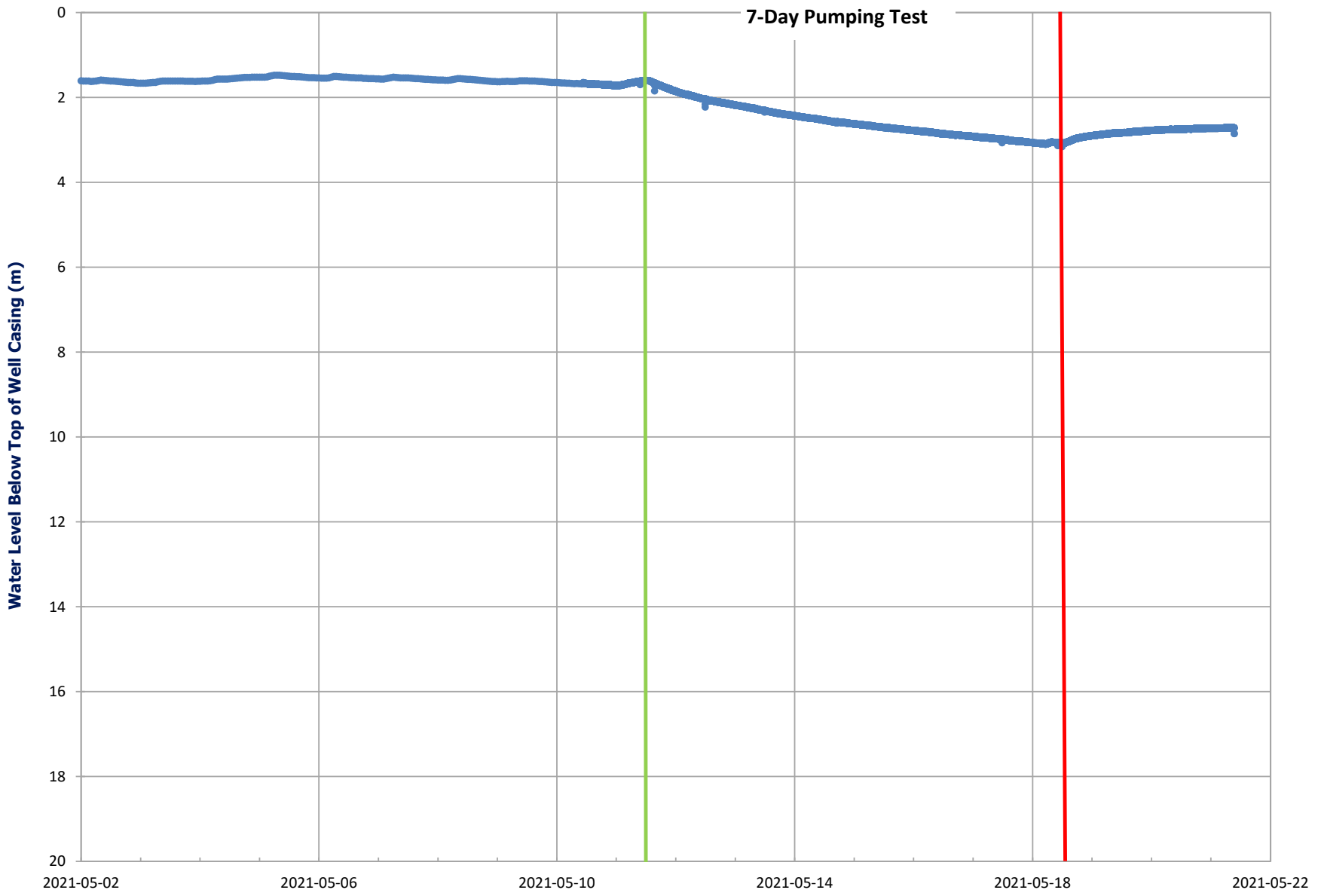
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 2**

Hydrograph - Monitoring Well MW6-9 (May 2-22, 2021)



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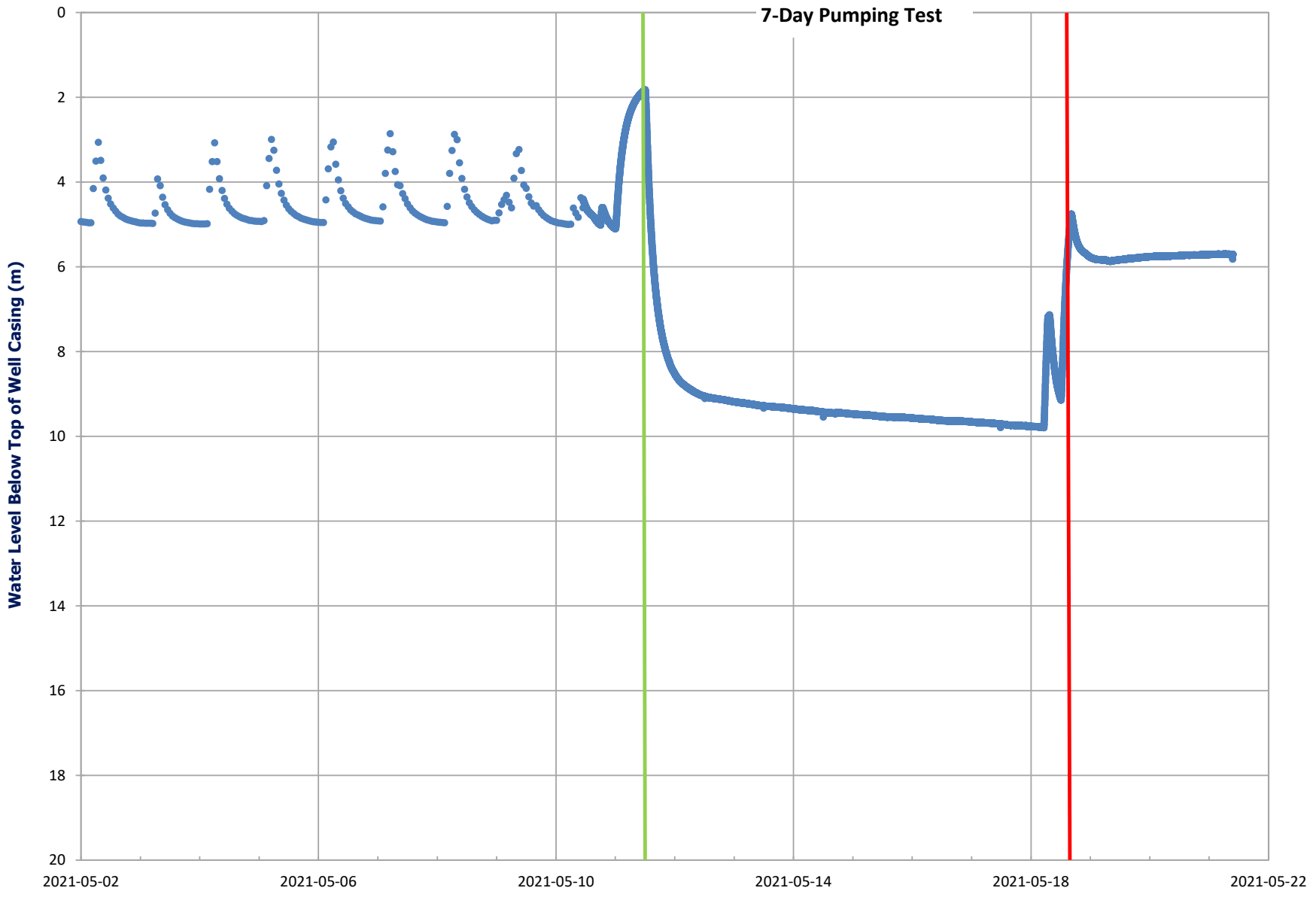
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 3**

Hydrograph - Monitoring Well MW7-30 (May 2-22, 2021)



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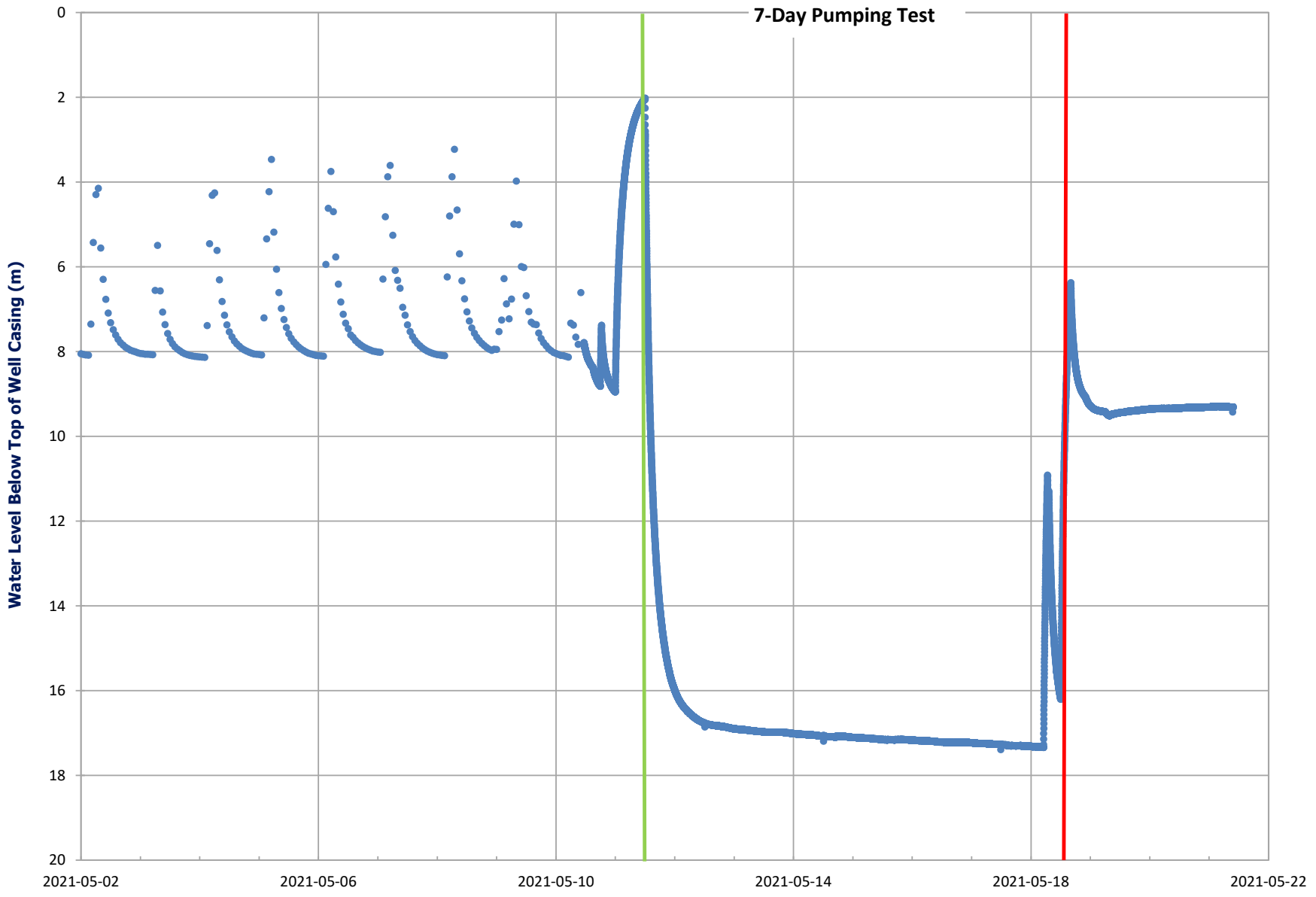
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 4**

Hydrograph - Monitoring Well MW7-45 (May 2-22, 2021)



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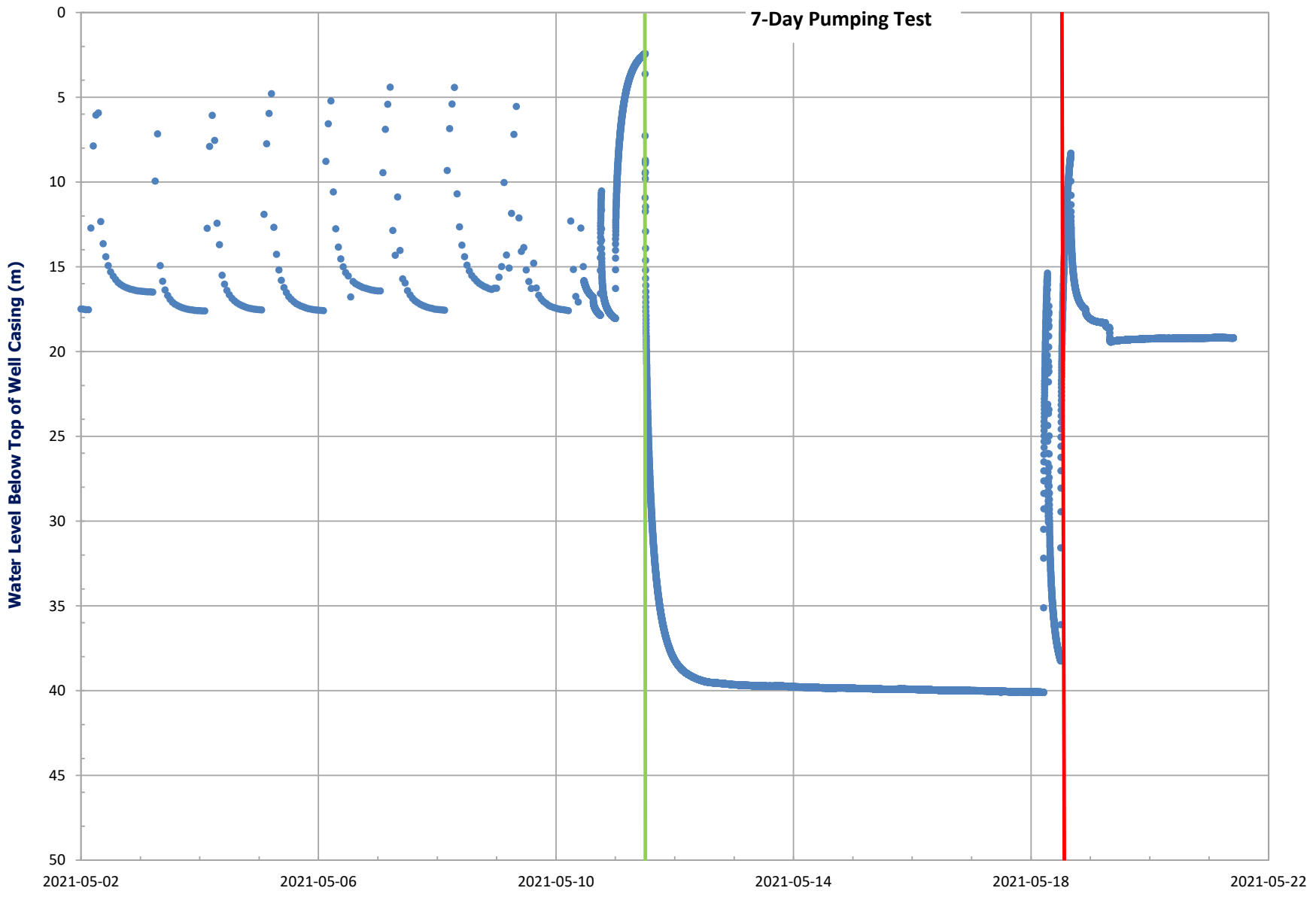
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 5**

Hydrograph - Monitoring Well MW7-75 (May 2-22, 2021)



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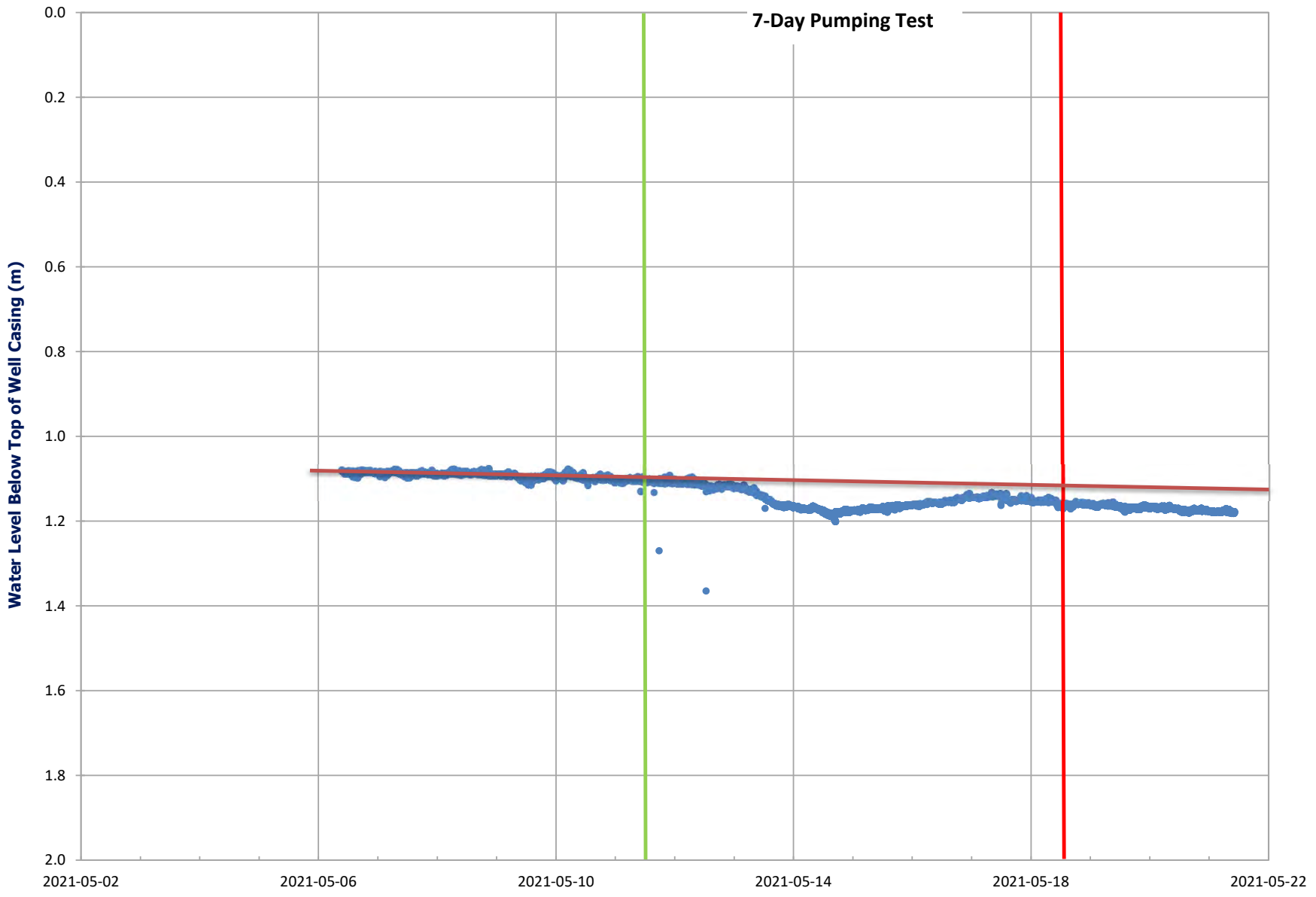
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 6**

Hydrograph - Monitoring Well MP1-2 (May 2-22, 2021)



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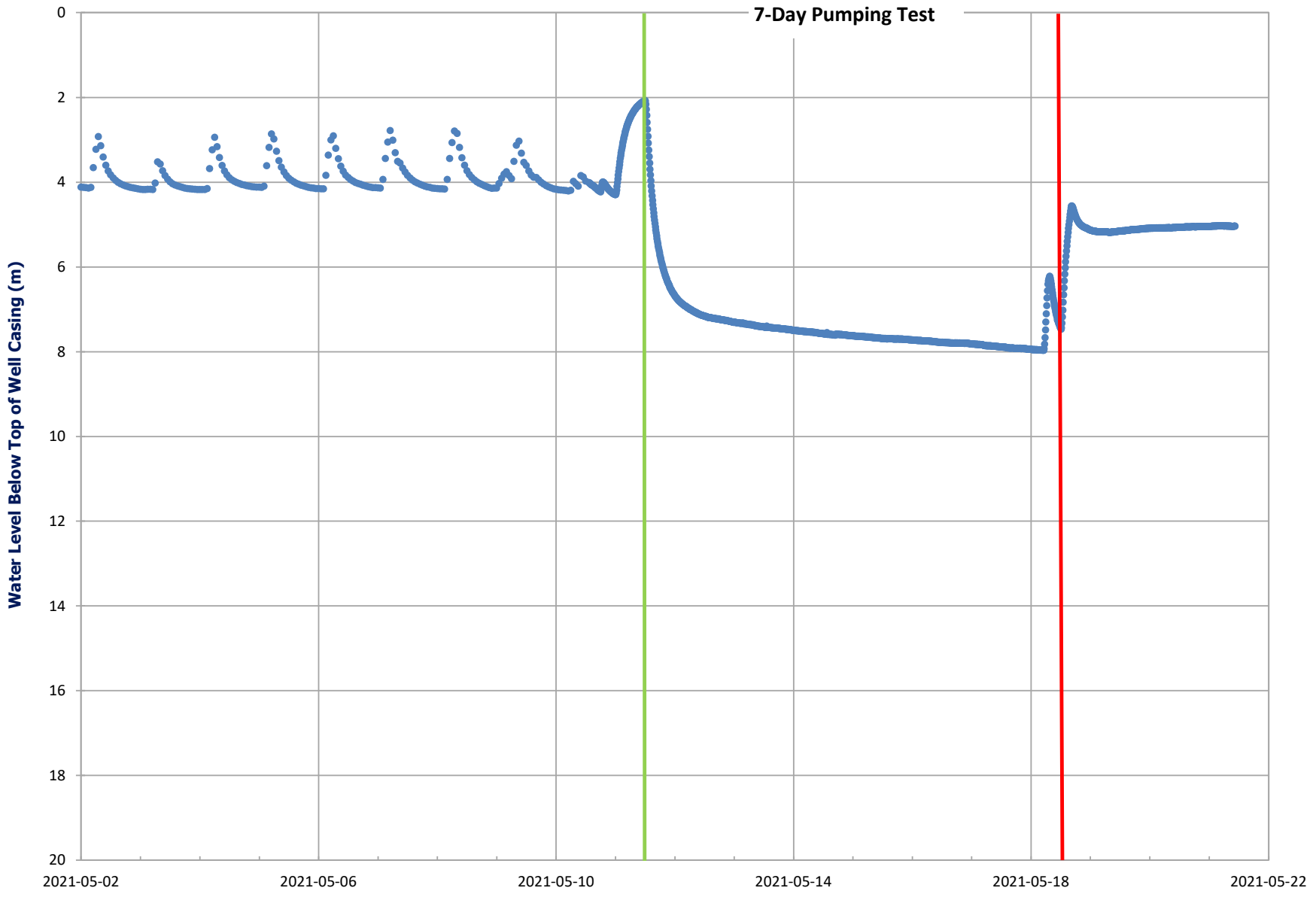
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 7**

Hydrograph - Monitoring Well MW9 (May 2-22, 2021)



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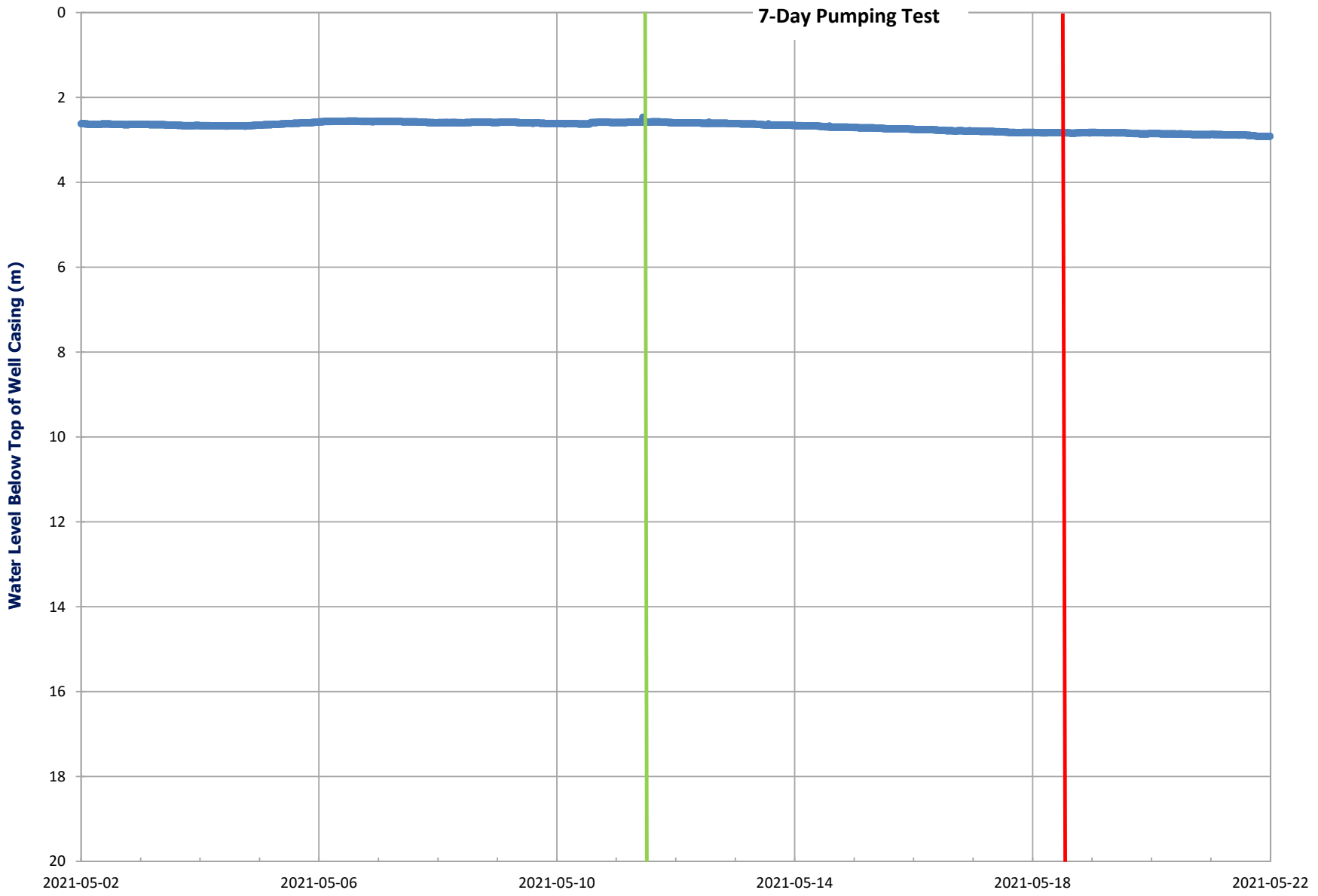
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 8**

Hydrograph - Monitoring Well MW8-S (May 2-22, 2021)



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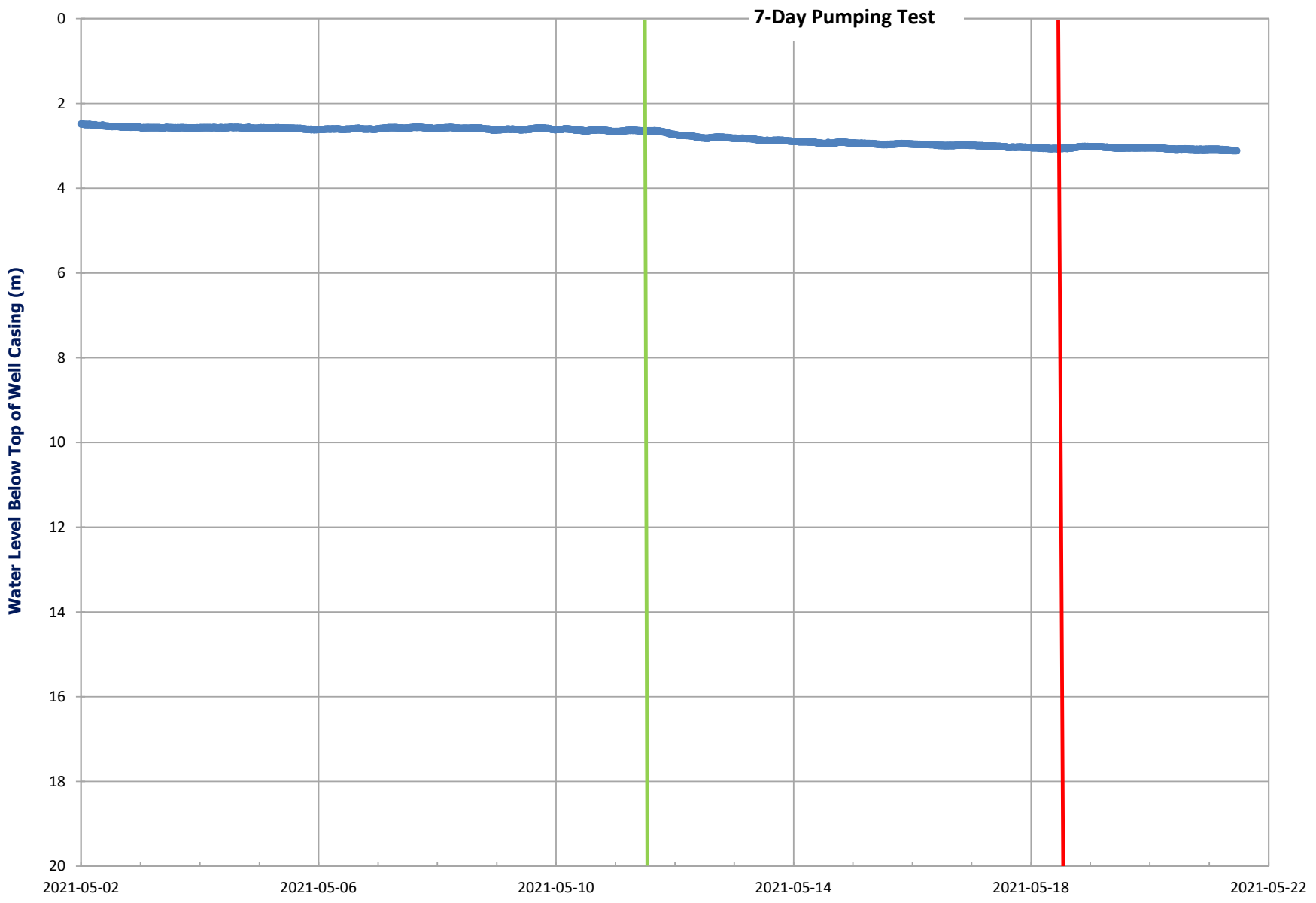
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 9**

Hydrograph - Monitoring Well MW8-I (May 2-22, 2021)



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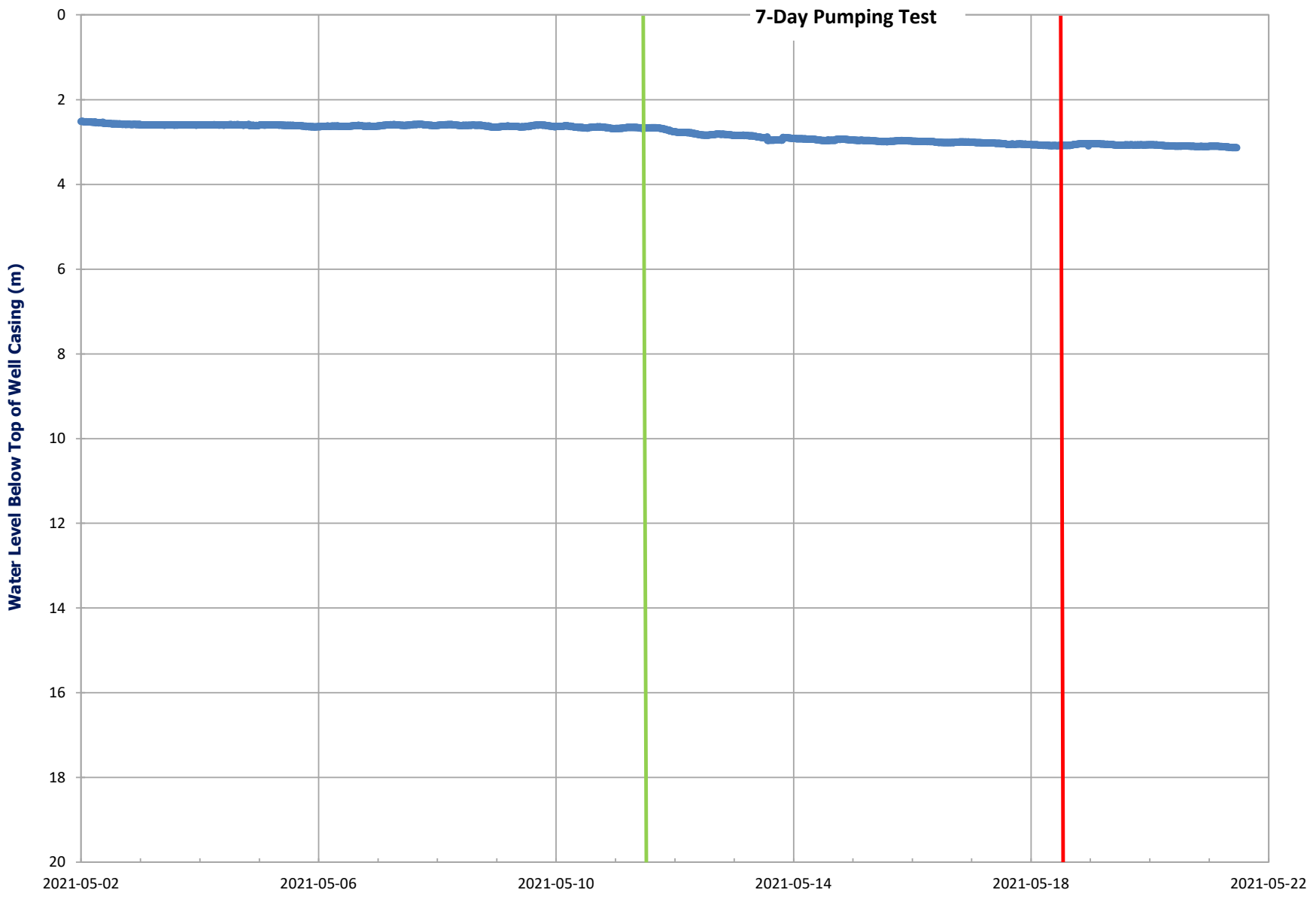
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 10**

Hydrograph - Monitoring Well MW8-D (May 2-22, 2021)



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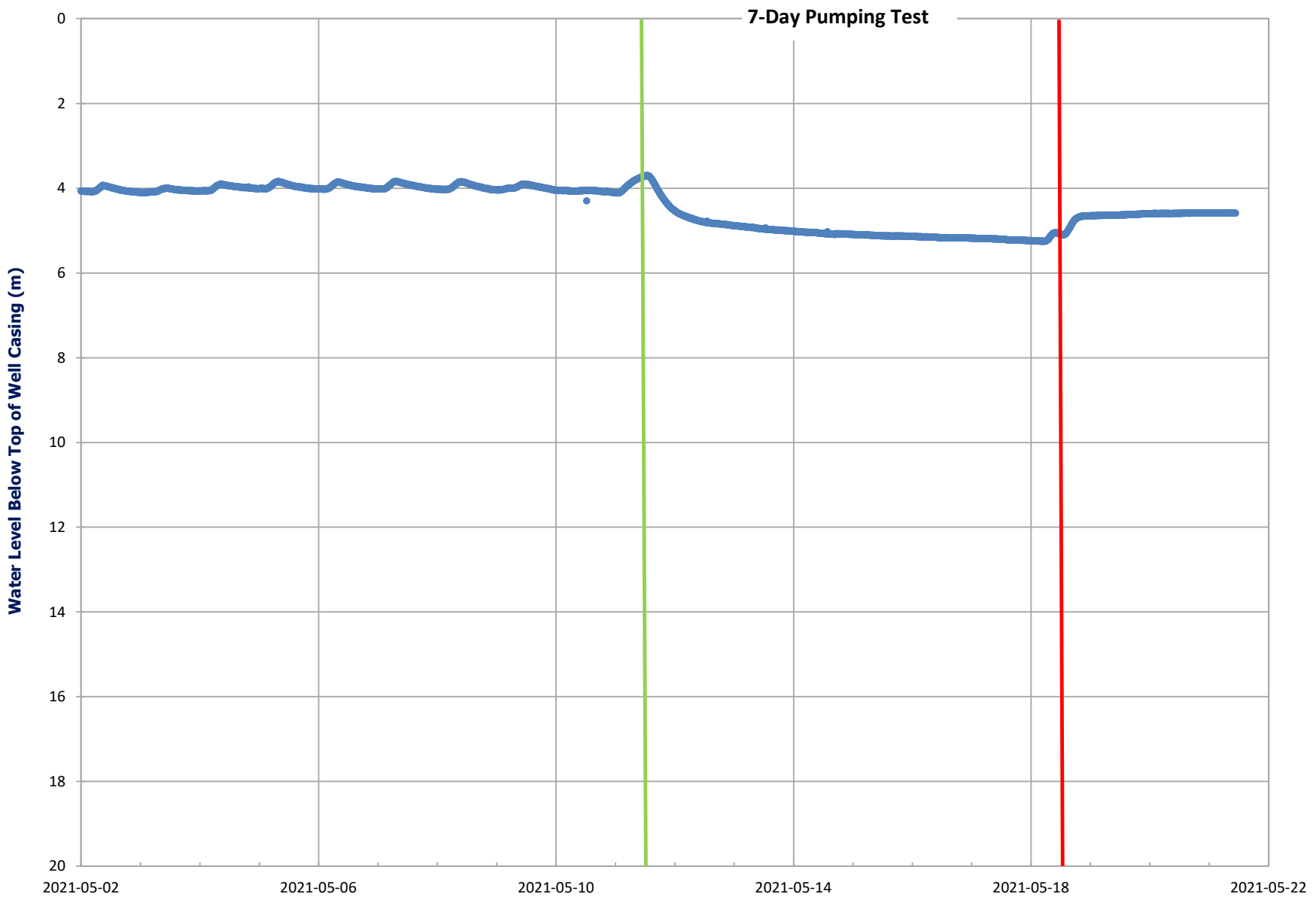
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 11**

Hydrograph - Monitoring Well MW10-S (May 2-22, 2021)



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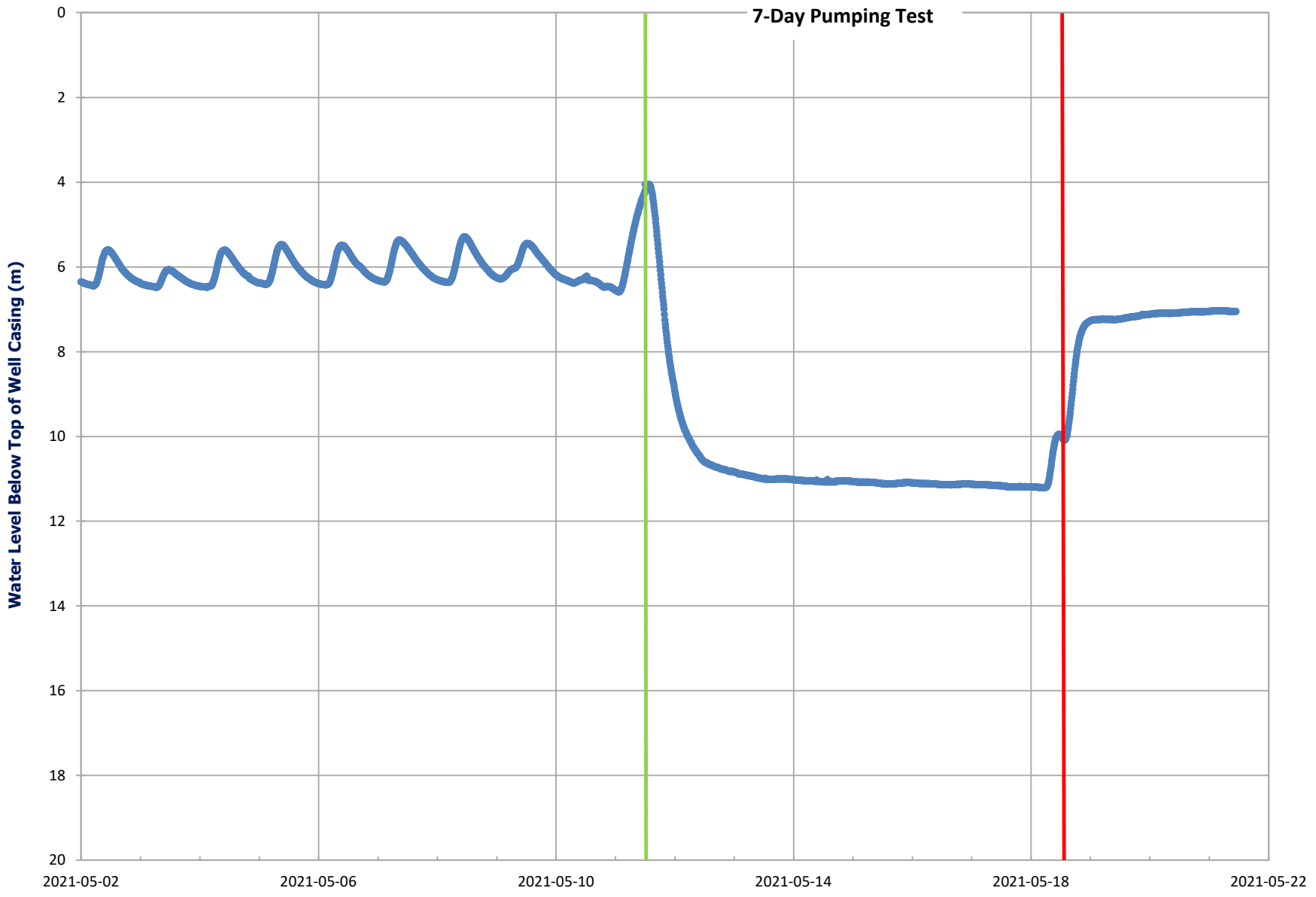
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 12**

Hydrograph - Monitoring Well MW10-I (May 2-22, 2021)



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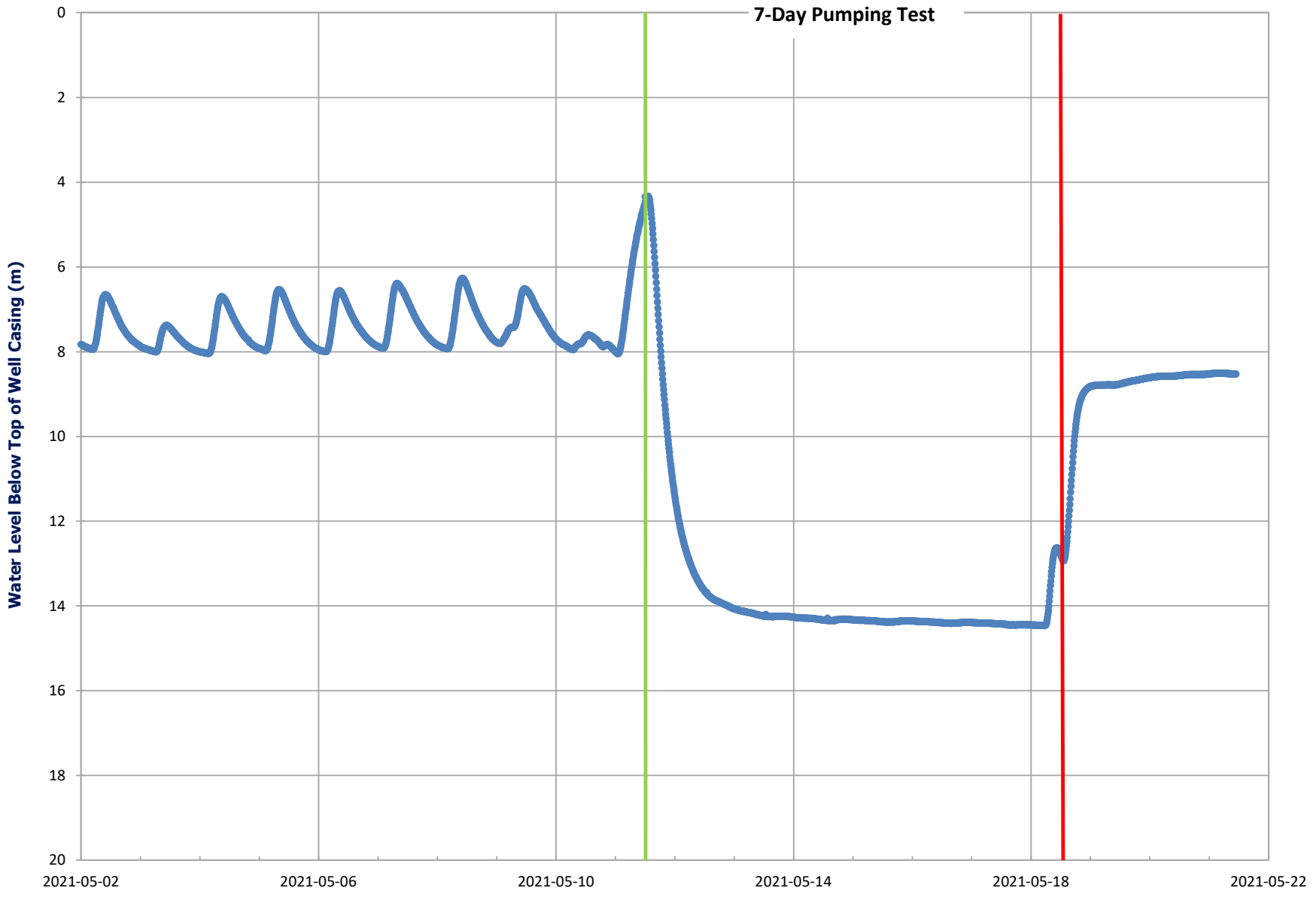
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 13**

Hydrograph - Monitoring Well MW10-D (May 2-22, 2021)



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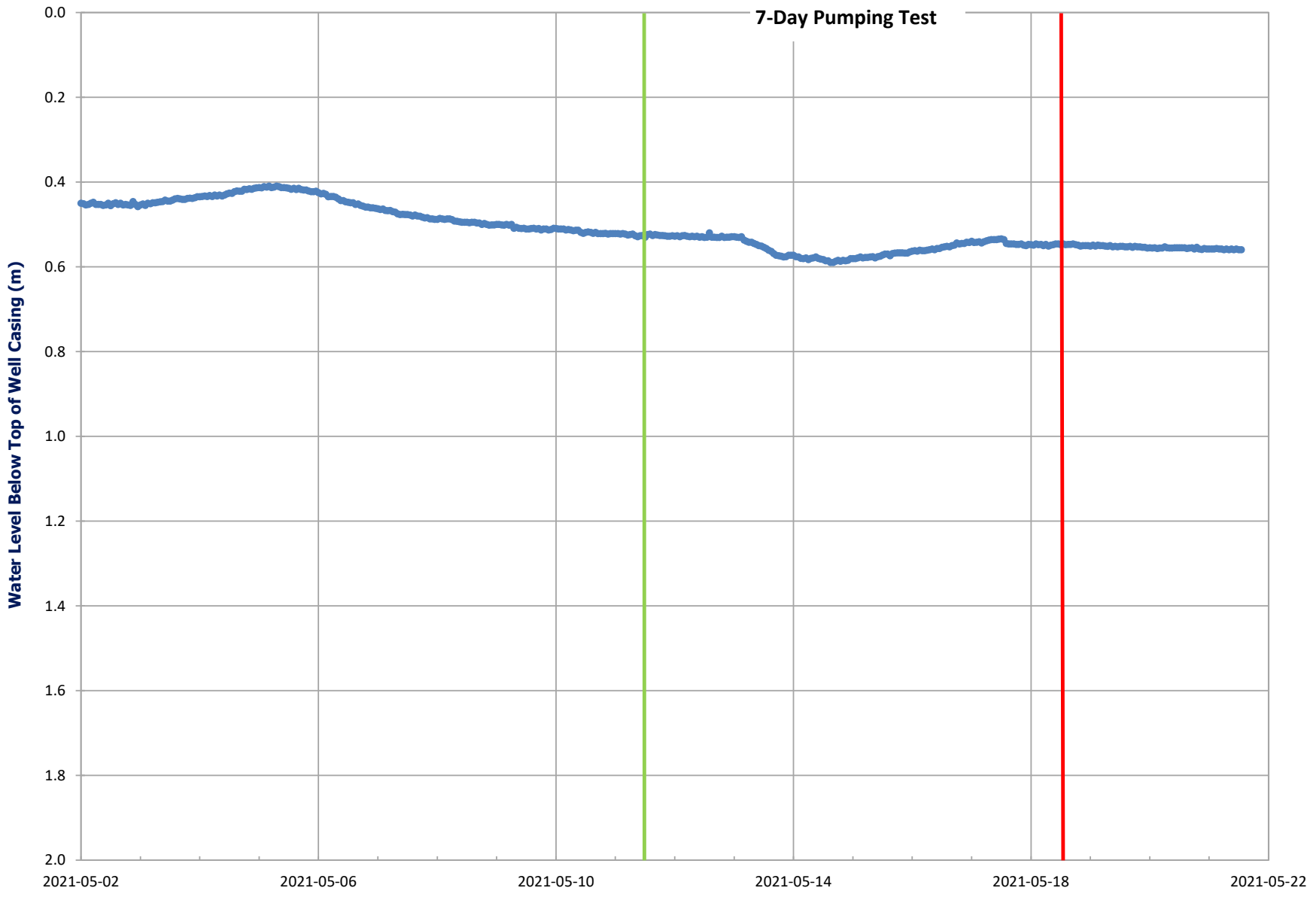
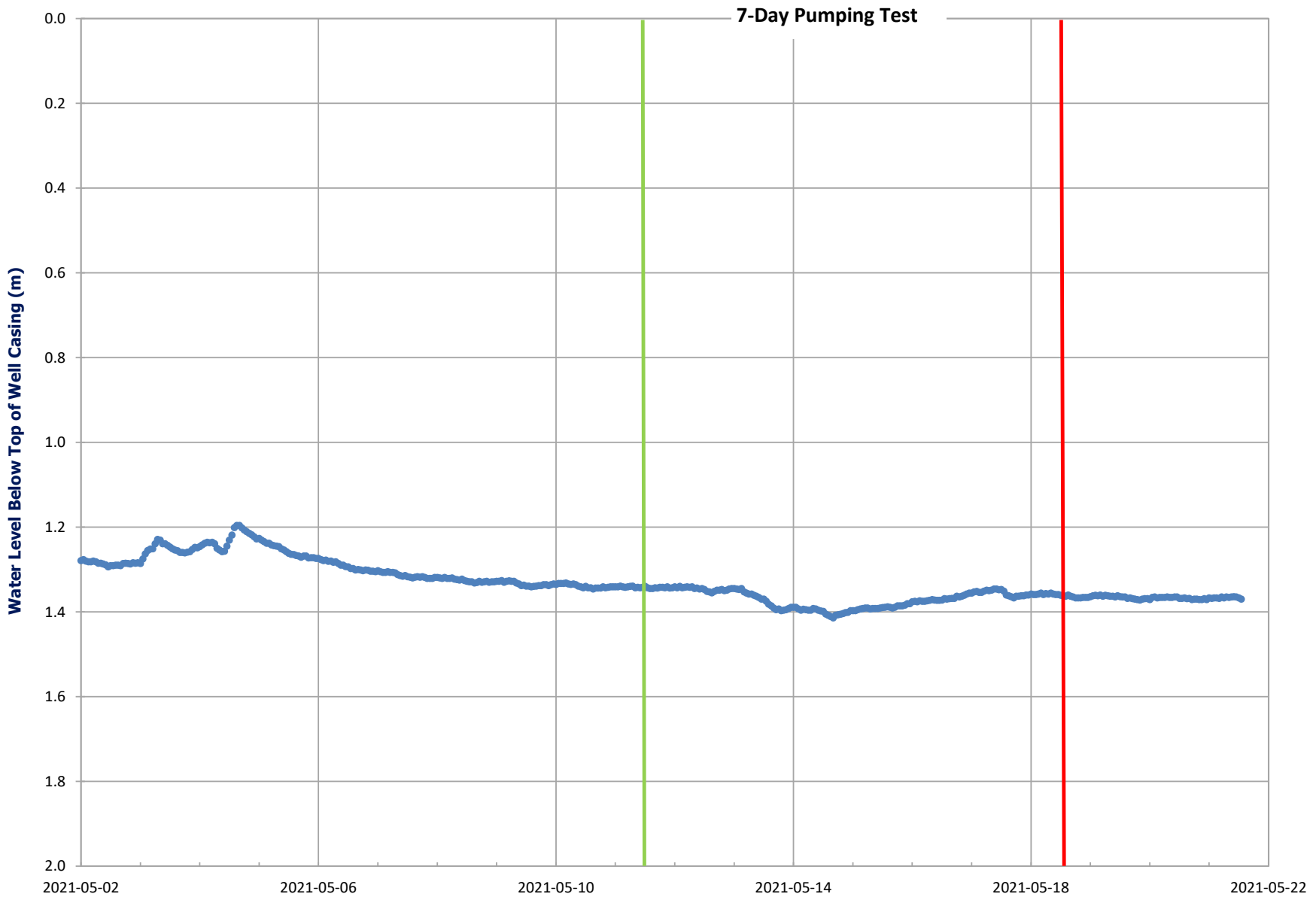
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 14**

Hydrograph - Monitoring Well MP10 (May 2-22, 2021)



Hydrograph - Monitoring Well SW10 (May 2-22, 2021)



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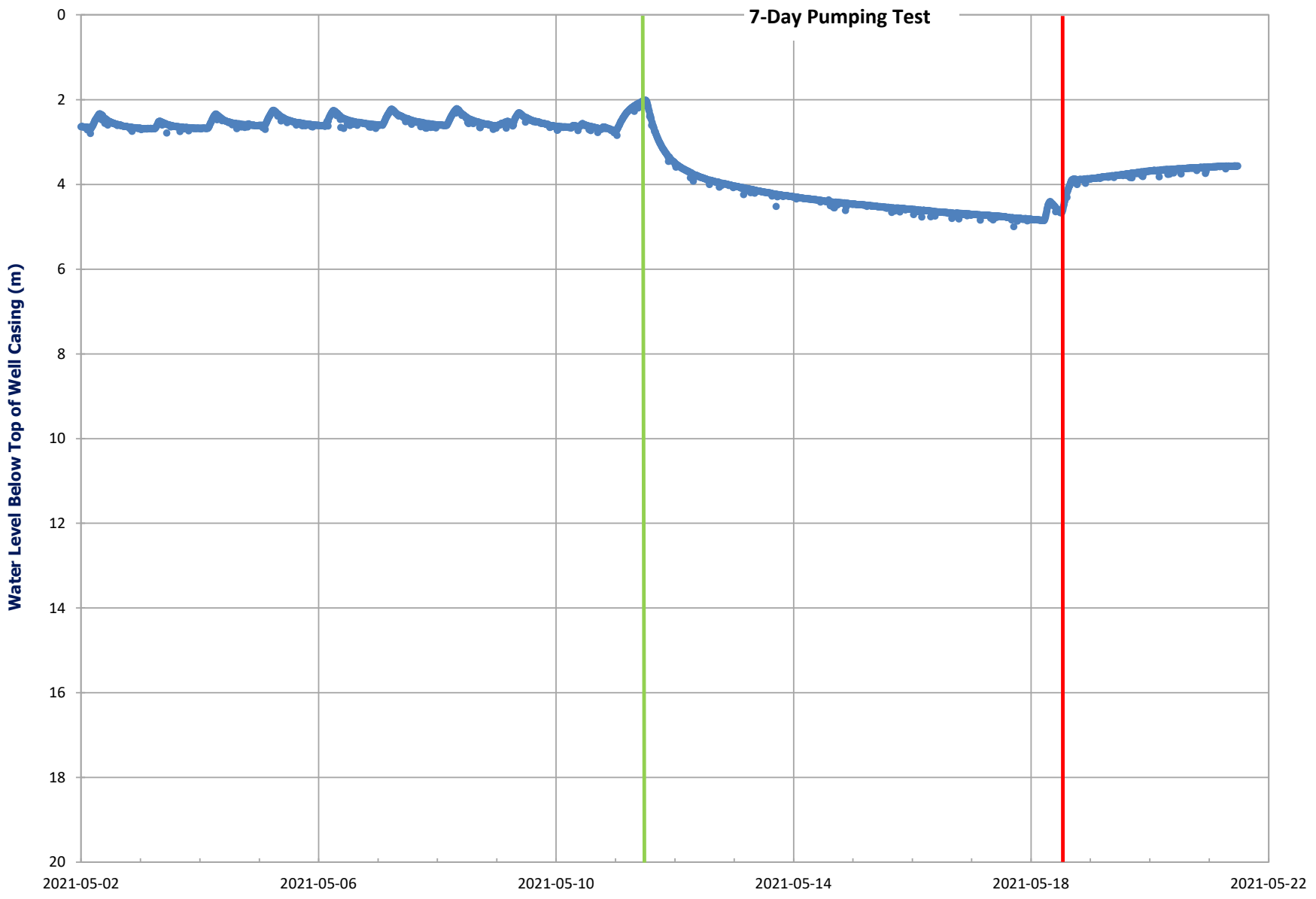
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 16**

Hydrograph - Domestic Well 116139 (May 2-22, 2021)



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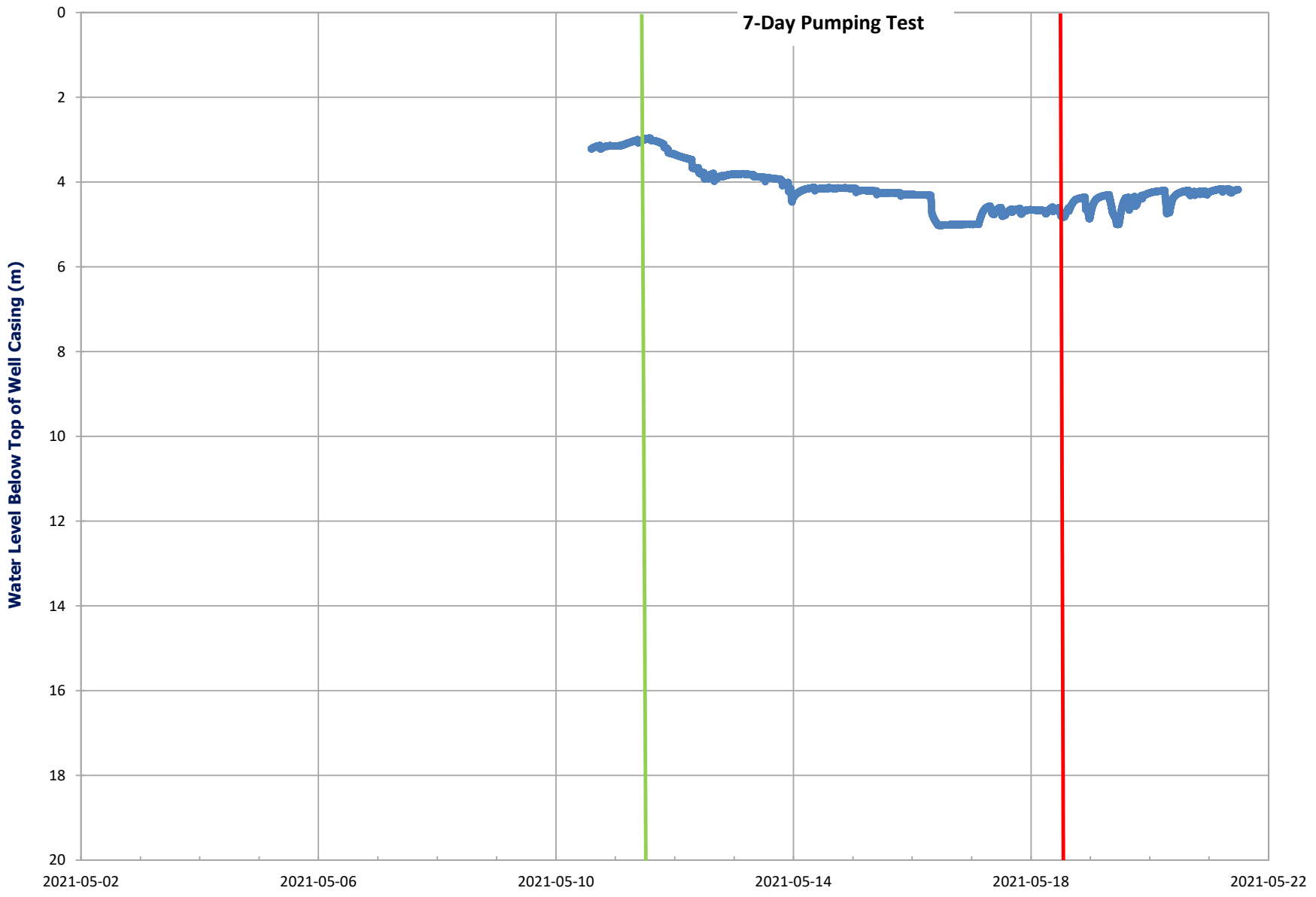
Banks Groundwater Engineering Limited

Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 17**

Hydrograph - Domestic Well 116116 (May 2-22, 2021)



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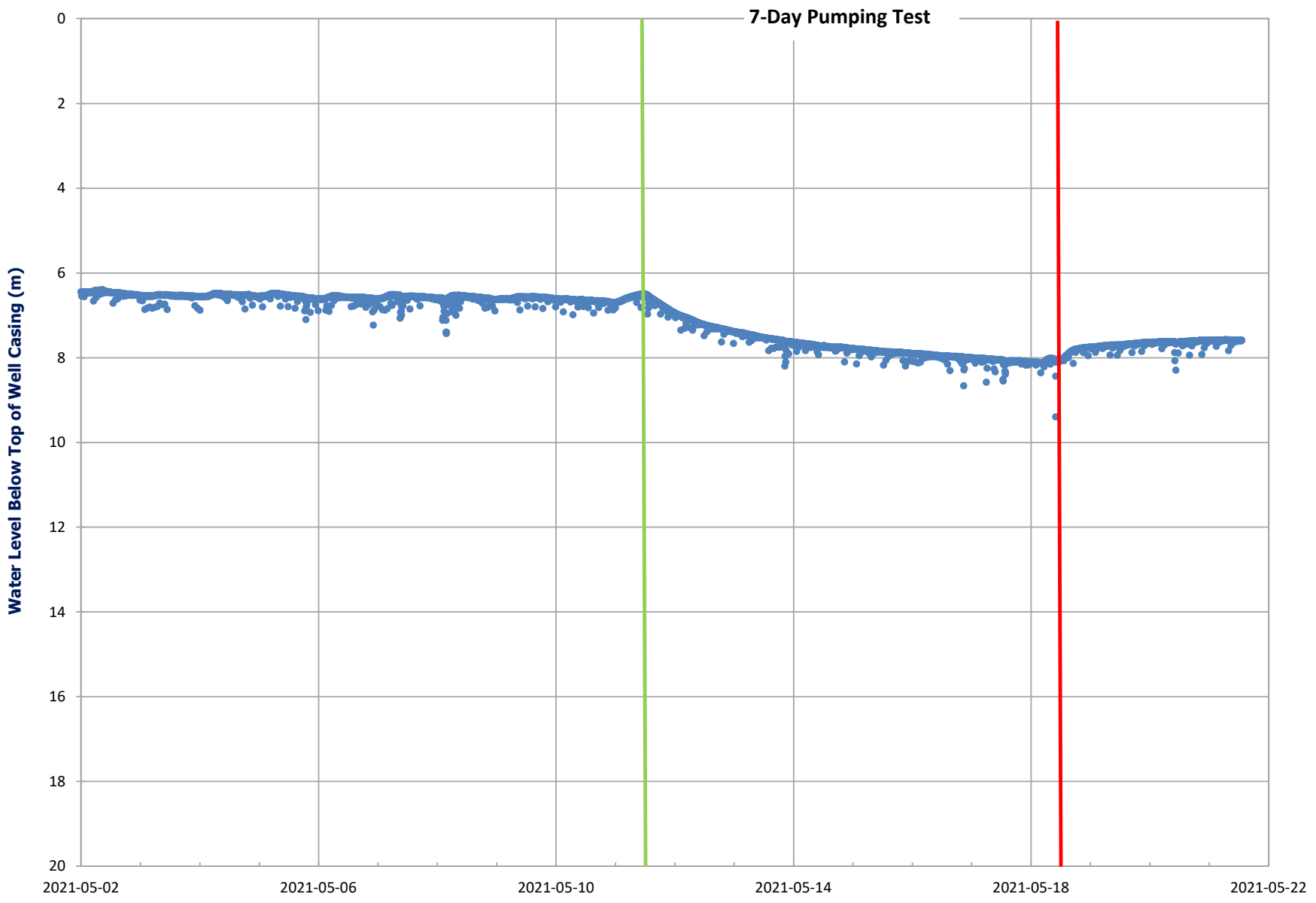
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 18**

Hydrograph - Domestic Well 116203 (May 2-22, 2021)



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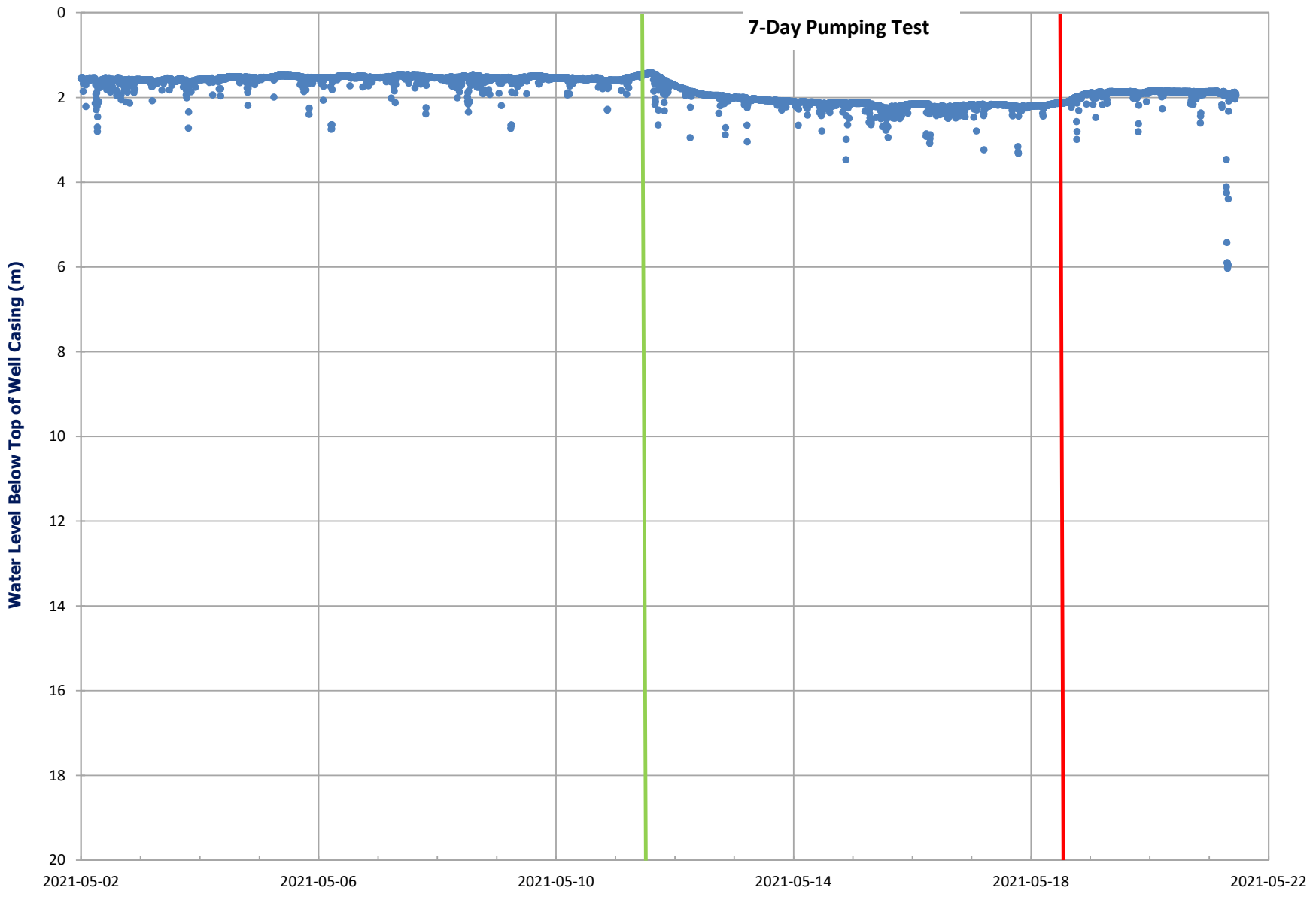
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 19**

Hydrograph - Domestic Well 116063 (May 2-22, 2021)



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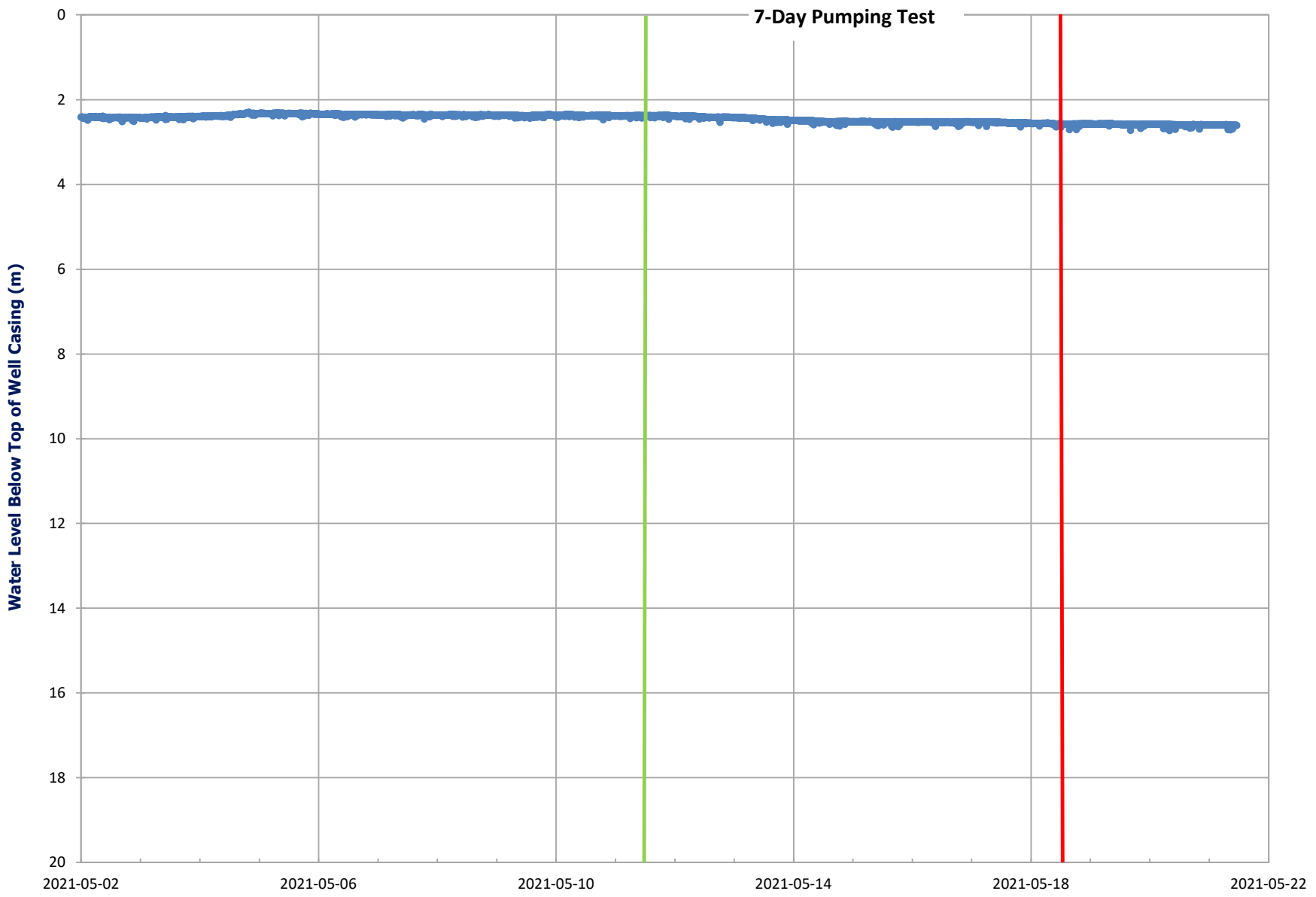
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 20**

Hydrograph - Domestic Well 504224 (May 2-22, 2021)



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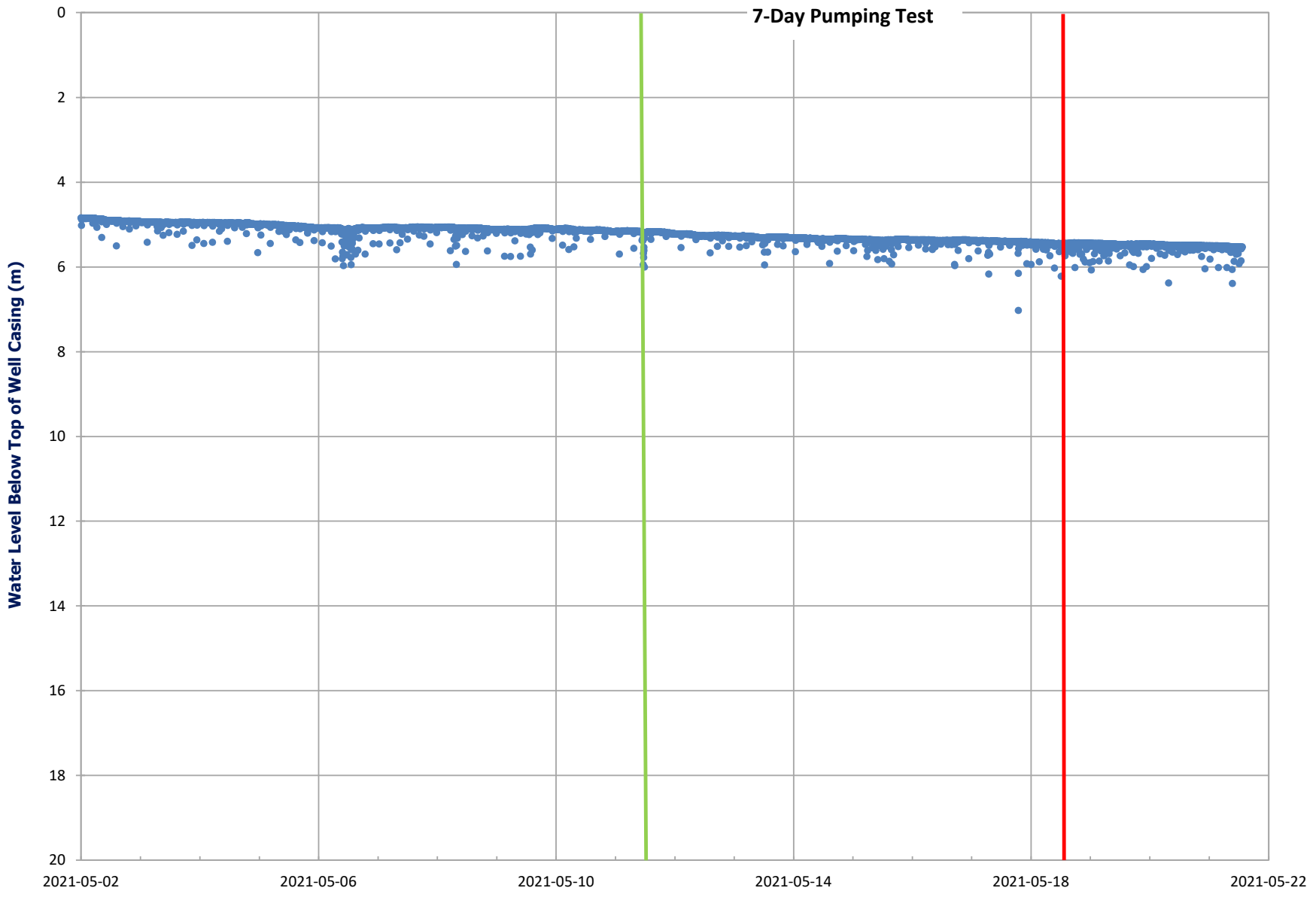
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 21**

Hydrograph - Domestic Well 116278 (May 2-22, 2021)



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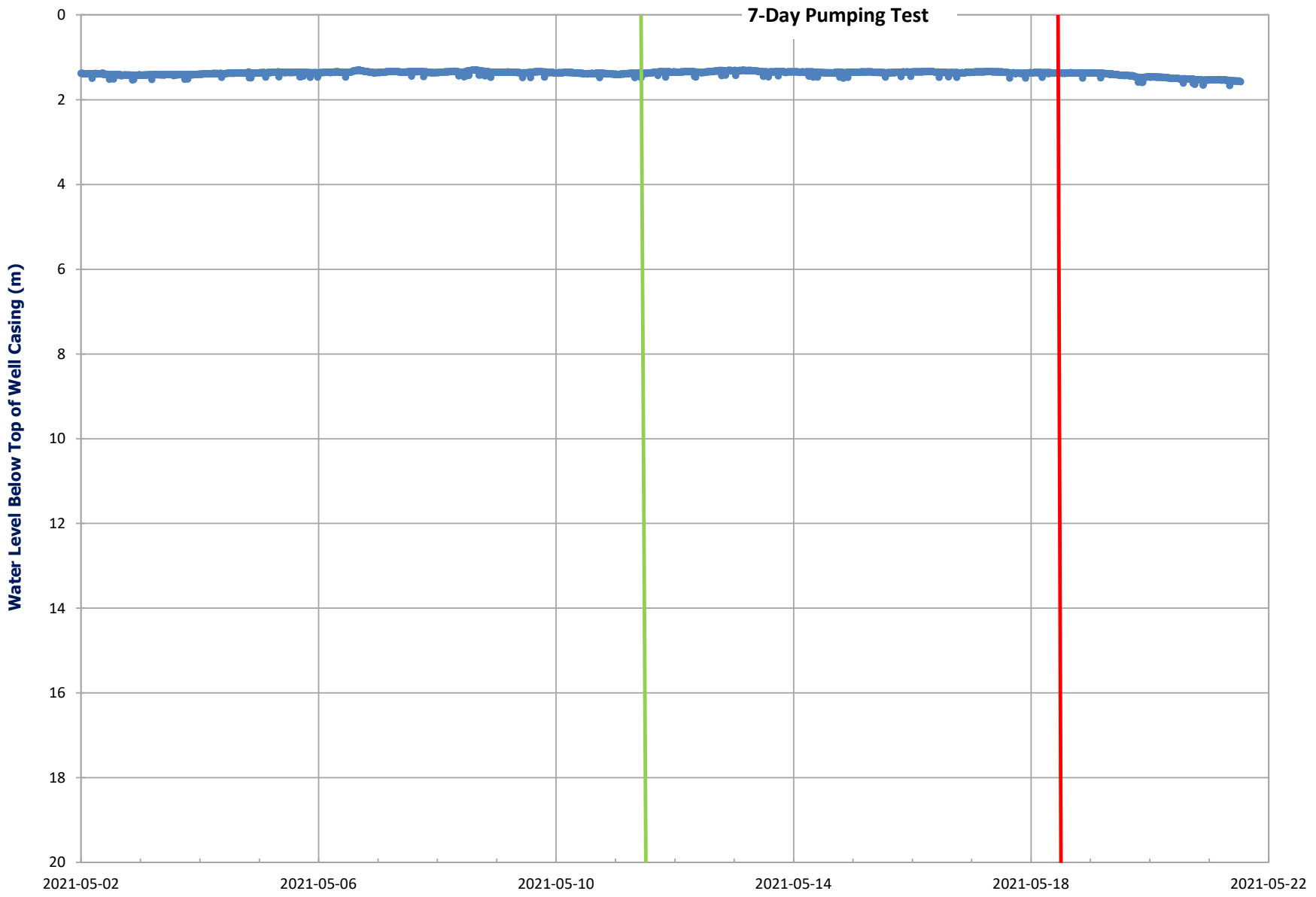
Banks Groundwater Engineering Limited

Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 22**

Hydrograph - Domestic Well 504336 (May 2-22, 2021)



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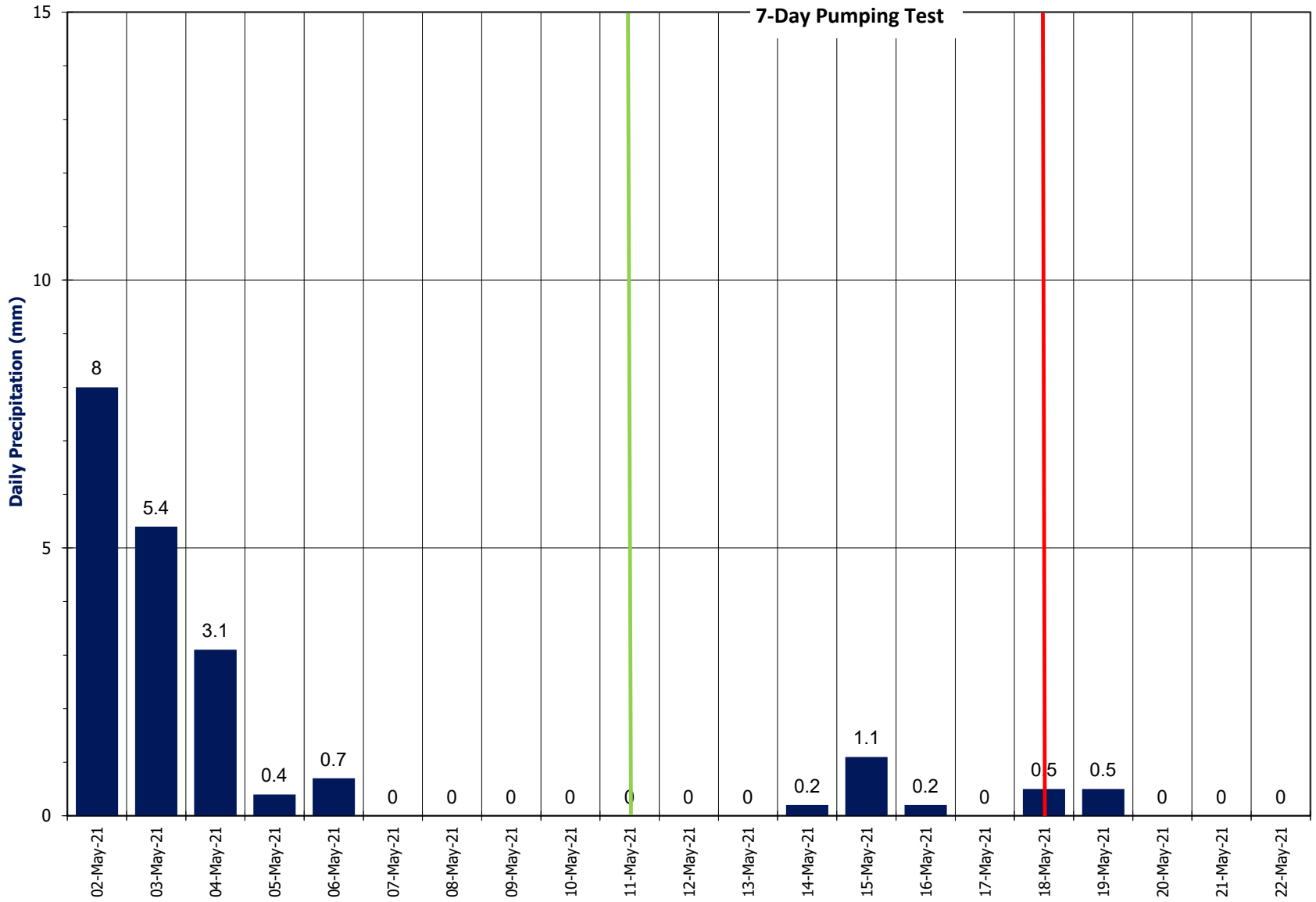
Banks Groundwater Engineering Limited

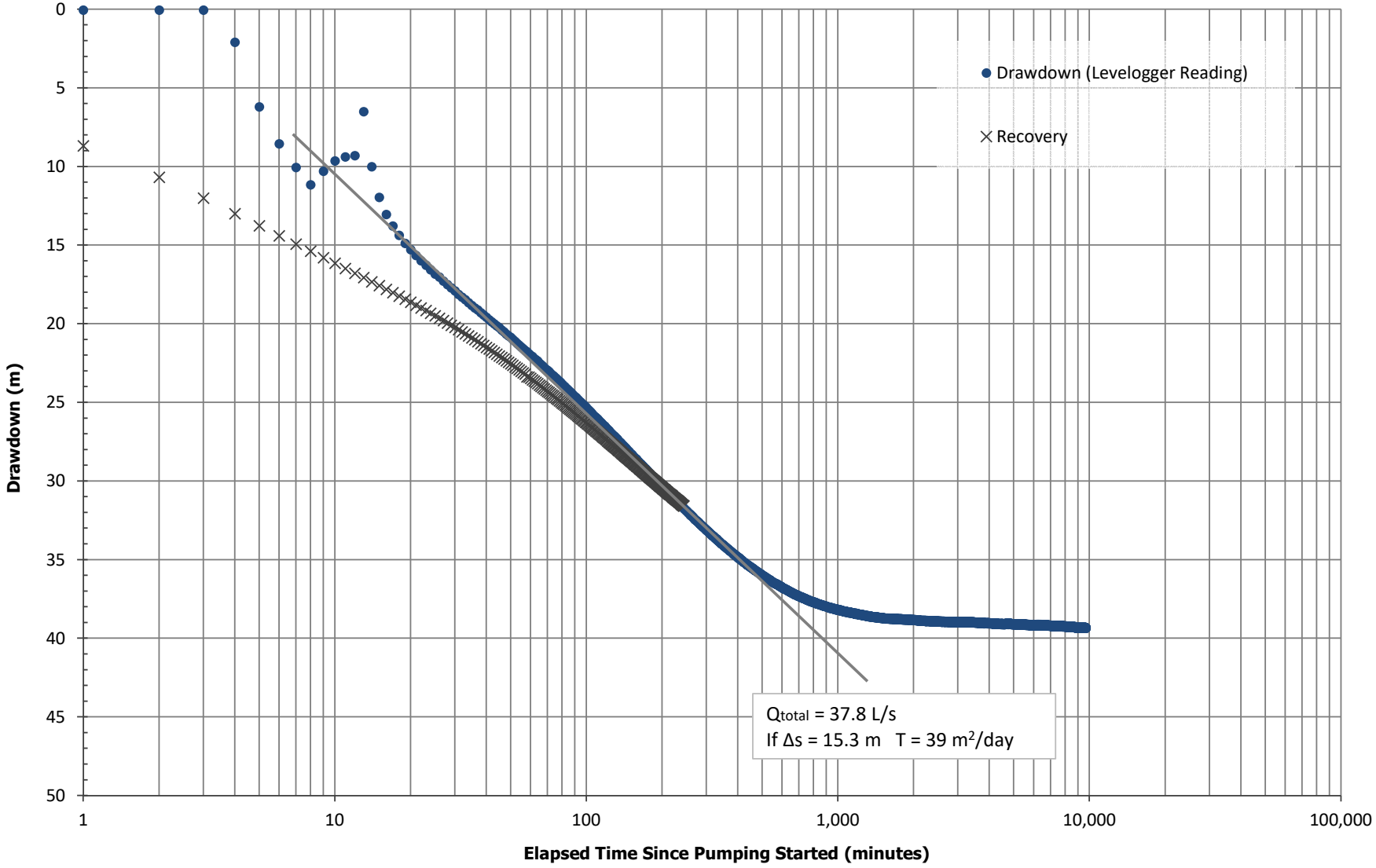
Town of Shelburne - Pumping Test and Monitoring Results of Production Wells PW7/PW8

November 2023 **Graph 23**

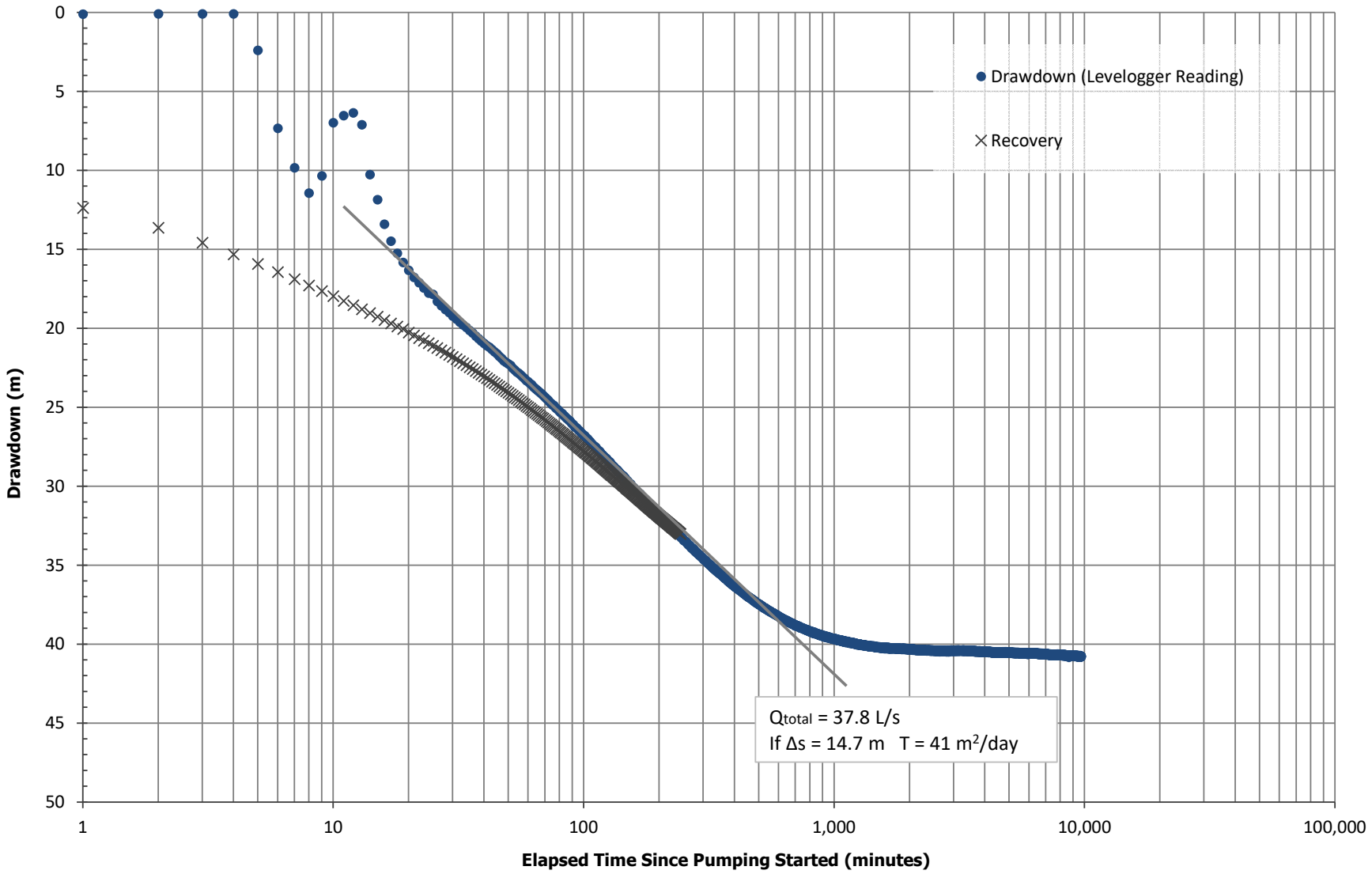
Daily Precipitation: Mono Centre Climate Station - May 2 - 22, 2021

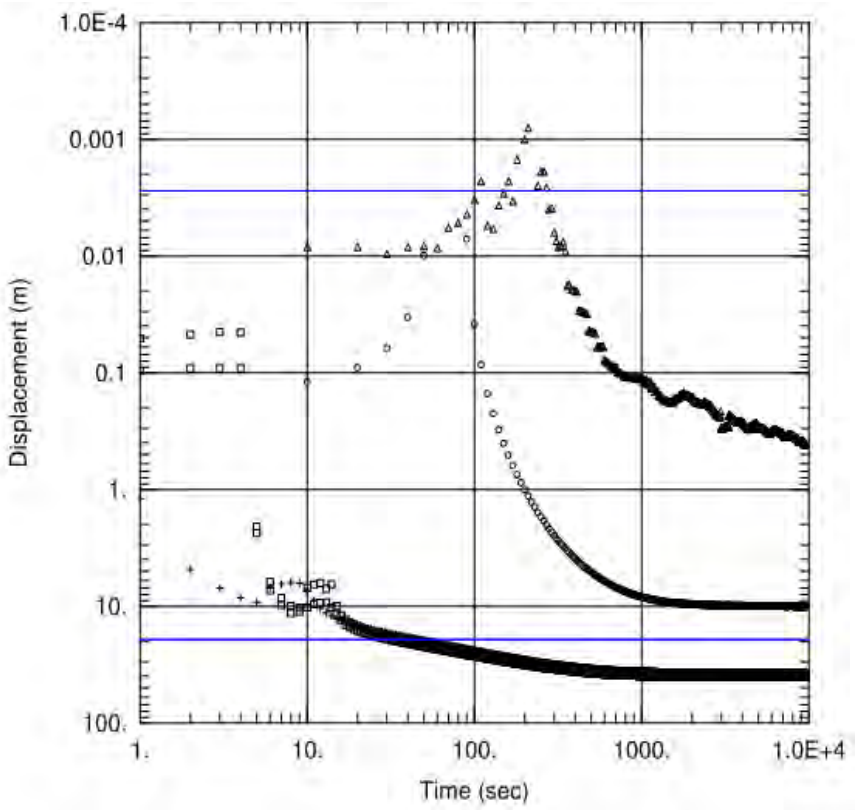


7-Day Pumping Test - Production Well PW7 (May 2-22, 2021)



7-Day Pumping Test - Production Well PW8 (May 2-22, 2021)





WELL TEST ANALYSIS

Data Set: Z:\...\Pumping & Observation Wells - Hantush-Jacob_v2.1.aqt
Date: 10/27/22 Time: 15:57:58

PROJECT INFORMATION

Company: S. Burnett & Associates Ltd.
Client: Town of Shelburne
Project: M17025
Test Well: PW7&PW8
Test Date: May 11 - 18, 2021

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW7	-5.5	0
PW8	5.5	0

Observation Wells

Well Name	X (m)	Y (m)
▫ PW7	-5.5	0
▫ PW8	5.5	0
▵ MW8-D	-635	-210
+ MW7-75	-10	-10
◦ MW10-D	150	725

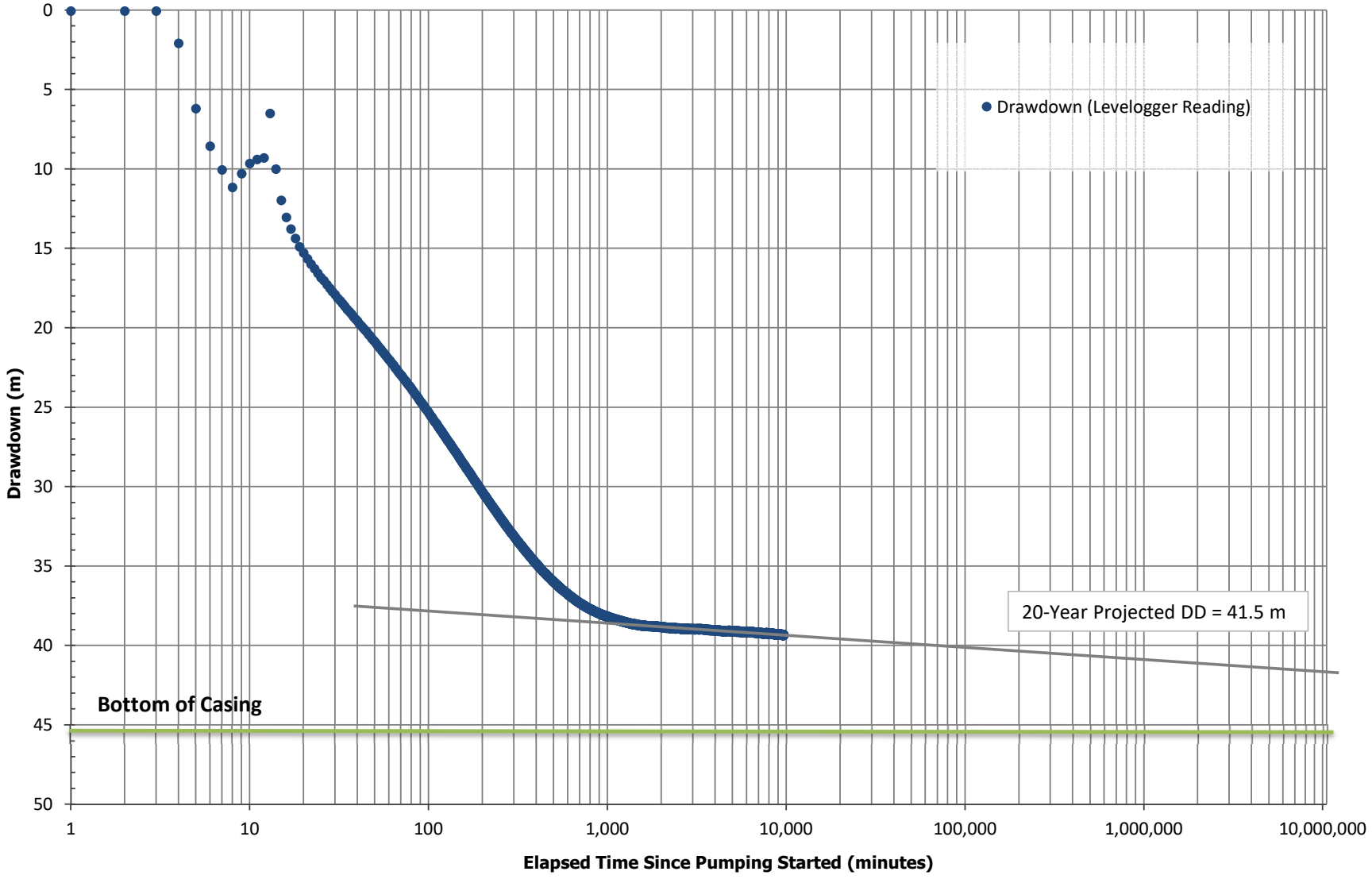
SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

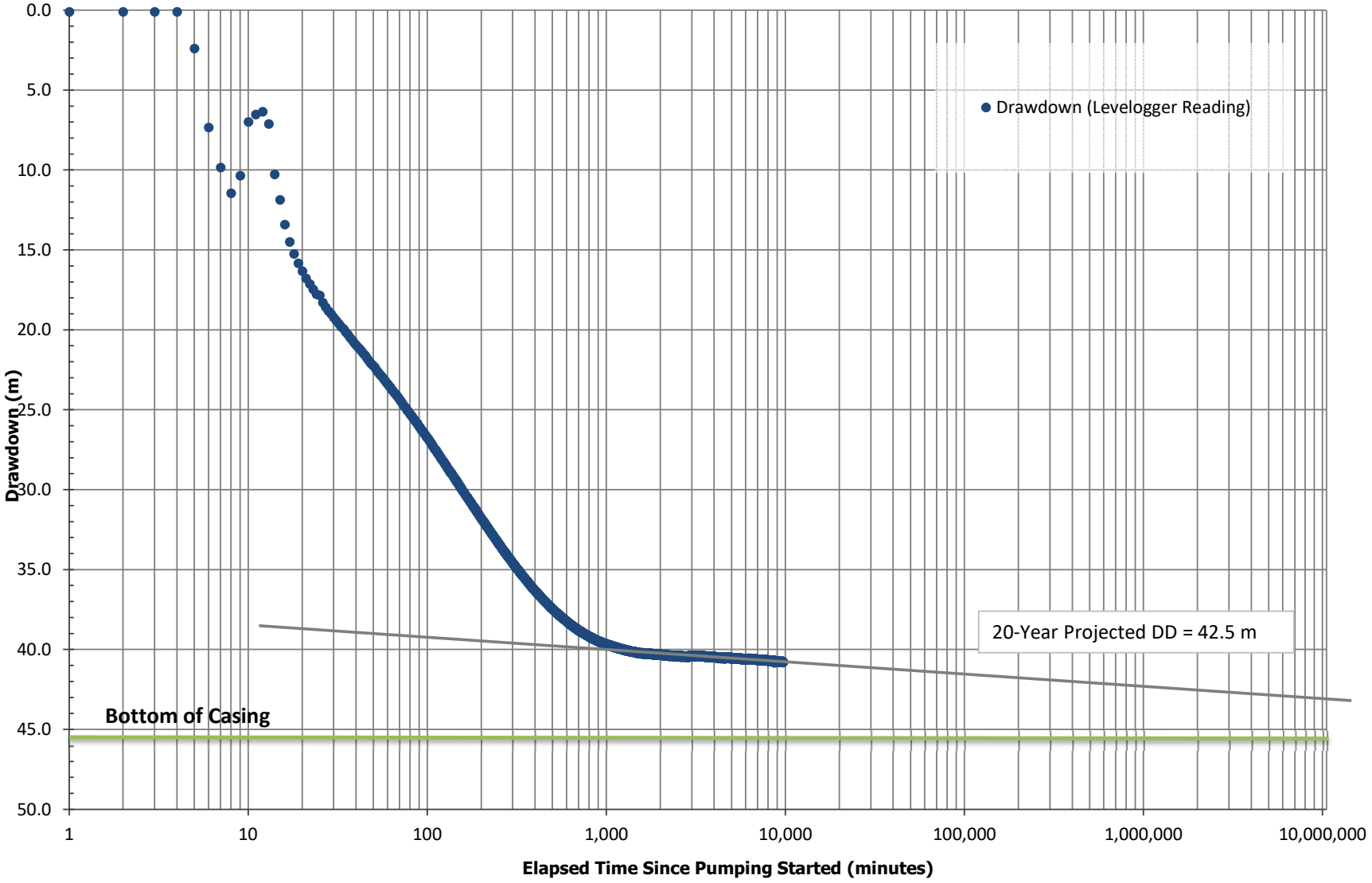
T = 65 m^2/day
1/B = 0.6557 m^{-1}
b = 15. m

S = 6.075E-7
Kz/Kr = 1.

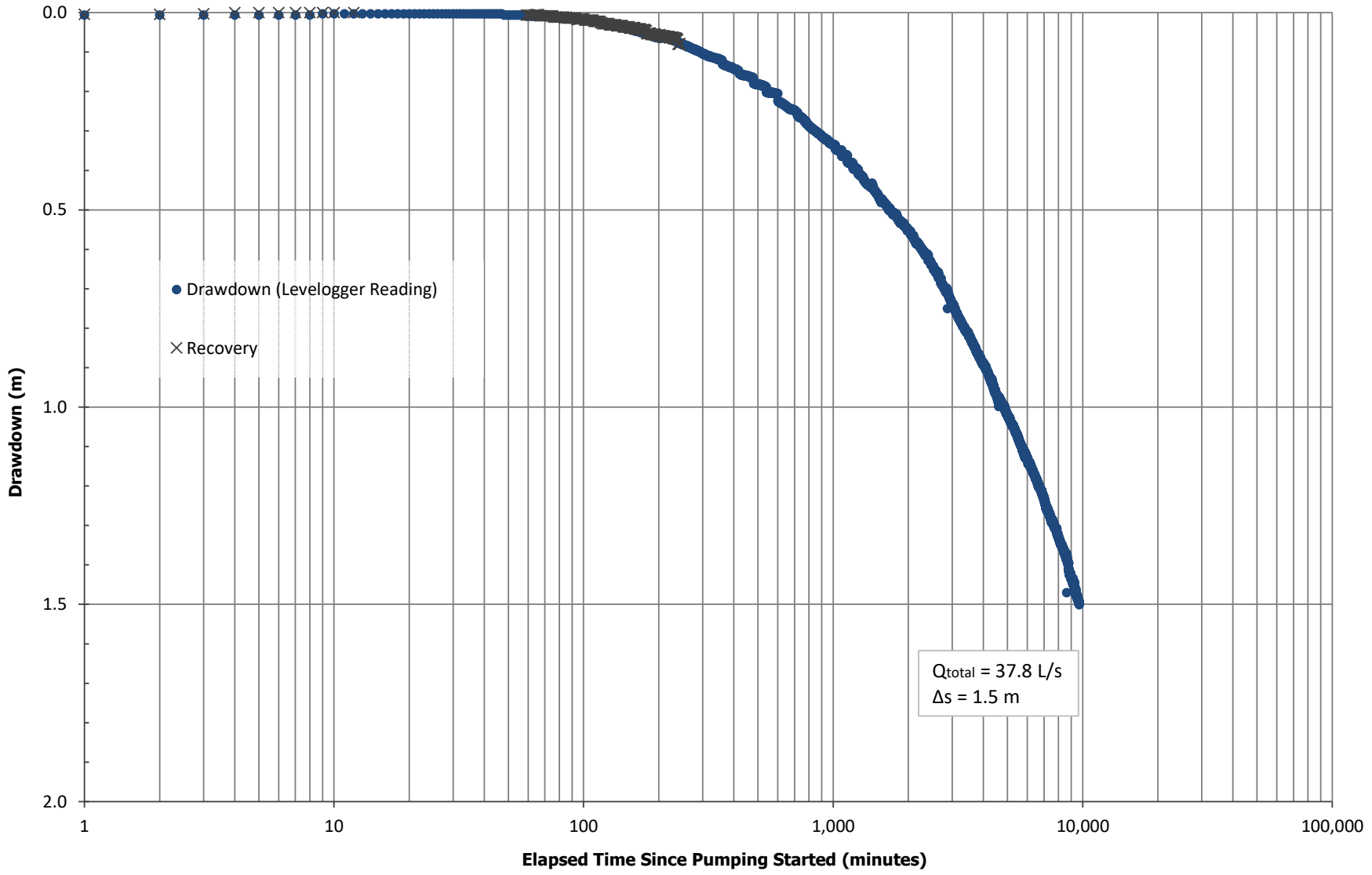
7-Day Pumping Test - Production Well PW7 (20-Year Projection)



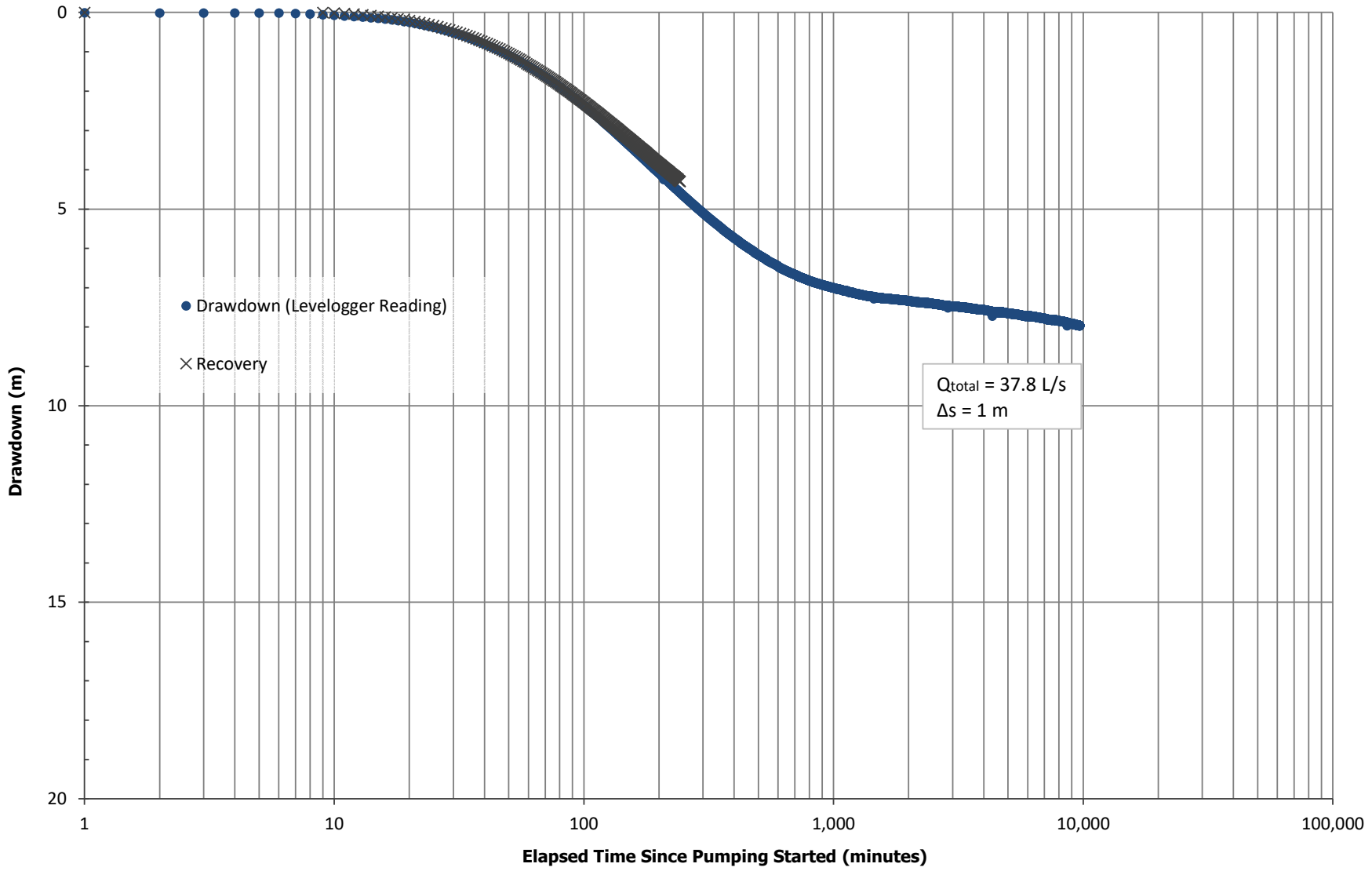
7-Day Pumping Test - Production Well PW8 (20-Year Projection)



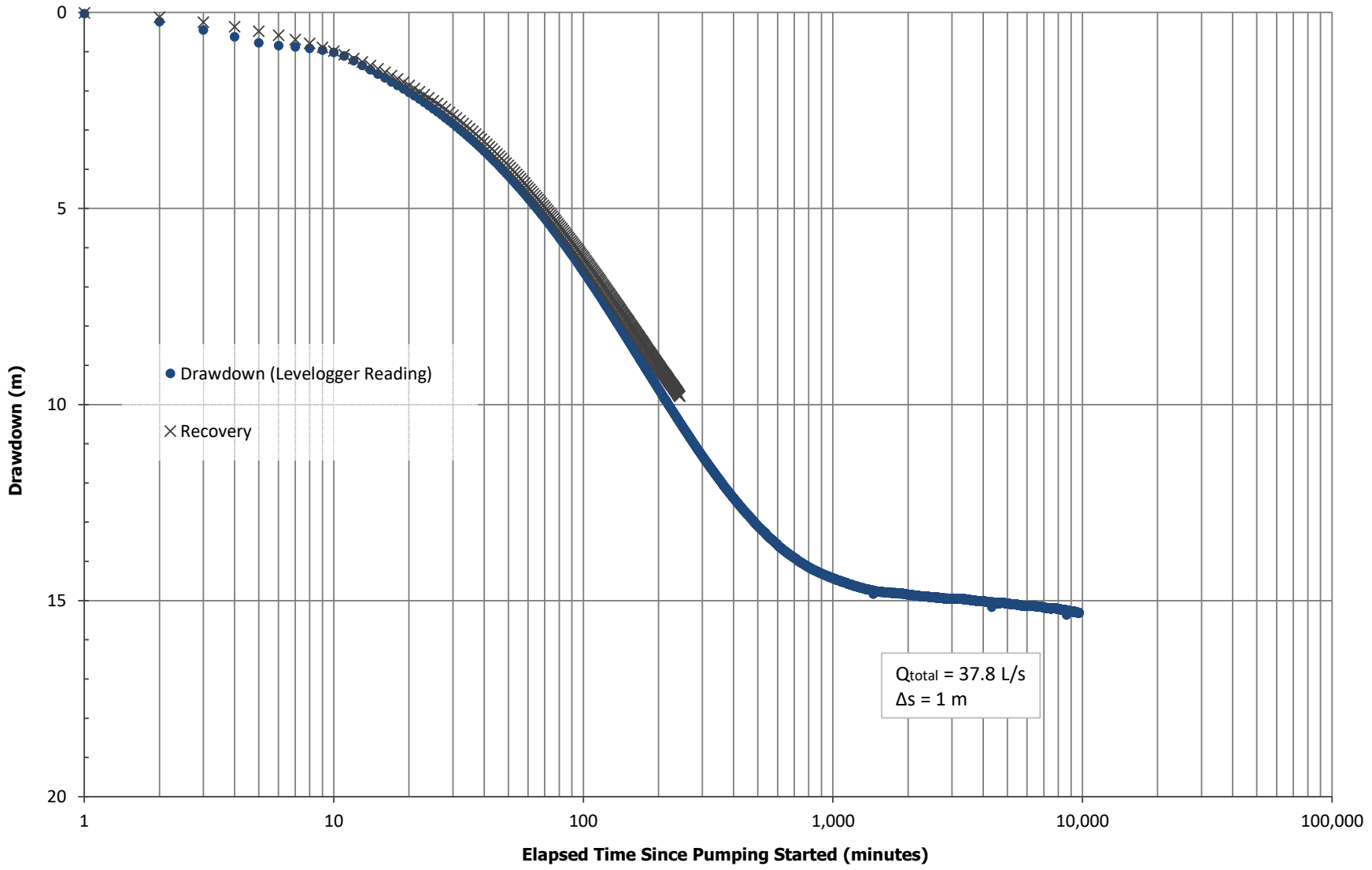
7-Day Pumping Test - Monitoring Well MW6-9 (May 2-22, 2021)



7-Day Pumping Test - Monitoring Well MW7-30 (May 2-22, 2021)



7-Day Pumping Test - Monitoring Well MW7-45 (May 2-22, 2021)



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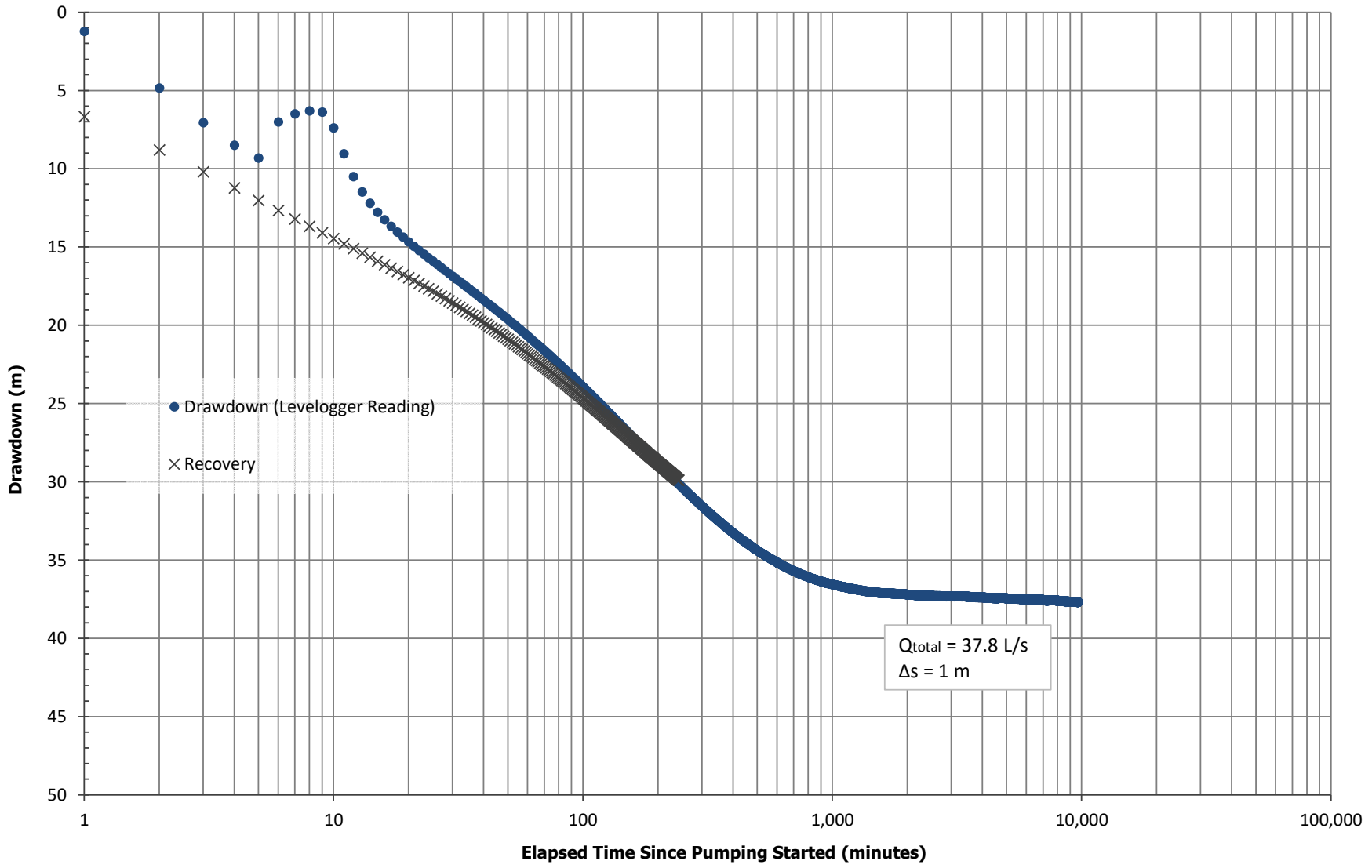
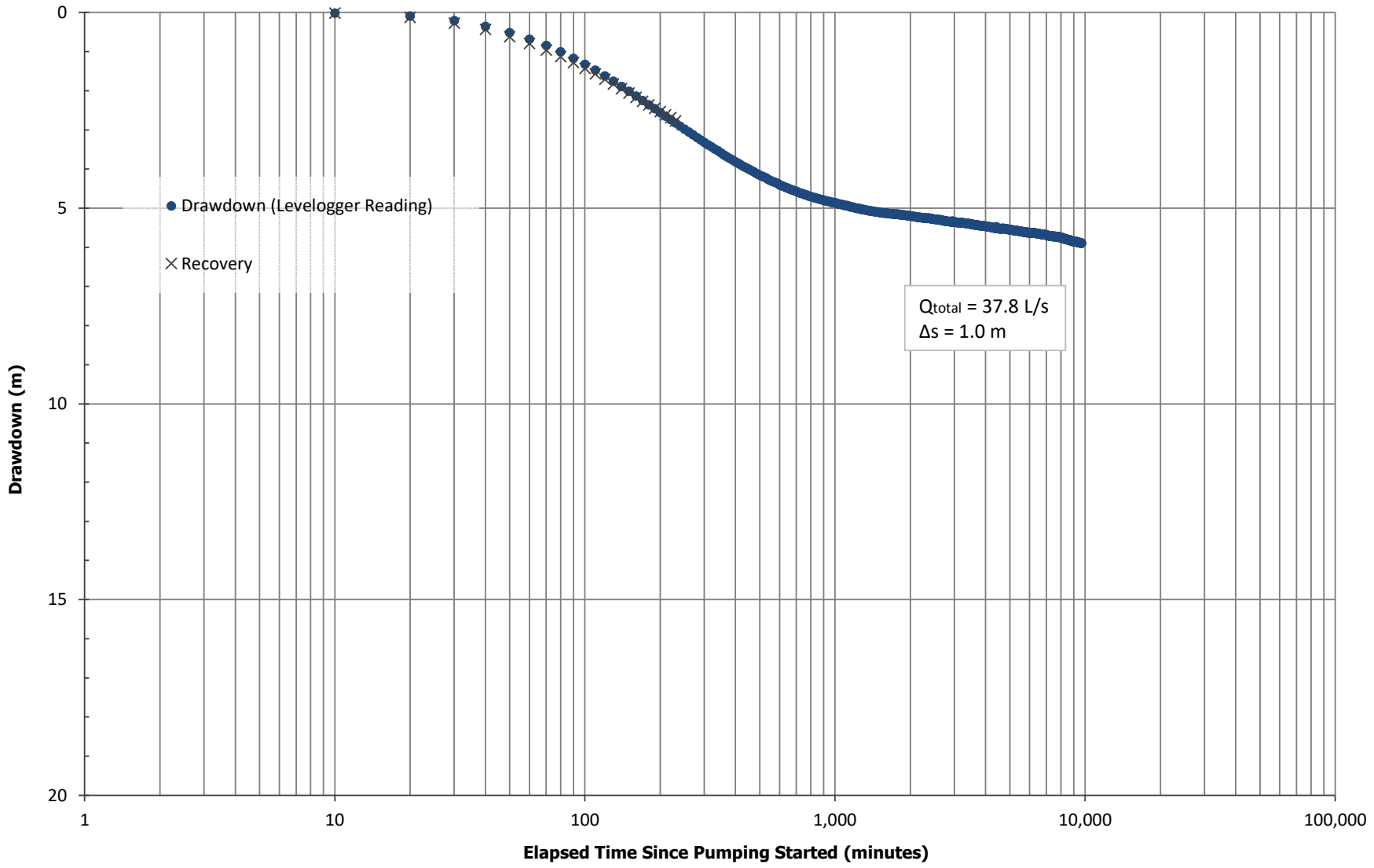
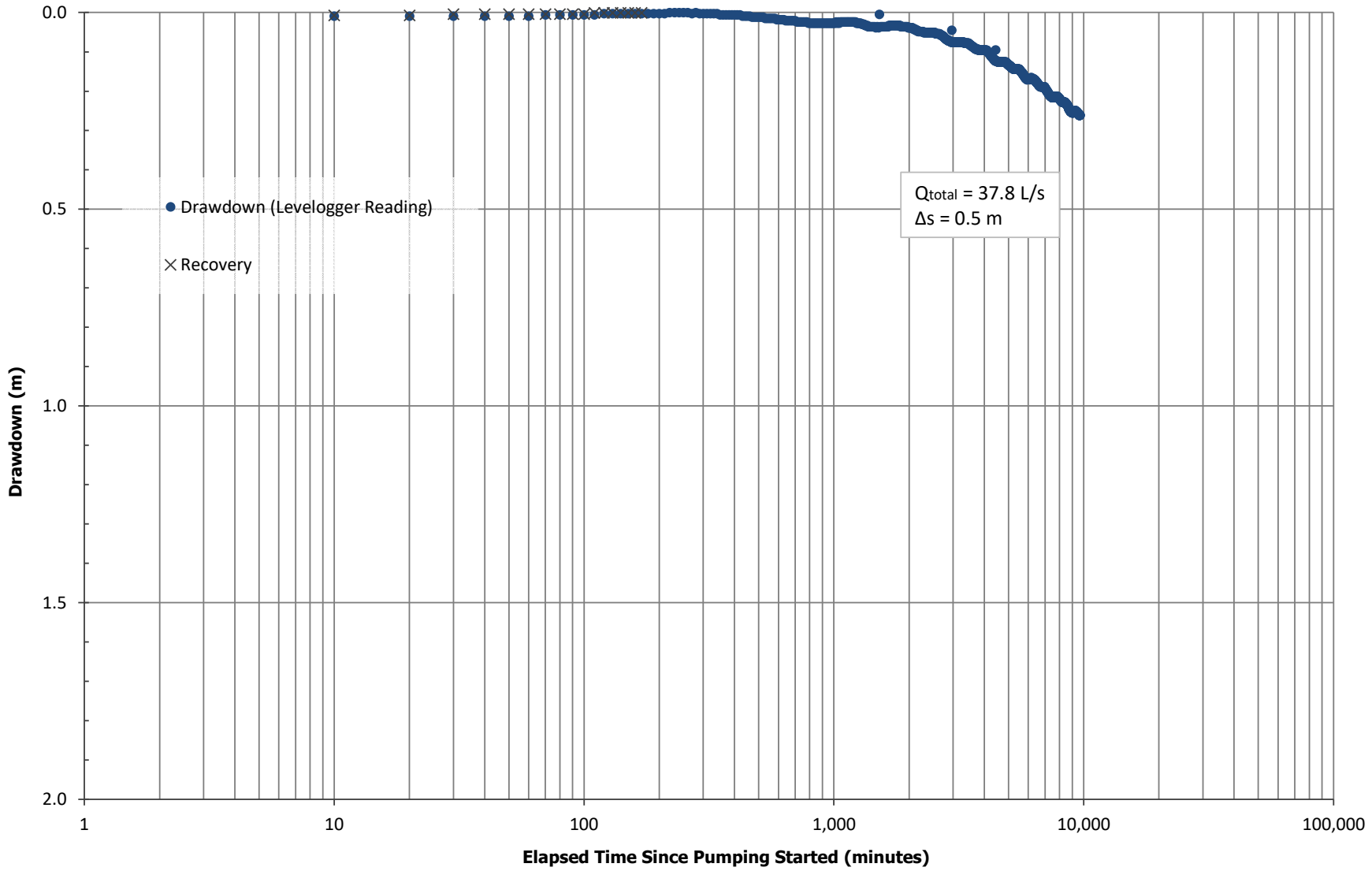


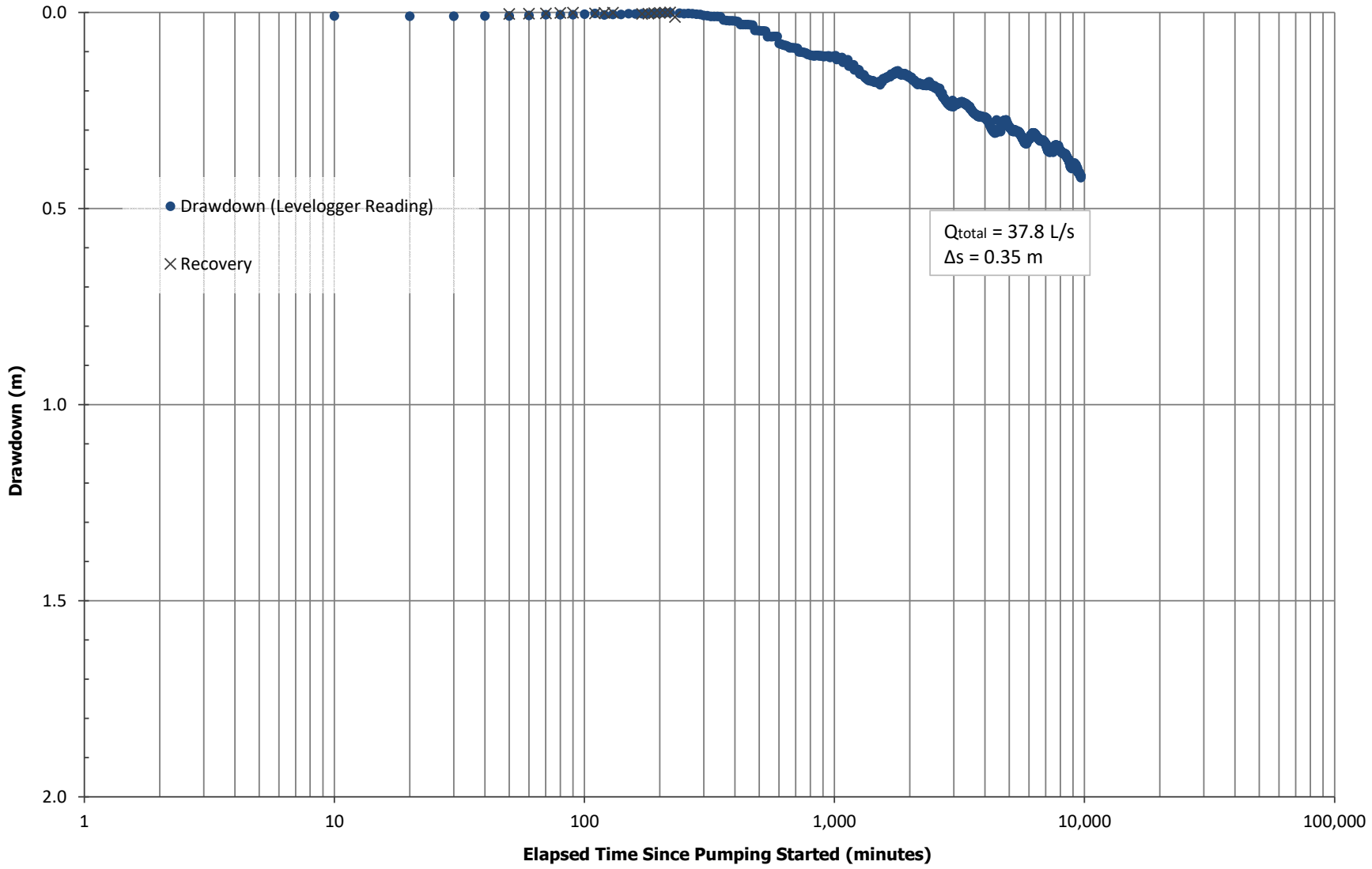
7-Day Pumping Test - Monitoring Well MW9 (May 2-22, 2021)



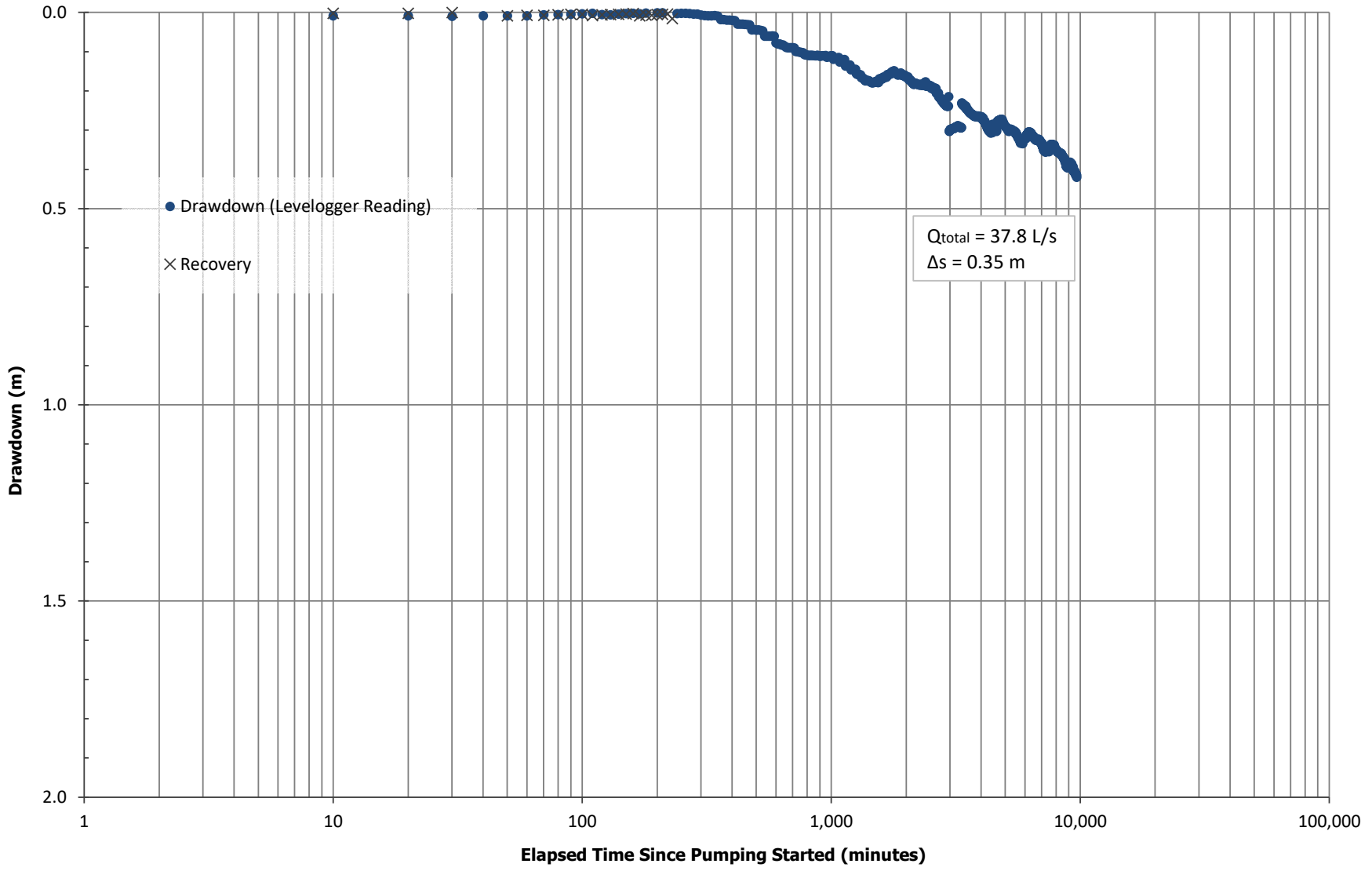
7-Day Pumping Test - Monitoring Well MW8-S (May 2-22, 2021)



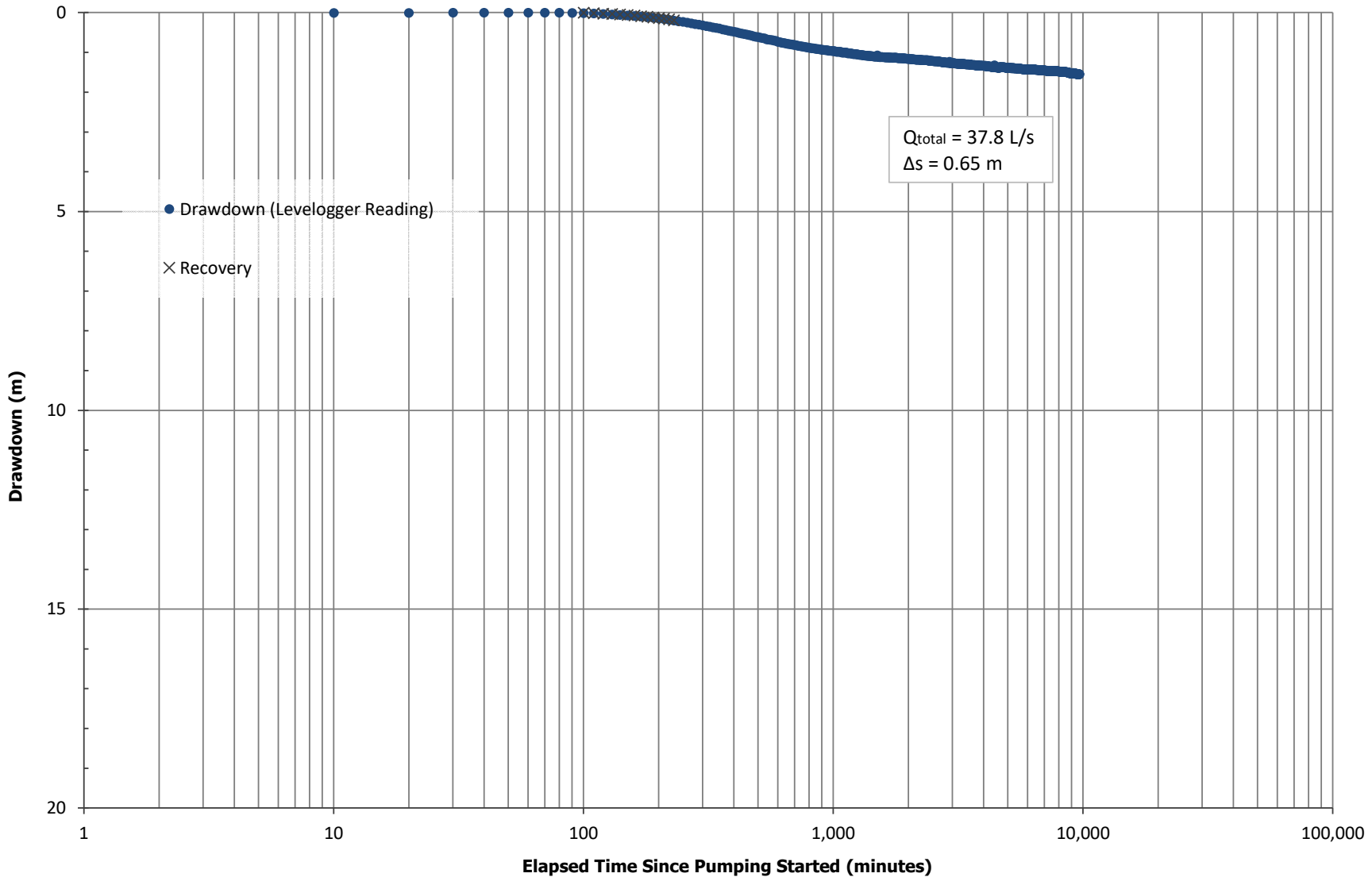
7-Day Pumping Test - Monitoring Well MW8-I (May 2-22, 2021)



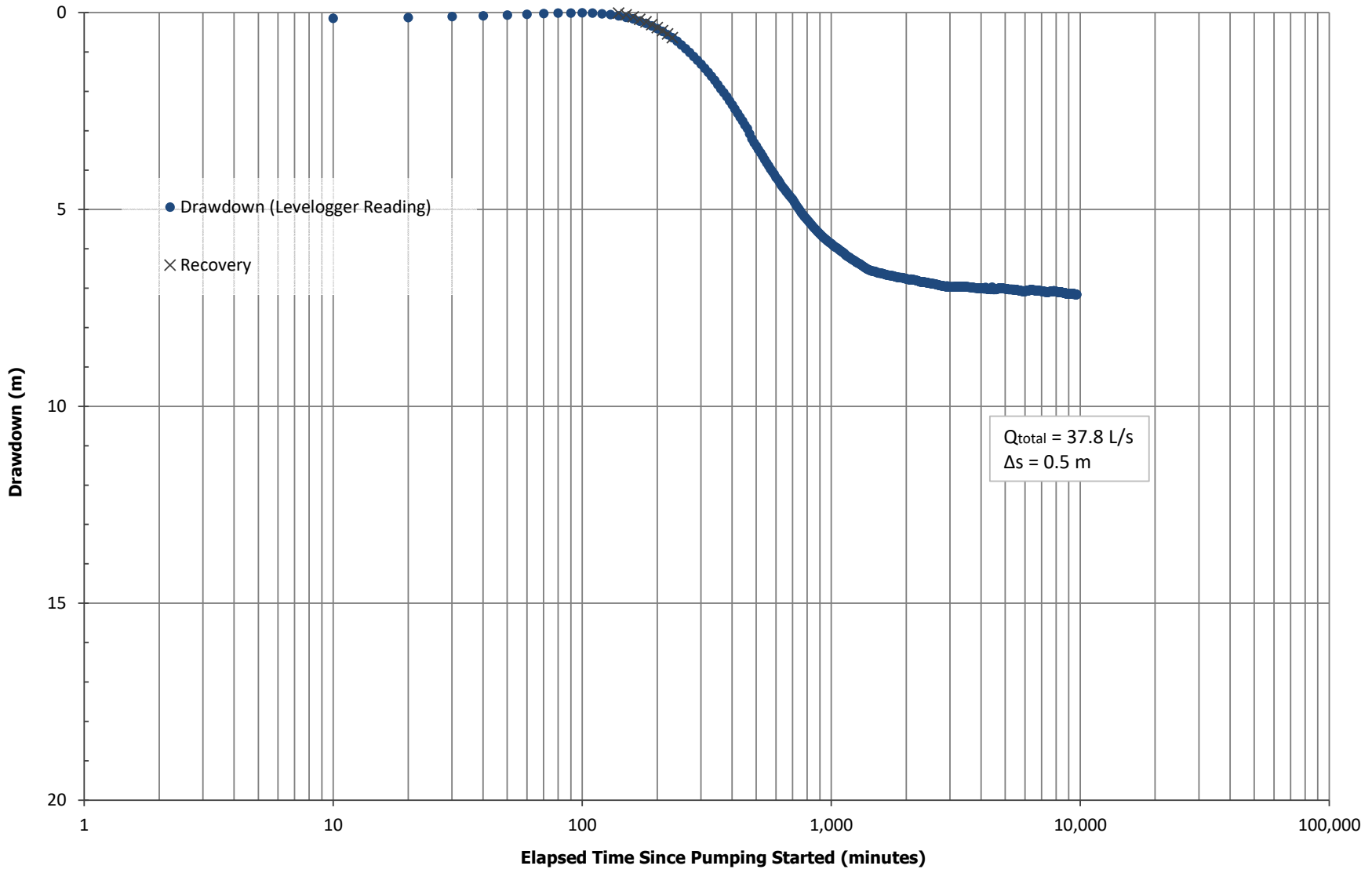
7-Day Pumping Test - Monitoring Well MW8-D (May 2-22, 2021)



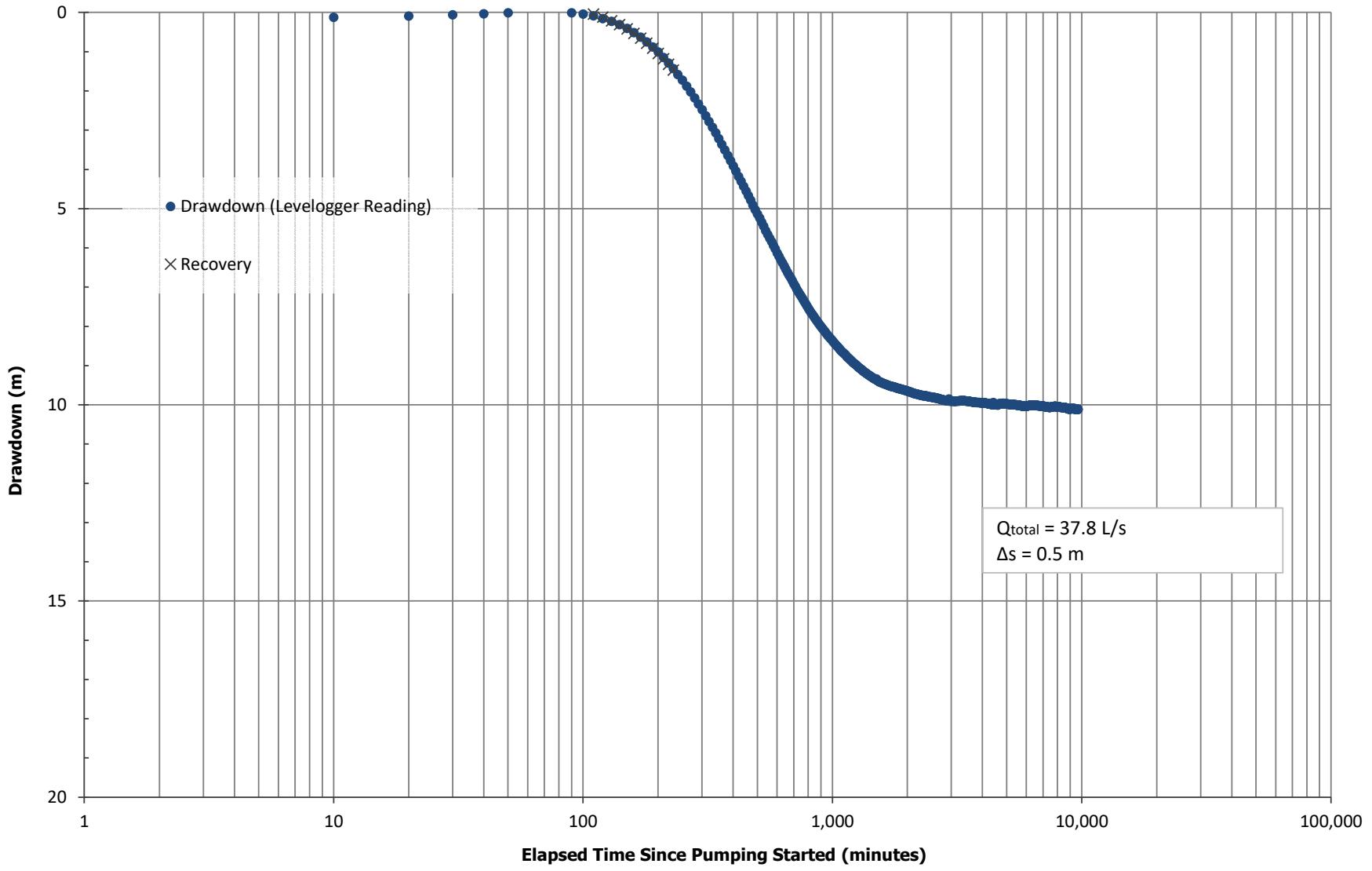
7-Day Pumping Test - Monitoring Well MW10-S (May 2-22, 2021)



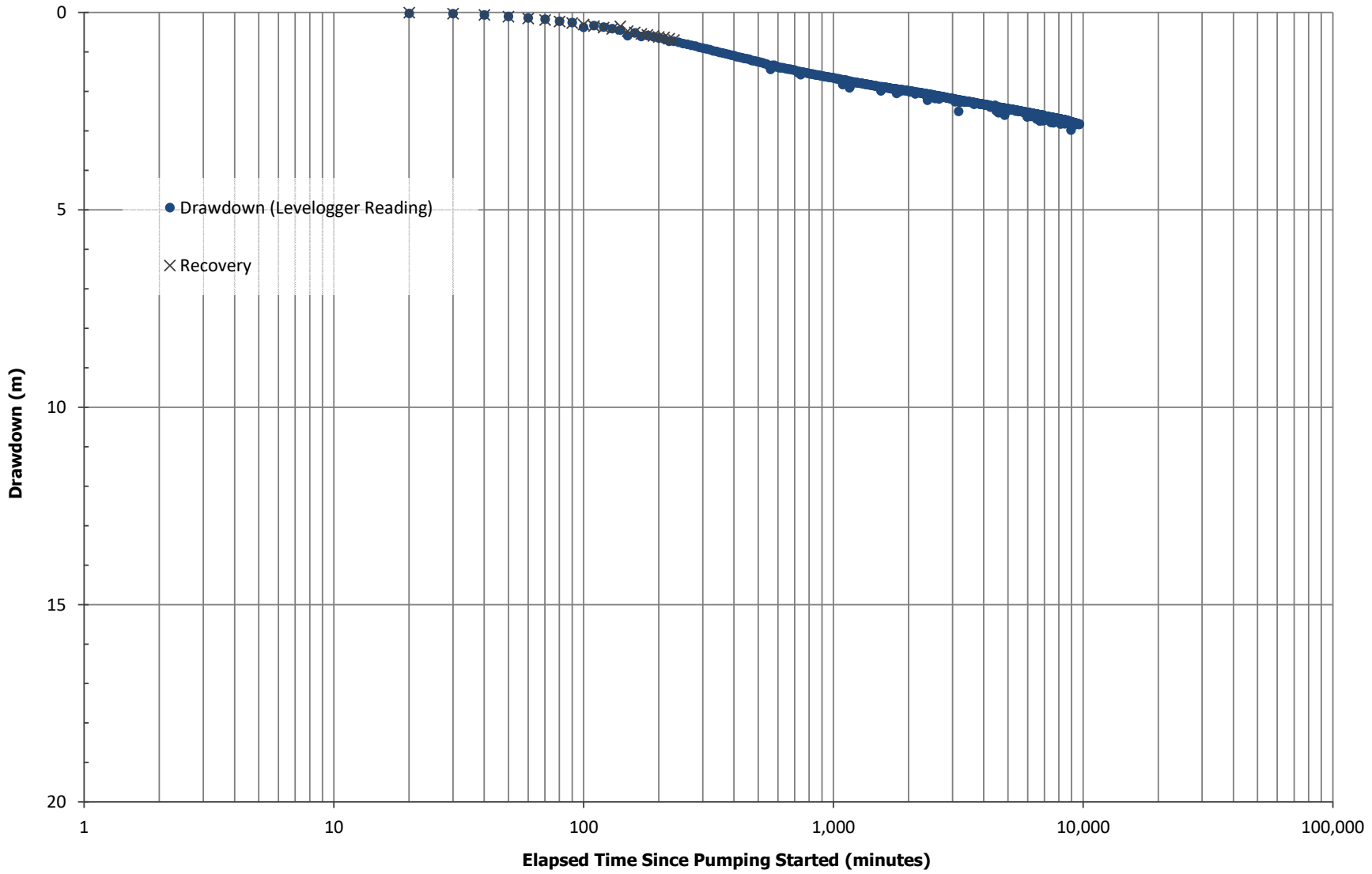
7-Day Pumping Test - Monitoring Well MW10-I (May 2-22, 2021)



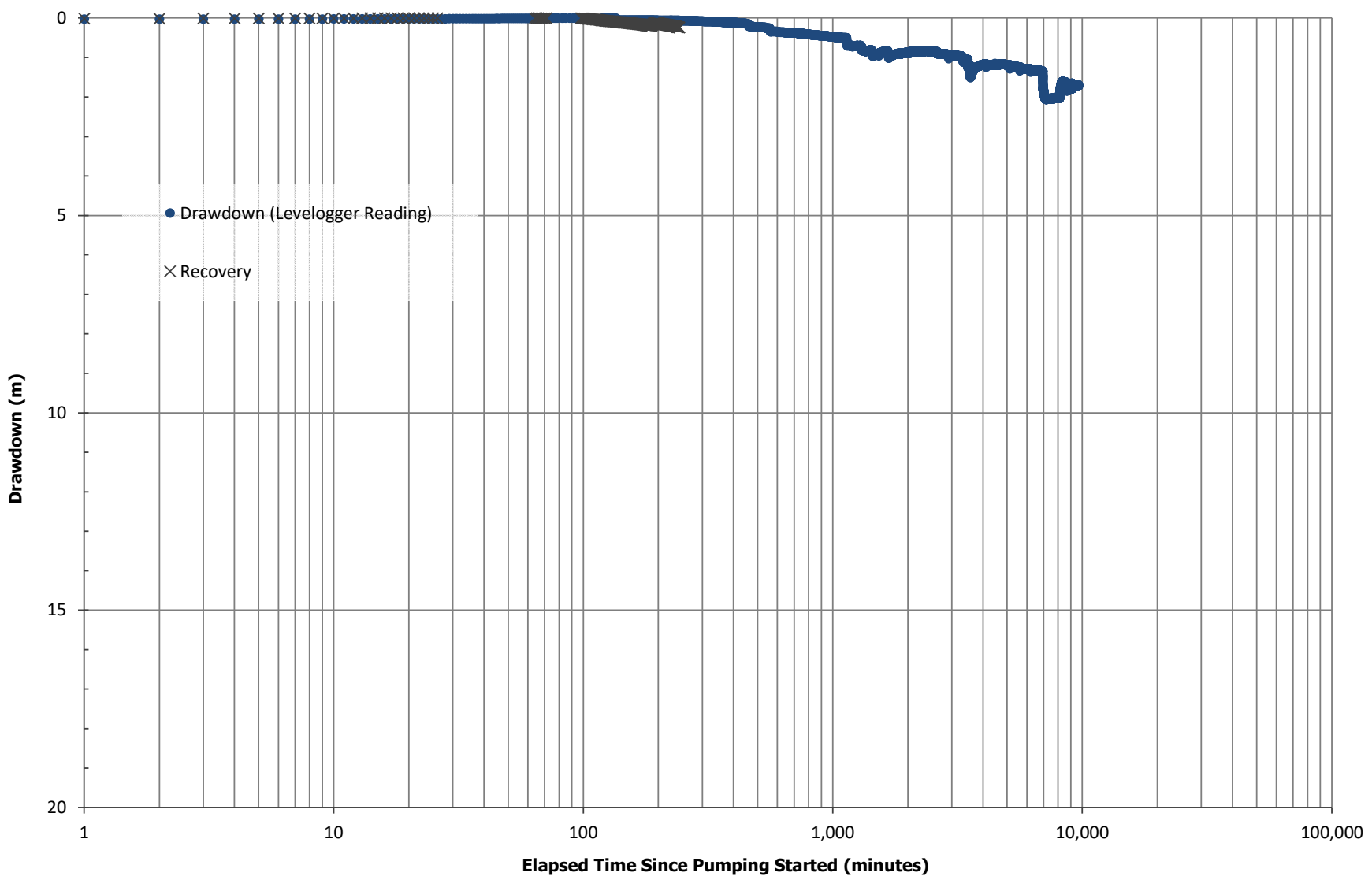
7-Day Pumping Test - Monitoring Well MW10-D (May 2-22, 2021)



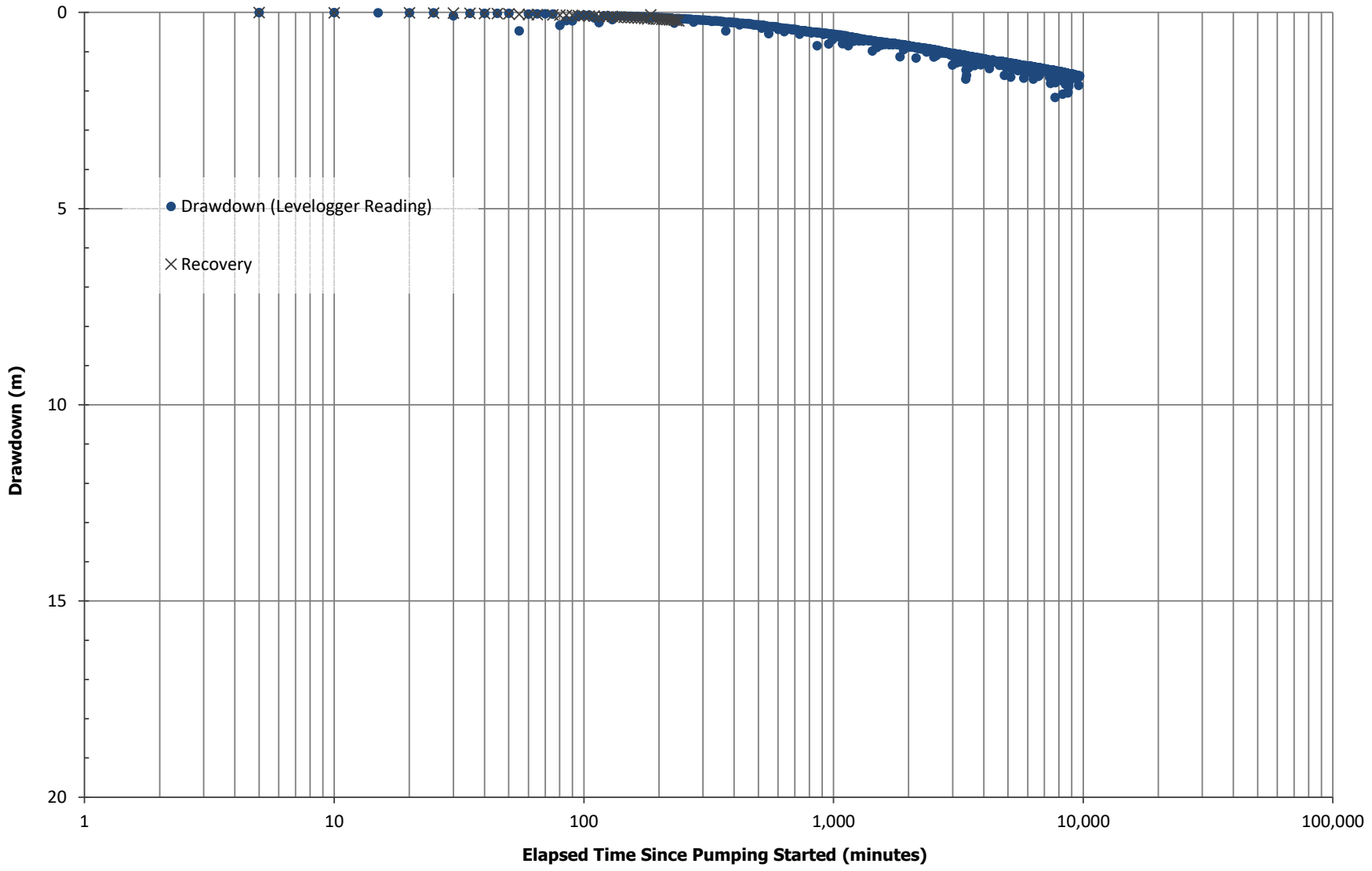
7-Day Pumping Test - Domestic Well 116139 (May 2-22, 2021)



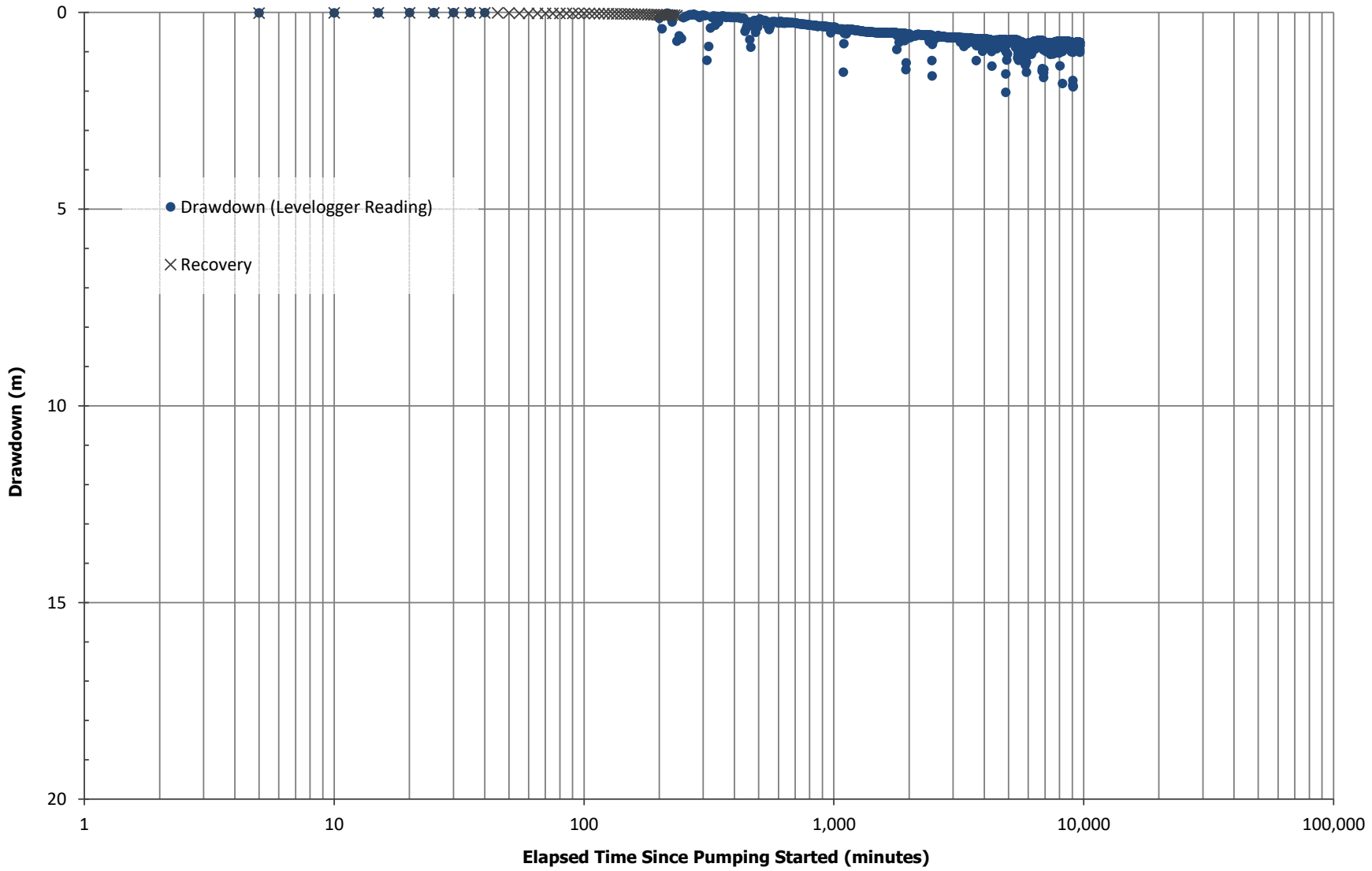
7-Day Pumping Test - Domestic Well 116116 (May 2-22, 2021)



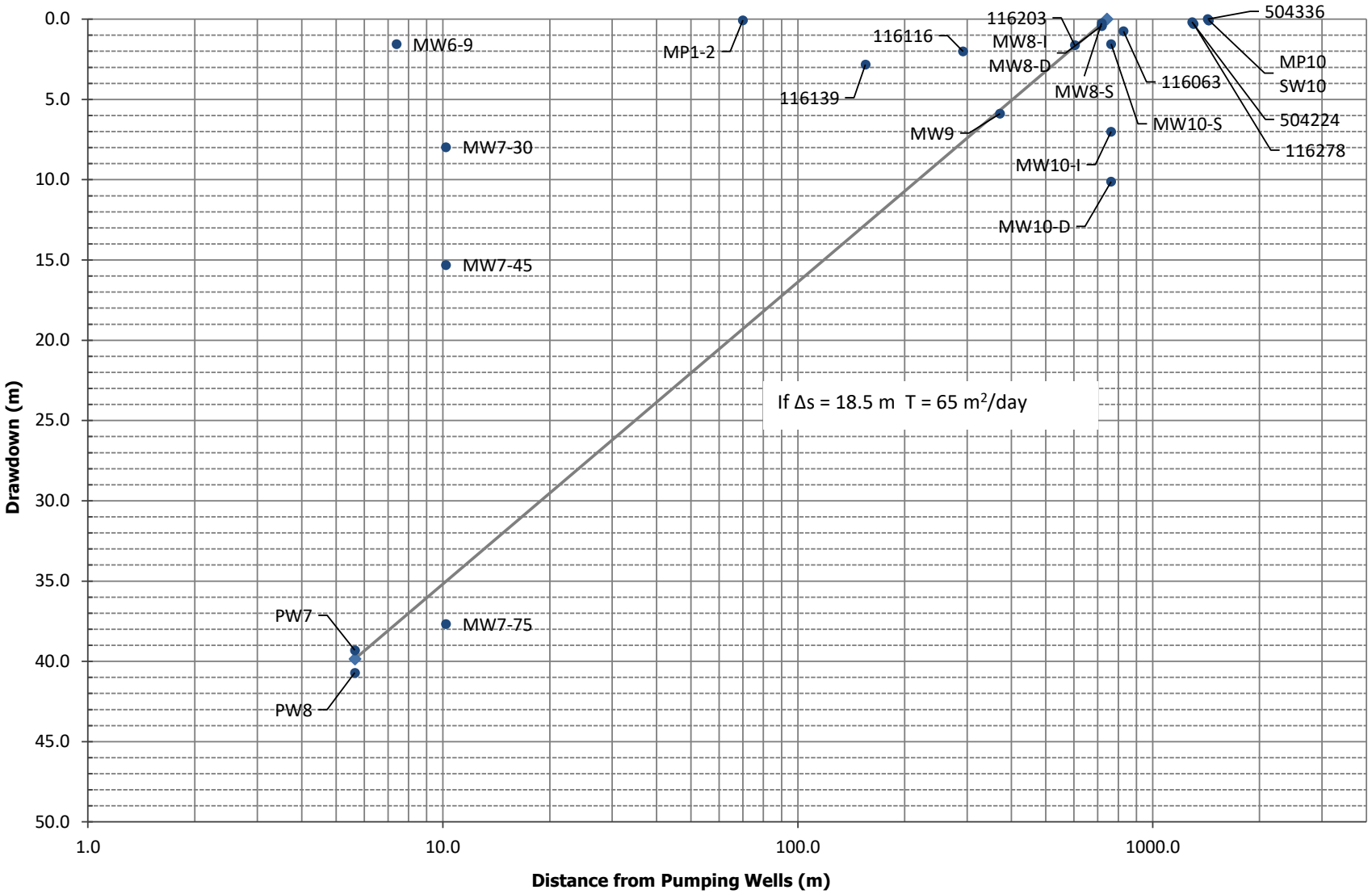
7-Day Pumping Test - Domestic Well 116203 (May 2-22, 2021)



7-Day Pumping Test - Domestic Well 116063 (May 2-22, 2021)



7-Day Pumping Test - Drawdown vs Distance from Pumping Wells PW7 and PW8



S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix H1

Groundwater Quality Summary

Table H-1: Historical Microbiological Testing Results for *E. coli*

Location	2016			2017			2018			2019			2020		
	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max
Well 7 Raw Water E. Coli	40	0	0	52	0	0	52	0	0	53	0	0	52	0	0
Well 7 Treated Water E. Coli	40	0	0	51	0	0	52	0	0	53	0	0	52	0	0
Well 8 Raw Water E. Coli	40	0	0	51	0	0	52	0	0	53	0	0	52	0	0
Well 8 Treated Water E. Coli	40	0	0	51	0	0	52	0	0	53	0	0	52	0	0

Table H-2: Historical Microbiological Testing Results for Total Coliforms

Location	2016			2017			2018			2019			2020		
	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max
Well 7 Raw Water Total Coliforms	40	0	1	52	0	0	52	0	1	53	0	0	52	0	0
Well 7 Treated Water Total Coliforms	40	0	0	51	0	0	52	0	0	53	0	0	52	0	0
Well 8 Raw Water Total Coliforms	40	0	0	51	0	0	52	0	0	53	0	0	52	0	0
Well 8 Treated Water Total Coliforms	40	0	0	51	0	0	52	0	0	53	0	0	52	0	0

Table H-3: Historical Operational Testing Results at PW7/8 for Turbidity, NTU

Location	2016			2017			2018			2019			2020		
	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max
Well 7 Treated Water Turbidity	10	0.14	0.37	12	0.15	0.86	12	0.08	0.47	12	0.10	0.37	12	0.08	0.29
Well 8 Treated Water Turbidity	10	0.15	0.86	12	0.16	0.71	12	0.07	0.41	12	0.09	0.40	12	0.07	0.29

Table H-4: Historical Operational Testing Results for Residual Chlorine at PW7/8 Treated Water, mg/L

Location	2016			2017			2018			2019			2020		
	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max	No. of samples	Min	Max
Well 7 Treated Water Residual Chlorine	8760	0.63	3.11	8760	0.91	2.20	8760	0.54	1.96	8760	0.91	1.76	8760	0.55	2.10
Well 8 Treated Water Residual Chlorine	8760	0.65	2.09	8760	0.91	2.38	8760	0.64	2.01	8760	0.87	1.68	8760	0.55	2.10

Table H-5: Inorganic Parameters Tested Annually

Ontario Regulation 170/30	Inorganic Parameters
Schedule 23	Antimony, Arsenic, Barium, Boron, Cadmium, Chromium, Mercury, Selenium, Uranium

Table H-6: Historical Testing Results for Inorganic Parameters

	2016	2017	2018	2019	2020
PW7/8 Inorganic Parameters	No exceedance – MAC	No exceedance - MAC	No exceedance – MAC	No exceedance – MAC	No exceedance – MAC

Table H-7: Historical Annual Summary Results for Arsenic at PW7/8 Treated Water, µm/L

Location	2016		2017		2018		2019		2020	
	Sample Date	Results	Sample Date	Results	Sample Date	Results	Sample Date	Results	Sample Date	Results
Well 7 Treated Water Arsenic	2016-10-11	1.4	2017-12-12	1.3	2018-10-01	0.9	2019-10-01	0.8	2020-10-06	0.5
Well 8 Treated Water Arsenic	2016-10-11	1.9	2017-10-10	1.6	2018-10-01	1.2	2019-10-01	0.9	2020-10-06	0.7

*Summary of inorganic parameters tested during this reporting period or the most recent sample results.

Table H-8: Organic Parameters Tested Annually

Ontario Regulation 170/30	Organic Parameters
Schedule 24	Alachlor, Atrazine + N-dealkylated metabolites, Azinphos-methyl, Benzene, Benzo(a)pyrene, Bromoxynil, Carbaryl, Carbofuran, Carbon Tetrachloride, Chlorpyrifos, Diazinon, Dicamba,1,2-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichloroethane, 1,1-Dichloroethylene (vinylidene chloride), Dichloromethane, 2,4-Dichlorophenol, 2,4-Dichlorophenoxy acetic acid (2,4-D), Diclofop-methyl, Dimethoate, Diquat, Diuron, Glyphosate, Malathion, 2-Methyl-4-chlorophenoxyacetic acid, Metolachlor, Metribuzin, Monochlorobenzene, Paraquat, Pentachlorophenol, Phorate, Picloram, Polychlorinated Biphenyls (PCB), Prometryne, Simazine, Terbufos, Tetrachloroethylene (perchloroethylene), 2,3,4,6-Tetrachlorophenol, Triallate, Trichloroethylene, 2,4,6-Trichlorophenol, Trifluralin, Vinyl Chloride

Table H-9: Historical Testing Results for Organic Parameters

	2016	2017	2018	2019	2020
PW7/8 Organic Parameters	No exceedance - MAC	No exceedance - MAC	No exceedance - MAC	No exceedance - MAC	No exceedance - MAC

Table H-10: Pre-Pump Test Sample Result Summary

Location	Sample Date and Time	Field Total Chlorine (mg/L)	Field Free Chlorine (mg/L)	Total Coliform (cfu/100mL)	E.Coli (cfu/100mL)	HPC (cfu/100mL)
Well 7 Raw Water	2021-05-10 7:43	-	-	0	0	-
Well 8 Raw Water	2021-05-10 7:54	-	-	0	0	-
Well 7 Treated Water	2021-05-10 7:42	1.3	1.19	0	0	0
Well 8 Treated Water	2021-05-10 7:52	1.66	1.53	0	0	0

*Samples taken by OCWA as part of weekly routine sampling procedure.

Table H-11: Post-Pump Test Sample Result Summary

Location	Sample Date and Time	Field Total Chlorine (mg/L)	Field Free Chlorine (mg/L)	Total Coliform (cfu/100mL)	E.Coli (cfu/100mL)	HPC (cfu/100mL)
Well 7 Raw Water	2021-05-19 7:43	-	-	0	0	-
Well 8 Raw Water	2021-05-19 8:17	-	-	0	0	-
Well 7 Treated Water	2021-05-19 7:45	1.2	1.03	0	0	0
Well 8 Treated Water	2021-05-19 8:14	1.37	1.26	0	0	0

*Samples taken by OCWA as part of weekly routine sampling procedure.

S. BURNETT & ASSOCIATES LIMITED
ENGINEERING & ENVIRONMENTAL

Appendix H2

Laboratory Results

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Works #: 220004965
Project : PO#017844

14-May-2021

OCWA-Highlands (Shelburne WTP)
Attn : Don Irvine

136 Main St., E.
Shelburne, ON
L9V 3K5, Canada

Phone: 519-925-1938 ext. 225
Fax:

Date Rec. : 11 May 2021
LR Report: **CA16565-MAY21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Sample Date & Time	Temperature Upon Receipt °C	Field Total Chlorine mg/L	Field Free Chlorine mg/L	Total Coliform cfu/100mL	E. Coli cfu/100mL	Heterotrophic Plate Count (HPC) cfu/1mL
1: Analysis Start Date		---	---	---	11-May-21	11-May-21	11-May-21
2: Analysis Start Time		---	---	---	18:03	18:03	16:58
3: Analysis Completed Date		---	---	---	13-May-21	13-May-21	13-May-21
4: Analysis Completed Time		---	---	---	15:23	15:23	15:23
5: MAC		---	---	---	0	0	---
6: RW RW5-Raw Water Well 5	10-May-21 07:26	10.0	---	---	0	0	---
7: RW RW6-Raw Water Well 6	10-May-21 08:02	10.0	---	---	0	0	---
8: TW TW5-Treated Water Well 5	10-May-21 07:25	10.0	1.85	1.69	0	0	0
9: TW TW6-Treated Water Well 6	10-May-21 08:01	10.0	1.93	1.71	0	0	1
10: RW RW7-Raw Water Well 7	10-May-21 07:43	10.0	---	---	0	0	---
11: RW RW8-Raw Water Well 8	10-May-21 07:54	10.0	---	---	0	0	---
12: TW TW7-Treated Water Well 7	10-May-21 07:42	10.0	1.30	1.19	0	0	0
13: TW TW8-Treated Water Well 8	10-May-21 07:52	10.0	1.66	1.53	0	0	0
14: DW DW-Distribution System-Water Tower	10-May-21 07:14	10.0	1.17	1.10	0	0	0
15: DW DW-Distribution System-WPCP	10-May-21 08:20	10.0	1.05	0.85	0	0	0
16: DW DW-Distribution System-OCWA Office	10-May-21 07:02	10.0	1.19	1.05	0	0	0
17: DW DW-Distribution System-Andrew St. Well	10-May-21 06:54	10.0	1.23	1.11	0	0	0
18: DW DW-Distribution System-Public Work Depot	10-May-21 08:12	10.0	0.86	0.79	0	0	0

Method Descriptions

Units	Description	SGS Method Code
cfu/100mL	E.Coli by membrane filtration on DC media	ME-CA-[ENV]MIC-LAK-AN-001
cfu/1mL	Heterotrophic Plate Count by membrane filtration	ME-CA-[ENV]MIC-LAK-AN-005
cfu/100mL	Total Coliform by membrane filtration using DC medi	ME-CA-[ENV]MIC-LAK-AN-001

Carrie Greenlaw
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002495123

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Works #: 220004965
Project : PO#017844

25-May-2021

OCWA-Highlands (Shelburne WTP)
Attn : Don Irvine

136 Main St., E.
Shelburne, ON
L9V 3K5, Canada

Phone: 519-925-1938 ext. 225
Fax:

Date Rec. : 20 May 2021
LR Report: **CA18442-MAY21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Sample Date & Time	Temperature Upon Receipt °C	Field Total Chlorine mg/L	Field Free Chlorine mg/L	Total Coliform cfu/100mL	E. Coli cfu/100mL	Heterotrophic Plate Count (HPC) cfu/1mL
1: Analysis Start Date		---	---	---	20-May-21	20-May-21	20-May-21
2: Analysis Start Time		---	---	---	15:10	15:10	14:34
3: Analysis Completed Date		---	---	---	21-May-21	21-May-21	25-May-21
4: Analysis Completed Time		---	---	---	14:16	14:16	08:45
5: MAC		---	---	---	0	0	---
6: RW RW5-Raw Water Well 5	19-May-21 07:25	15.0	---	---	0	0	---
7: RW RW6-Raw Water Well 6	19-May-21 08:30	15.0	---	---	0	0	---
8: TW TW5-Treated Water Well 5	19-May-21 07:24	15.0	1.61	1.35	0	0	0
9: TW TW6-Treated Water Well 6	19-May-21 08:28	15.0	1.35	1.18	0	0	1
10: RW RW7-Raw Water Well 7	19-May-21 07:43	15.0	---	---	0	0	---
11: RW RW8-Raw Water Well 8	19-May-21 08:17	15.0	---	---	0	0	---
12: TW TW7-Treated Water Well 7	19-May-21 07:45	15.0	1.20	1.03	0	0	0
13: TW TW8-Treated Water Well 8	19-May-21 08:14	15.0	1.37	1.26	0	0	0
14: DW DW-Distribution System-Water Tower	19-May-21 07:13	15.0	1.50	1.35	0	0	0
15: DW DW-Distribution System-WPCP	19-May-21 08:55	15.0	1.24	1.14	0	0	7
16: DW DW-Distribution System-OCWA Office	19-May-21 06:59	15.0	1.38	1.16	0	0	0
17: DW DW-Distribution System-Andrew St. Well	19-May-21 06:29	15.0	1.53	1.38	0	0	0
18: DW DW-Distribution Sysem-Public Work Depot	19-May-21 08:43	15.0	1.47	1.35	0	0	0

Method Descriptions

Units	Description	SGS Method Code
cfu/100mL	E.Coli by membrane filtration on DC media	ME-CA-[ENV]MIC-LAK-AN-001
cfu/1mL	Heterotrophic Plate Count by membrane filtration	ME-CA-[ENV]MIC-LAK-AN-005
cfu/100mL	Total Coliform by membrane filtration using DC medi	ME-CA-[ENV]MIC-LAK-AN-001

Carrie Greenlaw
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002505116