REPORT

White Wolf Aberfoyle Site

2024 Annual Monitoring Report

Submitted to:

White Wolf Property Management Inc.

485387 30 Sideroad
Shelburne, ON
L9V 3N5

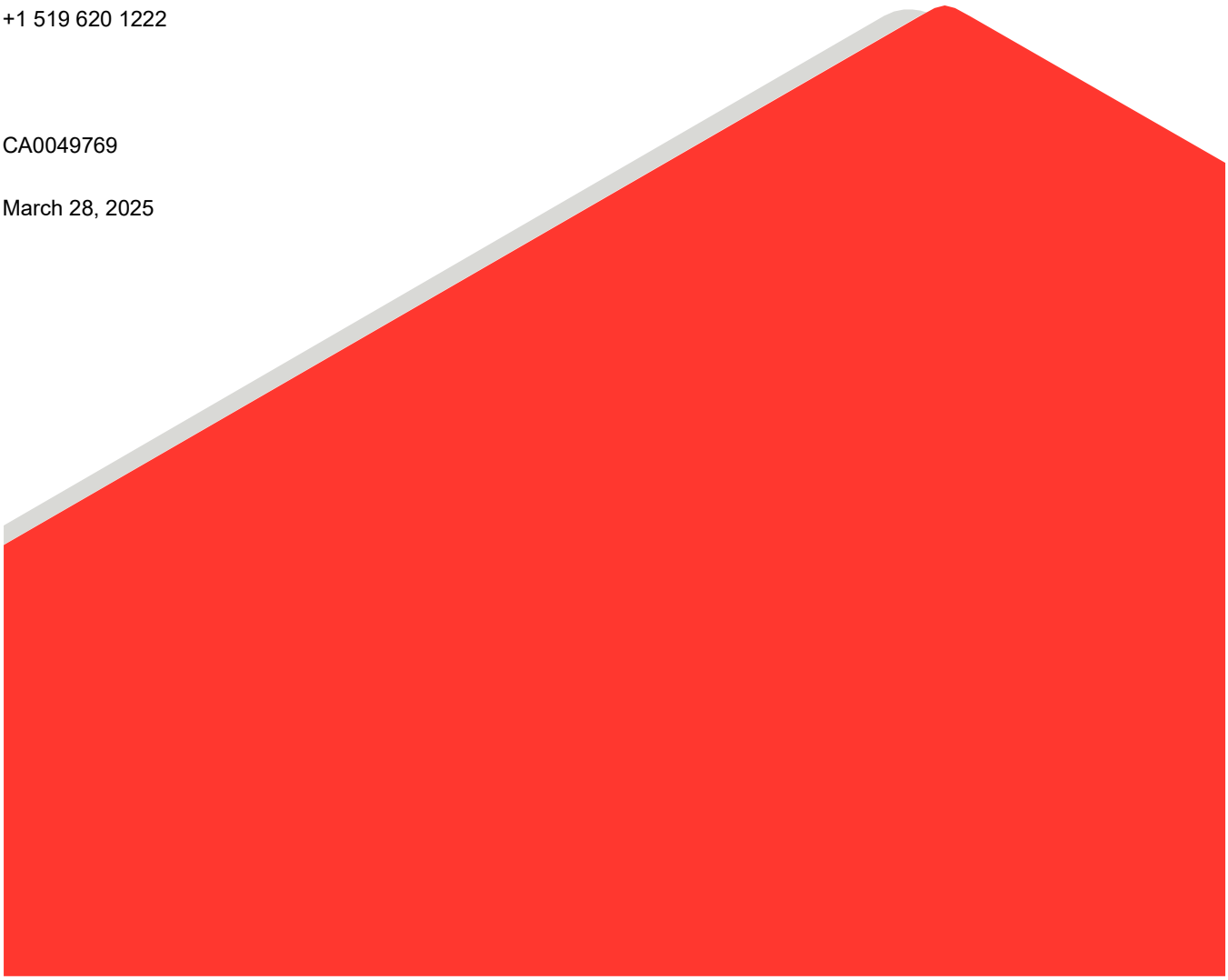
Submitted by:

WSP Canada Inc.

900 Maple Grove Road, Unit 10, Cambridge, ON, N3H 4R7, Canada
+1 519 620 1222

CA0049769

March 28, 2025



Distribution List

1 eCopy - White Wolf

1 eCopy - MECP

1 eCopy - Puslinch Township

1 eCopy - WSP Canada Inc.

Key Facts for 2024 Operations at Aberfoyle

Key facts for the 2024 operations at Aberfoyle are summarized below.

1) Blue Triton Brands (Blue Triton) continued to operate under the terms of Permit to Take Water (PTTW) 3133-C5BUH9 for well TW3-80 in 2024. The property was purchased by White Wolf Property Management Inc. (White Wolf) in January 2025.

2) Blue Triton has complied with all the conditions in the PTTW for the Aberfoyle well TW3-80 in 2024.

3) A comprehensive annual monitoring report for the Aberfoyle well (TW3-80) has been prepared under the conditions of the PTTW.

4) No complaints arising from the taking of water authorized under the PTTW were received in 2024.

5) The Grand River Low Water Response Team declared a Level 1 Low Water Condition for the entire Grand River Watershed, including Mill Creek, on December 20, 2023 which remained in effect until it was removed on January 31, 2024. Blue Triton committed to limit water takings to 90% of their monthly maximum permitted volume during the Level 1 Condition. Blue Triton's monthly water takings in January were 48.3% of the permitted monthly amount.

6) TW3-80 pumps water from the Lower Bedrock Aquifer, which is overlain by a Middle Bedrock Aquitard, an Upper Bedrock Aquifer and an overburden aquifer/aquitard.

7) The total volume of water taken in 2024 from TW3-80 was 612,693,646 L, approximately 47% of the permitted annual volume assuming continuous well operation.

8) The daily water takings at TW3-80 ranged from 175,283 L to 3,242,259 L. The average daily water taking was 1,674,026 L. The maximum daily taking corresponded to approximately 90% of the permitted maximum daily taking and, on most days, was substantially less than the maximum permitted daily taking.

9) The variations in water levels in TW3-80 continue to be due mainly to short-term changes in the pumping rate and during 2024 were within the historical ranges of observed water levels. Ongoing pumping from TW3-80 has not led to a long-term water level decline in the well.

10) Water levels in the Lower Bedrock Aquifer around the property continue to be influenced mainly by pumping of TW3-80, over both the short-term and long-term. The effects of long-term variability in pumping are observed more in the wells closer to TW3-80 where mean annual water levels correlate with total annual water takings (i.e., increased water takings result in lower water levels). The influence of pumping decreases with distance from the pumping well. Water levels recover when pumping rates are reduced, an indication that the water taking is sustainable. There is also some influence on the water levels from recharge and external influences, to varying degrees. Water levels measured within the Lower Bedrock Aquifer in 2024 are generally similar to the water levels measured since mid-2018 with the exception of the lower levels during the second half of 2022, which was marked by drought conditions and the reduced recharge to the Lower Bedrock Aquifer.

11) Water levels in the Upper Bedrock Aquifer around the property are partly influenced by pumping from TW3-80 (i.e., there is hydraulic connection between the Upper Bedrock and Lower Bedrock Aquifers); however, the connection is limited (i.e., there is less response than in the Lower Bedrock Aquifer). The magnitude of influence varies based on distance from TW3-80 and existing hydrogeologic conditions, reflecting complexity in the subsurface. While there is an influence on water levels in the Upper Bedrock Aquifer from pumping TW3-80, there are also seasonal and long-term trends in the Upper Bedrock water levels that are reflective of recharge trends (i.e., lower water levels during years of below average precipitation and higher water levels during years of above average precipitation). This is reflected in 2024 by the decrease in water levels during a time of below average precipitation during the second half of the year.

12) Water levels in the overburden are affected both by natural factors (recharge) and, to a much lesser degree, from pumping at TW3-80. The response to pumping in the overburden is observed only in the immediate vicinity of the pumping well. Water levels in the overburden were similar or slightly higher compared to the water levels observed in 2023 and higher compared to the lower water levels observed during the second half of 2022 due to the below average precipitation at that time.

13) The water levels in the mini-piezometers generally increase in the spring, decline through the summer, and then increase in the fall. In addition to the seasonal trend, short-term changes (“spikes”) in water level in the shallow groundwater are influenced by individual precipitation events. Overall, the water levels are influenced primarily by precipitation events, which overwhelm any changes due to pumping from TW3-80. Water levels measured in the mini-piezometers in 2024 were within the historical ranges.

14) Surface water levels in Aberfoyle Creek and Mill Creek fluctuate in response to natural processes (i.e., precipitation, snow melt and evapotranspiration) with no measurable effects from changes in pumping from TW3-80. In general, surface water levels are higher in the winter/spring and lower in the summer and then increase slightly into the fall. “Spikes” in the water levels are related to precipitation events or spring melt. Summer stream flows at SW1 and SW2 in 2024 were within the historical ranges. The effects of pumping TW3-80 could not be detected in the surface water flows observed at SW1 and SW2 in 2024.

Table of Contents

FIGURES

APPENDICES

1.0 INTRODUCTION

Blue Triton Brands (Blue Triton), formerly Nestlé Waters Canada (Nestlé), retained WSP Canada Inc. (WSP) to conduct the annual monitoring program for the Aberfoyle Site as required by Permit To Take Water (PTTW) Number 3133-C5BUH9 issued by the Ministry of the Environment, Conservation and Parks (MECP) on November 15, 2021. White Wolf Property Management Inc. (White Wolf) purchased the property in January 2025. WSP has prepared this report on behalf of White Wolf to meet the reporting condition of the PTTW. The PTTW is provided in Appendix A.

The location of the Aberfoyle Spring/Plant (Site) is shown on Figure 1.1. The PTTW authorizes water taking from one on-Site bedrock well located on Lot 23, Concession 7, Geographic Township of Puslinch, Wellington County, Ontario. Water from TW3-80 is taken for the purpose of bottling water.

The Aberfoyle bottling facility is located on a 46.75 hectare parcel, approximately 5 km southeast of Guelph and 12 km northeast of Cambridge (Figure 1.1). The Aberfoyle facility consists of a bottling plant, warehouse, paved parking and access drives, ponds, and open fields, and is bordered by wooded areas, wetlands and aggregate operations.

A summary of the PTTW Conditions and where the information can be found in this report are outlined in Table 1:

Table 1: Permit To Take Water Conditions

Condition Number	Condition Description	Report Section
3.2	Identifies use, rates, time and total takings allowed.	3.1.1, 4.1, Appendix C
3.3	Low Water Response Plan	4.1
4.1	Maintain a daily record of all water takings including date, volume of water taken and rate at which it was taken.	Appendix C
4.2, 4.3, 4.5	Establish the specified groundwater and surface water monitoring programs including monitoring requirements and monitoring timing.	3.1.2, 3.1.3
4.4	Undertake wetland monitoring and redd surveys and submit results to Director.	Appendix H
4.6	Notify the Director of monitoring locations that become inaccessible or abandoned and provide a recommendation for replacement.	3.1.2.1, 3.1.3.1, 3.1.4
4.7	Prepare and submit an annual monitoring report to the Director, which presents and interprets the data collected under the conditions of the PTTW.	This report
4.8	Submit details of the bottling operations to the Director.	4.1
4.9.1, 4.9.2, 4.9.3	Establish a publicly accessible website and have select technical data available for download.	Not reported on; updated annually prior to March 31
4.10	Host an annual stakeholder meeting.	Not reported on; completed annually prior to September 30
5.1	Notify the local District Office of any complaint arising from the taking of water and proposed action to rectify the complaint.	4.1
5.2	Supply water to anyone with a water supply (in effect prior to this taking) that has been negatively impacted.	Not applicable

WSP (formerly Golder Associates Ltd.) began monitoring at the Site in May 2014 on behalf of Nestlé and continued to monitor the site on behalf of Blue Triton in 2024. Prior to 2014, monitoring was performed by Conestoga Rovers and Associates (CRA) and Nestlé. The MECP has requested that the reporting follow the same outline and format as previous reports.

The report is structured as follows:

- **Section 1.0**: Introduction including site location, history, and construction details for supply well TW3-80;
- **Section 2.0**: Regional setting including a description of topography, drainage, ecology, physiography, geology and hydrogeology;
- **Section 3.0**: Summary of 2024 field program including a description of field activities conducted in 2024;
- **Section 4.0**: Monitoring program results including a summary and analysis of the data collected in 2024;
- **Section 5.0**: Conclusions from the 2024 monitoring program; and
- **Section 6.0**: Recommendations from the 2024 monitoring program.

1.1 Historical Summary

TW3-80 was constructed in April 1980 for an aquaculture (fish farming) operation. In December 2000, the Perrier Group of America, a Nestlé Company, purchased the property and started a bottling water operation. Including the current PTTW, seven consecutive PTTWs have been issued for TW3-80 since Nestlé acquired the property, allowing for water takings for bottling water purposes (change of ownership to Blue Triton and now White Wolf). Additional investigations have been conducted over the years to determine if there have been any negative impacts on the natural environment and ensure that the water taking is sustainable. These additional investigations have been requirements of previous permits and have been completed to the satisfaction of the MECP. Other than the on-going conditions of the PTTW, no additional studies were required in 2024.

1.2 Construction Details for Supply Well TW3-80

The borehole log for TW3-80 is provided in Appendix B. The glacial overburden at the well is 14.6 m thick and consists of a silt till to a depth of 12.2 m below grade, and 2.4 m of fine-to-medium sand overlying bedrock. Any coarse-grain sediments at surface may have been removed in the past.

The well was originally completed to a depth of 42.4 m below grade, 27.8 m into the bedrock. Conestoga Rovers and Associates (CRA, 2014) interpreted the bedrock through which TW3-80 was drilled as consisting of the Guelph Formation dolostone (14.6 to 16.8 m) and the Amabel Formation (Eramosa Member and underlying Unsubdivided Member) (16.8 to 42.4 m). Changes to the bedrock nomenclature have been made by the Ontario Geological Survey (OGS) (i.e., Brunton, 2008, 2009: Brunton and Brintnell, 2011). Based on the revised nomenclature, TW3-80 is interpreted to have been drilled through the Guelph, Eramosa, and Goat Island Formations and possibly into the Gasport Formation. The stratigraphy at TW3-80 is consistent with that of other wells in the area.

When TW3-80 was initially constructed in 1980; a 305 mm diameter steel casing was installed through the overburden and approximately 0.6 m into the top of rock, to a depth of 15.2 m, and cemented in place (CRA, 2014). The remainder of the well was completed as a 305 mm diameter open hole.

In 1999, the bottom 11.3 m of TW3-80 was sealed with gravel, bentonite grout, and a cement cap so that the well would pump water with more favourable natural water quality from within the Guelph to Goat Island/Gasport Formations. The revised finished depth is 31.1 m below grade.

To comply with Nestlé water well construction standards, a liner was installed in the well in 2002. A 250 mm diameter stainless steel liner was installed inside the 305 mm steel casing and grouted in place, to a depth of 28.4 m. The revised open interval of TW3-80 is now 28.4 m to 31.1 m below grade and only allows pumping from the Goat Island/Gasport Formations. A schematic of the well construction is included on Figure 1.2.

2.0 REGIONAL SETTING

The following sections provide a summary of the regional and local topography, drainage, physiography, and overburden and bedrock geology/hydrogeology for the Site.

2.1 Topography and Drainage

Regional topography is characterized by northeast-southwest trending bands of hummocky terrain (Chapman and Putnam, 1984). Locally, the property is located in a relatively flat area between the Paris and Galt Moraines. Surface topography is shown on Figure 2.1. Within a 1 km radius of the property, ground surface elevations typically range from 310 to 330 masl (metres above sea level) with the lows occurring along Aberfoyle Creek and Mill Creek. The streambed elevation of the portion of Aberfoyle Creek that traverses the property is approximately 310.5 masl (+/- 1 m).

The Site is located within the Mill Creek Subwatershed (Figure 2.1), which forms part of the larger Grand River Watershed. Part of Mill Creek is located north of the property and generally flows in a southwesterly direction within the study area. A tributary of Mill Creek, referred to as Aberfoyle Creek, flows through the Site, also in a southwesterly direction, and confluences with Mill Creek west of the property. Aberfoyle Creek is located approximately 150 m to the northwest of TW3-80 at its nearest point. Mill Creek and Aberfoyle Creek are shown on Figure 2.1 along with other surface water and wetland features, which are described below.

As shown on Figure 2.1 several ponds exist, both natural and man-made, within a 1 km radius of the property. One such pond, referred to as the Aberfoyle Mill Pond, located east of and upstream from the Site, is created by a dam across Aberfoyle Creek. Most of the other ponds in the area appear to be man-made and are off-line ponds (i.e., not connected to streams). Some of the ponds are the result of aggregate extraction below the water table. Some small on-Site ponds exist on the property.

In addition to the ponds, several wetland areas are also present within a 1 km radius of the property (Figure 2.1). Most of these wetlands are part of the Mill Creek Puslinch Wetland Complex and are considered provincially significant. Wetlands are present within the northwest part of the property.

2.2 Ecological Setting

The northwestern half of the property is in a natural condition and supports a diversity of forest and wetland habitats as well as a watercourse and fish habitat. Most of these habitats are relatively undisturbed and support a diverse range of flora and fauna, including some that are locally significant.

The wetland habitats along Aberfoyle Creek form part of the provincially significant Mill Creek Puslinch Wetland Complex.

Collectively, these natural features comprise part of an extensive natural heritage system of the headwaters of the Mill Creek watershed. This natural heritage system is recognized for its provincial, regional and local significance.

Aberfoyle Creek is a branch of Mill Creek that traverses the property. Its confluence with Mill Creek is immediately downstream from the property. Upstream of the property, Aberfoyle Creek flows through a 10 hectare pond, created by a dam constructed in the 1860's to power a grist mill. Outflows from the pond are controlled by a series of weirs. Upstream of mill pond, Aberfoyle Creek is a cold-water stream that contains both Brook Trout (*Salvelinus fontinalis*) and Brown Trout (*Salmo trutta*). However, during the summer the water is warmed in the Mill Pond so that downstream from the pond, through the property, the water temperature frequently exceeds the lethal temperature for these trout species. The most abundant fish species through the property are common cool-water species for which the water temperatures are suitable. Like the upper reaches of Aberfoyle Creek, Mill Creek is a cold-water stream that supports Brook Trout and Brown Trout.

2.3 Physiography

Chapman and Putnam (1984) define the physiographic region within which the property lies as the eastern limb of the Horseshoe Moraines. The existing landforms and most of the surficial soils in the area were created/deposited during the most recent glacial period, specifically the recession of the Lake Ontario ice lobe. During the recession of the Lake Ontario ice lobe, three distinct end moraines were formed in the area: the Paris Moraine, the Galt Moraine, and the Moffat Moraine (Karrow, 1987). The Paris Moraine is situated to the north of the property and the Galt Moraine is situated to the south of the property. These moraines are primarily composed of silty to sandy till and form the major drainage divides for the Mill Creek subwatershed. The property is situated mainly within an outwash gravel plain situated between the two moraines (Figure 2.2). The outwash gravel plain was likely formed by glacial meltwater associated with a halt in the ice retreat during the formation of the Galt Moraine.

2.4 Geology and Hydrogeology

The following sections provide a summary of the regional and local geology and hydrogeology. The regional interpretation is based on published mapping and information contained in the Mill Creek Subwatershed Study (CH2M Gore & Storrie, 1996). Detailed geologic information has also been obtained from logging of the stratigraphy by CRA at locations where monitoring wells were installed as part of previous field investigations. The bedrock interpretation has been updated to follow the revised nomenclature of the OGS (Brunton, 2008 and 2009, Brunton and Brintnell, 2011).

2.4.1 Overburden Geology

The overburden ranges in thickness from 15 m in low-lying areas of the subwatershed near Mill Creek and Aberfoyle Creek to 35 m along the crests of the Paris and Galt Moraines (Drift Thickness Map P.535, M.A., Vos, 1968; CH2M Gore & Storrie, 1996).

The surficial overburden geology, as mapped by the OGS is shown on Figure 2.2. The surficial overburden of the area is characterized by the following units:

- Outwash gravel;
- Ice-contact gravel: kames and eskers; and
- Stoney, sandy silt till (Wentworth Till).

Regionally, the Paris and Galt Moraines, located north and south of the property, respectively, consist of Wentworth Till. Karrow (1987) describes the till as a buff-coloured, stony, sandy silt till. Located between the moraines are younger outwash gravel deposits and ice-contact gravel deposits. Deposits along parts of Aberfoyle Creek and Mill Creek are mapped as peat and muck (organic deposits). There are no bedrock outcrops within the study area.

The coarse-grained deposits between the moraines generally overlie the Wentworth Till. In some areas, particularly the central part of the Mill Creek subwatershed, the till is not present, and the coarse-grained deposits are continuous to bedrock. The surficial coarse-grained deposits are thinner and separated from the bedrock by the underlying till in the upper and lower reaches of the Mill Creek subwatershed. The site is located within the upper half of the watershed. Occasional coarse-grained deposits exist at various depths as lenses or discontinuous layers within or between till units (CH2M Gore & Storrie, 1996). A gravel layer is also present immediately above the bedrock in some locations, including at TW3-80.

Locally, within a 1 km radius of the property, the overburden is typically 10 m to 30 m thick and consists mainly of outwash gravel or ice-contact gravel deposits. As previously discussed, these coarse-grained deposits are situated between the moraines and are elongated in a southwest to northeast direction. The Wentworth Till is mapped as the surficial deposit along the moraines to the southeast (approximately 500 m) and northwest (approximately 2 to 2.5 km) of TW3-80.

2.4.2 Bedrock Geology

The bedrock surface is somewhat irregular, but generally dips to the southwest. The bedrock elevation in the vicinity of the property declines from approximately 306 masl northeast of the property (MW10-09) to 293 masl south of the property (MW16-12).

The regional bedrock geology is shown on Figure 2.3. As noted above, the bedrock nomenclature shown on Figure 2.3 has since been revised based on work by the OGS (Brunton, 2008 and 2009, Brunton and Brintnell, 2011). In summary, the previous Guelph Formation is now divided into the Guelph Formation and the Eramosa Formation (Stone Road Member and Reformatory Quarry Member); the previous Eramosa Member of the Amabel Formation is now the Vinemount Member of the Eramosa Formation; and the previous Unsubdivided Member of the Amabel Formation is now divided into the Goat Island, Gasport and Irondequoit Formations. The bedrock hydrogeologic units underlying the property, which are relevant to the water taking, are composed of limestone, dolostone and shale sequences and are described as follows (from oldest to youngest).

- Cabot Head Formation: The Cabot Head Formation, readily distinguished by its grey-green colour, is a non-calcareous shale with thin interbeds of sandstone and limestone. Due to its low hydraulic conductivity, the top of the Cabot Head Formation is interpreted to be the base of the active groundwater flow system;
- Merritton Formation: The Merritton Formation consists of a pinkish-brown, finely crystalline dolostone unit with dark shaley partings. This unit is relatively thin where present in the area;
- Rockway Formation: The Rockway Formation is a greenish-grey fine crystalline argillaceous dolostone with shaley partings (Brunton, 2008). The thickness of the Formation is fairly consistent and typically less than 2 m;
- Irondequoit Formation: This Formation is a thickly to medium-bedded crinoidal grainstone (Brunton, 2008). The unit has a fairly consistent thickness of approximately 3 m throughout the area; and
- Gasport Formation: The Gasport Formation is a cross-bedded crinoidal grainstone-packstone with sequences of reef mound and coquina (shell bed) lithofacies. This unit has commonly been referred to as the Amabel Formation (Unsubdivided Member) in previous studies in the area (Turner, 1978). Wells in the vicinity of the property are generally not drilled through the entire sequence. In and around the City of Guelph, the Formation varies in thickness from about 25 to over 70 m, and the upper sections of the reef mounds, the crinoidal grainstones and the coquina shell beds make this formation highly transmissive, where they are present (Golder, 2011).

- Goat Island Formation: The Goat Island Formation consists of two members; the lower Niagara Falls Member and the upper Ancaster Member. Based on the boreholes completed in the area, the Goat Island Formation is estimated to range in thickness from approximately 2 m to 15 m:
  - Goat Island Formation – Niagara Falls Member: The Niagara Falls Member is a finely crystalline and cross laminated crinoidal grainstone with small reef mounds; and
  - Goat Island Formation – Ancaster Member: The Ancaster Member is a chert-rich, finely crystalline dolostone that is medium to ash grey in colour.
- Eramosa Formation: The Eramosa Formation consists of three members including, from oldest to youngest, the Vinemount Member, the Reformatory Quarry Member and the Stone Road Member:
  - Eramosa Formation – Vinemount Member: The Vinemount Member consists of thinly bedded, fine crystalline dolostone with shaley beds that give off a distinctive petroliferous odour when broken (Brunton, 2008). This dark grey to black dolostone unit was commonly identified in water well records as ‘black shale’ and mapped in previous studies in the City of Guelph as the Eramosa Member of the Amabel Formation. The shaley beds of this Formation significantly reduce the vertical permeability across this unit relative to the other Formations. The Vinemount Member ranges in thickness from approximately 4 m to 12 m in the area of the property;
  - Eramosa Formation – Reformatory Quarry Member: The Reformatory Quarry Member, is described by Brunton (2008) as light brown to cream coloured, pseudonodular, thickly bedded and coarsely crystalline dolostone. This unit is susceptible to karstification due to its uniform fine dolomite crystallinity (Brunton, 2008). This unit also often contains mud-rich and microbial mat-bearing lithofacies that may act as aquitard materials, reducing the vertical permeability across this unit; and
  - Eramosa Formation – Stone Road Member: This cream coloured coarsely crystalline Upper Eramosa unit is not present in most of the area and can be difficult to distinguish from the Guelph Formation.
- Guelph Formation: The Guelph Formation is the upper bedrock unit in the study area and consists of medium to thickly bedded crinoidal grainstones and wackestones and reefal complexes (Brunton, 2008). The Guelph Formation is cream coloured and fossiliferous. The upper 0.3 m to 0.6 m is noted to be highly fractured and weathered. Based on data from borehole drilling, the Guelph Formation is typically less than 5 m thick in the vicinity of the property, which is thin relative to the regional scale thickness.

2.4.3 Hydrogeology

The interpretation and nomenclature for the bedrock formations has been revised (as indicated above); however, the interpretation of the hydrostratigraphy at the property and surrounding area has remained consistent. The hydrostratigraphy consists of the following from surface down:

- Overburden Aquifer/Aquitard;
- Upper Bedrock Aquifer (Guelph Formation, Reformatory Quarry Member of the Eramosa Formation);
- Middle Bedrock Aquitard (Vinemount Member of the Eramosa Formation and sometimes parts of the Reformatory Quarry Member of the Eramosa Formation and the Goat Island Formation); and
- Lower Bedrock Aquifer (Goat Island Formation and Gasport Formation).

The designations of aquifers and aquitards is a simplification of the hydrostratigraphy for conceptual purposes. In reality, the hydraulic properties of the bedrock are variable and at some locations the hydraulic conductivity may be sufficiently small that locally a bedrock stratum act as an aquitard.

Two hydrostratigraphic cross-sections (A-A' and B-B') through the property are included on Figures 2.4 and 2.5 with the locations shown on Figure 2.2. Cross-section A-A' is oriented southwest to northeast roughly along Aberfoyle Creek and cross-section B-B' is oriented north to south through the property, crossing Aberfoyle Creek and including supply well TW3-80.

Based on the hydrostratigraphic interpretation around the property, the thickness of the hydrostratigraphic units is as follows: Overburden Aquifer/Aquitard – 7 to 35 m; Upper Bedrock Aquifer – 2 to 14 m; Middle Bedrock Aquitard – 4 to 12 m; and Lower Bedrock Aquifer – 46 to 58 m. As shown in cross-section A-A', TW3-80 is completed in the upper part of the Lower Bedrock Aquifer.

2.4.4 Groundwater Flow Under Non-Pumping Conditions

Non-pumping conditions have been observed prior to the start of pumping tests. In addition to the pumping tests, there are sometimes brief shutdowns during which water levels in the aquifers evolve towards non-pumping conditions. One such shutdown occurred in October 2010 for 3.4 days. CRA (2014) provided an interpretation of the non-pumping conditions in the overburden and bedrock groundwater levels measured on October 12, 2010, as discussed below and also compared to shutdowns that occurred in October 2004 and November 2006.

- The overburden water table interpretation is presented on Figure 2.6, which indicates that the direction of groundwater flow in the overburden is generally to the southwest, with local components of flow to the west and south toward Aberfoyle Creek. CRA (2014) indicates that this flow configuration was similar to the pattern observed for October 2004 and November 2006 shutdowns;
- The Upper Bedrock Aquifer interpretation is shown on Figure 2.7 with the groundwater flow direction identified in a southwest, south, and southeast direction, which is reported to be similar to the pattern observed for October 2004 and November 2006 shutdowns; and
- The Lower Bedrock Aquifer interpretation is shown on Figure 2.8 with the groundwater flow direction to the southwest in the vicinity of supply well TW3-80, which is reported to be similar to the pattern observed for October 2004 and November 2006 shutdowns.

Groundwater in the Lower Bedrock Aquifer flows generally south in the direction of TW3-80. The Aberfoyle aquifer is interpreted to be recharged primarily within the northern portion of the Mill Creek subwatershed and the capture zone for TW3-80 is inferred to extend to the north-northeast of the well. The Lower Bedrock Aquifer extends beyond Aberfoyle to the southwest, and groundwater is inferred to discharge to the Grand River in the vicinity of Cambridge.

2.5 Source Water Protection

Since the passing of the Clean Water Act (2006), municipalities in Ontario have been required to develop source protection plans to protect their municipal sources of drinking water. These plans identify both water quality and water quantity risks to local drinking water sources and develop strategies to reduce or eliminate these risks. Potential and existing risks for a municipal source are identified within wellhead protection areas (WHPA). A WHPA is an area projected to ground surface that delineates the zone in an aquifer where groundwater is flowing to a municipal drinking water source (pumping well). These areas are defined to protect water quality. The Aberfoyle property and well TW3-80 are located more than 2.6 km from the closest WHPAs, which include the

City of Guelph WHPA to the northwest and the Freelton WHPA to the southeast and east in the Lake Ontario Basin. The closest City of Guelph wells are the Burke Well, which is located approximately 7 km away from TW3-80, and the Downey Well, which is more than 8 km away from TW3-80. The Freelton Wells are more than 10 km from TW3-80.

In addition to protecting water quality, water quantity is also a concern and is considered under Water Quantity Protection Plans. A Water Quantity Risk Assessment is completed to ensure that future water needs of a community can be met. It identifies existing and potential water quantity threats and future activities that may limit municipal water supplies. This is important because when more water is taken from an area than can be naturally replenished, water supplies are threatened, and water shortages are possible. The Aberfoyle property falls within a Water Quantity Protection Zone (WHPA-Q) for the City of Guelph municipal wells. The WHPA-Q zone for the City of Guelph has been assigned a significant risk level (Matrix Solutions, 2017). The Tier 3 Assessment scenarios predicted that the City's municipal wells can meet current needs. However, the assessment predicted that the City's Queensdale municipal well would be unable to meet projected increased future demands under normal climate conditions and during prolonged drought (Matrix Solutions, 2017). The Queensdale municipal well is located approximately 12 km northwest of TW3-80. The Tier 3 Assessment also assigned a high level of uncertainty to the results of the analyses for the City's Arkell Well 1, which is located approximately 10 km north of TW3-80. It is for these reasons that the City's WHPA-Q has been assigned a significant risk level with respect to water quantity. The Source Protection Committee reviewed all existing water takings within the WHPA-Q to evaluate their contribution to water quantity stress in the area. The study showed that municipal wells have the greatest impact on themselves (i.e., pumping at a municipal well influences the water levels in other municipal wells). TW3-80 was not found to interfere with the municipal wells' ability to supply water (Matrix Solutions, 2018). TW3-80 is estimated to be responsible for 1% of the drawdown at the closest municipal well (Burke Well located approximately 7 km north-northeast of TW3-80) (Matrix Solutions, 2018). With a drawdown in the order of approximately 10.8 m at the Burke Well, pumping from TW3-80 is estimated to be responsible for approximately 0.1 m of the drawdown observed at the Burke Well.

An assessment of the potential cumulative impacts that could be caused by the bottled water takings at the facilities at Aberfoyle was also conducted as part to the Interim Procedural and Technical Guidance Document for Bottled Water Renewals: Permit to Take Water Applications and Hydrogeological Study Requirements (Ontario Ministry of the Environment and Climate Change Operations Division, April 2017). Matrix Solutions (2019) ran modelling scenarios to estimate the potential additional drawdown caused by an increase in the TW3-80 pumping from the current average to the maximum permitted rate. The additional drawdown at the City of Guelph Burke Well was predicted to be less than 0.02 m, well below the 2 m threshold to account for the natural seasonal variability beyond the effects of municipal pumping. As such, the groundwater withdrawal from TW3-80 has been assessed to not significantly interfere with existing municipal uses in the City of Guelph.

Matrix Solutions (2019) also analyzed how water levels would change if pumping was increased and there was a reoccurrence of the period of sustained below average precipitation that was observed in the early to mid-1960s. The analysis showed that the effects of the increased pumping are predicted to be negligible.

3.0 SUMMARY OF 2024 FIELD PROGRAM

This section describes the field activities performed in 2024 associated with PTTW 3133-C5BUH9 for TW3-80.

3.1 Groundwater and Surface Water Monitoring Program

Groundwater and surface water monitoring was initiated in 2000 and has evolved over the years with the objectives to 1) characterize the existing hydrogeologic setting, and 2) document potential long-term changes to

the groundwater and surface water resources in the area. The monitoring program includes measurement and record-keeping of water takings, groundwater levels, mini-piezometer levels, surface water levels, surface water flows and surface water temperatures. The monitoring program for PTTW 3133-C5BUH9 includes the following instrumentation, with the locations shown on Figures 3.1 through 3.3:

- Groundwater levels and pumping volumes in 1 production well;
- Groundwater levels in 43 monitoring wells at 18 sites (16 consisting of multiple monitoring intervals) with monitors in the Lower Bedrock Aquifer, Upper Bedrock Aquifer, and overburden;
- Groundwater levels in 2 private wells;
- Shallow groundwater levels in 8 mini-piezometers with a total of 16 monitors;
- Surface water levels at 5 stations;
- Stream flow at 2 locations; and
- Stream temperature at 6 locations.

3.1.1 Water Taking

Water taking from TW3-80 in 2024 was measured using a Krohne magnetic flow meter wired to an Allen Bradley industrial Programmable Logic Controller. The instantaneous flow and cumulative volume pumped are recorded every minute. The flow meter was calibrated on October 24, 2024 by Endress+Hauser.

The daily volumes taken from supply well TW3-80 in 2024 are provided in Appendix C.

3.1.2 Groundwater Monitoring Program

Groundwater levels have been measured at various locations for varying periods of time on-Site and off-Site since December 1980. Following the purchase of the Site by the Perrier Group of America, a monitoring program was initiated in December 2000. Modifications to the monitoring program have been made over time as a result of PTTW requirements, well abandonments, physical inaccessibility to wells, and changes in property ownership. During the 2024 monitoring period, none of the wells required as part of the monitoring program became inaccessible. All the existing monitoring locations and the decommissioned or unused wells are shown on Figure 3.4.

The monitoring locations for the 2024 groundwater monitoring program are shown on Figures 3.1 and 3.2 and are summarized below.

Overburden Monitors

- MW2D-07, MW2E-07, MW4C-07, MW10A-09, TW1-93, MW-S, PCC-S, PCC-I.

Bedrock Monitors

Upper Bedrock Aquifer Monitors

- MW2C-07, MW4B-07, MW6B-08, MW7B-08, MW8B-08, MW10B-09, MW14B-11, MW14C-11, MW15B-12, MW16B-12, MW17B-12, MW18B-12, MW19-18-7, MW20-19-7, MW21-18-4, MW-D, MW-I, PCC-D, Private Well “Y”.

Lower Bedrock Aquifer Monitors

- TW3-80 (Production Well), TW2-11, MW2A-07, MW2B-07, MW4A-07, MW6A-08, MW7A-08, MW8A-08, MW10C-09, MW10D-09, MW14A-11, MW15A-12, MW16A-12, MW17A-12, MW18A-12, MW19-18-4, MW20-19-5, MW21-18-3, PW5.

Water levels were measured at all locations quarterly under PTTW 3133-C5BUH9. Where required by the PTTW, dataloggers are used to record water levels at 60-minute intervals and downloaded quarterly. The groundwater levels measured in 2024 are presented in Appendix D.

3.1.2.1 Missing Data

The following table provides a list and description of missing data from the 2024 groundwater monitoring. All of the issues were related to transducer failures. Where necessary the transducers have been replaced. The issues were temporary and have been resolved.

Table 2: Missing Groundwater Data from the 2024 Monitoring

Monitoring Location	Missing Data	Comments
MW2A-07	Transducer data for mid-September to start of October	Transducer failure
MW2B-07	Transducer data for late February to late March	Transducer failure
MW19-18-7	Transducer data for start of January to mid-January	Transducer failure
Y Well	Transducer data for late June to end of year	Transducer failure (twice)

3.1.3 Surface Water Monitoring Program

The monitoring locations for the 2024 surface water monitoring program are shown on Figure 3.3 and are summarized below.

Surface Water Levels

Measurement of surface water levels was initiated in December 2001 as part of a monthly monitoring program. In 2024, surface water levels were measured at the following locations:

- Aberfoyle Creek:
  - SW1 - located within the upstream part of the property;
  - SW2 - located within the downstream part of the property; and
  - SW3 - located at Gilmour Road, upstream of the property.
- Mill Creek:
  - SW4 - located on Mill Creek at Maple Leaf Lane, upstream of the confluence with Aberfoyle Creek; and
  - SW5 - located on Mill Creek at McLean Road, downstream of the property.

Water levels are measured at all locations once a month using a water level meter. At SW1 and SW2, dataloggers are used to record water levels at 60-minute intervals, which are also downloaded once a month. The surface water levels for 2024 are presented in Appendix E.

Stream Flow

Measurement of stream flow was initiated in December 2001 as part of a monthly monitoring program. Stream flow is measured at SW1 (upstream part of property) and SW2 (downstream part of property) in Aberfoyle Creek once each month. Despite the proximity of these onsite stations to one another, and the small difference in contributing drainage area between them, stream flows are measured at SW1 and SW2 to monitor for changes that could potentially be attributed to pumping at TW3-80. In 2024, stream flow velocities were measured using a Hach electromagnetic flow meter and the stream flows were calculated using the cross-sectional area-velocity method. The stream flow calculations for 2024 are presented in Appendix F.

In addition to the monthly stream flow measurements, water levels at SW1 and SW2 are logged continuously (hourly). The monthly surface water elevations ("stage") and stream flow measurements ("discharge") collected in 2024 are used to update and/or re-establish the stage-discharge relationships (rating curves) at SW1 and SW2. The rating curves are then used to infer continuous records of stream flow from the continuous water level measurements at SW1 and SW2. It should be noted that since the conditions of the stream channels at SW1 and SW2 change through time, updated rating curves are generally required for each year (note that in 2024 the rating curve for both SW1 and SW2 changed).

Mini-Piezometers

Mini-piezometers were initially installed in 2004 with additional mini-piezometers being installed since that time. In 2024, water levels were measured in mini-piezometers at eight locations, each containing a shallow and a deep monitor (see locations on Figure 3.3). The mini-piezometer nests are located along Aberfoyle Creek upstream of the property to Mill Creek downstream of the confluence of the two creeks as follows.

- MP1-16S/D;
- MP16S/D-08;
- MP6S-08/D-04;
- MP12S/D-04;
- MP14S/D-07;
- MP8S/D-04;
- MP17S/D-11; and
- MP18S/D-11.

Water levels were measured at all locations quarterly under PTTW 3133-C5BUH9. Where required by the PTTW, dataloggers are used to record water levels at 60-minute intervals and downloaded quarterly. The water levels measured in 2024 are presented in Appendix E.

Temperature

Measurement of surface water temperature began in 2005. In 2024, surface water temperature was measured at six locations along Aberfoyle Creek. The most upstream location is situated at Brock Road with the remainder of the sites located on the property downstream of Brock Road. Beginning upstream and moving downstream, the stream temperature sites are as follows (see locations on Figure 3.3).

- ST6-08;
- ST1-05;
- ST2-05;
- ST3-05;
- ST4-05; and
- ST5-05.

The dataloggers are located at the sediment-water interface with temperature data measured and logged at 30-minute intervals using HOBO Tidbit MX dataloggers. Two dataloggers are installed at each site. Air temperature is also measured in a shaded area at ST1-05 at 30-minute intervals.

C. Portt and Associates Ltd. (2011) conducted a review of the appropriateness of the methodology for the temperature monitoring program. The report was approved by the MECP in October 2011 and recommendations from the report were implemented by CRA at that time and continued by WSP (formerly Golder Associates Ltd.) since May 2014. The temperature data are analyzed by C. Portt and Associates using ThermoStat software. A report on the surface water temperature is included as Appendix G.

3.1.3.1 Missing Data

The following table provides a list and description of missing data from the 2024 surface water monitoring. The missing data are technically not missing but rather were affected by winter conditions. The water levels in the mini-piezometers are close to surface and can become frozen in the winter. Slow moving water in the creeks can also become frozen in the winter. The water level is not necessarily representative of the actual water level under these frozen winter conditions. The issues were temporary and have been resolved.

Table 3: Missing Surface Water Data from the 2024 Monitoring

Monitoring Location	Missing Data	Comments
MP14D-07	Frozen	Frozen in March
MP1-16D	Frozen	Frozen in March
SW1	Frozen	Frozen in January

3.1.4 Notification Regarding Locations That Become Inaccessible

None of the monitoring locations required in PTTW 3133-C5BUH9 have become inaccessible or removed from the monitoring program.

3.2 Biological Monitoring

Biological monitoring undertaken on the Aberfoyle property in 2024 was completed in accordance with the requirements of the PTTW for the site and under the guidance of recommendations provided in the 2023 Biological Monitoring Report (Beacon Environmental, 2024). Monitoring of terrestrial resources (vegetation and wildlife) was completed by Beacon Environmental and monitoring of aquatic resources (salmonid redd survey reaches of Aberfoyle Creek) was completed by C. Portt and Associates. The findings of the 2024 Biological Monitoring Program are presented in the 2024 Biological Monitoring Program Report (Beacon Environmental, 2025), which is included in Appendix H.

3.3 Surveying

Surveyed the measuring point at SW4 following the bridge re-construction.

3.4 Precipitation

Precipitation data were obtained from the Grand River Conservation Authority for the Shades Mill Station and are used in this report.

The following table provides a summary of the annual precipitation. The annual 20-year average (2001-2020) precipitation from the Shades Mill Station is 943.7 mm. The total precipitation measured in 2024 was 976.4 mm, which is approximately 3% above the average. This is the close to average annual precipitation and similar to the total precipitation in 2023. Annual precipitation is also shown graphically on Figure 3.5 along with the 20-year average.

Table 4: Annual Precipitation

Year	Precipitation (mm)	% Difference from Average
2001	829.5	-12.1
2002	727.3	-22.9
2003	911.9	-3.4
2004	840.5	-10.9
2005	854.8	-9.4
2006	1180.5	25.1
2007	726.3	-23.0
2008	1200.8	27.2
2009	1011.0	7.1
2010	921.5	-2.4
2011	1023.9	8.5
2012	807.1	-14.5
2013	1108.1	17.4
2014	898.7	-4.8
2015	839.4	-11.1
2016	937.8	-0.6
2017	1091.8	15.7
2018	1048.6	11.1
2019	1058.9	12.2
2020	856.45	-9.2
2021	1022.8	8.4
2022	682.3	-27.7
2023	987.8	4.7
2024	976.4	3.5

Year	Precipitation (mm)	% Difference from Average
Average (2001-2020)	943.7	

The monthly precipitation for 2024 is included in Table 5. Above average precipitation occurred during most of the year with the exception of below average precipitation in February and three consecutive months from September through November.

Table 5: Monthly Precipitation 2024

Month	Precipitation (mm)	Average from 2001-2020 (mm)	% Difference from Average
January	118.0	71.4	65.3
February	26.9	63.3	-57.5
March	71.4	64.6	10.5
April	116.4	81.0	43.7
May	99.7	81.4	22.5
June	81.8	82.2	-0.5
July	153.3	95.3	60.9
August	104.3	77.4	34.7
September	28.8	81.6	-64.7
October	35.2	93.2	-62.2
November	53.1	75.8	-29.9
December	87.5	76.5	14.4

It is recognized that there are differences between the amounts of precipitation recorded at the different stations. It is impossible to obtain a perfectly representative estimate of the annual precipitation over the full extent of the area of contribution for the Aberfoyle well. What is most important is that adopting a consistent approach from year to year allows an assessment of the differences with respect to long-term average conditions. An analysis of precipitation trends was conducted to see if there is a correlation with water level trends. We note that the actual influence on water levels (groundwater) would be due to recharge and not total precipitation, and that recharge is controlled by more than just precipitation. However, in the absence of detailed recharge data in the area, the use of precipitation totals allows for some comparison of long-term trends in water levels, particularly in the shallow monitors (overburden and mini piezometers).

An independent soil water balance analysis has been conducted by S.S. Papadopulos & Associates to estimate annual average rates of potential recharge over the region surrounding TW3-80. The SWB code of the United States Geological Survey was applied (Westenbroek et al., 2010) with the records of precipitation data compiled since 2008. The results of the analysis suggested that the annual average potential recharge is about 17% of the annual precipitation.

4.0 MONITORING PROGRAM RESULTS

4.1 Water Taking for TW3-80

Water taking at the Aberfoyle Site in 2024 continues to be governed by PTTW 3133-C5BUH9, which permits water to be taken from one well as outlined in Table 6.

Table 6: Permitted Water Takings at Aberfoyle

Source	Maximum Rate	Maximum Number of Hours of Water Taking per Day	Maximum Daily Water Taking	Maximum Number of Days of Water Taking per Year
TW3-80	2,500 L/min	24	3,600,000 L	365

The daily water takings for 2024 are tabulated in Table C1 in Appendix C. The daily water taking at TW3-80 ranged from 175,283 L to 3,242,259 L; the latter is 90% of the permitted taking. The average daily taking was 1,674,026 L. During 2024, the instantaneous flow rates and the daily takings were always below the limits of the PTTW (i.e., less than 2,500 L/min and 3,600,000 L, respectively).

The total volume of water taken each year from 2001 to 2024 is presented on Figure 4.1. The total volume of water taken in 2024 from TW3-80 was 612,693,646 L. In 2024, the total volume taken was approximately 47% of the permitted volume. The total pumping from TW3-80 in 2024 was less than the total annual water taking in 2022 and 2023 and within the historical range that has been taken from the well. Since 2002, the groundwater taking has ranged from approximately 43% to 67% of the permitted taking.

The monthly water takings for the past 5 years are presented on Figure 4.2. The monthly water takings in 2024 from TW3-80 ranged from 35,567,823 L in October to 64,904,554 L in June. In 2024, the monthly water takings generally increased during the first half of the year (from January to June with the exception of April), with the peak water taking in June, and then were lower during the last five months of the year (August to December).

The Grand River Low Water Response Team declared a Level 1 Low Water Condition for the entire Grand River Watershed, including Mill Creek, on December 20, 2023 which remained in effect until it was removed on January 31, 2024. Blue Triton committed to limit water takings to 90% of their monthly maximum permitted volume during the Level 1 Condition. The monthly water takings in January were 48.3% of the permitted monthly amount. In addition, as per Condition 3.3, the Low Water Response Program was implemented, which included an increase in monitoring and review of data from MW2-07 from quarterly to monthly.

Condition 4.8 of the PTTW requires details of the bottling operations such as location and name of facilities where water is delivered in bulk containers, if bulk water is containerized at the receiving location, the size of the containers into which the water is transferred, and total volume of water transported in bulk to each remote facility. Blue Triton has indicated that no water was shipped in bulk (container greater than 20 litres) in 2024.

As per Condition 5.1, Blue Triton has indicated that no complaints arising from the taking of water authorized under this PTTW were received in 2024.

4.2 Groundwater Monitoring Program

The groundwater levels measured manually in 2024 at the monitoring wells are tabulated in Table D1 in Appendix D. Hydrographs with the manual or transducer water level data are also included in Appendix D. In addition to the water levels, the hydrographs include the daily pumping volumes at TW3-80 and daily precipitation as recorded at the Shades Mill meteorological station. It should be noted that two short-term (7-day) aquifer tests were

conducted in the previous year (2023) to gain a better understanding of the aquifer; one at TW2-11 at the Aberfoyle Plant property from October 17 to 24, 2023 and one at TW1-10 at the Gilmour Road property from November 1 to 8, 2023. The influence on locally surrounding monitoring wells from pumping these wells is evident on some of the hydrographs, however, an analysis of the data or comment on these responses is not included in this annual monitoring report.

4.2.1 TW3-80

Water levels and average daily pumping rates for TW3-80, along with daily precipitation, from 2020 through 2024 are shown on Figure D1a (Appendix D).

Water levels measured in 2024 at TW3-80 range from approximately 300.7 to 313.3 masl (or approximately 15.7 to 3.1 m below ground surface) under pumping and non-pumping conditions, respectively. These variations in water levels are mainly due to changes in the pumping rate and are within the historical ranges of water levels observed at TW3-80. Previous analysis of monthly average water levels at TW3-80 versus average pumping at TW3-80 indicates that the pumping rate accounts for approximately 89% of the variation in water levels in TW3-80.

Operation records of TW3-80 indicate that the well is seldom shut-down for significant periods of time and, consequently, there are few fully recovered non-pumping water levels available. Based on previous shutdowns, CRA (2014) indicates that the non-pumping water levels are approximately 311 to 313 masl or 5.4 to 3.4 m below ground surface. The estimated non-pumping water levels (partially recovered conditions following shutdown of the pump) measured in 2024 range from approximately 308 to 313 masl. The non-pumping water levels have been similar over the past seven years (2018 through 2024) and higher than the previous three years (2015 through 2017) when the water takings were higher. It should be noted that non-pumping water levels do not represent “true” conditions that would be observed if there was no pumping at TW3-80 for an extended period. Instead, they represent partially recovered conditions, with the amount of recovery dependent on the average pumping rate before the pumping stopped, how much time has elapsed before pumping resumes and whether there is a background (seasonal) trend in the water levels. Previous analyses suggest that the fully recovered non-pumping level in TW3-80 is about 313 m.

The pumping water levels in 2024 range from approximately 301 to 309 masl. Based on a static water level of 313 masl, the estimated drawdown at the well in 2024 ranged from approximately 4 to 12 m. The total available drawdown to the top of the pump intake is about 20.7 m (based on a static water elevation of 313 masl and a top of pump intake elevation of 292.3 masl). Referring to Figure 1.2, the top of the Lower Bedrock Aquifer is at an elevation of approximately 292.3 masl. The pumping levels in 2024 ranged from about 9 to 17 m above the top of the aquifer; confirming that the aquifer remained under confined conditions throughout 2024.

The records of average monthly water levels, monthly withdrawals and monthly precipitation between 2006 and 2024 are shown on the hydrograph for TW3-80 (Figure D1b). The hydrograph extends back to 2006 to include the period of increased pumping up to 2008. The data provide important insights into the performance of the well and the long-term sustainability of pumping. The water levels and pumping volumes can be categorized into five periods with a year of transition between each period as follows: 2006 through 2007 when pumping rates were higher and water levels were lower; 2009 through 2013 when pumping rates were lower and water levels were higher; 2015 through 2017, when pumping rates were higher and water levels were lower; 2019 through 2021, when pumping rates have been lower and water levels higher; and 2022 through 2024, when the pumping and trends are similar to the transition years (e.g., 2014 and 2018). In general, the water level changes in TW3-80 correspond to the changes in the overall water taking from the well (i.e., lower water levels during periods of

higher water takings (e.g., 2007) and higher water levels during periods of lower water takings (e.g., 2011)). Overall, the water levels respond to pumping as expected and the on-going groundwater taking at TW3-80 has not led to a long-term declining trend in the TW3-80 water levels. The capacity of the well has not changed through time.

4.2.2 Lower Bedrock Aquifer

The regional groundwater potentiometric surface in the Lower Bedrock Aquifer is shown on Figure 4.3. The potentiometric surface was prepared based on the water levels measured on June 22, 2024. This represents a time when the highest monthly pumping volumes were recorded at TW3-80 and monthly precipitation was about average. A review of the potentiometric surface on June 22, 2024, indicates groundwater flow toward TW3-80 from the northeast, north and northwest. The greater hydraulic connection with the area toward MW7-08 is evident in the potentiometric surface under pumping conditions. It is estimated that the water elevation contours return to the regional mean southerly flow pattern approximately 1.5 km south of the Site.

Hydrographs for wells completed in the Lower Bedrock Aquifer are included on Figures D2 through D17 in Appendix D.

The findings from a review of the hydrographs of wells completed in the Lower Bedrock Aquifer are summarized below.

- Water levels measured within this aquifer in 2024 are generally similar to the water levels measured since mid-2018 (lower water levels were observed during the second half of 2022 and into the beginning of 2023 due to the lack of recharge during most of 2022). In 2024 the water levels decreased through the winter and spring, increased through the summer and then declined through the fall. This trend in water levels follows the inverse trend in the volume pumped from TW3-80 indicating the strong correlation between pumping and water levels in the Lower Bedrock Aquifer;
- Water levels in portions of the Lower Bedrock Aquifer near TW3-80 are influenced by short-term fluctuations in TW3-80 pumping. The short-term pumping effects are evident with the water levels fluctuating in response to daily changes in pumping rates and are observed in monitoring wells closest to TW3-80 (e.g., MW2A-07 and MW4A-07). In comparison, wells located further away (upgradient – MW6A-08, MW8A-08, MW10C-09 and MW10D-09; downgradient – MW15A-12, MW16A-12 and MW17A-12) show only minor differences between the daily high and low water levels;
- Water levels in the Lower Bedrock Aquifer are also influenced by longer term trends in the TW3-80 pumping. The long-term pumping effects are evident in the wells closer to TW3-80 where water level changes from year to year correlate with overall annual water takings (i.e., increased annual water takings result in lower average water levels). During periods of reduced pumping, the water levels recover with no long-term increasing or decreasing trends. These effects of variations in total annual pumping decrease with distance from TW3-80, as can be seen by comparing the hydrographs for MW2A-07 against hydrographs for wells further from TW3-80 (e.g., MW8A-08);
- As in previous years there appears to be a stronger hydraulic connection with TW3-80 at MW7A-08 (located approximately 1,050 m north of TW3-80) compared to the connection between TW3-80 and MW14A-11 (located approximately 750 m northwest of TW3-80) and TW3-80 and MW18A-12 (located approximately 750 m southwest of TW3-80). The response at MW7A-08 suggests that the zone of influence extends further upgradient toward MW7-08, as opposed to downgradient toward MW18-12. This interpreted hydraulic connection is consistent with previous years; and

- These trends are less evident at MW10C/D-09 (located approximately 1,230 m north east of TW3-80) and at MW16A-12 (located approximately 1,650 m south of TW3-80), where less fluctuation during the year is evident. This is consistent with previous years and indicates that these wells are on the periphery of the zone of influence. The water levels at MW8A-08 did not show an increasing or decreasing trend during the year with water levels fluctuating less than 1 m. The water levels at MW10C/D-09 (and also MW6A-08) decreased during the entire year. Water levels in these wells have been following this trend since the end of 2023 immediately following a rise in water levels at the end of an aquifer test on the Gilmour Property. The water levels at these wells are still returning to background conditions.

In summary, the water levels in the onsite monitoring wells in the Lower Bedrock Aquifer are influenced primarily by pumping at TW3-80. The effects of pumping at TW3-80 diminish with distance from the well, and beyond about a kilometre water levels are predominantly affected by other influences. In addition, water levels recover when pumping rates are reduced, as was observed in the second half of 2024 and decrease when pumping rates are increased, as was observed during the first half of 2024. No long-term trends in the water levels due to pumping TW3-80 have been observed over the last five years.

4.2.3 Middle Bedrock Aquitard

Hydrographs for wells completed in the Middle Bedrock Aquitard are included on Figure D18 in Appendix D. One well is monitored within this unit (MW2B-07), which is sealed within the Middle Bedrock Aquitard but close to the top of the Lower Bedrock Aquifer.

The results of a review of the hydrograph of MW2B-07 completed in the Middle Bedrock Aquitard are summarized below:

- Water levels measured within this aquitard in 2024 are similar to the water levels measured since mid-2022 and lower than the water levels observed during the previous three years (2019 through 2021) reflecting the slight differences in overall pumping during the year. The water levels are within the historical ranges measured at this well; and
- The water levels in MW2B-07 follow a similar trend as the water levels in the Lower Bedrock Aquifer from year to year and respond to pumping at TW3-80. However, the response to pumping is less compared to the response in the lower bedrock aquifer. This is consistent with the interpretation that the bottom of the screen is only 2 m above the contact between the Middle Bedrock Aquitard and the Lower Bedrock Aquifer.

4.2.4 Upper Bedrock Aquifer

The regional groundwater potentiometric surface in the Upper Bedrock Aquifer is shown on Figure 4.4. The potentiometric surface was prepared based on the water levels measured on June 22, 2024. This represents a time when the highest monthly pumping volumes were recorded at TW3-80 and monthly precipitation was about average. A review of the potentiometric surface on June 22, 2024, indicates groundwater flow toward TW3-80 from the northeast, north and northwest. The greater hydraulic connection with the area toward MW7-08 is evident in the potentiometric surface under pumping conditions.

Hydrographs for wells completed in the Upper Bedrock Aquifer are included on Figures D19 through D31 in Appendix D.

The findings from a review of the hydrographs of wells completed in the Upper Bedrock Aquifer are summarized below:

- Water levels measured in the Upper Bedrock Aquifer are within the historical ranges measured at the wells and similar or higher than those observed in 2023 when the annual pumping and precipitation were similar following a year (2022) of below average precipitation. Following the below average precipitation that occurred for most of 2022, the water levels in the Upper Bedrock Aquifer have increased. During 2024, the water levels increased through the first few months and then stabilized before a spike in water levels in July following above average precipitation. Following the spike in water levels, the water levels declined to the end of the year with some water levels stabilizing at the end of the year. At some wells the timing of the increases or decreases is delayed but the overall trends are similar with the exception of some of the wells that are closer to TW3-80 (MW2C-07) or more influenced by pumping at TW3-80 (MW7B-08, MW20-19-7) where a decline in water levels during the spring (prior to the spike in July) was observed;
- Water levels in the Upper Bedrock Aquifer around the Site show some effects of pumping at TW3-80 (i.e., there is hydraulic connection between the Lower Bedrock and Upper Bedrock Aquifers); however, the connection is limited (i.e., less response than in the Lower Bedrock Aquifer). The extent of influence varies based on distance from TW3-80 and existing hydrogeologic conditions (i.e., complexity in the subsurface geologic structure and properties);
- Typically, wells further away from TW3-80 show less effect from pumping, although this is not always the case. The greatest influence from pumping is observed at MW2C-07 and MW7B-08. There appears to be a stronger hydraulic connection between TW3-80 and MW7B-08 (located approximately 1,050 m north of TW3-80) compared to the connection between TW3-80 and MW4B-07 (located approximately 330 m northwest of TW3-80). This is also consistent with previous years and points to complexity in the subsurface;
- While there is an influence on water levels in the Upper Bedrock Aquifer from pumping TW3-80, there are also long-term water level fluctuations that are reflective of variations in recharge (i.e., lower water levels during years of below average precipitation (such as 2022) and higher water levels during years of above average precipitation); and
- There are also seasonal influences observed in the water levels in the Upper Bedrock Aquifer. For example, melt events and significant precipitation events influence the water levels in the Upper Bedrock Aquifer. Recharge to the aquifer has more of an effect than pumping during these events (i.e., the changes in water level are more reflective of the wet spring/dry summer and fall compared to the total pumping). This was evident with the rise in water levels occurring in July when above average precipitation was recorded (typically during a time when water levels are declining). This is also evident at during the second half of the year when water levels were declining during a time of decreased precipitation, even though pumping from TW3-80 was also decreasing.

In summary, the water levels in the onsite monitoring wells in the Upper Bedrock Aquifer are influenced by pumping at TW3-80 but to a lesser degree than water levels in the Lower Bedrock Aquifer due to a lower permeability bedrock layer that exists between the two aquifers. There is also an influence on water levels reflective of trends in recharge. This is reflected in 2024 by the decrease in water levels during a time of below average precipitation during the second half of the year. The long-term monitoring data, which show that water levels recover when pumping rates are reduced, are consistent with the interpretation that the water taking is sustainable.

4.2.5 Overburden

The potentiometric surface of the overburden plotted in Figure 4.5 is also based on water levels measured on June 22, 2024. This represents a time when the highest monthly pumping volumes were recorded at TW3-80 and

monthly precipitation was about average. A review of the potentiometric surface on June 22, 2024, indicates that groundwater flow is generally in a southerly direction with potentially some flow towards Aberfoyle Creek. We note that there is both lateral and vertical flow in the overburden. An interpretation of the lateral flow in the overburden is shown in Figure 4.5, while vertical gradients in the shallow overburden along the creek are discussed below. Shallow groundwater flow directions are more variable locally than the deeper bedrock flow systems as they are more influenced by topography and interactions with surface features.

Hydrographs for wells completed in the overburden are included on Figures D32 through D36 in Appendix D. The intermediate and deep overburden wells are installed in the till, in sand and gravel within or below the till, or deep within the surficial sand and gravel aquifer. Shallow overburden wells are typically installed in the upper portion of the surficial sand gravel.

Findings from a review of the hydrographs of wells completed in the overburden are summarized below:

- Similar to the water levels in the Upper Bedrock Aquifer, the water levels in the overburden increased through the winter, but then generally declined from the spring to the end of the year with the exception of the spike in July. Some of the water levels stabilized at the end of the year (with the exception of MW4C-07 which continued to decrease to the end of the year);
- Water levels in the overburden were similar or slightly higher compared to the water levels observed in 2023 and higher compared to the lower water levels observed during the second half of 2022 due to the below average precipitation. Water levels in 2024 were within the ranges of water levels observed at the wells with some higher water levels observed during the above average precipitation in July; and
- Water levels in the overburden are affected by natural factors (recharge), and to a lesser degree by pumping at TW3-80. The response to pumping in the overburden is muted compared to the response in Upper and Lower Bedrock Aquifers but for monitoring wells immediately adjacent to TW3-80 there is a correlation with long-term variations in pumping.

In summary, the water levels in the overburden are influenced by weather events and to a lesser degree, pumping at TW3-80. The influence of pumping on water levels in the overburden is less than the influence of pumping on water levels in both the Upper and Lower Bedrock Aquifers. There are no long-term declining trends in the overburden water levels. The fact that water levels recover when pumping rates are reduced and there are no long-term declining trends is a line of evidence that the water taking is sustainable.

4.2.6 Vertical Gradients

Vertical gradients between the Lower Bedrock Aquifer and the Upper Bedrock Aquifer are plotted on Figures D37 through D50 in Appendix D; the gradients are inferred from multi-level monitoring wells completed in both units.

Note that a positive gradient is calculated when the water level in the upper aquifer exceeds the level in the lower aquifer. Under these conditions, the mean direction of vertical groundwater flow is downwards.

In general, based on a review of the graphs for the multi-level monitoring well locations, a dampened response in the Upper Bedrock Aquifer relative to the response in the Lower Bedrock Aquifer is evident. At locations where the positive gradient increases when pumping increases, this is due to the fact that water levels in the Lower Bedrock Aquifer respond more to pumping than do the water levels in the Upper Bedrock Aquifer.

A description of the gradients at the Site is as follows:

- MW2A/C-07 – positive gradient (potential downward flow) that increases with increased pumping. There are brief periods in 2024 and other years when the gradient is reversed, coinciding with reduced pumping. Seasonal changes in vertical gradient are evident and correspond to the seasonal changes in pumping (i.e., higher pumping during the summer months – or spring in 2024). Daily changes in the vertical gradient are greater than at wells further away from TW3-80;
- MW4A/C-07 – positive gradient (potential downward flow) that increases with increased pumping. The seasonal changes in vertical gradient are also evident and similar to those observed at MW2-07. The daily changes in the vertical gradient are less than at MW2-07;
- MW6A/B-08 – positive gradient (potential downward flow) that has been relatively consistent over the previous four years but has decreased (less potential downward flow) since the end of 2023 following the aquifer test at the Gilmour Road property. The overall trend has correlated with the annual volume pumped from TW3-80 in previous years but less so in 2024 as the water levels return to background conditions;
- MW7A/B-08 – positive gradient (potential downward flow) that increases with increased pumping. There is a daily fluctuation in the positive gradient that relates to the daily pumping at TW3-80. Seasonal changes in vertical gradient are evident and correspond to the seasonal changes in pumping (i.e., higher pumping during the summer months – or spring in 2024);
- MW8A/B-08 – negative gradient (potential upward flow) that reverses to a positive gradient (potential downward flow) mainly when pumping from TW3-80 is higher. The gradient has been relatively consistent over the past five years with the overall trend correlating with the annual volume pumped from TW3-80;
- MW10B/C-09 – positive gradient (potential downward flow) that does not change with seasonal pumping fluctuations. The gradient has been relatively consistent over the previous four years but has decreased (less potential downward flow) since the end of 2023 following the aquifer test at the Gilmour Road property;
- MW14A/C-11 – positive gradient (potential downward flow) that increases with increased pumping and correlates with the long-term pumping trend. Seasonal changes in vertical gradient are also evident and correspond to the seasonal changes in pumping;
- MW15A/B-12 – negative gradient (potential upward flow) that does not change with increased pumping. The gradient has been similar over the past three years and slightly less than 2020 and 2021 showing some correlation with the long-term pumping trend at TW3-80;
- MW16A/B-12 – positive gradient (potential downward flow) with minor changes related to seasonal changes in pumping;
- MW17A/B-12 – positive gradient (potential downward flow) that reverses to a negative gradient (potential upward flow) during times of decreased pumping. Seasonal changes in vertical gradient are also evident and correspond to the seasonal changes in pumping;
- MW18A/B-12 – negative gradient (potential upward flow) that reverses to a positive gradient (potential downward flow) during times of increased pumping. Seasonal changes in vertical gradient are also evident and correspond to the seasonal changes in pumping;
- MW19-18-4/7 – positive gradient (potential downward flow) with minor change related to seasonal changes in pumping. There has also been a correlation with the vertical gradient and the pumping over the past four years (since monitoring began) that correlates with the long-term pumping trend at TW3-80;

- MW20-19-5/7 – positive gradient (potential downward flow) that increases with increased pumping. Seasonal changes in vertical gradient are also evident and correspond to the seasonal changes in pumping. There has also been a correlation with the vertical gradient and the pumping over the past four years (since monitoring began) that correlates with the long-term pumping trend at TW3-80; and
- MW21-18-3/4 – positive gradient (potential downward flow) that increases with increased pumping. Seasonal changes in vertical gradient are also evident and correspond to the seasonal changes in pumping.

Most of the area around TW3-80 is characterized by positive gradients (downward flow) in the bedrock. A negative gradient (upward flow) is present at wells further away from TW3-80 (i.e., at MW15-12 to the west and MW8-08 to the north). Over the past five years, a negative gradient (upward flow) is also present at MW2-07 (close to TW3-80), and MW17-12 and MW18-12 (to the south) when pumping at TW3-80 has been lower.

4.3 Surface Water Monitoring Program

The surface water monitoring program includes measurement of mini-piezometer and surface water levels, surface water flows and surface water temperatures. The surface water levels measured in 2024 are presented in Appendix E along with hydrographs of the water levels. Surface water flows are tabulated and graphed in Appendix F. The hydrographs also include the daily pumping volumes at TW3-80 and daily precipitation as recorded at the Shades Mill meteorological stations. Surface water temperatures are discussed in Section 4.3.4 and Appendix G.

4.3.1 Mini-Piezometer Water Levels

Hydrographs for the mini-piezometer locations are presented on Figures E1 through E8 in Appendix E with the “a” figures including data for the last 5 years (2020 through 2024) and the “b” figures including data for 2024 only.

The findings from a review of the hydrographs for the mini-piezometers are summarized below.

- A mini-piezometer nest (MP1-16) was installed in Aberfoyle Creek at the Gilmour Road property in April 2016 to monitor background conditions upstream of the Site. For the 2024 analysis, MP1-16 is considered to represent background conditions. The variation in water levels at MP1-16 over 2024 was approximately 0.62 m in the deep piezometer and 0.76 m in the shallow piezometer with spikes related to precipitation and/or snowmelt events. The water levels in MP1-16S have been similar over the past five years compared to the water levels in MP1-16D which were the lowest in 2022 (during drought conditions) and have remained similar in 2023 and 2024. In 2024 the water levels rose to mid-April and then declined to the start of September and were relatively stable to the end of the year (with the exception of some spikes due to precipitation events). There was also a significant spike in the water levels at the beginning of July due to above average precipitation. These changes in water level are influenced by natural seasonal patterns. The potential for vertical flow at the MP1-16 nest is consistently upwards in 2024, similar to previous years (i.e., as shown in Figure E1a/b, water levels in MP1-16D exceed those in MP1-16S);
- There are five mini-piezometer nests situated on the Aberfoyle property (MP16, MP6, MP12, MP14, MP8) and two located downstream of the confluence of Aberfoyle Creek and Mill Creek (MP17, MP18). These mini-piezometer nests, located upgradient and downgradient of TW3-80, showed fluctuations of approximately 0.4 m to 1.0 m during 2024. The trends in water levels at the mini-piezometers were similar to those observed at MP1-16 (but to a lesser extent at MP16-08, MP6-04/08, MP12-04 and MP14-07 located downstream of Mill Pond). The similarity in water level fluctuations indicates that changes in water levels correspond more with natural events rather than changes in pumping in TW3-80 and are mainly due to precipitation, snow melt and evaporation;

- Water levels measured in the mini-piezometers in 2024 are within the historical ranges;
- The water levels have generally increased in the spring, declined through the summer, and then increased in the fall or remain stable; and
- In addition to the seasonal trends, short-term changes (“spikes”) in water level in the shallow groundwater reflect the influence of precipitation.

Shallow gradients observed in the mini-piezometers are shown on Figures E9 through E11 in Appendix E with the “a” figures including data for the last 5 years (2020 through 2024) and the “b” figures including data for 2024 only. Beginning upstream and moving downstream, the vertical gradients are as follows:

- MP1-16 – strong negative gradient (potential upward flow) in 2024 and over the past five years. The gradient reduced slightly during the second half of the year in relation to the below average precipitation during that time. The short-term decreases in the negative gradient are caused by rapidly rising surface water elevations following precipitation events;
- MP16 – no gradient measured in 2024 which is consistent with the previous five years;
- MP6 – weak negative gradient (potential upward flow) in 2024. There is typically a weak negative gradient that occasionally reverses to a weak positive gradient (potential downward flow) in the summer, however that was not observed possibly due to the above average precipitation in July. The gradient has been similar over the past five years;
- MP12 – weak negative gradient (potential upward flow) in 2024 with one reversal at the end of February. The gradient is mostly negative with the exception of late 2022 and early 2023 following the below average precipitation in 2022;
- MP14 – strong negative gradient (potential upward flow) in 2024 that was reduced slightly in September. Historically the gradient is reduced during the summer but generally remains negative, which is what was also reflected in 2024;
- MP8 – weak negative gradient (potential upward flow) that decreased during the second half of the year. Historically there has been a weak negative gradient (potential upward flow) at this location; and
- MP17 and MP18 – near neutral gradient that switched between a weak positive gradient (potential downward flow) and a weak negative gradient (potential upward flow) during the year.

The water levels in the mini-piezometers on June 22, 2024 are plotted on Figure 4.6 which represents a time when the highest monthly pumping volumes were recorded at TW3-80 and monthly precipitation was about average. Review of the water levels on June 22, 2024 indicates that there is a strong negative gradient (potential upward flow) at MP1-16 located upstream of Aberfoyle Mill Pond. There is essentially no gradient at the two piezometers (MP16, MP6) upgradient of TW3-80 (and immediately downgradient of Mill Pond) and then a slight negative gradient at MP12 and a strong negative gradient at MP14 moving downstream, near the middle of the property. Further downstream before the confluence with Mill Creek, there is a weak negative gradient at MP8 and then after the confluence, a weak negative gradient at MP17 and MP18. These gradients are similar to those observed in the past.

4.3.2 Surface Water Levels

Hydrographs for the surface water level monitoring locations are included on Figures E12 through E16 in Appendix E with the “a” figures including data for the last 5 years (2020 through 2024) and the “b” figures including data only for 2024.

A review of the hydrographs for the surface water level monitoring locations indicates the following:

- Surface water levels in the creeks fluctuate in response to precipitation, snow melt and evapotranspiration with no measurable effects from pumping at the current rates;
- In general, surface water levels have been higher in the winter/spring and lower in the summer and then have increased slightly into the fall. The trends were similar in 2024, however, the trend was interrupted by a spike in the water levels in July due to above average precipitation. In general, surface water levels at the off-Site stations (manual measurements at SW3, SW4 and SW5) were similar throughout the year with the spike in July observed at SW3 and SW5 (SW4 destroyed during the summer). In general, surface water levels at the on-Site stations (transducer data at SW1 and SW2) showed a similar trend to the water levels in the off-site wells but in more detail including spikes in water levels during precipitation events; and
- The water levels in 2024 were within the historical ranges recorded at the sites.

The water levels at the surface water stations on June 22, 2024 (June 20, 2024 for SW3, SW4 and SW5) are included on Figure 4.6, which represents a time when the highest monthly pumping volumes were recorded at TW3-80 and monthly precipitation was about average. Review of the water levels on June 20 and 22, 2024 indicates that surface water features varied in elevation from approximately 317.39 masl at SW3 to 307.41 masl at SW5 with surface water levels across the Site ranging from 311.57 masl (SW1) to 310.47 masl (SW2).

It is important to note that the stream flow provides a more reliable data set for investigating the potential impacts of pumping compared to an analysis of stream water levels, which can be affected by channel geometry. An analysis of stream flow is presented in the following section.

4.3.3 Surface Water Flow

The monthly stream flow data collected in 2024 are summarized in Appendix F. Stream flow has been measured at SW1 and SW2 since December 2001. SW1 is located along Aberfoyle Creek near the upstream part of the property while SW2 is located along Aberfoyle Creek near the downstream part of the property.

Stage-discharge curves are developed for SW1 and SW2 which show the relationship between surface water elevation (stage) and stream flow (discharge). The stage-discharge relationship was used to convert the continuous measurements of stream stages to stream flows. Due to changing stream conditions, individual stage-discharge curves sometimes need to be created for individual years or a series of years. This is done because a review of the discrete flow and water level measurement results indicates that the hydraulic controls at the gauging stations have changed subtly. In 2024, the stage-discharge curves were reviewed/updated at both stations which resulted in a modification to the curve for SW1 and SW2. The stream geometry appears to have changed slightly at SW1 and SW2 resulting in the need for new stage-discharge curves. These stage-discharge curves were developed to represent continuous flows in 2024 at SW1 and SW2. The new curves for SW1 and SW2 provide a better fit to the 2024 data. Stage-discharge curves were developed by estimating the level at which zero flow would occur (i.e., y0) at each station. This was estimated using the available low-flow measurements collected over the monitoring period. Historical data were included for comparison and to include measured data over a larger range of stream discharge conditions. Power functions were used to develop a best

fit curve for the measured data at each station. Data outliers were evaluated with a lower confidence due to suspected winter conditions or measurement error. The updated stage-discharge curves for SW1 and SW2 are presented on Figures F1 and F2, respectively. Flow data from previous years were estimated using historic stage-discharge curves that best fit the monitoring data collected during those years (as presented in previous reports).

Graphs of estimated stream flow at SW1 and SW2, along with pumping rates and precipitation, are presented on Figure F3 in Appendix F with the “a” figure including data for the last 5 years (2020 through 2024) and the “b” figure including data for 2024. The updated stage-discharge relationship was used to estimate stream flow from the continuous water level elevation data in 2024. It should be noted that historically there are a few occasions when flow was estimated at SW1 and SW2 for stream elevations outside of the observed stage-discharge curve relationship (typically flows do not exceed approximately 1,200 L/s).

Review of the flow data indicates the following:

- In 2024, stream flow measured in the field (during monthly monitoring) at SW1 ranged from 36 L/s (September) to 609 L/s (July) and at SW2 stream flow ranged from 42 L/s (September) to 929 L/s (July);
- The trends in surface water flow at SW1 and SW2 over the year are similar. This is consistent with previous years and as expected over the ~900 m reach of creek;
- In 2024, stream flow was higher in the spring following precipitation and melt events and then was lower through the summer before increasing in the fall. Stream flow increased in July during a time of above average precipitation;
- In 2024, the calculated flows, using the rating curves, indicate that flow at SW1 and SW2 are similar. It should be noted that the contributing drainage area between SW1 and SW2 is small in comparison to the total drainage area upstream of the site. This means that the expected increase in flow based on increase in drainage area will also be small and that stream flows at SW1 and SW2 will be similar and differences are likely to be within the margin of error for flow measurements in natural open channels; and
- Apparent flow is sometimes slightly lower at SW2 compared to SW1. This can sometimes be due to manual flow measurement accuracy or changed hydraulic controls. With respect to stream conditions, the channel cross section at SW1 is relatively stable from year to year and has a silty bed composition. This type of channel is less prone to underestimating flow due to irregularities. In contrast, the channel cross section at SW2 is wide, very shallow during low flow, has a cobbly substrate and the bed is mobile, often changing from year to year. The presence of large cobbles in the bed at SW2 introduces flow irregularities that cause additional error to flow measurements, especially at low flow conditions. In addition, flow through the coarse substrate, known as gauge underflow, is likely occurring at SW2. The magnitude of gauge underflow and the error it introduces cannot be measured using standard stream flow measurement techniques, but the relative error is larger for shallow depths of flow (when the flow above the bed is small) and less significant for deeper flows (when the flow above the bed is large). For this reason, discrete measurements can significantly underestimate the flow at SW2 during low water conditions.

There have been no significant effects observed on Aberfoyle Creek adjacent to the site since 2008 (when continuous monitoring began), which included ten Low Water Advisories over that time.

It was noted in CRA (2014) that pumping tests conducted in 2004, 2007, and 2010 indicated that surface water flow at SW1 and SW2 was not measurably affected by pumping. The on-going monitoring confirms this

conclusion and shows that the stream flows are influenced primarily by precipitation events and fluctuate seasonally.

4.3.4 Surface Water Temperature

Surface water temperature was monitored at six stations across the property.

The average daily water and air temperature data for 2020 through 2024 are shown on Figure G1a and for 2024 on Figure G1b. Review of the data indicates the following:

- The seasonal trend in stream temperature levels in 2024 is similar to previous years;
- Average daily ambient air temperature ranged from -12.3ºC (2.4ºC warmer than 2023) to 24.8ºC (1.2ºC warmer than 2023) in 2024;
- Average daily surface water temperature ranged from 0.5ºC to 27.6ºC at the upstream end of the property (ST6-08) and from -0.1ºC to 25.3ºC at the downstream end of the property (ST5-05). Surface water temperatures decrease, across the Site, moving downstream; and
- Air temperature significantly influences stream temperature as seen by the strong correlation between the two. The correlation is not evident during the winter months when air temperature typically drops below 0ºC and surface water temperature remains relatively constant around 0ºC.

The surface water temperature data were provided to C. Portt and Associates, and the results were incorporated in their report, which is also included in Appendix G.

The mill pond on Aberfoyle Creek has a major influence on the temperature of the creek and its fish community. During the summer, the water in the mill pond, upstream from Brock Road, becomes warm and, as a consequence, the creek is warm through the property. In the C. Portt and Associates report it is concluded that:

> In 2024, mean summer (June – August) air temperature was fifth highest among those observed during the period 2007 – 2024. The overall pattern of water temperature suitability for the fish species found in the Aberfoyle Branch of Mill Creek from Brock Road downstream through the Blue Triton property in 2024 are consistent with previous years. Water temperatures during the June 1 – August 31 period are usually too warm for coldwater species such as brook trout and brown trout and too cold for warmwater species such as largemouth bass. The water temperatures during this period are most favorable for species such as common shiner which have intermediate thermal requirements. During the summer, the water in the mill pond upstream from Brock Road becomes warm and, although the creek temperature decreases with distance downstream, it frequently exceeds the ultimate upper incipient lethal temperature for brook trout and brown trout at the furthest downstream temperature monitoring site.
>
> The 2024 stream temperatures were lower than predicted from the mean water temperature versus mean air temperature regression at all six sites. The cause of the lower stream temperature in 2024 is unknown.

4.4 Biological Monitoring Program

In the 2024 Biological Monitoring Program Report for the Aberfoyle property (Beacon Environmental, 2025) it is concluded that:

In summary, the findings suggest that there have been minor changes to the various terrestrial and aquatic parameters being monitored on the subject property, though these changes are generally within the range expected and attributable to natural variation and succession. The subject property continues to support high quality terrestrial and wetland habitats that support a diverse range of native wildlife.

The aquatic environment is strongly influenced by the thermal loading from the Aberfoyle Mill Pond upstream of the subject property, which makes downstream reaches unsuitable for sensitive cold-water fish.

The report also includes recommendations for continued biological monitoring in 2025. Details are included in the report which can be found in Appendix H.

5.0 CONCLUSIONS

The following conclusions are provided based on the results of the 2024 monitoring program.

1) Blue Triton has complied with all the conditions in the existing permit for the Aberfoyle well TW3-80.

2) TW3-80 has been operated in accordance with the pumping limits outlined in the PTTW. The daily water taking at TW3-80 in 2024 ranged from 175,283 L to 3,242,259 L. The average daily taking in 2024 was 1,674,026 L. The total volume of water taken in 2024 from TW3-80 was 612,693,646 L or 47% of the permitted volume.

3) The interpreted non-pumping water levels in TW3-80, which obtains water from the Lower Bedrock Aquifer, ranged from approximately 308 to 313 masl in 2024 and the interpreted water levels under variable pumping conditions ranged from approximately 301 to 309 masl. The drawdown at the well ranged from approximately 12 m to 4 m in 2024. Historical and current records indicate that long-term water levels generally correlate with the monthly pumping volumes (i.e., higher water levels during months of lower pumping and lower water levels during months of higher pumping). At all times the water level in TW3-80 remained above the top of the Lower Bedrock Aquifer.

4) The trends of water level variations within the Lower Bedrock Aquifer are stable, with nearby monitoring wells in the Lower Bedrock Aquifer fluctuating in response to variations in pumping at TW3-80. Water levels measured within this aquifer in 2024 are generally similar to the water levels measured since mid-2018 with the exception of the lower levels during the second half of 2022 which was marked by drought conditions and the low amount of recharge to the Lower Bedrock Aquifer. The groundwater taking from TW3-80 has not led to a long-term declining trend in the aquifer water levels.

5) The muted responses at monitoring wells in the Upper Bedrock Aquifer relative to the Lower Bedrock Aquifer confirm that the Middle Bedrock Aquitard limits the effect of pumping on overlying units. The water levels in the Upper Bedrock Aquifer and overburden aquifer show seasonal trends that are reflective of spring melt and precipitation. In 2024 the water levels were similar or higher than those observed in 2023. No unacceptable impacts (i.e., long-term declining trends) to the Upper Bedrock Aquifer and overburden aquifer have been observed.

6) Surface water levels fluctuate in response to precipitation, snow melt and evapotranspiration.

7) The water taking does not interfere with the ecological functions of the terrestrial, wetland and aquatic ecosystems on or adjacent to the property.

8) The water taking does not prevent other water users from continuing their established pattern of use. The groundwater withdrawals from TW3-80 do not interfere with existing municipal uses or private uses. There have been no well interference complaints at Aberfoyle due to the water taking from TW3-80.

9) There were no complaints from neighbouring properties in 2024 regarding either groundwater quantity or quality. This suggests that no irreversible impacts have been observed due to pumping of the aquifer or deterioration of groundwater quantity or quality on neighbouring properties.

10) Based on the monitoring data collected, the 2024 water takings from TW3-80 are sustainable.

6.0 RECOMMENDATIONS

No changes to the existing monitoring program are recommended.

Signature Page

WSP Canada Inc.

March 28 2025

Greg Padusenko, M.Sc., P.Eng., P.Geo.
Senior Hydrogeologist

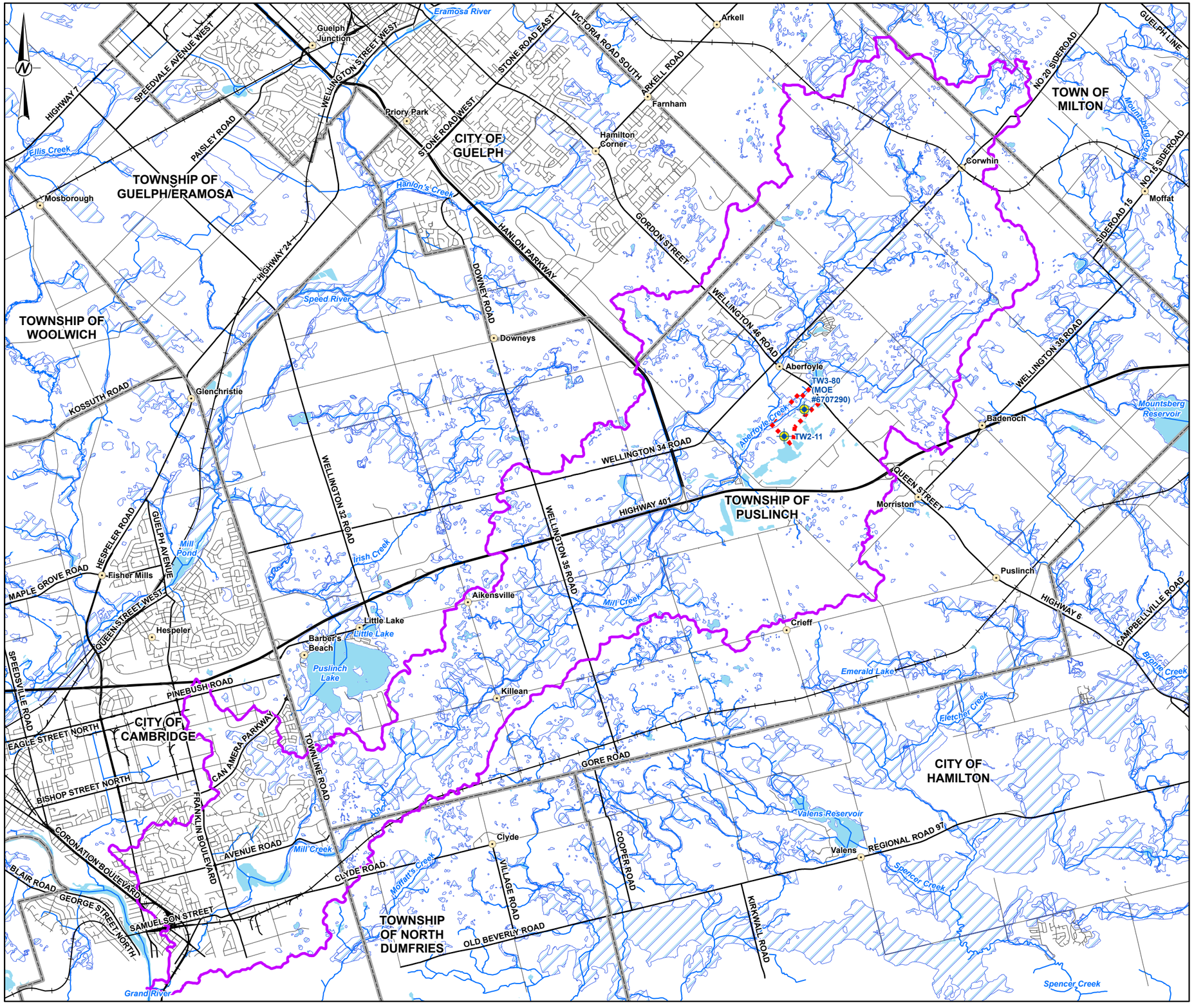
Craig DeVito, M.Sc., P.Eng.
Senior Hydrologist

John Piersol, M.Sc., P.Geo.
Senior Hydrogeologist

GRP/CDV/JAP/rk

FIGURES

Figures 1.1 to 4.6



NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
SITE PLAN

CONSULTANT

wsp

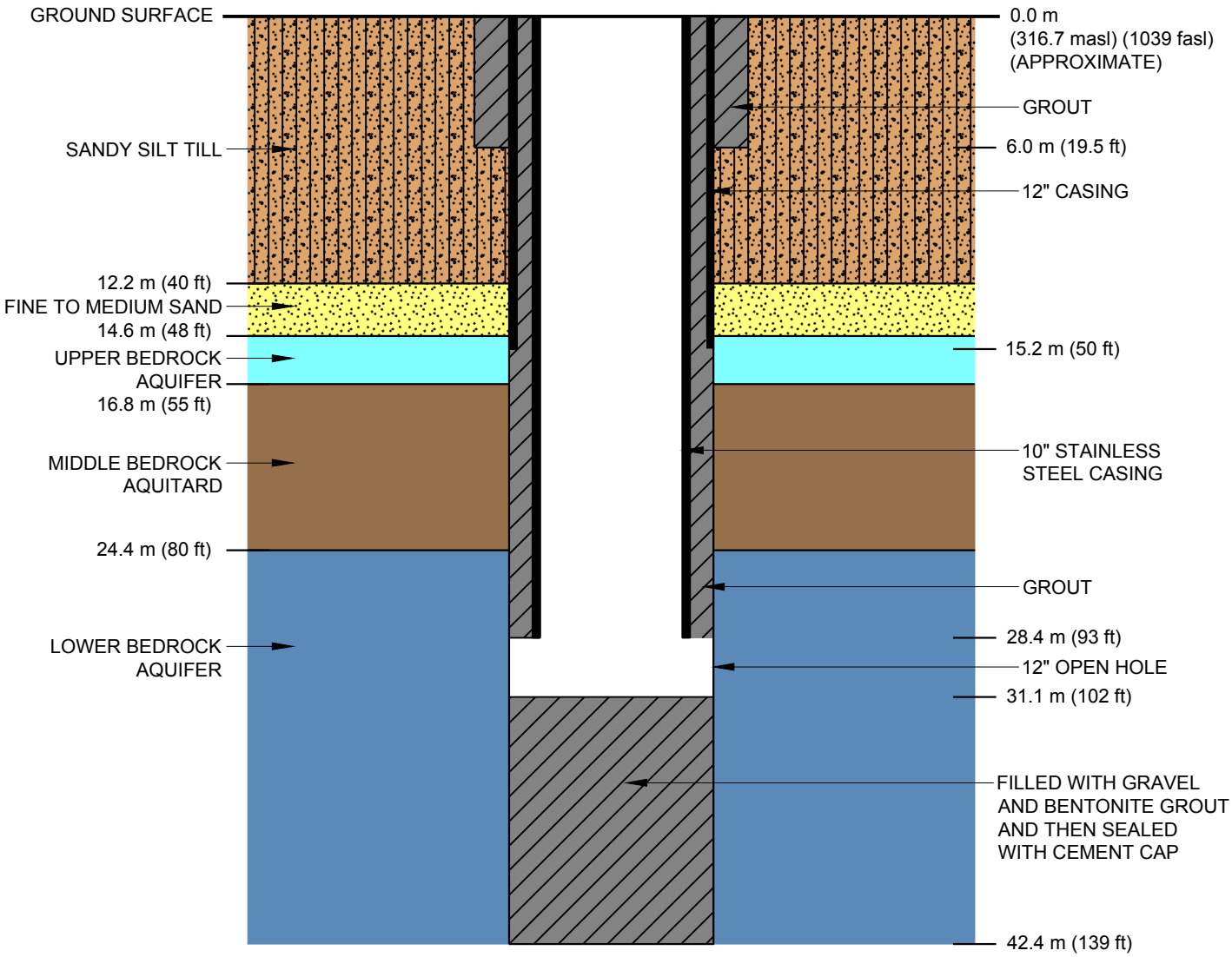
YYYY-MM-DD	2025-03-14
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	1.1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: S:\Clients\Nestle\Aberfoyle\09_PRO\UCA0049769_2148\40_PRO\0001 Annual Report 2024\CA0049769_2148-0001-CIH-0000\CA0049769_2148-0001-GH-0000.aprx PRINTED ON: AT: 12:29:15 PM



CLIENT
WHITE WOLF PROPERTY MANAGEMENT

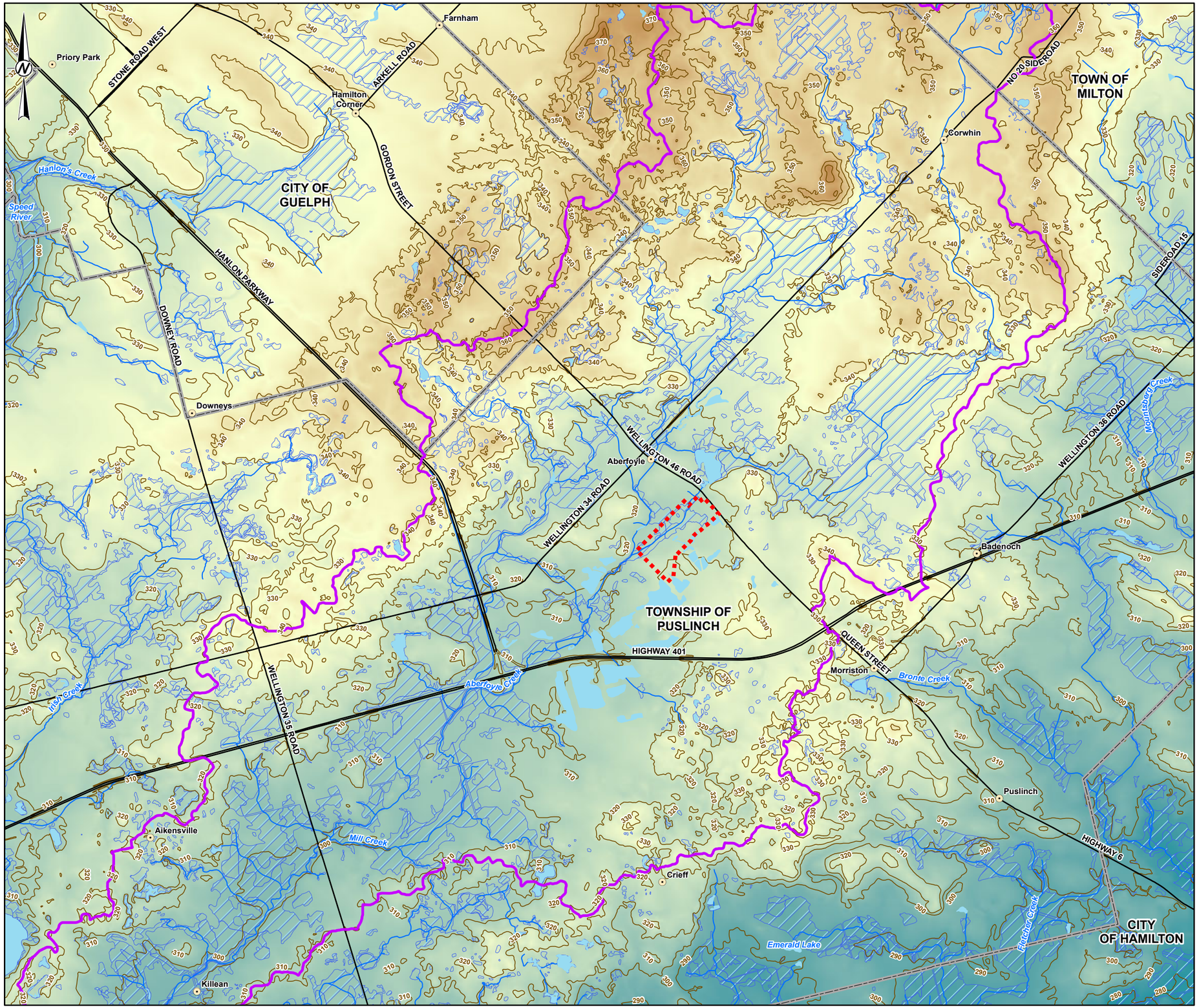
PROJECT
2024 ANNUAL REPORT

CONSULTANT

YYYY-MM-DD	2025-03-04
PREPARED	DD
DESIGN	
REVIEW	GP
APPROVED	GP

TITLE
ABERFOYLE TW3-80 SCHEMATIC

PROJECT No.	TASK	Rev.	FIGURE
CA0049769.2148	(1000)	A	1.2



LEGEND

- CITY / TOWN
- TOPOGRAPHIC ELEVATION CONTOUR (MASL)
- MAIN ROAD /HIGHWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- MILL CREEK SUB-WATERSHED
- MUNICIPAL BOUNDARY
- PROPERTY BOUNDARY

VALUE

HIGH : 395.933

LOW : 94.8032

0 500 1,000 2,000

1:50,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
TOPOGRAPHY AND DRAINAGE

CONSULTANT

wsp

YYYY-MM-DD	2025-03-14
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

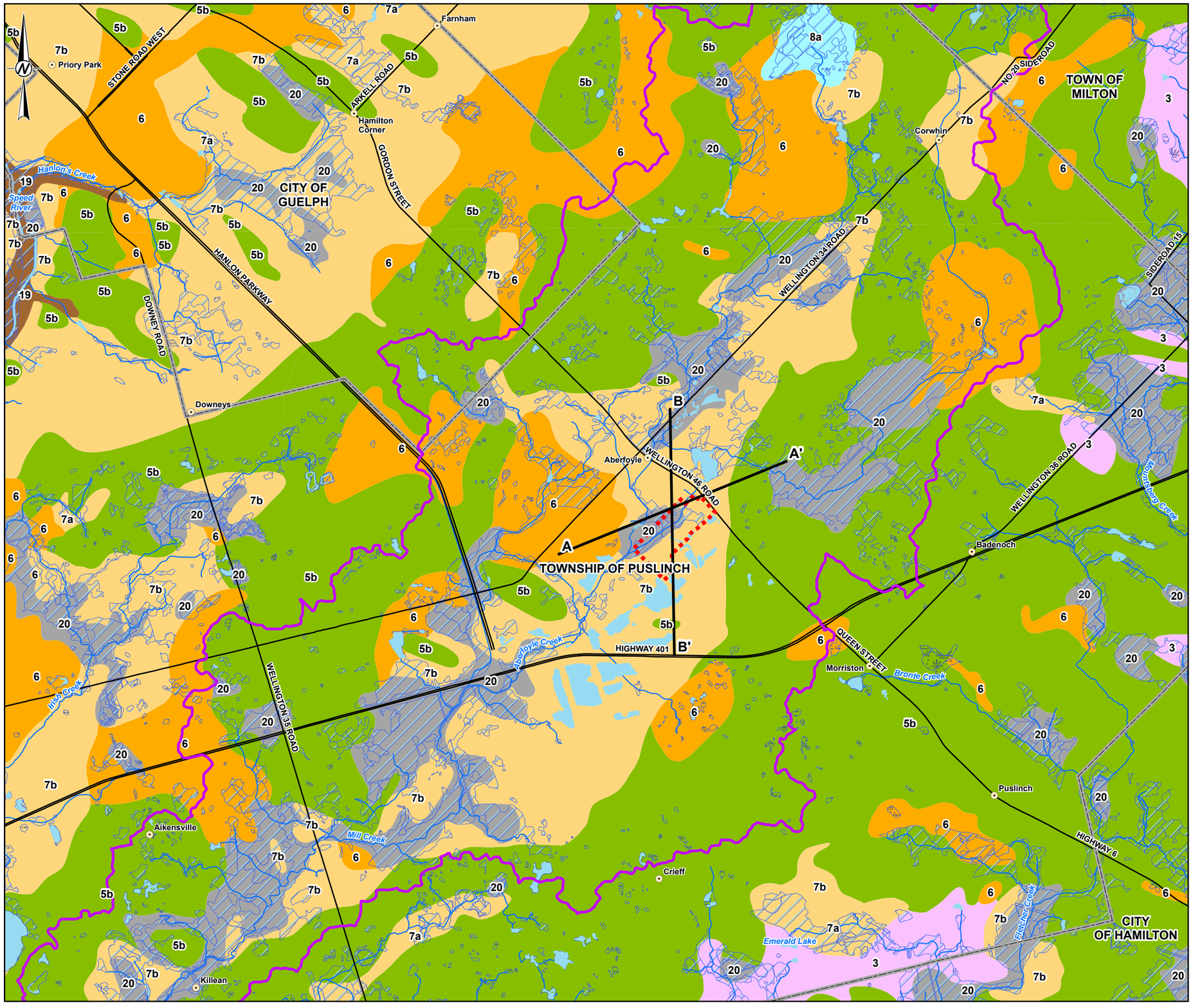
PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	2.1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: S:\Clients\Nestle\Aberfoyle\99_PROJ\CA0049769_2148\40_PROD\0001_Annual Report_2024\CA0049769_2148-0001-CH-0000\CA0049769_2148-0001-CH-0000.aprx, PRINTED ON: AT: 12:29:23 PM



LEGEND

- CITY / TOWN
- CROSS-SECTION LOCATION
- MAIN ROAD /HIGHWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- MILL CREEK SUB-WATERSHED
- MUNICIPAL BOUNDARY
- PROPERTY BOUNDARY
- 3: PALEOZOIC BEDROCK
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL
- 6: ICE-CONTACT STRATIFIED DEPOSITS
- 7A: SANDY DEPOSITS
- 7B: GRAVELLY DEPOSITS
- 8A: MASSIVE-WELL LAMINATED
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 500 1,000 2,000

1:50,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
REGIONAL QUATERNARY GEOLOGY

CONSULTANT

wsp

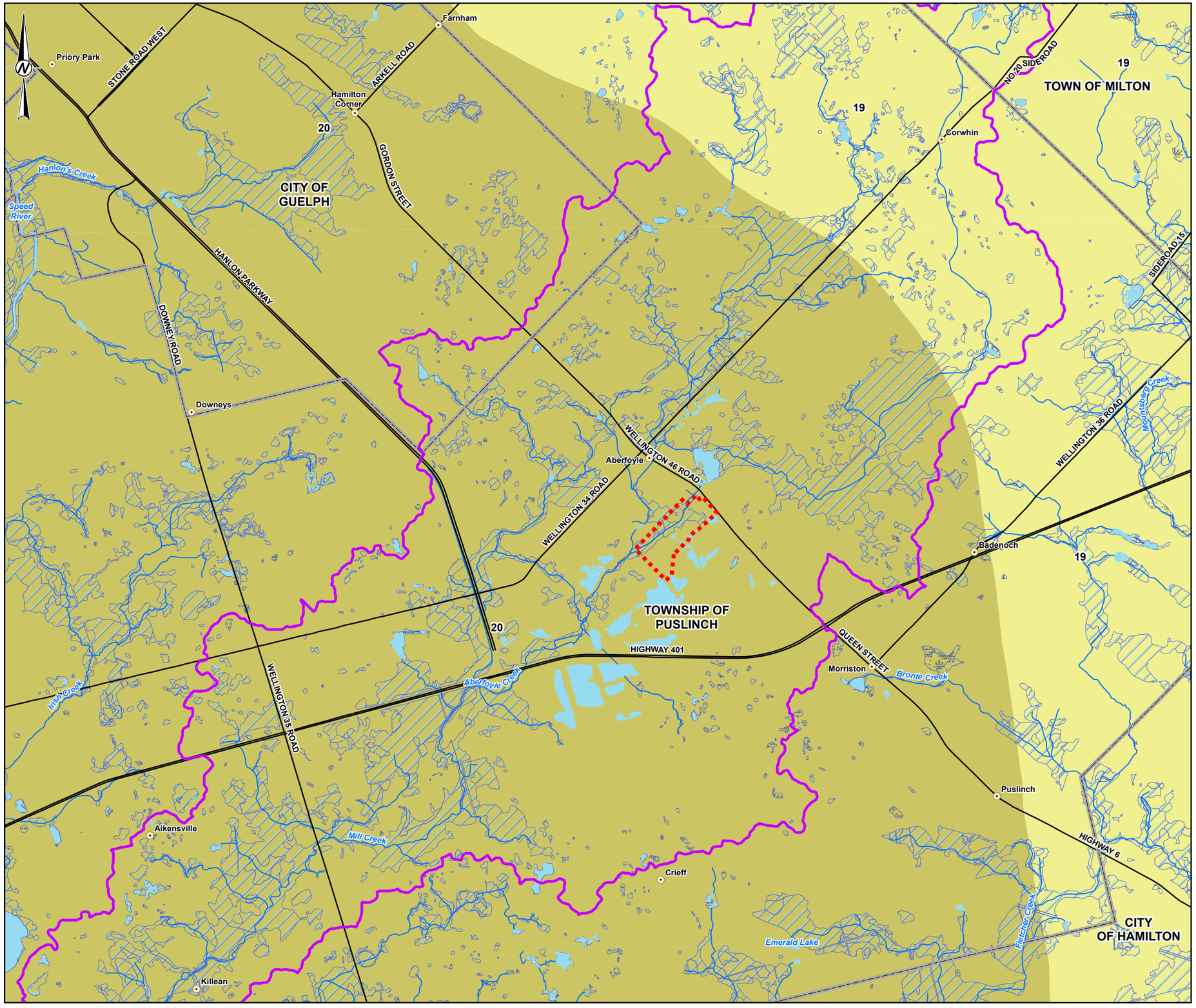
YYYY-MM-DD	2025-03-14
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	2.2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: S:\Clients\Nestle\Aberfoyle\99_PROJ\CA0049769_214840_PROD\0001_Annual Report_2024\CA0049769_2148-0001-CH-0000\CA0049769_2148-0001-CH-0000.aprx PRINTED ON: AT: 12:29:29 PM



LEGEND

- CITY / TOWN
- MAIN ROAD /HIGHWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- MILL CREEK SUB-WATERSHED
- MUNICIPAL BOUNDARY
- PROPERTY BOUNDARY
- 20: GUELPH - DOLOSTONE; THICK-BEDDED, CRINOIDAL, LOCALLY BIOHERMAL; LOCALLY BITUMINOUS (ERAMOSA MB)
- 19: AMABEL - DOLOSTONE, LIMESTONE, ARGILLACEOUS DOLOSTONE; LOCALLY CHERTY; LOCALLY BITUMINOUS (ERAMOSA MB)

0 500 1,000 2,000

1:50,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
REGIONAL BEDROCK GEOLOGY

CONSULTANT

wsp

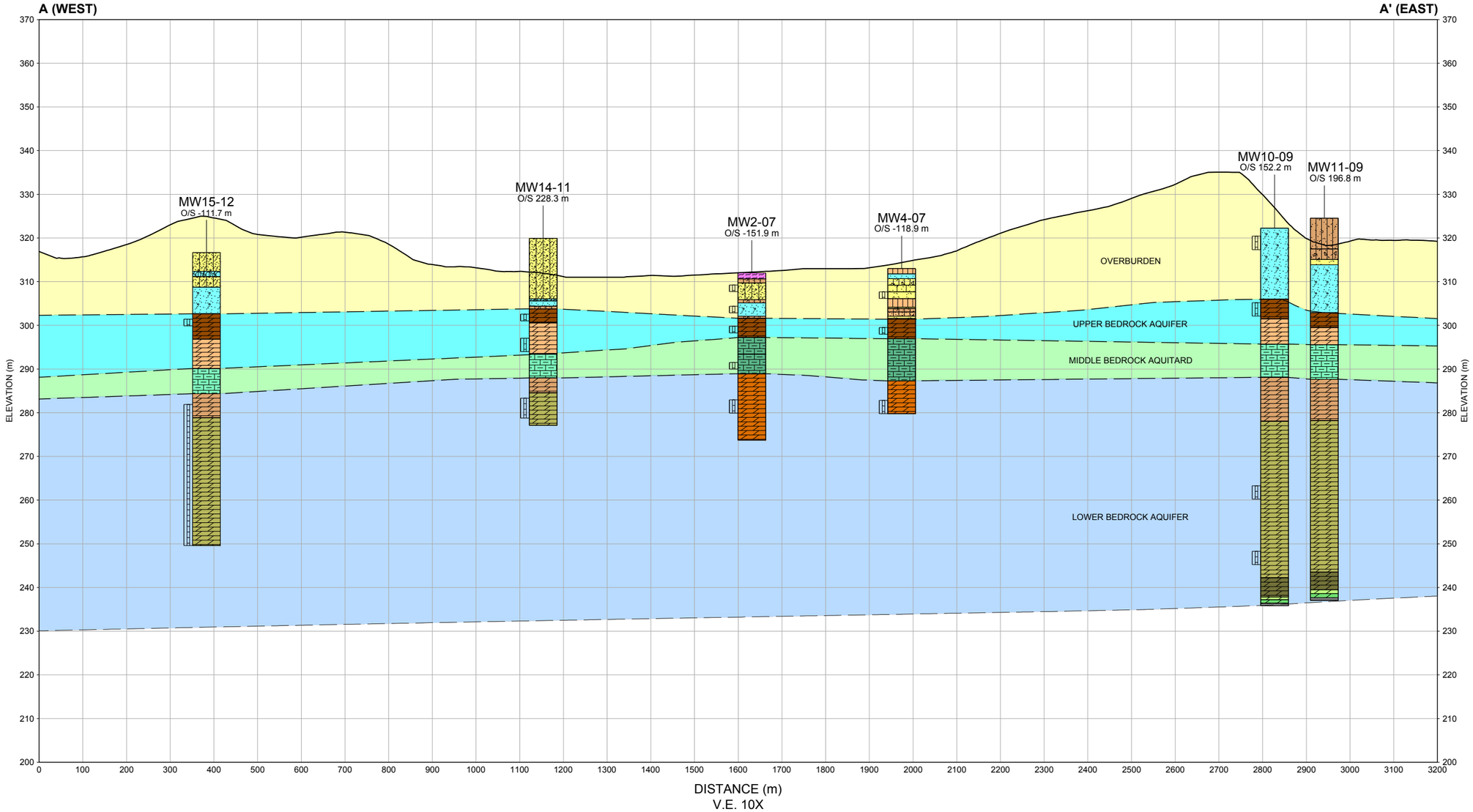
YYYY-MM-DD	2025-03-14
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	2.3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: S:\Clients\Nestle\Aberfoyle\69_PROJ\CA0049769_214840_PROD\0001_Annual_Report_2024\CA0049769_2148-0001-CH-0000\CA0049769_2148-0001-CH-0000.aprx PRINTED ON: AT: 12:29:33 PM



LEGEND

OVERBURDEN
- SAND
- SILTY SAND
- SILTY SAND TILL
- SANDY SILT
- SANDY SILT TILL
- SILT
- SILT TILL
- TOPSOIL
- SAND AND GRAVEL
- GRAVEL AND SILT

BEDROCK (OLD)
- GUELPH
- ERAMOSA
- AMABEL
- BEDROCK

BEDROCK (NEW)
- GUELPH
- REFORMATORY QUARRY
- VINEMOUNT
- GOAT ISLAND
- GASPORT
- IRONDEQUOIT
- ROCKWAY
- MERRITTON
- CABOT HEAD

0 25 50
1:1,000 VERTICAL METRES

0 250 500
1:10,000 HORIZONTAL METRES

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
CROSS SECTION A-A'

CONSULTANT

YYYY-MM-DD	2025-03-04
DESIGNED	
PREPARED	DD
REVIEWED	GP
APPROVED	GP

PROJECT NO. CA0049769.2148 | TASK (1000) | REV. A | FIGURE 2.4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

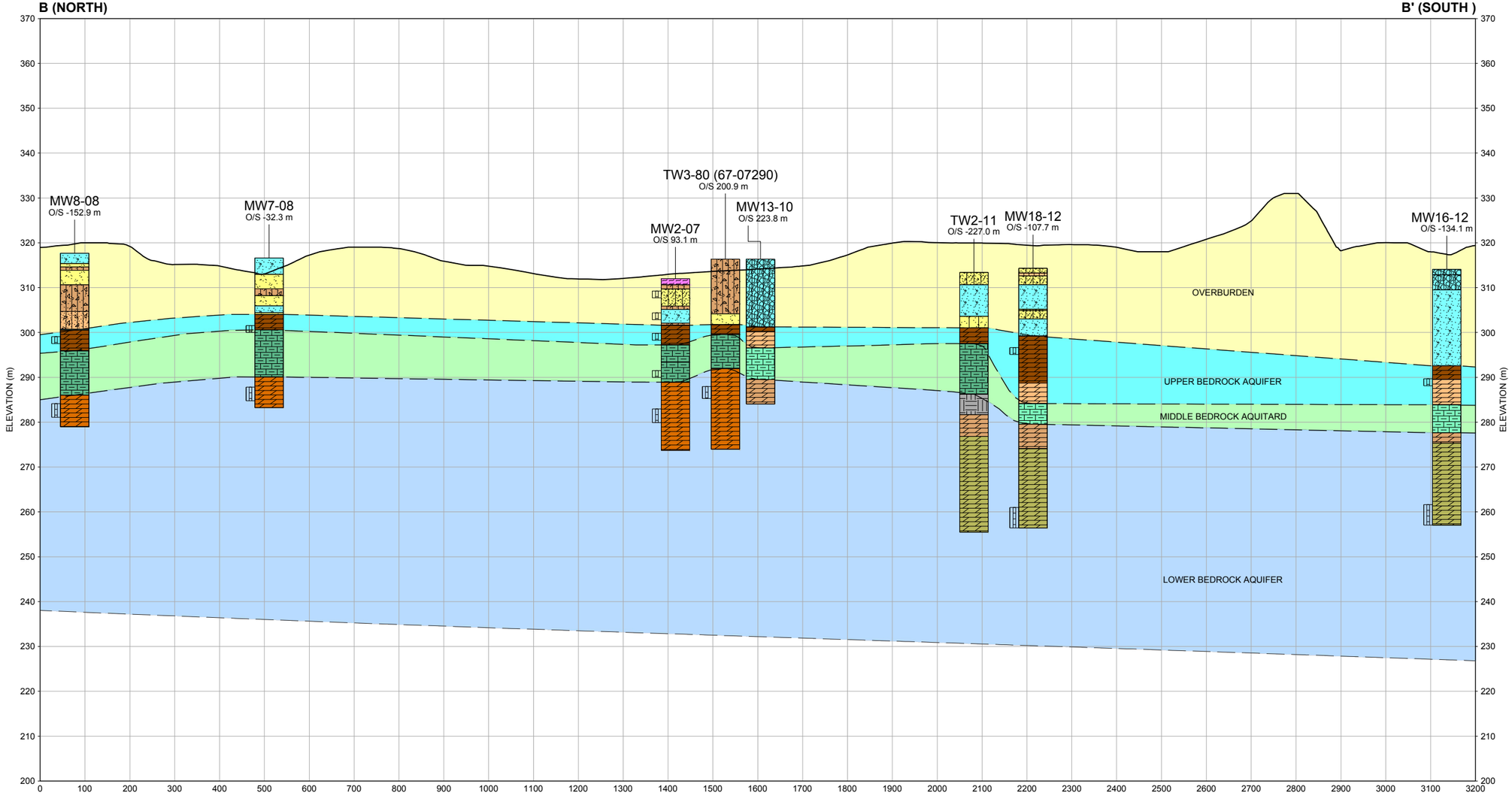
25 mm

0

Path: \\corp.pbwan.net\CA\CAMIS300\CTX_Data\SIM\Clients\Nestle\Aberfoyle\99_PROJ\CA0049769_2148\40_PROD\0001_Annual_Report_2024\ | File Name: CA0049769_2148-0001-CH-0024.dwg | Last Edited By: ddojcinovic Date: 2025-03-04 Time:8:49:07 PM | Printed By: gld_ddojcinovic Date: 2025-03-04 Time:9:02:58 PM

B (NORTH)

B' (SOUTH)



LEGEND

OVERBURDEN

- SAND
- SILTY SAND
- SILTY SAND TILL
- SANDY SILT
- SANDY SILT TILL
- SILT
- SILT TILL
- TOPSOIL
- SAND AND GRAVEL
- GRAVEL AND SILT

BEDROCK (OLD)

- GUELPH
- ERAMOSA
- AMABEL
- BEDROCK

BEDROCK (NEW)

- GUELPH
- REFORMATORY QUARRY
- VINEMOUNT
- GOAT ISLAND
- GASPORT
- IRONDEQUOIT
- ROCKWAY
- MERRITTON
- CABOT HEAD

0 25 50
1:1,000 VERTICAL METRES

0 250 500
1:10,000 HORIZONTAL METRES

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
CROSS SECTION B - B'

CONSULTANT
wsp

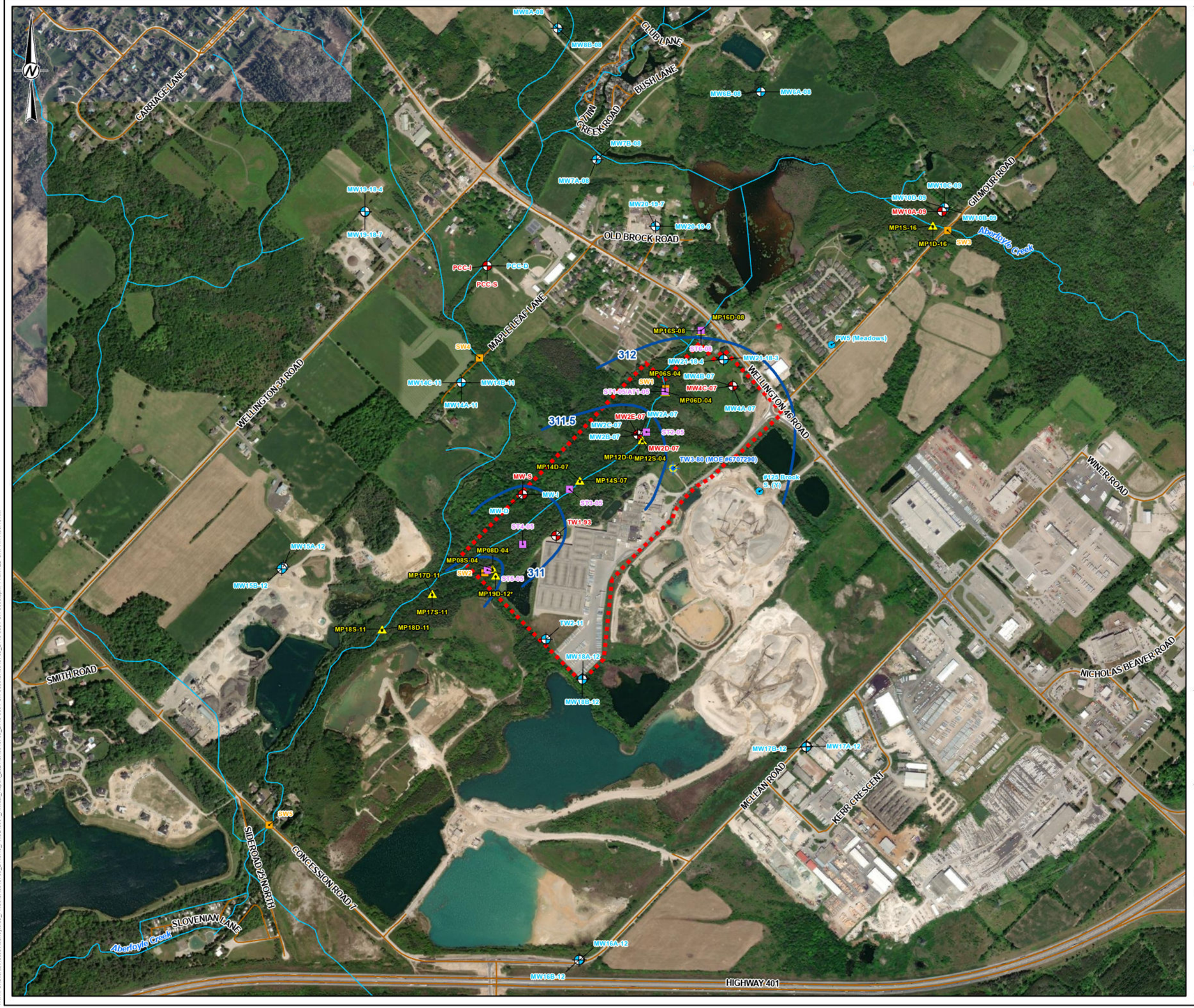
YYYY-MM-DD	2025-03-04
DESIGNED	
PREPARED	DD
REVIEWED	GP
APPROVED	GP

PROJECT NO. CA0049769.2148 TASK (1000) REV. A FIGURE 2.5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

Path: \\corp.pbwan.net\CAVCAMIS300\CTX_Data\SIM\Clients\Nestle\Aberfoyle\99_PROJ\CA0049769_2148\40_PROD\0001_Annual_Report_2024\ | File Name: CA0049769_2148-0001-CH-0025.dwg | Last Edited By: ddojcinovic Date: 2025-03-04 Time:8:49:18 PM | Printed By: gld_ddojcinovic Date: 2025-03-04 Time:9:06:09 PM



LEGEND

- PRODUCTION WELL
- MONITORING WELL (BEDROCK)
- MONITORING WELL (OVERBURDEN)
- PRIVATE WELL (BEDROCK)
- PIEZOMETER
- SURFACE WATER STATION
- SURFACE WATER TEMPERATURE STATION
- WATER LEVEL ELEVATION CONTOUR (OCT. 12, 2010)
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

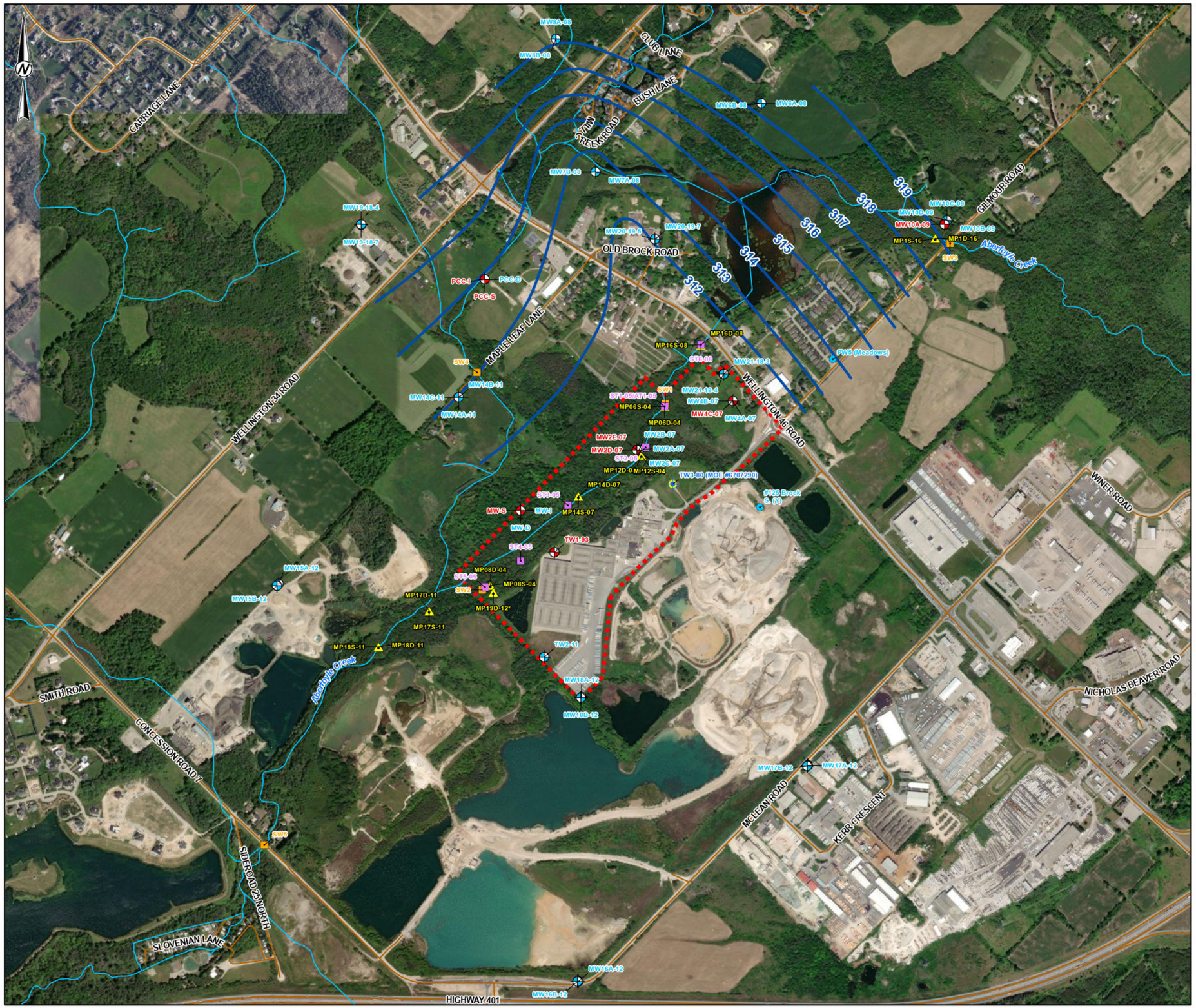
TITLE
OVERBURDEN AND SURFACE WATER ELEVATIONS (NON-PUMPING CONDITION OCTOBER 2010)

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	2.6



LEGEND

- MONITORING WELL (BEDROCK)
- MONITORING WELL (OVERBURDEN)
- PRODUCTION WELL
- PRIVATE WELL (BEDROCK)
- PIEZOMETER
- SURFACE WATER STATION
- SURFACE WATER TEMPERATURE STATION
- WATER LEVEL ELEVATION CONTOUR (OCT. 12, 2010)
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
POTENTIOMETRIC SURFACE OF UPPER BEDROCK AQUIFER (NON-PUMPING CONDITION OCTOBER 2010)

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

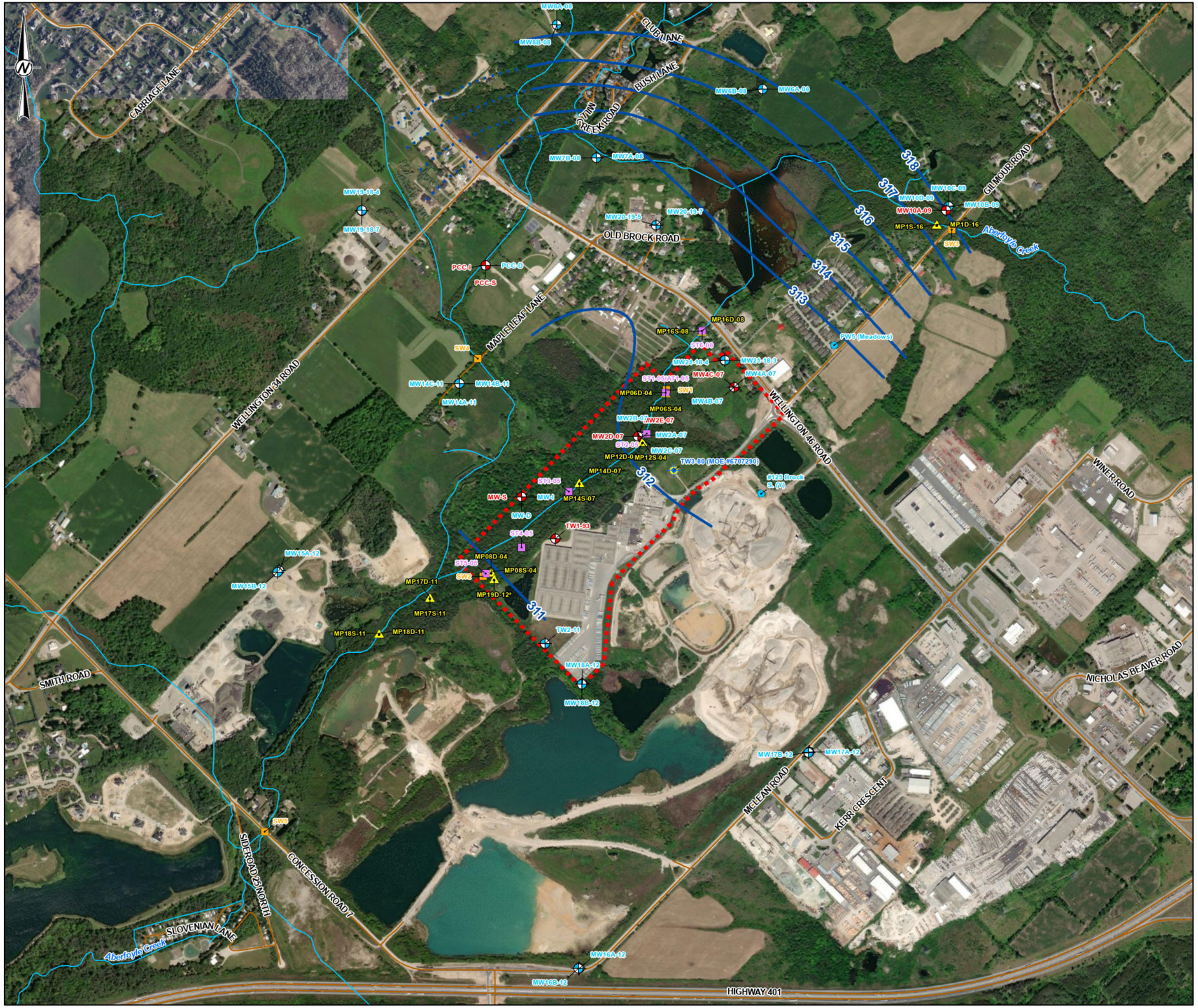
PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	2.7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: S:\Clients\Nestle\Aberfoyle (9)_PRO\CA0049769_2148-00_PROD\0001_Annual_Report_2024\CA0049769_2148-0001-GIH-0000\CA0049769_2148-0001-GIH-0003.aprx, PRINTED ON: AT 7:38:22 AM



LEGEND

- PRODUCTION WELL
- MONITORING WELL (BEDROCK)
- MONITORING WELL (OVERBURDEN)
- PRIVATE WELL (BEDROCK)
- PIEZOMETER
- SURFACE WATER STATION
- SURFACE WATER TEMPERATURE STATION
- WATER LEVEL ELEVATION CONTOUR (OCT. 12, 2010)
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
POTENTIOMETRIC SURFACE OF LOWER BEDROCK AQUIFER (NON-PUMPING CONDITION OCTOBER 2010)

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	2.8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: S:\Clients\Nestle\Aberfoyle 99_PROJ\CA0049769_2148-40_PROD\0001_Annual_Report_2024\CA0049769_2148-0001-CH-0000\CA0049769_2148-0001-CH-0000.aprx, PRINTED ON: AT: 8:55:39 AM

LEGEND

- PRODUCTION WELL
- MONITORING WELL (BEDROCK)
- PRIVATE WELL (BEDROCK)
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
2024 BEDROCK MONITORING LOCATION

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	3.1

LEGEND

- PRODUCTION WELL
- MONITORING WELL (OVERBURDEN)
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
2024 OVERBURDEN MONITORING LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	3.2

LEGEND

- PRODUCTION WELL
- PIEZOMETER
- SURFACE WATER STATION
- SURFACE WATER TEMPERATURE STATION
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)
1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
2024 SURFACE WATER MONITORING LOCATIONS

CONSULTANT

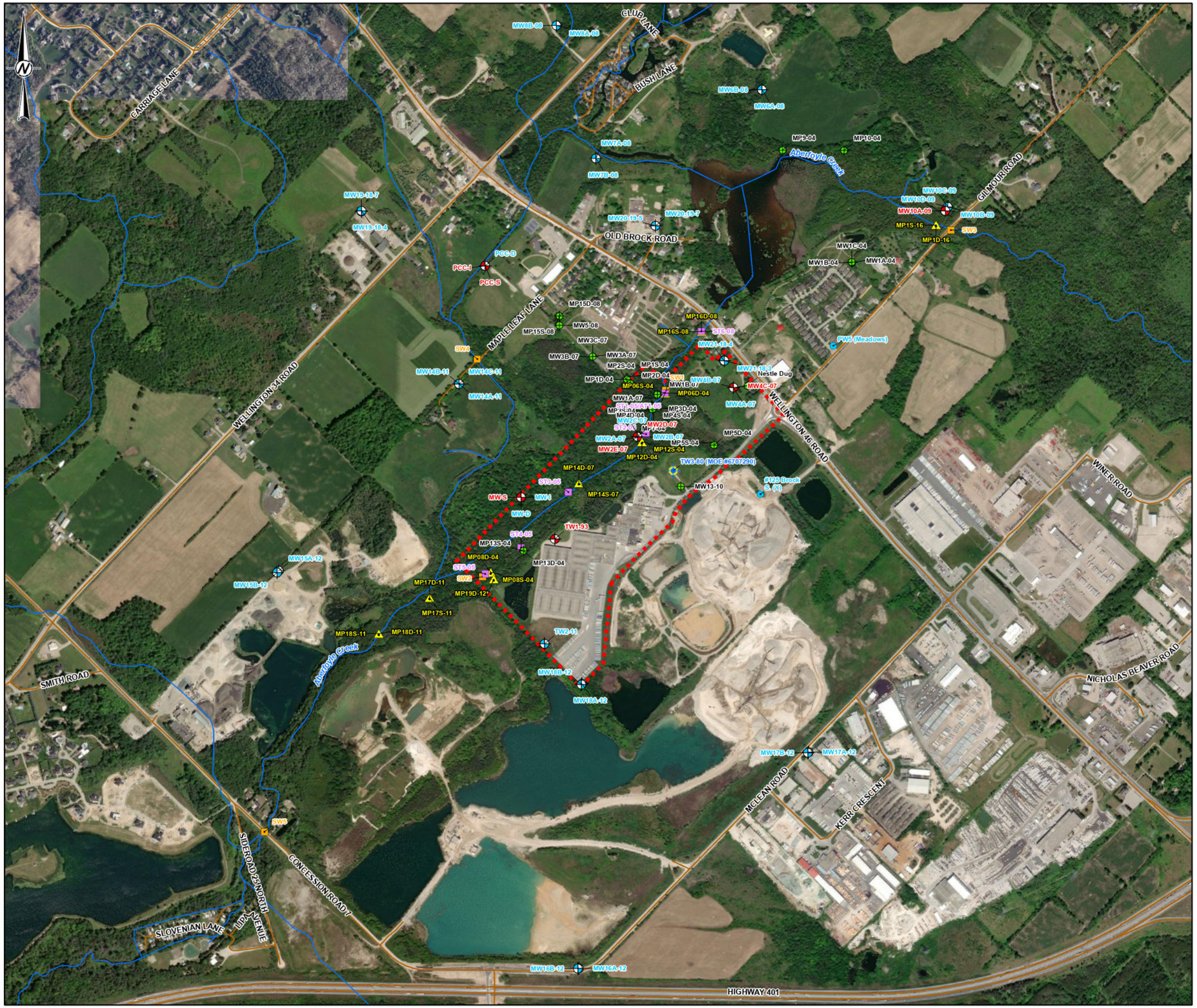
wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	3.3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: S:\Clients\Nestle\Aberfoyle\99_PRO\CA0049769_2148\40_PROD\0001_Annual_Report_2024\CA0049769_2148-0001-CIH-0000\CA0049769_2148-0001-CIH-0000.aprx, PRINTED ON: AT 8:10:00 AM



LEGEND

- PRODUCTION WELL
- MONITORING WELL (BEDROCK)
- MONITORING WELL (OVERBURDEN)
- PRIVATE WELL (BEDROCK)
- PIEZOMETER
- SURFACE WATER STATION
- SURFACE WATER TEMPERATURE STATION
- DECOMMISSIONED
- WATERCOURSE
- PROPERTY BOUNDARY

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

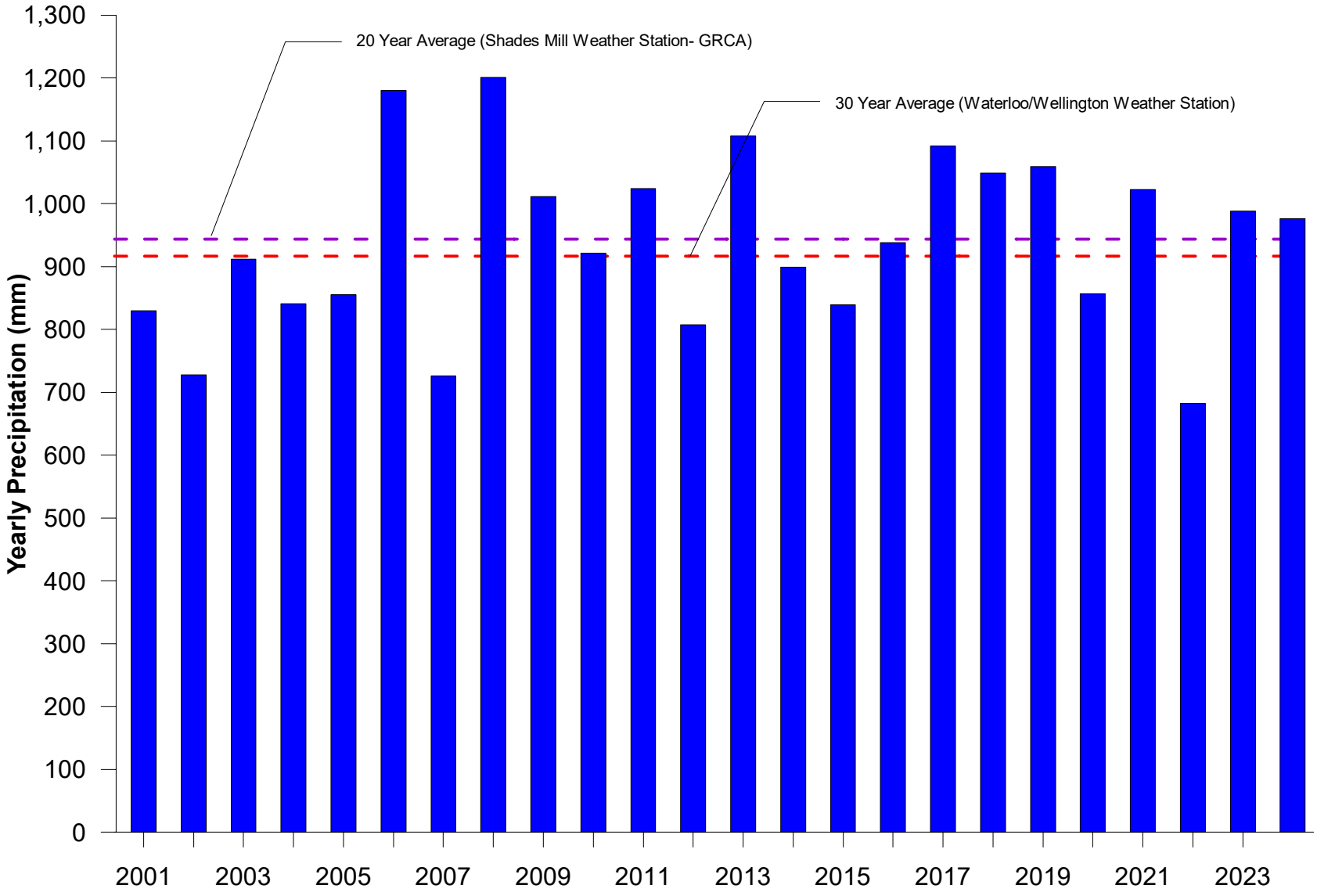
TITLE
WELL LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	3.4

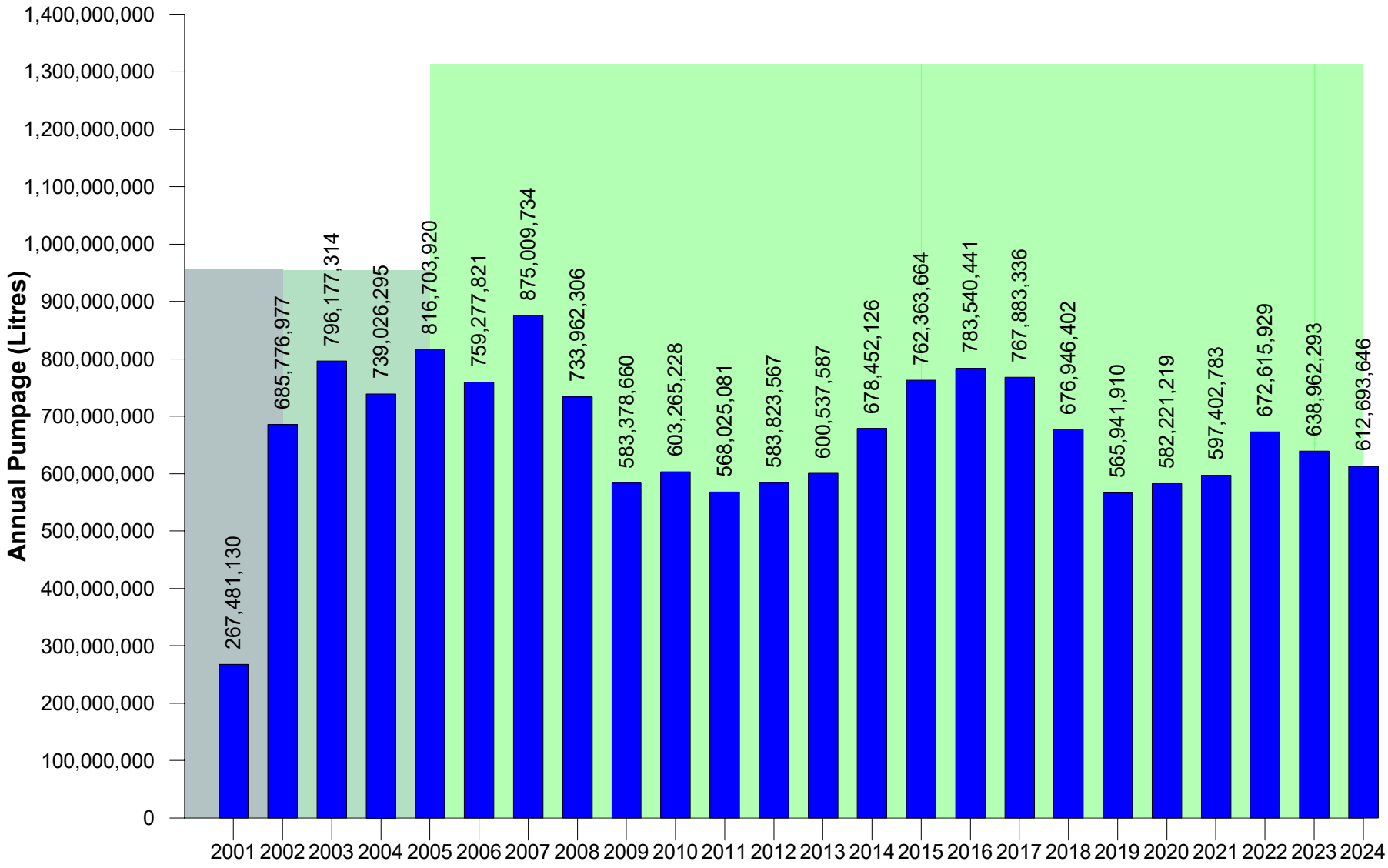


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Guelph, Ontario

TITLE
HISTORICAL YEARLY PRECIPITATION (2001 TO 2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	SK
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	3.5

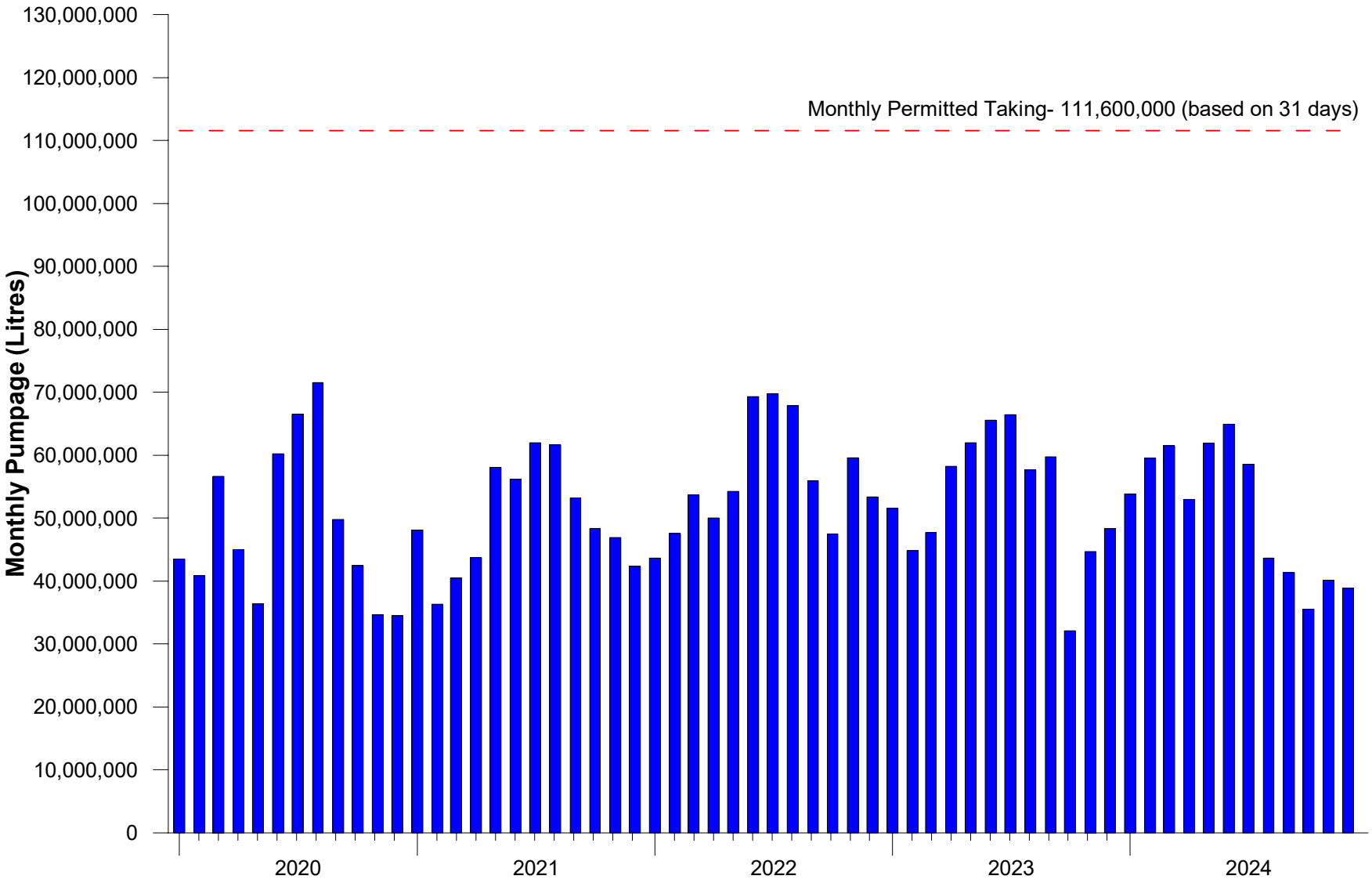


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Guelph, Ontario

TITLE
TW3-80 ANNUAL WATER TAKING (2001 TO 2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	4.1



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

Guelph, Ontario

TITLE

TW3-80 MONTHLY WATER TAKING (2020 TO 2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	4.2

LEGEND

- PRODUCTION WELL
- MONITORING WELL (BEDROCK)
- PRIVATE WELL (BEDROCK)
- WATERCOURSE
- WATER ELEVATION CONTOURS (MASL)
- PROPERTY BOUNDARY
- 309.83 WATER LEVEL ELEVATION (JUNE 22, 2024)

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDERLICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
POTENTIOMETRIC SURFACE OF LOWER BEDROCK AQUIFER (JUNE, 2024)

CONSULTANT

wsp

YYYY-MM-DD	2025-0317
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	4.3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: S:\Clients\Nestle\Aberfoyle\99_PRO\CA0049769_2148-00_PRO\0001_Annual_Report_2024\CA0049769_2148-0001-CH-0000\CA0049769_2148-0001-CH-0000.aprx, PRINTED ON: AT 2:57:29 PM

LEGEND

- PRODUCTION WELL
- MONITORING WELL (BEDROCK)
- PRIVATE WELL (BEDROCK)
- WATERCOURSE
- WATER ELEVATION CONTOURS (MASL)
- PROPERTY BOUNDARY
- 309.83 WATER LEVEL ELEVATION (JUNE 22, 2024)

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
POTENTIOMETRIC SURFACE OF UPPER BEDROCK AQUIFER (JUNE 2024)

CONSULTANT

wsp

YYYY-MM-DD	2025-03-14
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	4.4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: S:\Clients\Nestle\Aberfoyle\99_PROJ\CA0049769_2148\40_PROD\0001_Annual_Report_2024\CA0049769_2148-0001-CH-0000\CA0049769_2148-0001-CH-0000.aprx, PRINTED ON: , AT: 12:50:00 PM

LEGEND

- PRODUCTION WELL
- MONITORING WELL (OVERBURDEN)
- WATERCOURSE
- WATER ELEVATION CONTOURS (MASL)
- PROPERTY BOUNDARY
- 312.00 WATER LEVEL ELEVATION (JUNE 22, 2024)

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

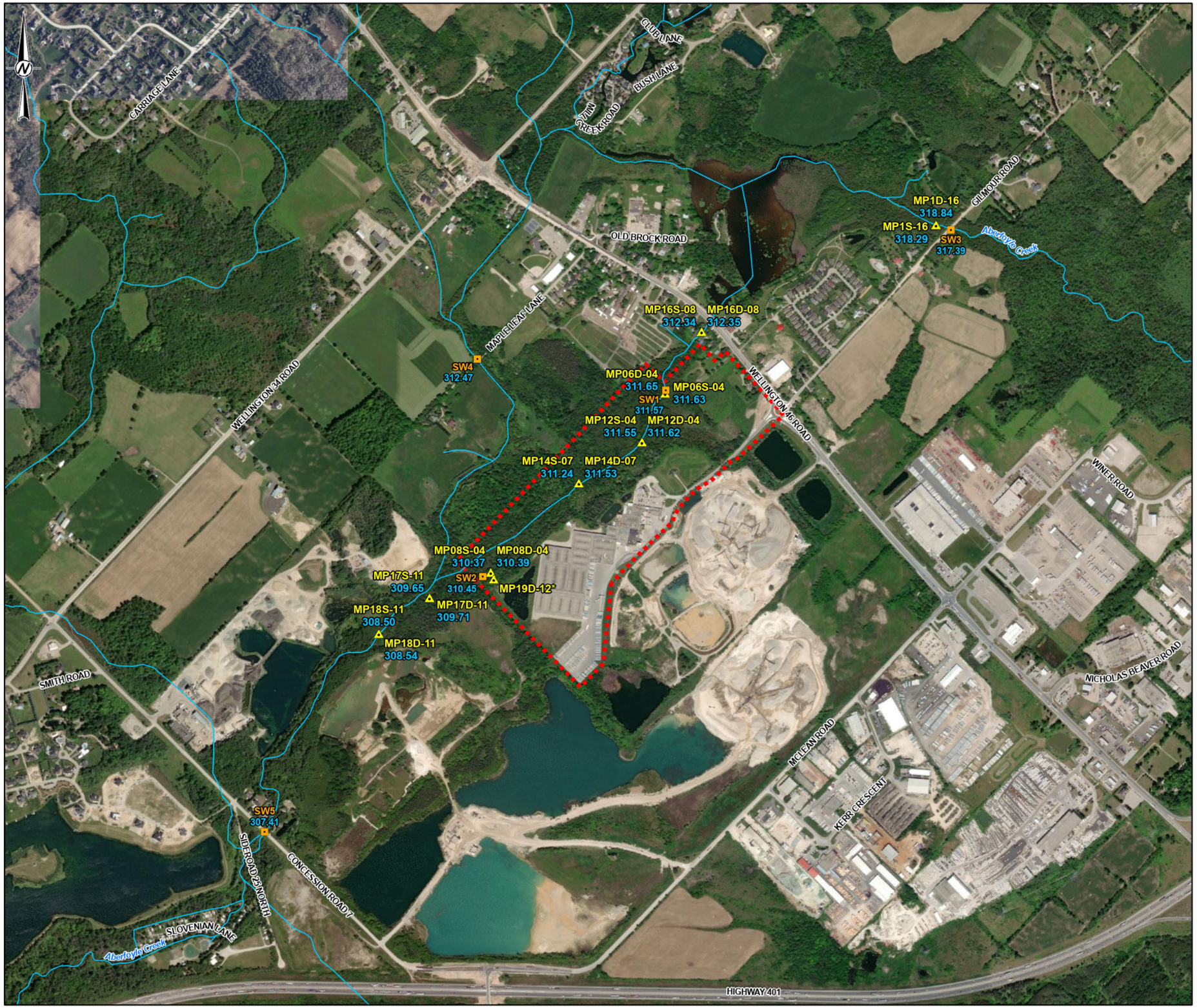
TITLE
POTENTIOMETRIC SURFACE OF OVERBURDEN (JUNE 2024)

CONSULTANT

wsp

YYYY-MM-DD	2025-03-14
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	4.5



LEGEND

- PIEZOMETER
- SURFACE WATER STATION
- WATERCOURSE
- PROPERTY BOUNDARY
- 312.00 WATER LEVEL ELEVATION (JUNE 22, 2024)

0 125 250 500

1:12,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE
2. SW3, SW4 AND SW5 WERE MEASURED ON JUNE 20, 2024

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY (C) GRAND RIVER CONSERVATION AUTHORITY, 2014
3. PROPERTY BOUNDARY OBTAINED FROM CRA, NOVEMBER 2014TOWN OF OAKVILLE, MAXAR
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
WHITE WOLF PROPERTY MANAGEMENT

PROJECT
2024 ANNUAL REPORT

TITLE
SURFACE WATER ELEVATIONS (JUNE 2024)

CONSULTANT

wsp

YYYY-MM-DD	2025-03-17
DESIGNED	JM
PREPARED	JM
REVIEWED	GRP
APPROVED	GRP

PROJECT NO.	CONTROL	REV.	FIGURE
CA0049769.2148	0001	0	4.6

APPENDIX A

Permit to Take Water Number 3133-C5BUH9

Ministry of the Environment, Conservation and Parks
Environmental Assessment and Permissions Division
Brownfields and Permit to Take Water
Permit To Take Water Unit
Floor 1, 135 St Clair Ave W
Toronto, ON
M4V 1P5
Tel: (289) 830-5867

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Division des évaluations et des permissions environnementales
Réaménagement des friches contaminées et réglementation des prélèvements d'eau
Unité de la réglementation des prélèvements d'eau
1er étage, 135 av St. Clair O
Toronto, ON
M4V 1P5
Tél:(289) 830-5867

November 15, 2021

Triton Water Canada Holdings, Inc.
101 Brock Rd S
Puslinch, Ontario, N0B 2J0
Canada

Dear Andreanne Simard:

RE: Permit To Take Water No. 3133-C5BUH9
101 Brock Rd S, Puslinch, County of Wellington
Reference Number 3572-A8XGCE

Please find attached a Permit to Take Water which authorizes the withdrawal of water in accordance with the application for this Permit to Take Water, dated April 1, 2016 and signed by Andreanne Simard.

This Permit expires on November 15, 2026. Authorized rates and amounts are indicated on Table A. This Permit cancels and replaces Permit Number 1381-95ATPY, issued on December 19, 2013

Section 9(3) of Ontario Regulation 387/04 (Water Taking and Transfer) requires all holders of a permit to report daily water taking amounts annually, in a manner and form approved by the Director (https://www.lrcsde.lrc.gov.on.ca/wtrs/). For the purpose of s. 9(3), such reports shall be submitted electronically to the Water Taking Reporting System (WTRS) electronic database or via hard copy, as described in the Technical Bulletin entitled "Permit to Take Water Program Monitoring and Reporting of Water Takings", dated November 2010, PIBs 6003e (https://archive.org/details/std01079790.ome/mode/2up).

If you have questions about reporting requirements, please call the WTRS Help Desk at 416-235-6322 (toll free: 1-877-344-2011) or by email, WTRSHelpdesk@ontario.ca. It is preferred that you submit your data directly and electronically to the WTRS. Where this is impracticable, please contact the WTRS Help Desk to arrange for written submission of your data.

Condition 1.4 specifically indicates that this Permit is not transferable to another party. Any queries regarding a change in owner/operator should be made to the Permit to Take Water Evaluator at the above address.

Take notice that in issuing this Permit, terms and conditions pertaining to the taking of water and to the results of the taking have been imposed. The terms and conditions have been designed to allow for the development of water resources, while providing reasonable protection to existing water uses and users.

Yours truly,

Gregory Meek
Supervisor (Acting), Permit To Take Water
Director, Section 34.1, Ontario Water Resources Act, R.S.O. 1990
Environmental Permissions Branch

File Storage Number: -

PERMIT TO TAKE WATER
Ground Water
NUMBER 3133-C5BUH9

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

Triton Water Canada Holdings, Inc.
101 Brock Rd S
Puslinch, Ontario
N0B 2J0

For the water taking from: One Drilled Well (TW3-80)

Located at: 101 Brock Rd S
Puslinch, County of Wellington

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. 3133-C5BUH9 including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means Triton Water Canada Holdings, Inc..

(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 April 1, 2016 and signed by Andreanne Simard , 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 **November 15, 2026**. 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 per Year:	Zone/ Easting/ Northing:
1	TW3-80	Well Drilled	Bottled Water	Commercial	2,500	24	3,600,000	365	17 569053 4812797
						Total Taking:	3,600,000		

3.3 It is the responsibility of the Permit Holder to keep advised of any Low Water Advisory within the jurisdiction of the Grand River Conservation Authority. For the purpose of this condition, Low Water Advisory means a Level 1, Level 2, or Level 3 low water condition as defined by the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) in their Low Water Response Program, as may be amended from time to time by the MNDMNRF.

When a Low Water Advisory exists within the Grand River Conservation Authority watershed, the Permit Holder shall undertake measures outlined in the Low Water Response Plan, as described in **Item 6** of **Schedule A**.

4. Monitoring

4.1 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. 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.

4.2 The Permit Holder shall establish the following groundwater monitoring program for the duration of the Permit:

Bedrock Wells

(i) Continuous monitoring of groundwater levels in the following bedrock and overburden monitoring wells:

Upper Bedrock

- MW2C-07
- MW4B-07

- MW-D
- PCC-D
- MW6B-08
- MW7B-08
- MW8B-08
- MW10B-09
- MW14B-11
- MW14C-11
- MW15B-12
- MW16B-12
- MW17B-12
- MW18B-12
- MW19-18-7
- MW20-19-7
- MW21-18-4
- Private well "Y" MOE WWR #67-09669 (continuous monitoring is subject to owner's concurrence)
- MW-I

Lower bedrock

- TW3-80 (67-07290)
- TW2-11
- MW2A-07
- MW2B-07
- MW4A-07
- MW6A-07
- MW7A-08
- MW8A-08
- MW10C-09
- MW-10D-09
- MW14A-11
- MW15A-12
- MW16A-12
- MW17A-12
- MW18A-12
- MW19-18-4
- MW20-19-5
- MW21-18-3
- PW5 (continuous monitoring is subject to owner's concurrence)

Overburden Wells

- TW1-93
- MW-S
- PCC-S
- PCC-I

- MW2D-07
- MW2E-07
- MW4C-07
- MW10A-09

4.3 The Permit Holder shall establish the following surface water monitoring program for the duration of the Permit:

Surface Water Levels

(i) Continuous monitoring of water levels at the following locations:

- SW1
- SW2

(ii) Monthly monitoring of water levels at the following locations:

- SW3
- SW4
- SW5

Stream Flow

(iii) Monthly monitoring of flow, encompassing a range of flow conditions, and the development of a stage-discharge curve at the following surface water locations:

- SW1
- SW2

Multi-level Piezometers

(iv) Continuous monitoring of multi-level piezometers at the following locations:

- MP16S/D-08
- MP6S-08/D -04
- MP12S/D-04
- MP14S/D-07
- MP8S/D-04
- MP1-16S/D
- MP17S/D-11
- MP18S/D-11

Temperature

(v) Continuous monitoring of temperature at the sediment-water interface at the following locations:

- ST6-08
- ST1-05/AT-01
- ST2-05
- ST3-05
- ST4-05
- ST5-05

4.4 The Permit Holder shall undertake wetland monitoring and redd surveys as recommended in "2010 Biological Monitoring Program Final Report" by C. Portt and Associates dated January 28, 2011. Results from the wetland and redd surveys shall be submitted to the Director as a part of the annual monitoring report required under Condition 4.7.

4.5 Continuous monitoring shall be datalogged at 60 minute intervals and downloaded quarterly, however, the daily minimum water levels can be used to evaluate the water level variation with respect to pumping to improve the data handling and presentation.

Where monthly monitoring data is datalogged, this data shall also be downloaded on a quarterly basis.

4.6 The Permit Holder shall identify to the Director in writing, within 15 days of any monthly monitoring event, any monitoring locations identified in Conditions 4.2 and 4.3 which become permantly inaccessible and/or abandoned along with a recommendation for replacement monitoring locations. This shall exclude wells that become temporarily inaccessible, i.e., due to frozen conditions. Upon approval of the Director the monitoring program shall be appropriately modified.

4.7 The Permit Holder shall submit to the Director, an annual monitoring report which present and interprets the monitoring data to be collected under the Terms and Conditions of this Permit. This report shall be prepared, signed and stamped by a licensed professional geoscientist or a licensed professional engineer specializing in hydrogeology who shall take responsibility for its accuracy. Surface water impact assessment shall be conducted by a qualified surface water scientist who shall co-sign the report as responsibility for the accuracy of the surface water portion. The report shall be submitted to the Director by March 31 of each calendar year and include monitoring data for the 12 month period ending December 31 of the previous year.

4.8 The Permit Holder shall submit to the Director as part of the annual monitoring report, details of the bottling operations involved with water taking under this Permit to Take Water to indicate compliance with OWRA Section 34.3. These details shall include:

- Location and name of the facilities to which water is delivered in bulk containers greater than 20 L from this source,
- If the bulk water is containerized at the receiving location,
- The size of container(s) into which the water is transferred at the receiving location, and
- Total volume of the water transported in bulk in each calendar year to each remote facility.

4.9.1 Prior to December 31, 2021, the Permit Holder shall establish a publicly accessible internet Website, with no user, access or registration fees, and shall maintain the website for the duration of this permit. Following the establishment of the Website, the Permit Holder shall notify the Director in writing, of the Website URL address.

4.9.2 By December 31, 2021, the Permit Holder shall upload and make available for download the following information:

- all technical documentation submitted to support the Permit To Take Water application, items listed in Schedule A of this Permit;
- a plain language executive summary of the water taking activity; and,
- the well interference protocol.

4.9.3 By March 31 of each calendar year (until March 31, 2027) the Permit Holder shall upload and make available for download the following information to the Website:

- the monitoring report required by Condition 4.7 for the 12-month period ending December 31 of the previous year.
- The daily water taking records collected as required by Condition 4.1, uploaded in a suitable electronic format (e.g. Microsoft Excel) for the 12-month period ending December 31 of the previous year.

4.10 By September 30 of each calendar year (until September 30, 2027), the Permit Holder shall host an annual stakeholder meeting. The meeting will provide an opportunity for the Permit Holder to inform stakeholders of the Permit and the results of the annual monitoring report (for the 12-month period ending December 31 of the previous year), to receive submissions from stakeholders and the public, and to answer questions concerning the water taking.

The Permit Holder shall also directly notify the following stakeholders:

- The Director
- The City of Guelph
- The Grand River Conservation Authority
- Credit Valley Conservation Authority
- The Township of Puslinch
- The Six Nations of the Grand River
- The Mississaugas of the New Credit First Nation
- The Haudenosaunee Confederacy Chiefs Council (via the Haudenosaunee Development Institute)
- The Wellington Water Watchers
- Council of Canadians

The meeting may be held virtually and/or at suitable accessible and public venue within the County of Wellington.

A copy of the meeting invitations, agenda and minutes shall be submitted to the Director within 30 days of the meeting.

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 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

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).

6.1 Subsection 4 (4) in the Water Taking and Transfer Regulation (Ontario Regulation 387/04) ("Regulation") sets out priorities of water use that the Director will take into account as a last resort to avoid or resolve conflict among water users in the event of a shortage of water resources in an area. The four priority of use categories set out in subsection 4 (2) of the regulation, are as follows:

- Priority 1 – Environment, drinking water, and Farm animal production;
- Priority 2 – Agricultural;
- Priority 3 – Industrial and commercial and other (including water bottling); and
- Priority 4 – Aesthetic

In the event of an urgent shortage of water resources in the Puslinch area, the Director may amend this Permit prioritize water takings in Priority categories 1 and 2.

The Director may also require the Permit Holder to investigate and resolve interferences that occur between existing water takings, working with the affected water users to identify potential solutions.

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, 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 Minister of the Environment,
Conservation and Parks
777 Bay Street, 5th Floor
Toronto, Ontario
M7J 2J3

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	

This instrument is subject to Section 38 of the ***Environmental Bill of Rights*** *that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.*

This Permit cancels and replaces Permit Number 1381-95ATPY, issued on 2013/12/19.

Dated at Toronto this 15th day of November, 2021.

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

Schedule A

This Schedule “A” forms part of Permit To Take Water 3133-C5BUH9, dated November 15, 2021.

1. Report titled “Nestle Waters Canada – Aberfoyle, Technical Study for Permit to Take Water Renewal Application”, signed by Greg Padusenko, M.Sc., P.Eng., P.Geo. and John Piesol, M.Sc., P.Eng. of Golder Associates Ltd., Christopher J. Neville, M.Sc., P.Eng. of S.S. Papadopulos & Associates, Inc. and Ken Ursic, M.Sc. of Beacon Environmental, dated June 2019.

2. Report titled “Nestle Waters of Canada Aberfoyle Site, 2020 Annual Monitoring Report”, signed by Greg Padusenko, M.Sc. P.Eng., P.Geo, and Kevin MacKenzie, P.Eng. and John Piersol, M.Sc. P.Geo. of Golder Associates Limited, dated March 2021.

3. Memo titled "Nestle Waters Canada Aberfoyle 2016 Annual Monitoring Report", prepared by Sarah Day, Surface Water Specialist, Technical Support Section, West Central Region, Ministry of the Environment and Climate Change, dated September 18, 2017.

4. Report titled "Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fish: 2006 to 2020:, signed by Cam Portt and Jim Reid of C. Portt & Associates, dated February 2021.

5. Report titled "2020 Biological Monitoring Program, Nestle Waters Canada, Aberfoyle Property", signed by Anna Cunningham, B. Sc, and Ken Ursic, M. Sc. of Beacon Environmental Limited, dated February 2021. Project No. 216114.

6. Technical Memorandum "Low Water Response Plan For Aberfoyle TW3-80" prepared by Greg Padusenko and John Piersol of Golder Associates Ltd., dated October 19, 2021, Project No. 20449101 (1000).

APPENDIX B

TW3-80 Borehole Log

Attachment 2

Project Name: ABERFOYLE FISHERIES
Job No. 979-653
Client: CUSTOM AGGREGATE
Borehole Type: 12" Ø Cable Tool
Location: Pit No. 1, Aberfoyle

Borehole No. TW3-80
Date Completed April 14/80
Geologist/Engineer A.V.N.
Elevation 1040.90, top of casing

Profile: Depth (Elev.)	Profile: Stratigraphy	Profile: Description & Remarks	Sample: Number – Type – Blows/Foot	Penetration Test Blows/Foot (20 40 60 80)	Piezometer or Standpipe Installation
0 (1039)		(316.7 m amsl) Brown clayey-silt till containing some sand and small gravel			12" Ø steel casing to rock grouted to 20' from surface
40		(304.5 m amsl) fine - medium sand			
45		(303.0 m amsl) fine sand matrix w/sand and gravel			
48		(302.1 m amsl) Eramosa member of the Guelph formation * Black dolomite slightly crystalline solid			12" Ø Drive shoe seated into rock
80 (959)		(292.3 m amsl) Saw Wiarton formation of the Amabel Group light - medium grey dolomite slightly crystalline fractured water bearing zone			12" Ø Open hole in rock
139 (900)		(274.3 m amsl) N.B. Static level, 11.42 ft. below top of casing on April 15/80 ELEV. = 1029.48			

FIGURE 2.3

* Based on driller's log, Guelph Fm. interpreted to occur from El. 302.1 to 299.9 m amsl. Eramosa from 299.9 to 292.3 m amsl.

Conestoga - Rovers & Associates

Ministry of the Environment
Ontario

TW #3/80

The Ontario Water Resources Act
WATER WELL RECORD

MOE # 67-07290

County or District	Township, Borough, City, Town, Village	Con., Block, Tract, Survey, etc.	Lot
Wellington	Puslinch	Con 7	23, 2

Owner	Address	Date Completed
Elliott, Mr. John	R.R. #3, Guelph, Ontario.	14 Apr. 80

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	Stones			
Brown	" sand	Gravels		0	20
M. Br.		Rock		20	47
D. Br.		Rock		47	55
Black		Rock		55	75
M. Br.		Rock		75	85
Grey & Br.		Rock		85	95
D. Grey		Rock		95	135
				135	139
	TW #3/80	Total Depth			139

12" shoe

WATER RECORD

Water Found at Feet	Kind of Water
55	Fresh
93	Fresh
130	Fresh

CASING & OPEN HOLE RECORD

Inside Diam. Inches	Material	Wall Thickness Inches	Depth From	Depth To
12"	Steel	.250	0	48
12	Open hole		48	139

PLUGGING & SEALING RECORD

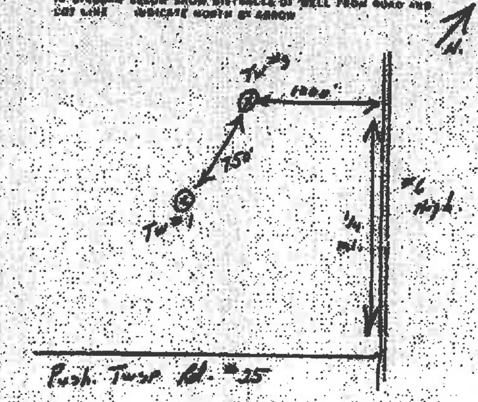
Depth Set At - From	Depth Set At - To	Material and Type
102	110	Cement
110	120	Bentonite Grout
120	139	Limestone Gravel

PUMPING TEST

Pump; Pumping rate 1200 GPM; Duration of pumping 24 hours
Static level 11' 6"; Water level end of pumping 50 ft.; Water levels during recovery 11' 6"
Clear; Recommended pump type: Deep; Recommended pump setting 100 ft.; Recommended pumping rate 1200 GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Push. Twsp. Rd. #25

FINAL STATUS OF WELL

Water supply

WATER USE

Commercial

METHOD OF DRILLING

Cable tool

CONTRACTOR

Name of Well Contractor	Licence Number
Graham Well Drilling Ltd.	2936

Address: Guelph, Ont.
Name of Driller: J. Hawkins 22w
Submission date: 30 Apr. 80

CONTRACTOR'S COPY

FORM NO. 0506-4-77 FORM 7

APPENDIX C

TW3-80 Water Taking

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Jan-24	247,987	172	938,734	651.9
02-Jan-24	373,444	259	1,413,637	981.7
03-Jan-24	449,988	312	1,703,389	1182.9
04-Jan-24	435,551	302	1,648,737	1145.0
05-Jan-24	410,404	285	1,553,548	1078.9
06-Jan-24	546,251	379	2,067,783	1436.0
07-Jan-24	608,286	422	2,302,611	1599.0
08-Jan-24	387,023	269	1,465,039	1017.4
09-Jan-24	341,615	237	1,293,153	898.0
10-Jan-24	260,012	181	984,254	683.5
11-Jan-24	406,548	282	1,538,949	1068.7
12-Jan-24	468,465	325	1,773,332	1231.5
13-Jan-24	530,131	368	2,006,763	1393.6
14-Jan-24	610,074	424	2,309,381	1603.7
15-Jan-24	594,768	413	2,251,440	1563.5
16-Jan-24	466,939	324	1,767,555	1227.5
17-Jan-24	426,571	296	1,614,747	1121.4
18-Jan-24	484,010	336	1,832,176	1272.3
19-Jan-24	566,219	393	2,143,373	1488.5
20-Jan-24	503,068	349	1,904,320	1322.4
21-Jan-24	469,424	326	1,776,963	1234.0
22-Jan-24	438,818	305	1,661,107	1153.5
23-Jan-24	297,745	207	1,127,086	782.7
24-Jan-24	484,728	337	1,834,893	1274.2
25-Jan-24	564,416	392	2,136,547	1483.7
26-Jan-24	460,470	320	1,743,069	1210.5
27-Jan-24	481,834	335	1,823,937	1266.6
28-Jan-24	571,377	397	2,162,896	1502.0
29-Jan-24	476,334	331	1,803,121	1252.2
30-Jan-24	378,846	263	1,434,086	995.9
31-Jan-24	485,097	337	1,836,292	1275.2

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Feb-24	764,044	531	2,892,219	2008.5
02-Feb-24	568,629	395	2,152,493	1494.8
03-Feb-24	421,053	292	1,593,857	1106.8
04-Feb-24	502,498	349	1,902,160	1320.9
05-Feb-24	465,223	323	1,761,061	1223.0
06-Feb-24	575,864	400	2,179,880	1513.8
07-Feb-24	461,959	321	1,748,704	1214.4
08-Feb-24	492,735	342	1,865,203	1295.3
09-Feb-24	519,819	361	1,967,728	1366.5
10-Feb-24	628,762	437	2,380,123	1652.9
11-Feb-24	611,681	425	2,315,463	1608.0
12-Feb-24	674,126	468	2,551,843	1772.1
13-Feb-24	522,804	363	1,979,028	1374.3
14-Feb-24	530,549	368	2,008,347	1394.7
15-Feb-24	430,221	299	1,628,564	1130.9
16-Feb-24	459,507	319	1,739,421	1207.9
17-Feb-24	502,178	349	1,900,950	1320.1
18-Feb-24	513,010	356	1,941,952	1348.6
19-Feb-24	573,296	398	2,170,160	1507.1
20-Feb-24	485,435	337	1,837,570	1276.1
21-Feb-24	457,754	318	1,732,786	1203.3
22-Feb-24	475,372	330	1,799,476	1249.6
23-Feb-24	494,599	343	1,872,261	1300.2
24-Feb-24	558,647	388	2,114,708	1468.5
25-Feb-24	550,810	383	2,085,041	1447.9
26-Feb-24	535,941	372	2,028,757	1408.9
27-Feb-24	827,929	575	3,134,051	2176.4
28-Feb-24	562,996	391	2,131,172	1480.0
29-Feb-24	546,678	380	2,069,399	1437.1

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Mar-24	492,722	342	1,865,153	1295.2
02-Mar-24	390,414	271	1,477,879	1026.3
03-Mar-24	568,434	395	2,151,755	1494.3
04-Mar-24	459,947	319	1,741,089	1209.1
05-Mar-24	533,551	371	2,019,707	1402.6
06-Mar-24	856,515	595	3,242,259	2251.6
07-Mar-24	472,566	328	1,788,856	1242.3
08-Mar-24	521,460	362	1,973,940	1370.8
09-Mar-24	545,006	378	2,063,072	1432.7
10-Mar-24	499,233	347	1,889,800	1312.4
11-Mar-24	557,468	387	2,110,245	1465.4
12-Mar-24	424,953	295	1,608,622	1117.1
13-Mar-24	498,264	346	1,886,135	1309.8
14-Mar-24	800,060	556	3,028,556	2103.2
15-Mar-24	550,969	383	2,085,644	1448.4
16-Mar-24	633,740	440	2,398,967	1665.9
17-Mar-24	628,943	437	2,380,808	1653.3
18-Mar-24	558,661	388	2,114,761	1468.6
19-Mar-24	275,098	191	1,041,358	723.2
20-Mar-24	599,743	416	2,270,271	1576.6
21-Mar-24	556,622	387	2,107,041	1463.2
22-Mar-24	434,549	302	1,644,946	1142.3
23-Mar-24	407,148	283	1,541,222	1070.3
24-Mar-24	492,983	342	1,866,142	1295.9
25-Mar-24	418,269	290	1,583,319	1099.5
26-Mar-24	597,561	415	2,262,014	1570.8
27-Mar-24	471,010	327	1,782,964	1238.2
28-Mar-24	483,705	336	1,831,022	1271.5
29-Mar-24	489,979	340	1,854,771	1288.0
30-Mar-24	495,946	344	1,877,359	1303.7
31-Mar-24	528,209	367	1,999,488	1388.5

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Apr-24	540,008	375	2,044,152	1419.5
02-Apr-24	402,732	280	1,524,506	1058.7
03-Apr-24	506,663	352	1,917,926	1331.9
04-Apr-24	436,675	303	1,652,995	1147.9
05-Apr-24	419,292	291	1,587,192	1102.2
06-Apr-24	497,742	346	1,884,158	1308.4
07-Apr-24	482,436	335	1,826,219	1268.2
08-Apr-24	475,548	330	1,800,143	1250.1
09-Apr-24	475,874	330	1,801,378	1251.0
10-Apr-24	405,477	282	1,534,897	1065.9
11-Apr-24	427,959	297	1,620,000	1125.0
12-Apr-24	364,165	253	1,378,514	957.3
13-Apr-24	393,421	273	1,489,259	1034.2
14-Apr-24	393,582	273	1,489,868	1034.6
15-Apr-24	219,875	153	832,317	578.0
16-Apr-24	184,158	128	697,113	484.1
17-Apr-24	338,717	235	1,282,182	890.4
18-Apr-24	430,170	299	1,628,371	1130.8
19-Apr-24	511,935	356	1,937,885	1345.8
20-Apr-24	496,719	345	1,880,286	1305.8
21-Apr-24	632,120	439	2,392,834	1661.7
22-Apr-24	620,833	431	2,350,106	1632.0
23-Apr-24	553,723	385	2,096,069	1455.6
24-Apr-24	615,380	427	2,329,467	1617.7
25-Apr-24	495,563	344	1,875,908	1302.7
26-Apr-24	524,159	364	1,984,155	1377.9
27-Apr-24	512,712	356	1,940,827	1347.8
28-Apr-24	548,958	381	2,078,031	1443.1
29-Apr-24	503,304	350	1,905,212	1323.1
30-Apr-24	577,920	401	2,187,663	1519.2

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-May-24	480,058	333	1,817,218	1262.0
02-May-24	452,423	314	1,712,608	1189.3
03-May-24	572,543	398	2,167,308	1505.1
04-May-24	534,739	371	2,024,206	1405.7
05-May-24	525,523	365	1,989,320	1381.5
06-May-24	563,835	392	2,134,345	1482.2
07-May-24	617,301	429	2,336,738	1622.7
08-May-24	587,755	408	2,224,895	1545.1
09-May-24	502,708	349	1,902,955	1321.5
10-May-24	590,772	410	2,236,315	1553.0
11-May-24	541,077	376	2,048,199	1422.4
12-May-24	552,633	384	2,091,942	1452.7
13-May-24	483,836	336	1,831,517	1271.9
14-May-24	613,475	426	2,322,254	1612.7
15-May-24	470,498	327	1,781,028	1236.8
16-May-24	546,375	379	2,068,253	1436.3
17-May-24	606,334	421	2,295,223	1593.9
18-May-24	509,457	354	1,928,503	1339.2
19-May-24	510,519	355	1,932,522	1342.0
20-May-24	533,742	371	2,020,433	1403.1
21-May-24	632,576	439	2,394,558	1662.9
22-May-24	507,412	352	1,920,764	1333.9
23-May-24	541,268	376	2,048,921	1422.9
24-May-24	583,486	405	2,208,732	1533.8
25-May-24	508,646	353	1,925,432	1337.1
26-May-24	634,909	441	2,403,392	1669.0
27-May-24	556,070	386	2,104,952	1461.8
28-May-24	463,850	322	1,755,861	1219.3
29-May-24	317,450	220	1,201,680	834.5
30-May-24	375,102	260	1,419,914	986.1
31-May-24	436,028	303	1,650,544	1146.2

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Jun-24	519,032	360	1,964,749	1364.4
02-Jun-24	427,437	297	1,618,024	1123.6
03-Jun-24	519,938	361	1,968,179	1366.8
04-Jun-24	597,454	415	2,261,609	1570.6
05-Jun-24	562,253	390	2,128,358	1478.0
06-Jun-24	621,341	431	2,352,031	1633.4
07-Jun-24	609,637	423	2,307,728	1602.6
08-Jun-24	548,175	381	2,075,065	1441.0
09-Jun-24	644,084	447	2,438,123	1693.1
10-Jun-24	613,494	426	2,322,325	1612.7
11-Jun-24	645,087	448	2,441,920	1695.8
12-Jun-24	636,933	442	2,411,054	1674.3
13-Jun-24	492,835	342	1,865,581	1295.5
14-Jun-24	585,676	407	2,217,024	1539.6
15-Jun-24	659,886	458	2,497,939	1734.7
16-Jun-24	537,989	374	2,036,507	1414.2
17-Jun-24	513,816	357	1,945,005	1350.7
18-Jun-24	509,975	354	1,930,463	1340.6
19-Jun-24	502,444	349	1,901,955	1320.8
20-Jun-24	602,524	418	2,280,801	1583.9
21-Jun-24	665,821	462	2,520,404	1750.3
22-Jun-24	669,891	465	2,535,813	1761.0
23-Jun-24	574,852	399	2,176,052	1511.1
24-Jun-24	612,784	426	2,319,640	1610.9
25-Jun-24	562,317	390	2,128,601	1478.2
26-Jun-24	511,327	355	1,935,581	1344.2
27-Jun-24	500,883	348	1,896,046	1316.7
28-Jun-24	622,374	432	2,355,940	1636.1
29-Jun-24	659,184	458	2,495,283	1732.8
30-Jun-24	416,535	289	1,576,755	1095.0

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Jul-24	302,877	210	1,146,515	796.2
02-Jul-24	421,603	293	1,595,941	1108.3
03-Jul-24	570,117	396	2,158,125	1498.7
04-Jul-24	488,342	339	1,848,574	1283.7
05-Jul-24	399,344	277	1,511,682	1049.8
06-Jul-24	428,602	298	1,622,434	1126.7
07-Jul-24	453,530	315	1,716,795	1192.2
08-Jul-24	444,330	309	1,681,970	1168.0
09-Jul-24	477,801	332	1,808,674	1256.0
10-Jul-24	563,474	391	2,132,981	1481.2
11-Jul-24	539,228	374	2,041,198	1417.5
12-Jul-24	438,396	304	1,659,508	1152.4
13-Jul-24	594,759	413	2,251,408	1563.5
14-Jul-24	562,183	390	2,128,094	1477.8
15-Jul-24	488,059	339	1,847,504	1283.0
16-Jul-24	468,046	325	1,771,746	1230.4
17-Jul-24	499,584	347	1,891,131	1313.3
18-Jul-24	573,794	398	2,172,044	1508.4
19-Jul-24	474,483	330	1,796,114	1247.3
20-Jul-24	513,122	356	1,942,376	1348.9
21-Jul-24	489,831	340	1,854,212	1287.6
22-Jul-24	573,153	398	2,169,621	1506.7
23-Jul-24	580,538	403	2,197,574	1526.1
24-Jul-24	579,653	403	2,194,222	1523.8
25-Jul-24	545,204	379	2,063,821	1433.2
26-Jul-24	560,626	389	2,122,200	1473.7
27-Jul-24	547,997	381	2,074,394	1440.6
28-Jul-24	526,171	365	1,991,772	1383.2
29-Jul-24	471,651	328	1,785,391	1239.9
30-Jul-24	471,589	327	1,785,159	1239.7
31-Jul-24	420,658	292	1,592,362	1105.8

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Aug-24	388,288	270	1,469,831	1020.7
02-Aug-24	456,210	317	1,726,940	1199.3
03-Aug-24	497,525	346	1,883,334	1307.9
04-Aug-24	133,588	93	505,686	351.2
05-Aug-24	188,358	131	713,012	495.1
06-Aug-24	240,267	167	909,508	631.6
07-Aug-24	337,343	234	1,276,981	886.8
08-Aug-24	426,316	296	1,613,780	1120.7
09-Aug-24	476,504	331	1,803,765	1252.6
10-Aug-24	527,596	366	1,997,168	1386.9
11-Aug-24	478,513	332	1,811,366	1257.9
12-Aug-24	447,825	311	1,695,201	1177.2
13-Aug-24	302,182	210	1,143,883	794.4
14-Aug-24	452,048	314	1,711,186	1188.3
15-Aug-24	394,902	274	1,494,867	1038.1
16-Aug-24	459,369	319	1,738,899	1207.6
17-Aug-24	447,778	311	1,695,024	1177.1
18-Aug-24	391,876	272	1,483,411	1030.1
19-Aug-24	217,451	151	823,140	571.6
20-Aug-24	331,634	230	1,255,371	871.8
21-Aug-24	289,064	201	1,094,226	759.9
22-Aug-24	253,208	176	958,495	665.6
23-Aug-24	397,445	276	1,504,493	1044.8
24-Aug-24	355,349	247	1,345,140	934.1
25-Aug-24	238,869	166	904,218	627.9
26-Aug-24	389,253	270	1,473,481	1023.3
27-Aug-24	468,538	325	1,773,610	1231.7
28-Aug-24	422,713	294	1,600,143	1111.2
29-Aug-24	332,621	231	1,259,106	874.4
30-Aug-24	356,974	248	1,351,294	938.4
31-Aug-24	429,880	299	1,627,272	1130.1

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Sep-24	407,020	283	1,540,738	1070.0
02-Sep-24	339,760	236	1,286,131	893.1
03-Sep-24	253,771	176	960,626	667.1
04-Sep-24	375,812	261	1,422,604	987.9
05-Sep-24	407,050	283	1,540,849	1070.0
06-Sep-24	474,878	330	1,797,607	1248.3
07-Sep-24	337,306	234	1,276,840	886.7
08-Sep-24	379,917	264	1,438,141	998.7
09-Sep-24	477,736	332	1,808,427	1255.9
10-Sep-24	412,823	287	1,562,704	1085.2
11-Sep-24	505,589	351	1,913,861	1329.1
12-Sep-24	449,833	312	1,702,801	1182.5
13-Sep-24	425,404	295	1,610,329	1118.3
14-Sep-24	376,810	262	1,426,380	990.5
15-Sep-24	329,460	229	1,247,140	866.1
16-Sep-24	352,771	245	1,335,384	927.4
17-Sep-24	254,632	177	963,885	669.4
18-Sep-24	275,539	191	1,043,030	724.3
19-Sep-24	419,487	291	1,587,932	1102.7
20-Sep-24	466,271	324	1,765,028	1225.7
21-Sep-24	484,109	336	1,832,551	1272.6
22-Sep-24	484,486	336	1,833,977	1273.6
23-Sep-24	328,845	228	1,244,814	864.5
24-Sep-24	401,180	279	1,518,632	1054.6
25-Sep-24	327,981	228	1,241,541	862.2
26-Sep-24	252,111	175	954,342	662.7
27-Sep-24	307,623	214	1,164,478	808.7
28-Sep-24	245,633	171	929,822	645.7
29-Sep-24	161,284	112	610,527	424.0
30-Sep-24	208,315	145	788,557	547.6

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Oct-24	389,751	271	1,475,365	1024.6
02-Oct-24	454,830	316	1,721,718	1195.6
03-Oct-24	427,227	297	1,617,231	1123.1
04-Oct-24	528,046	367	1,998,870	1388.1
05-Oct-24	449,977	312	1,703,348	1182.9
06-Oct-24	518,726	360	1,963,591	1363.6
07-Oct-24	431,746	300	1,634,335	1135.0
08-Oct-24	484,425	336	1,833,748	1273.4
09-Oct-24	468,005	325	1,771,592	1230.3
10-Oct-24	514,400	357	1,947,215	1352.2
11-Oct-24	443,494	308	1,678,806	1165.8
12-Oct-24	545,732	379	2,065,819	1434.6
13-Oct-24	250,125	174	946,826	657.5
14-Oct-24	72,187	50	273,256	189.8
15-Oct-24	225,220	156	852,551	592.0
16-Oct-24	192,651	134	729,262	506.4
17-Oct-24	333,048	231	1,260,721	875.5
18-Oct-24	267,084	185	1,011,022	702.1
19-Oct-24	290,955	202	1,101,383	764.8
20-Oct-24	282,237	196	1,068,383	741.9
21-Oct-24	46,305	32	175,283	121.7
22-Oct-24	173,714	121	657,578	456.7
23-Oct-24	76,259	53	288,670	200.5
24-Oct-24	105,459	73	399,207	277.2
25-Oct-24	157,809	110	597,373	414.8
26-Oct-24	94,809	66	358,891	249.2
27-Oct-24	185,658	129	702,792	488.0
28-Oct-24	113,189	79	428,468	297.5
29-Oct-24	167,447	116	633,856	440.2
30-Oct-24	347,690	241	1,316,149	914.0
31-Oct-24	357,825	248	1,354,514	940.6

TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Nov-24	342,499	238	1,296,499	900.3
02-Nov-24	457,892	318	1,733,309	1203.7
03-Nov-24	443,916	308	1,680,405	1166.9
04-Nov-24	418,056	290	1,582,514	1099.0
05-Nov-24	381,915	265	1,445,705	1004.0
06-Nov-24	354,678	246	1,342,603	932.4
07-Nov-24	407,664	283	1,543,176	1071.6
08-Nov-24	463,236	322	1,753,539	1217.7
09-Nov-24	453,253	315	1,715,748	1191.5
10-Nov-24	354,521	246	1,342,008	932.0
11-Nov-24	361,507	251	1,368,454	950.3
12-Nov-24	313,420	218	1,186,425	823.9
13-Nov-24	395,600	275	1,497,508	1039.9
14-Nov-24	400,025	278	1,514,258	1051.6
15-Nov-24	373,283	259	1,413,030	981.3
16-Nov-24	365,698	254	1,384,318	961.3
17-Nov-24	323,765	225	1,225,583	851.1
18-Nov-24	268,937	187	1,018,037	707.0
19-Nov-24	314,328	218	1,189,858	826.3
20-Nov-24	384,513	267	1,455,538	1010.8
21-Nov-24	452,293	314	1,712,114	1189.0
22-Nov-24	447,189	311	1,692,793	1175.6
23-Nov-24	454,381	316	1,720,019	1194.5
24-Nov-24	467,794	325	1,770,792	1229.7
25-Nov-24	234,562	163	887,914	616.6
26-Nov-24	172,475	120	652,890	453.4
27-Nov-24	295,377	205	1,118,123	776.5
28-Nov-24	170,286	118	644,601	447.6
29-Nov-24	165,744	115	627,410	435.7
30-Nov-24	161,505	112	611,364	424.6

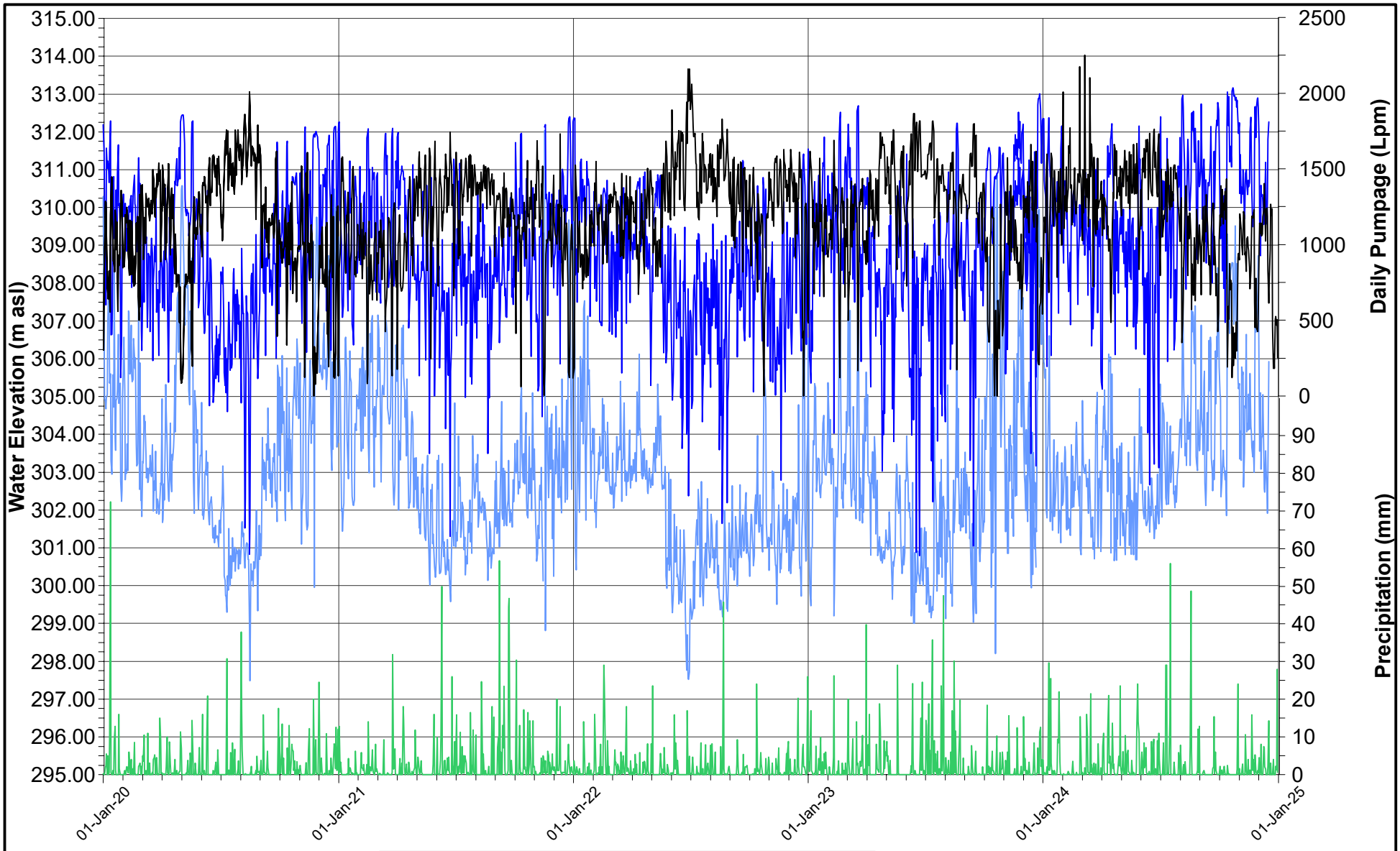
TABLE C1
TW3-80 DAILY WATER TAKING
WHITE WOLF PROPERTY MANAGEMENT
ABERFOYLE, ONTARIO

Date	Volume (US gpd)	Average Flow Rate Over Time Taken (US gpm)	Volume (L/day)	Average Flow Rate Over Time Taken (L/min)
01-Dec-24	214,181	149	810,763	563.0
02-Dec-24	380,167	264	1,439,089	999.4
03-Dec-24	434,551	302	1,644,953	1142.3
04-Dec-24	408,061	283	1,544,678	1072.7
05-Dec-24	434,586	302	1,645,084	1142.4
06-Dec-24	402,174	279	1,522,394	1057.2
07-Dec-24	406,463	282	1,538,630	1068.5
08-Dec-24	450,546	313	1,705,500	1184.4
09-Dec-24	466,904	324	1,767,422	1227.4
10-Dec-24	533,748	371	2,020,453	1403.1
11-Dec-24	461,658	321	1,747,563	1213.6
12-Dec-24	389,658	271	1,475,016	1024.3
13-Dec-24	469,042	326	1,775,517	1233.0
14-Dec-24	472,281	328	1,787,775	1241.5
15-Dec-24	450,892	313	1,706,810	1185.3
16-Dec-24	313,628	218	1,187,210	824.5
17-Dec-24	233,279	162	883,056	613.2
18-Dec-24	298,153	207	1,128,629	783.8
19-Dec-24	368,130	256	1,393,523	967.7
20-Dec-24	481,524	334	1,822,765	1265.8
21-Dec-24	453,711	315	1,717,482	1192.7
22-Dec-24	470,655	327	1,781,622	1237.2
23-Dec-24	174,575	121	660,838	458.9
24-Dec-24	69,197	48	261,939	181.9
25-Dec-24	103,267	72	390,908	271.5
26-Dec-24	69,078	48	261,489	181.6
27-Dec-24	192,440	134	728,463	505.9
28-Dec-24	199,465	139	755,056	524.3
29-Dec-24	178,212	124	674,604	468.5
30-Dec-24	191,856	133	726,254	504.3
31-Dec-24	96,047	67	363,576	252.5

Notes:
1. All volumes measured with a flow meter and recorded on a datalogger.

APPENDIX D

Groundwater Level Monitoring



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

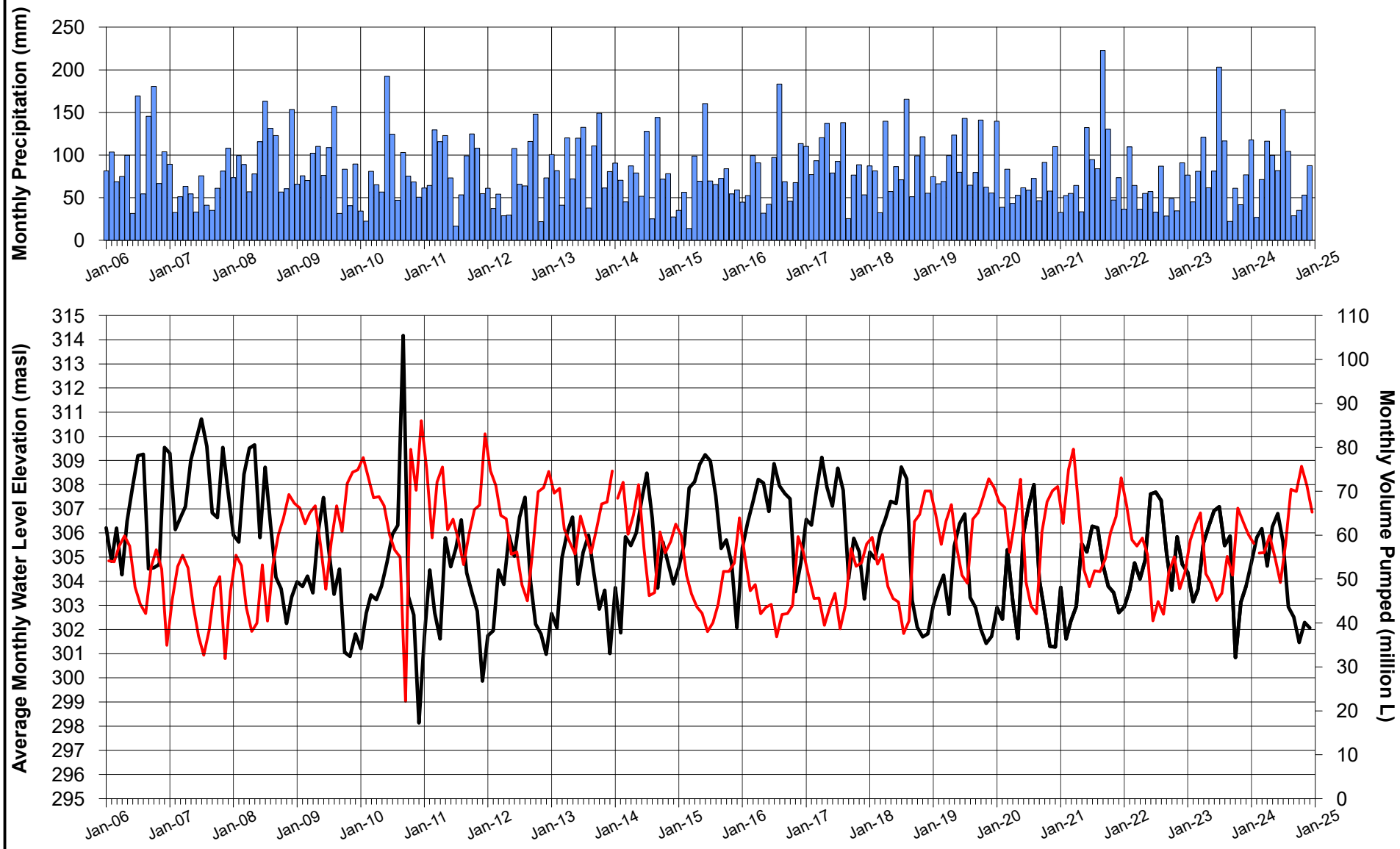
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

HYDROGRAPH FOR TW3-80
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D1a



DATE	MARCH 2025
DESIGN	KJ
REVIEW	GP
APPROVED	GP

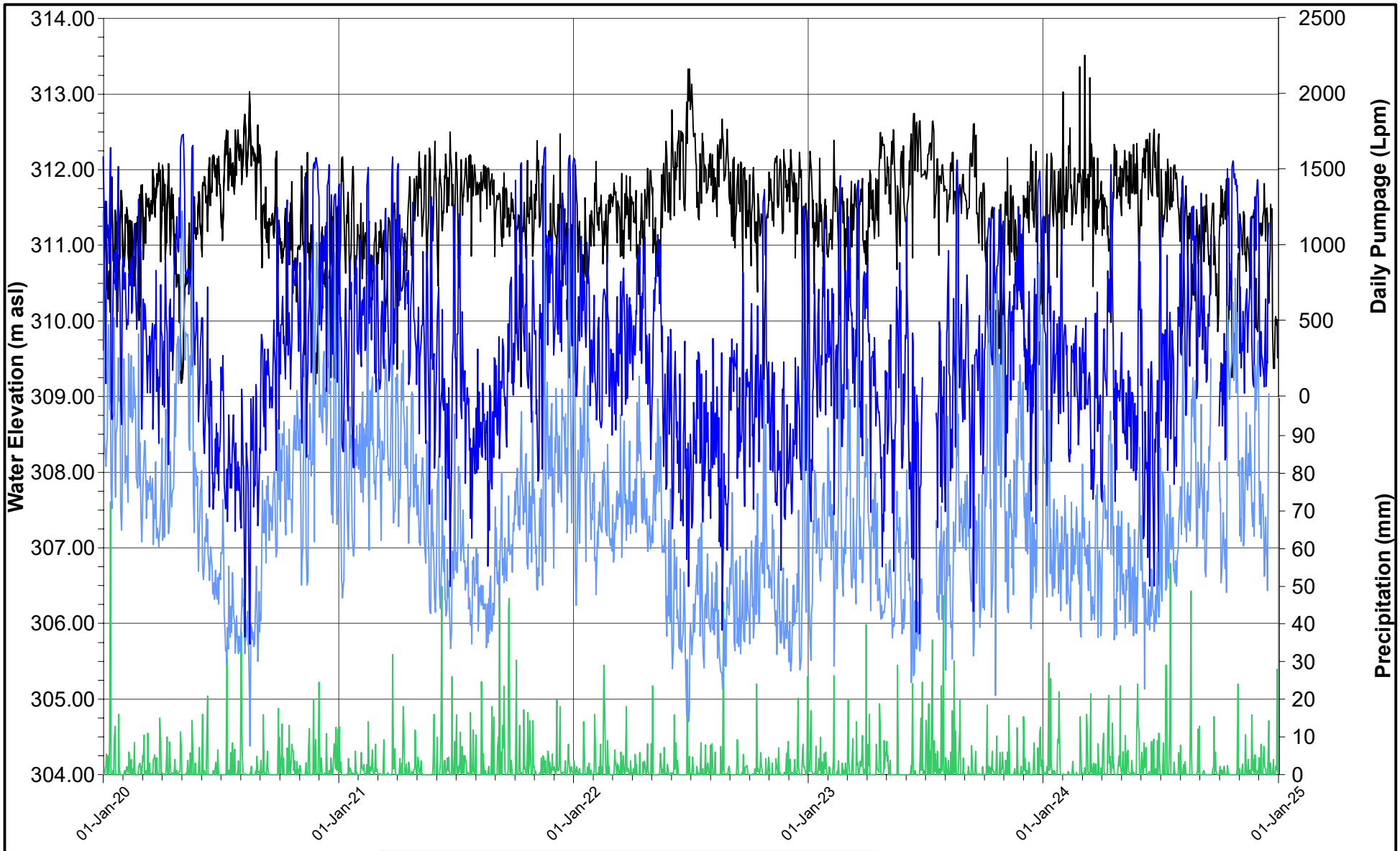
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

AVERAGE MONTHLY WATER LEVELS TW3-80
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D1b

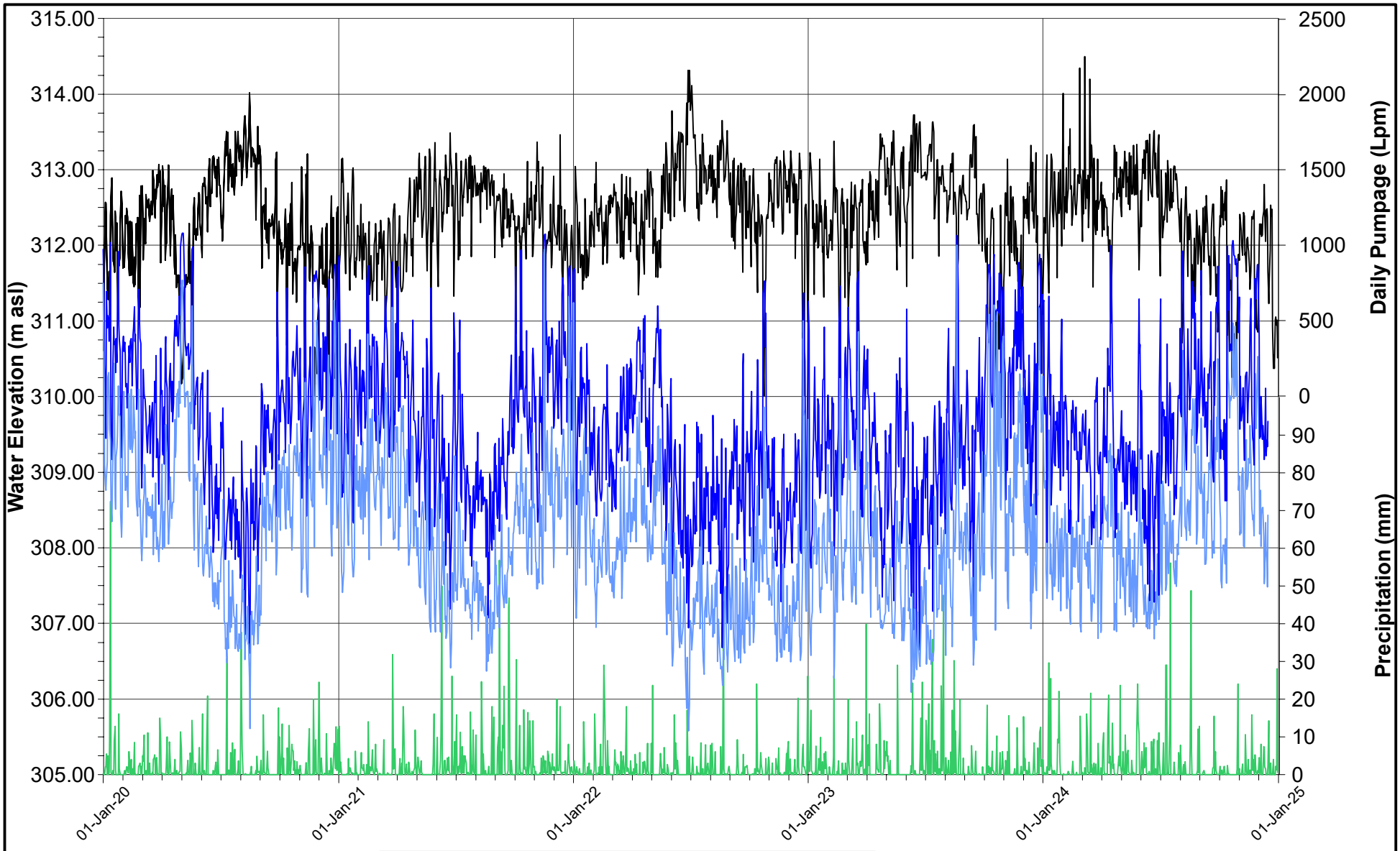


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D2



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

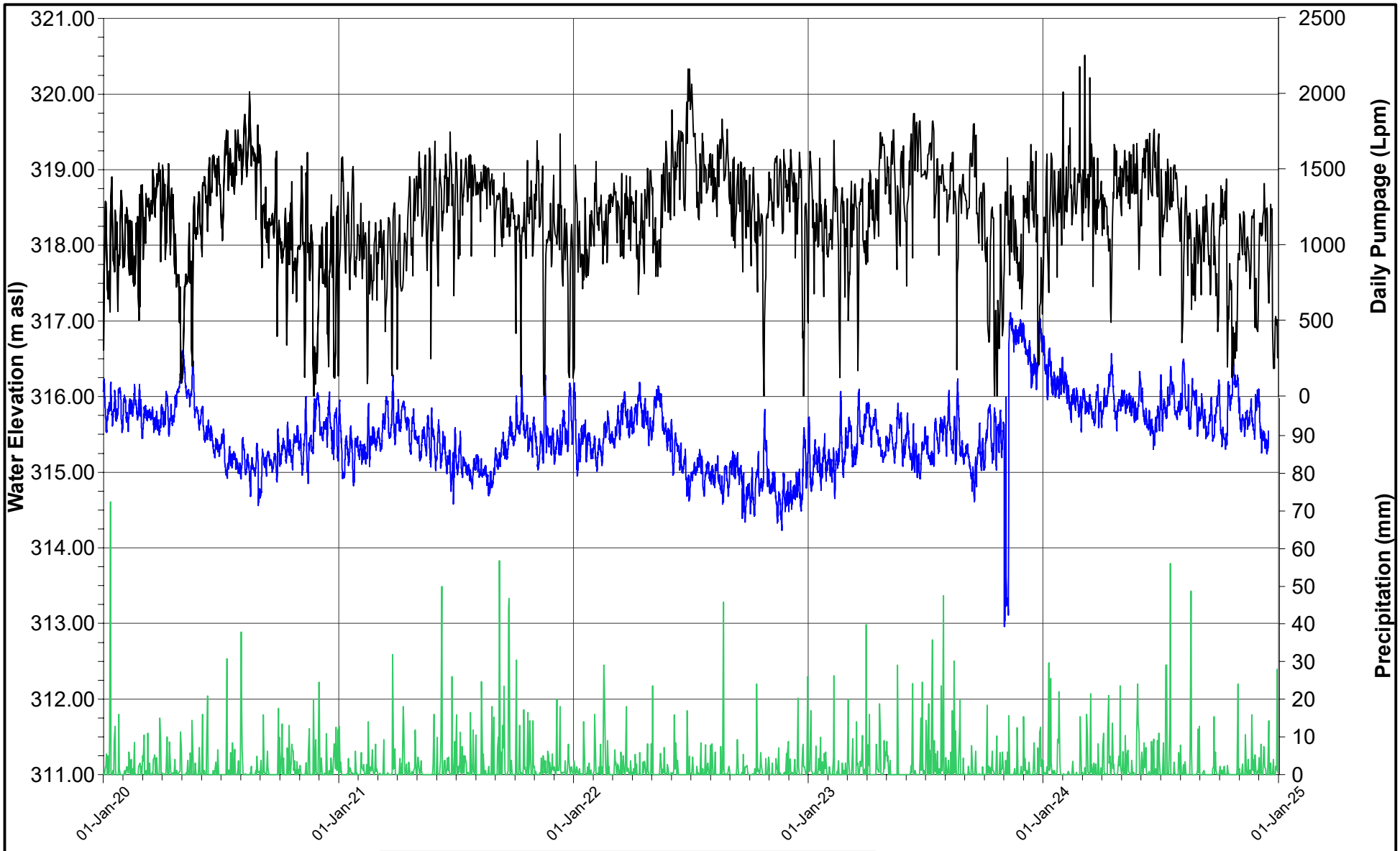
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D3



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

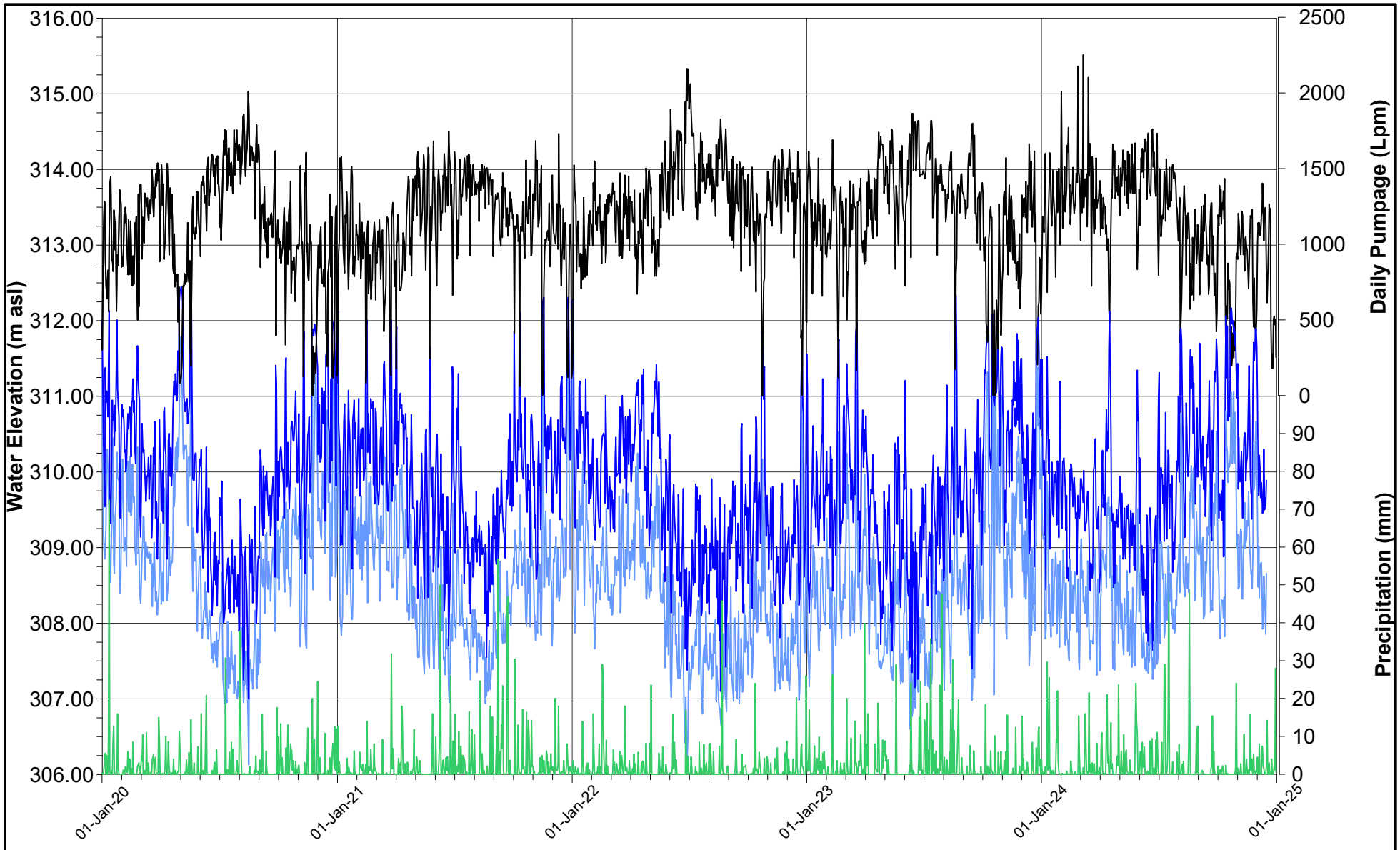
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D4



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

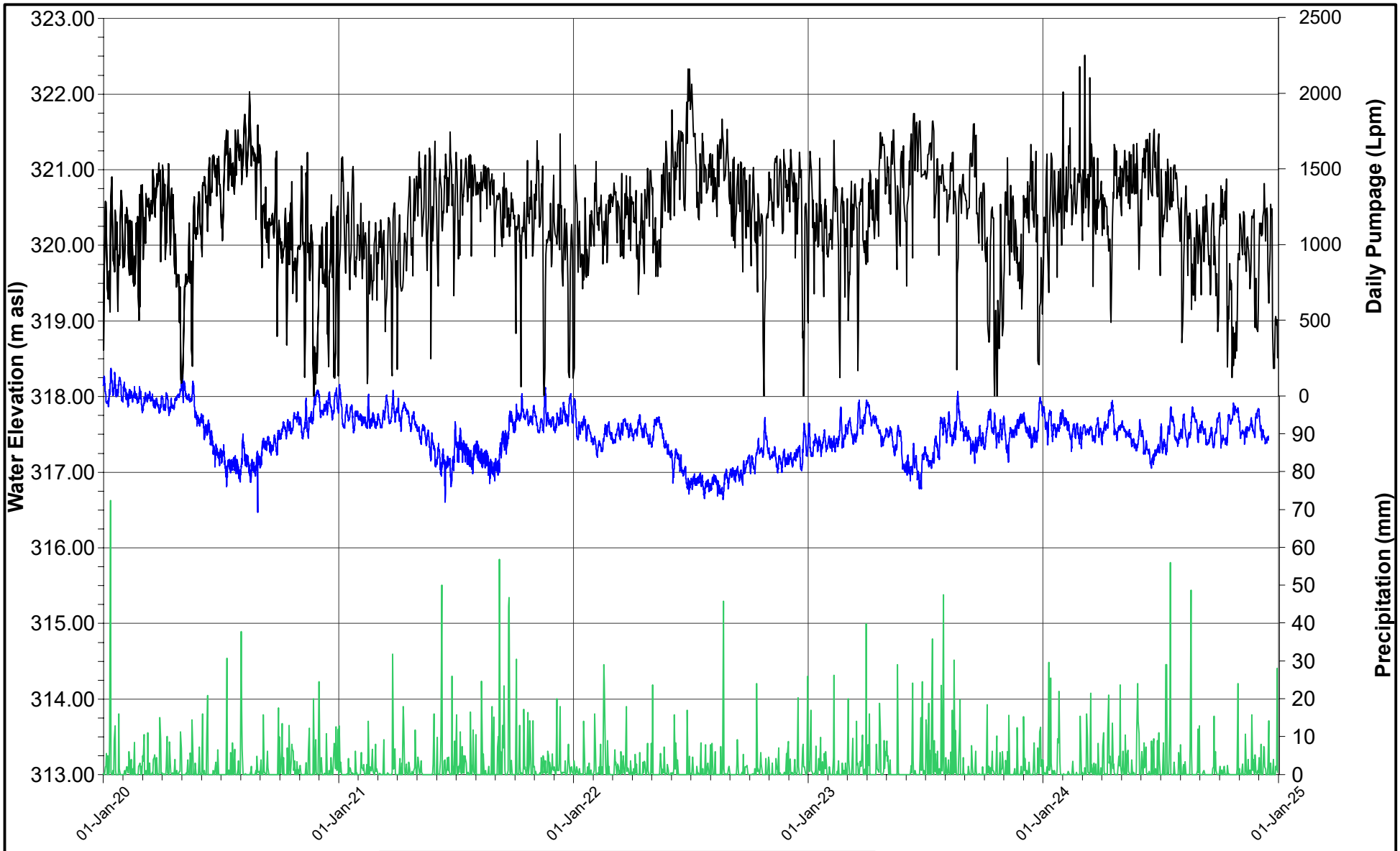
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D5



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

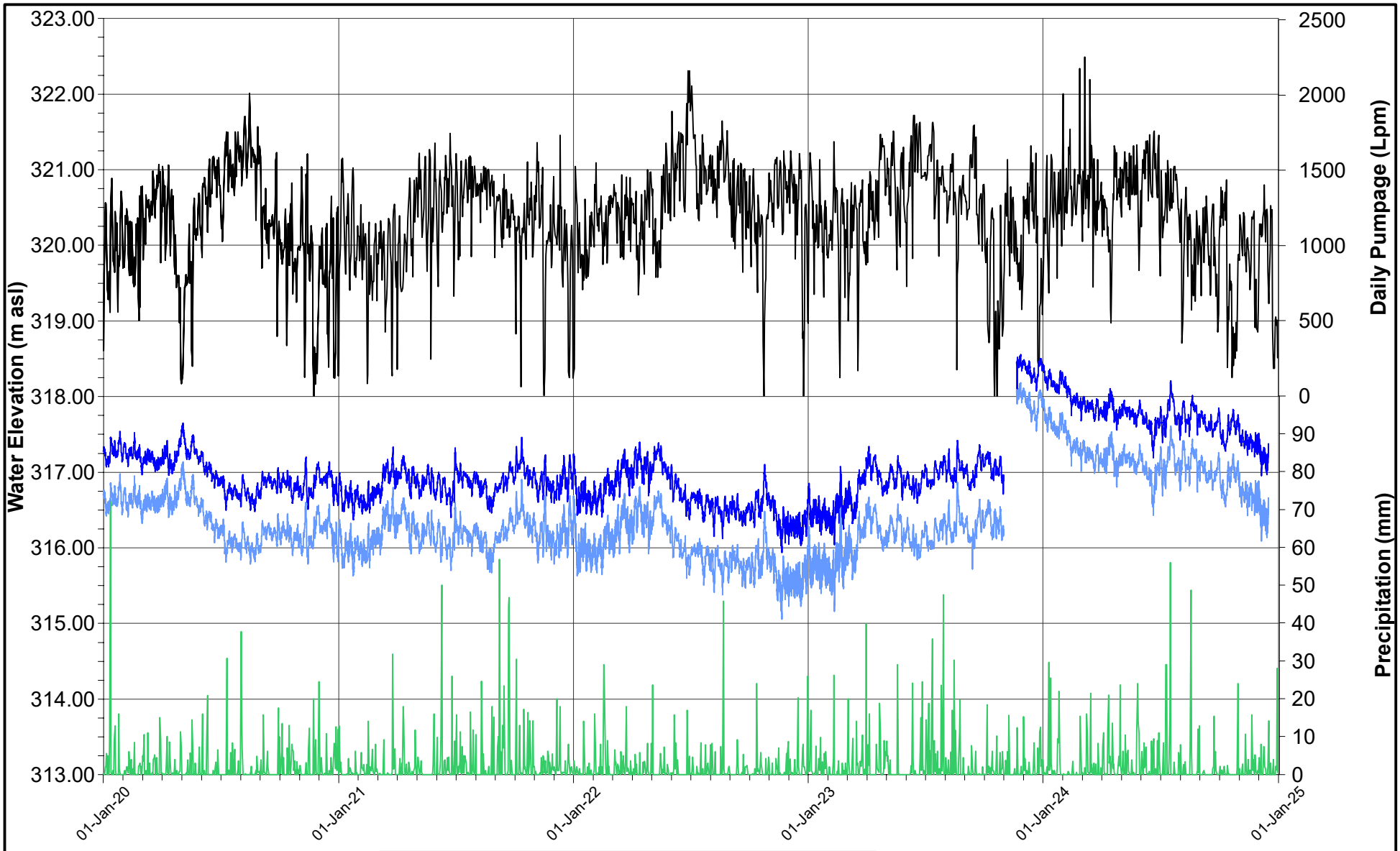
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D6



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

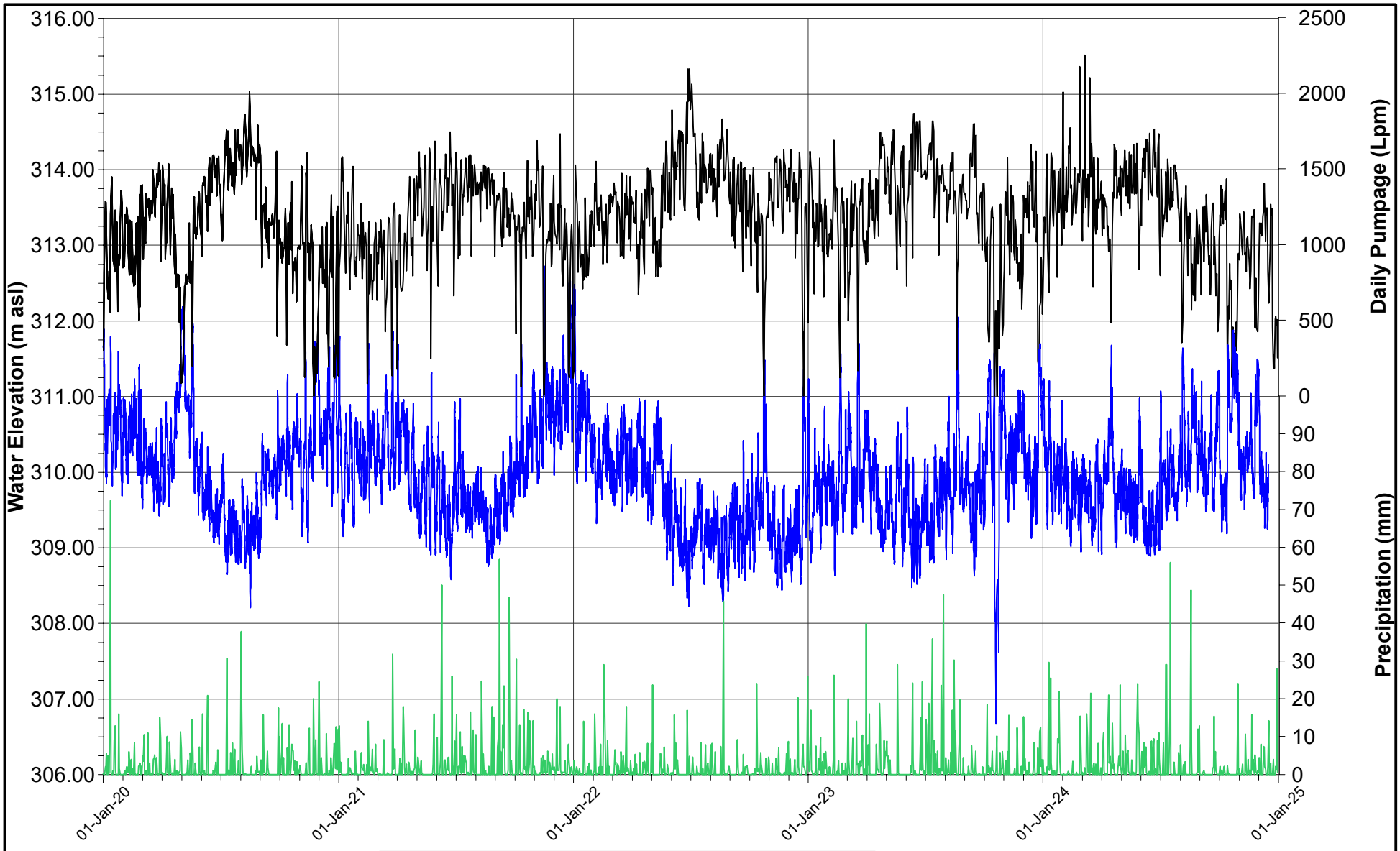
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D7



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

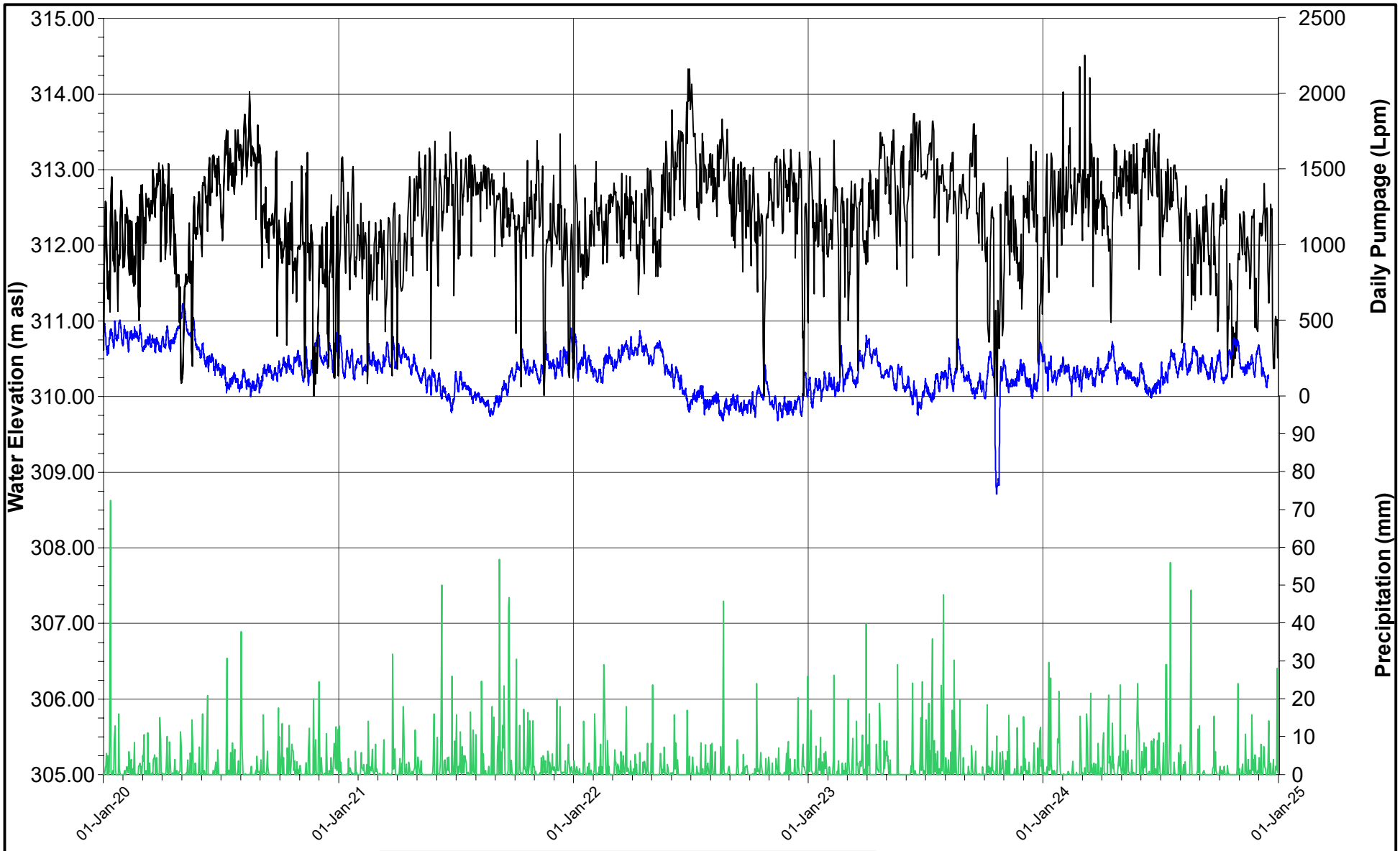
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D8



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

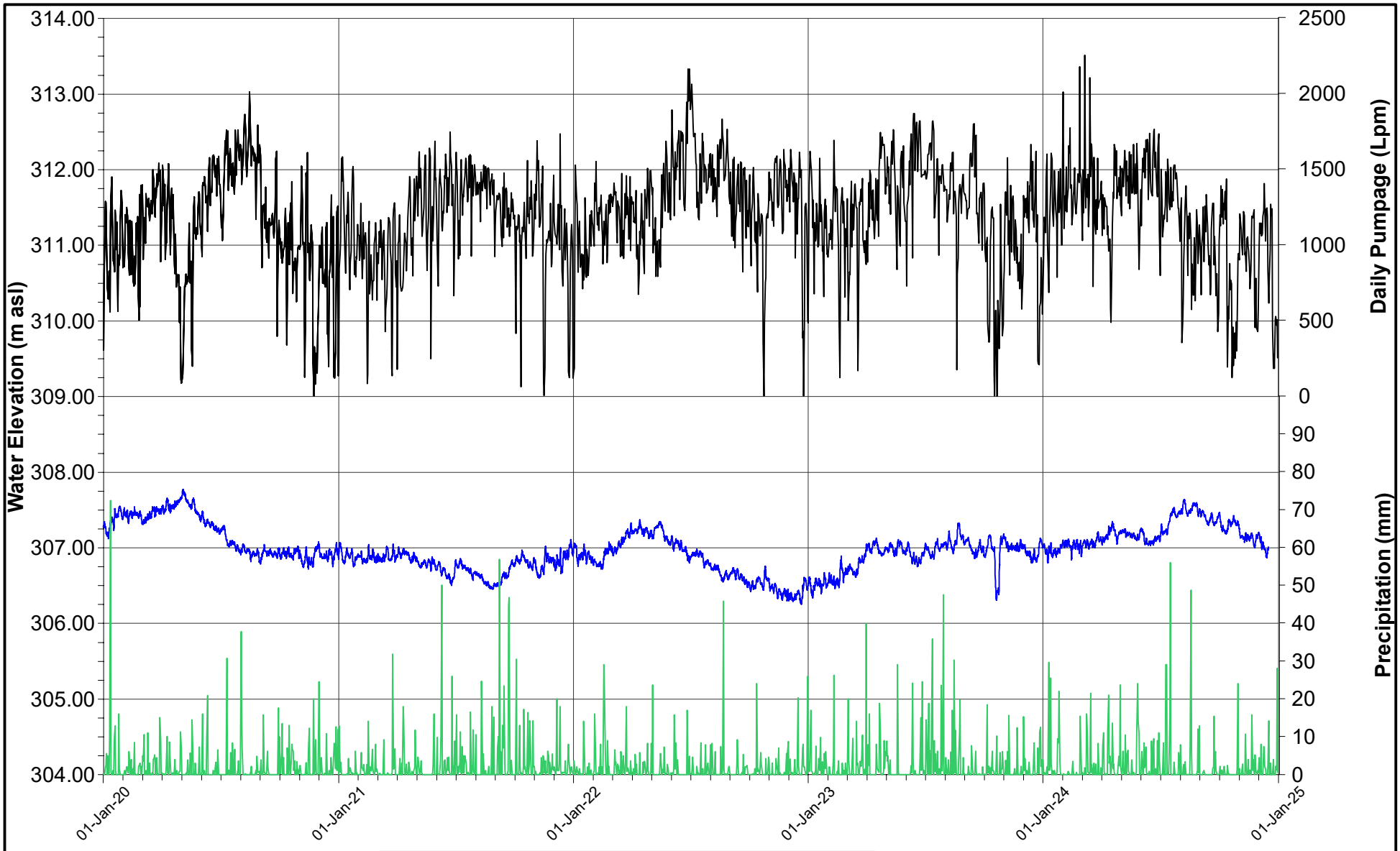
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D9

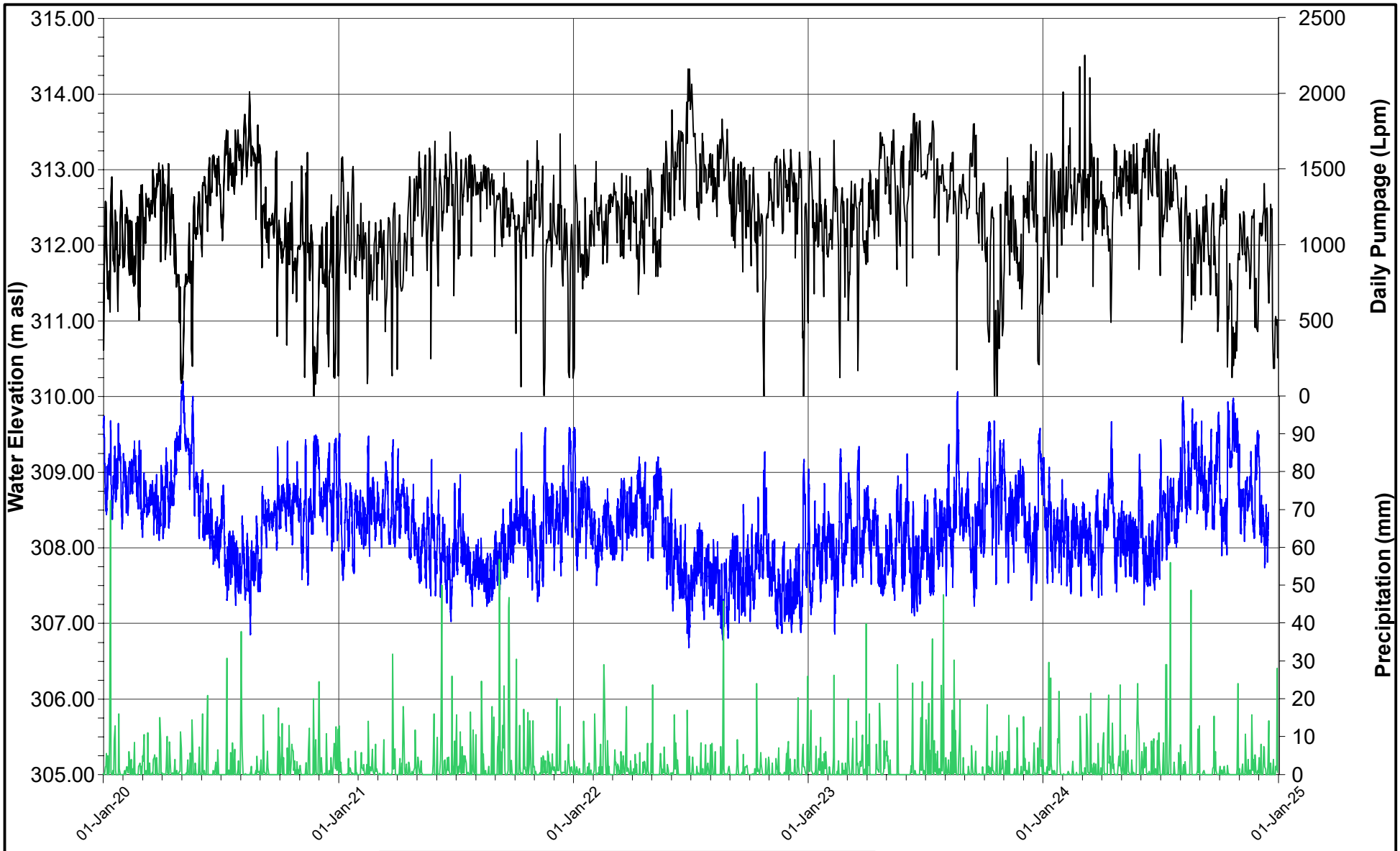


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D10



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

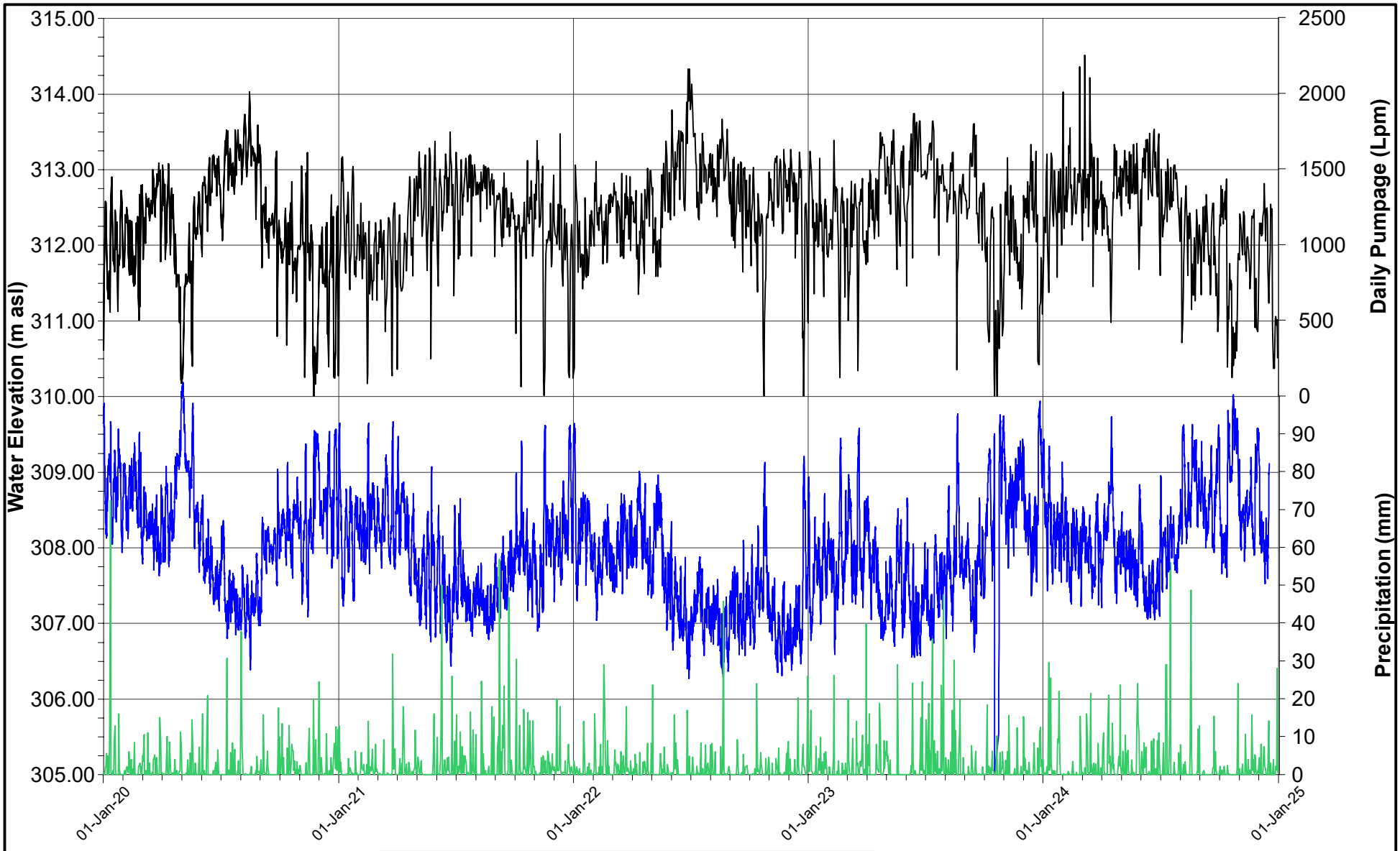
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D11



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

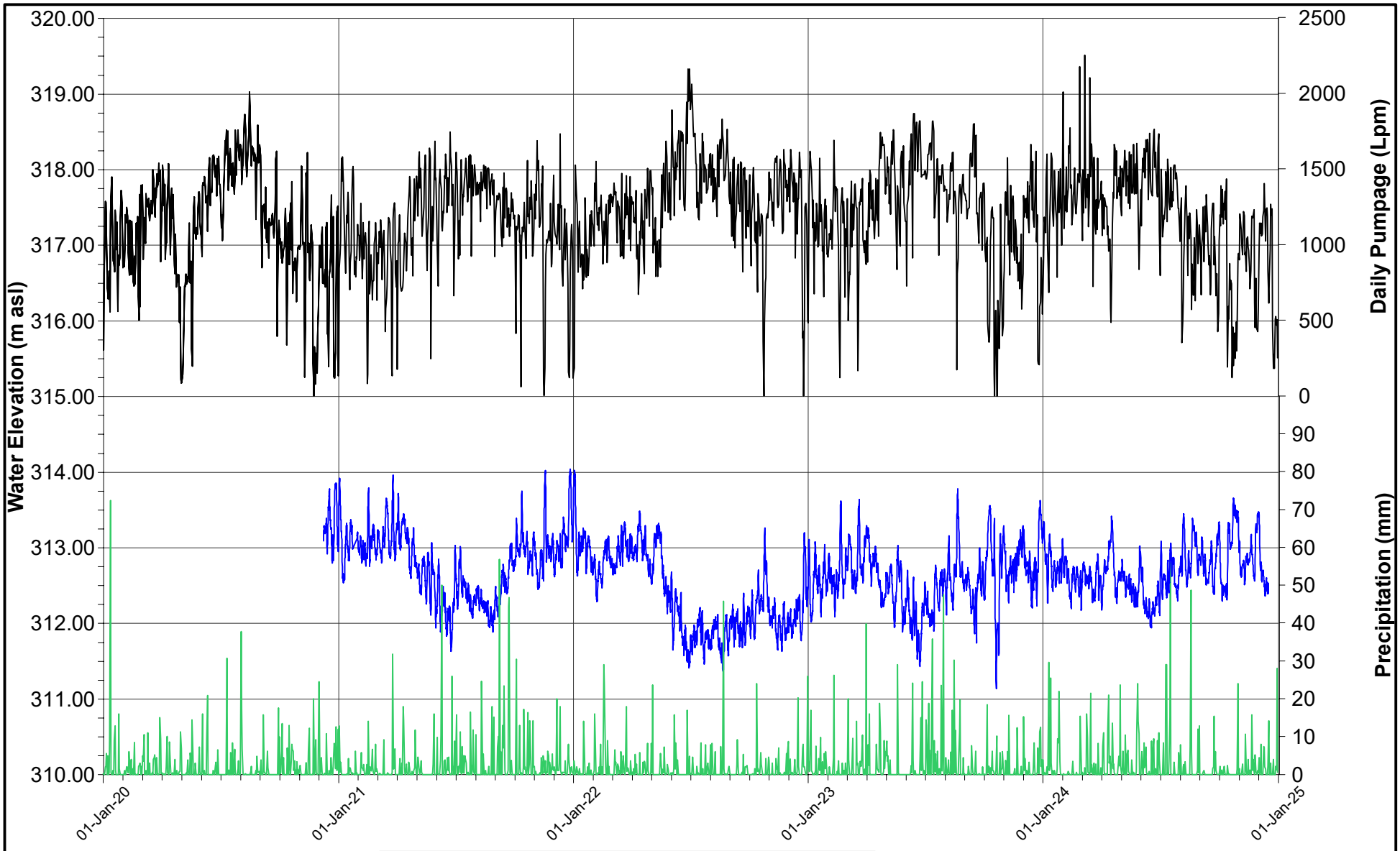
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D12



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

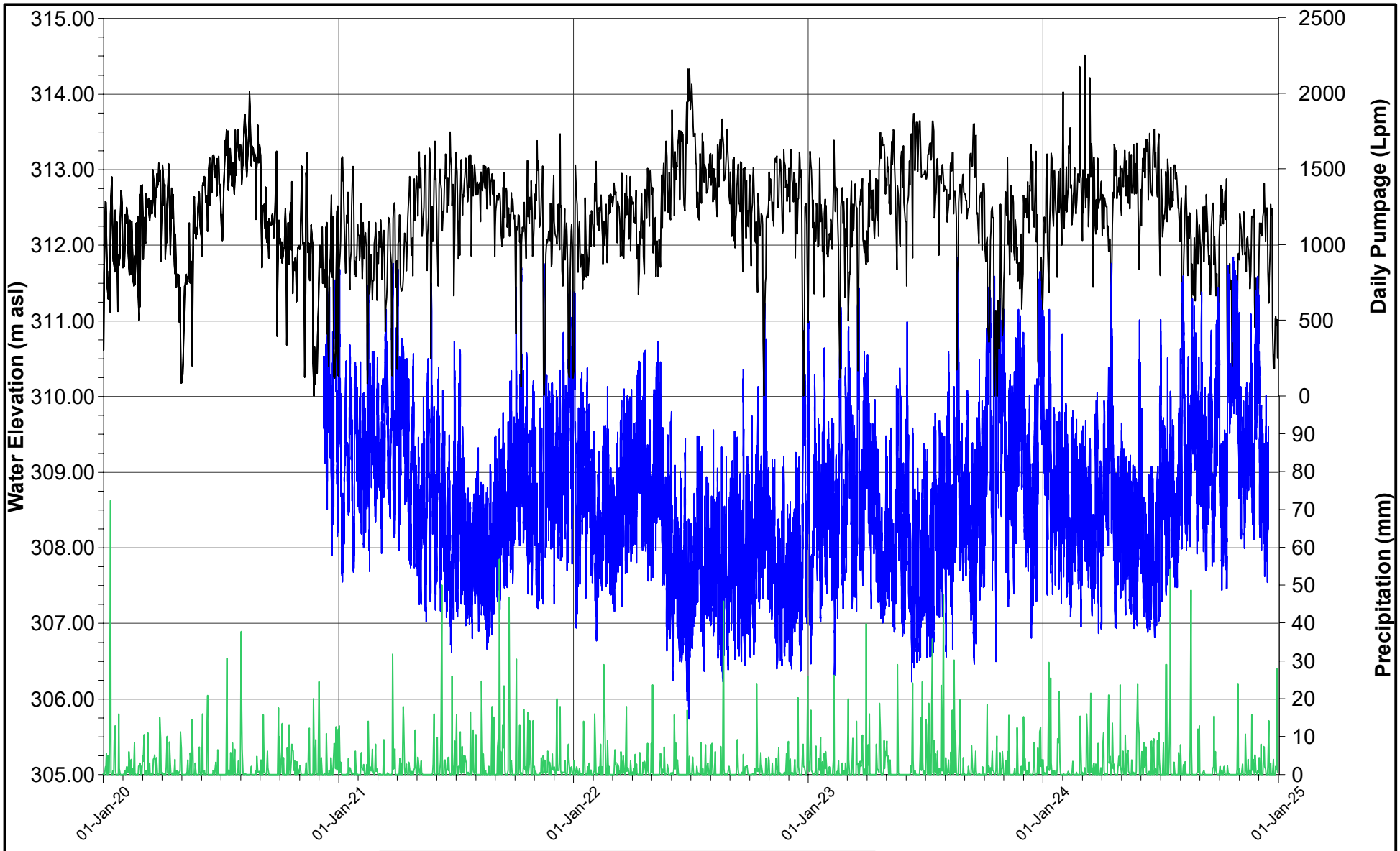
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D13



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

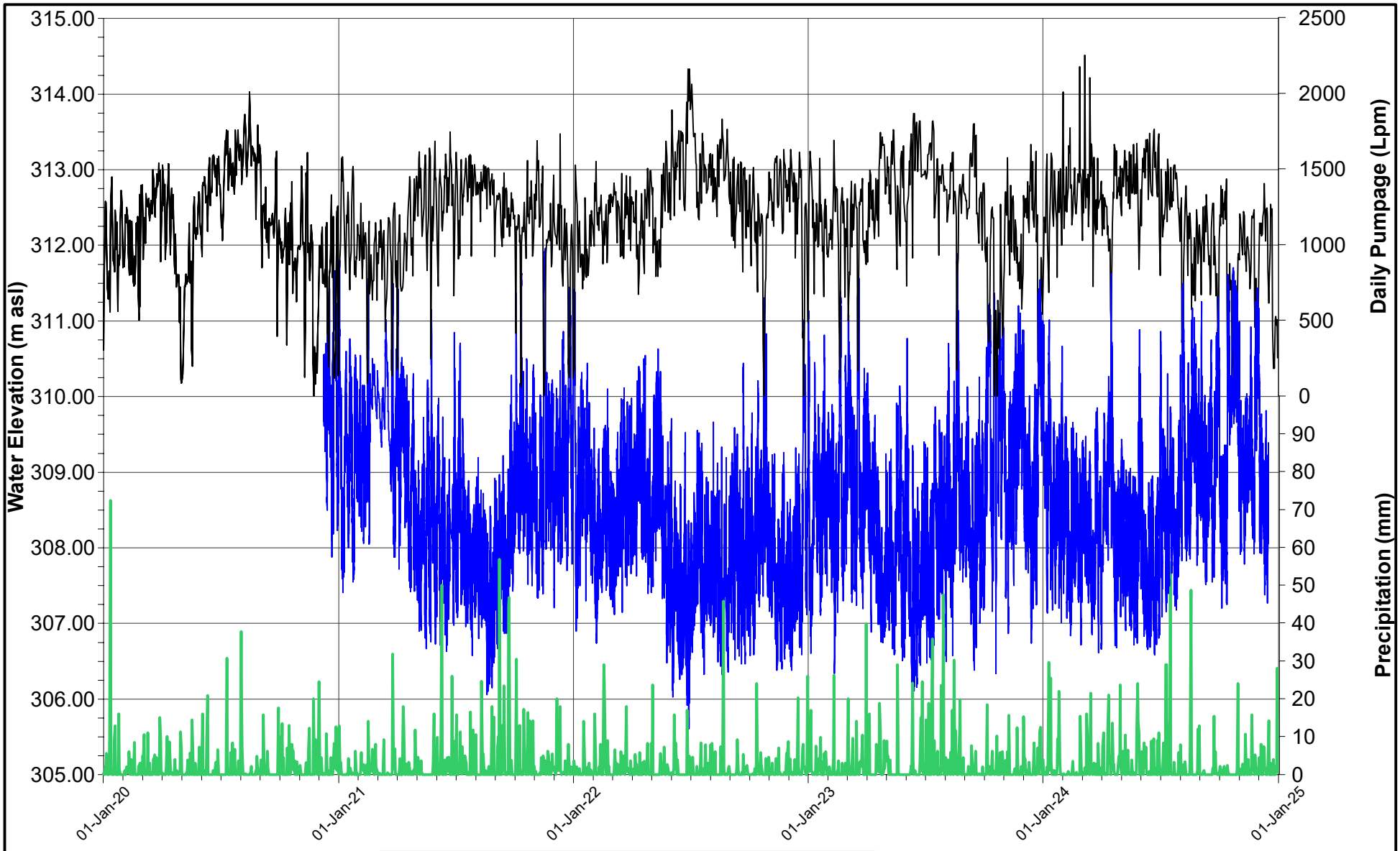
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D14

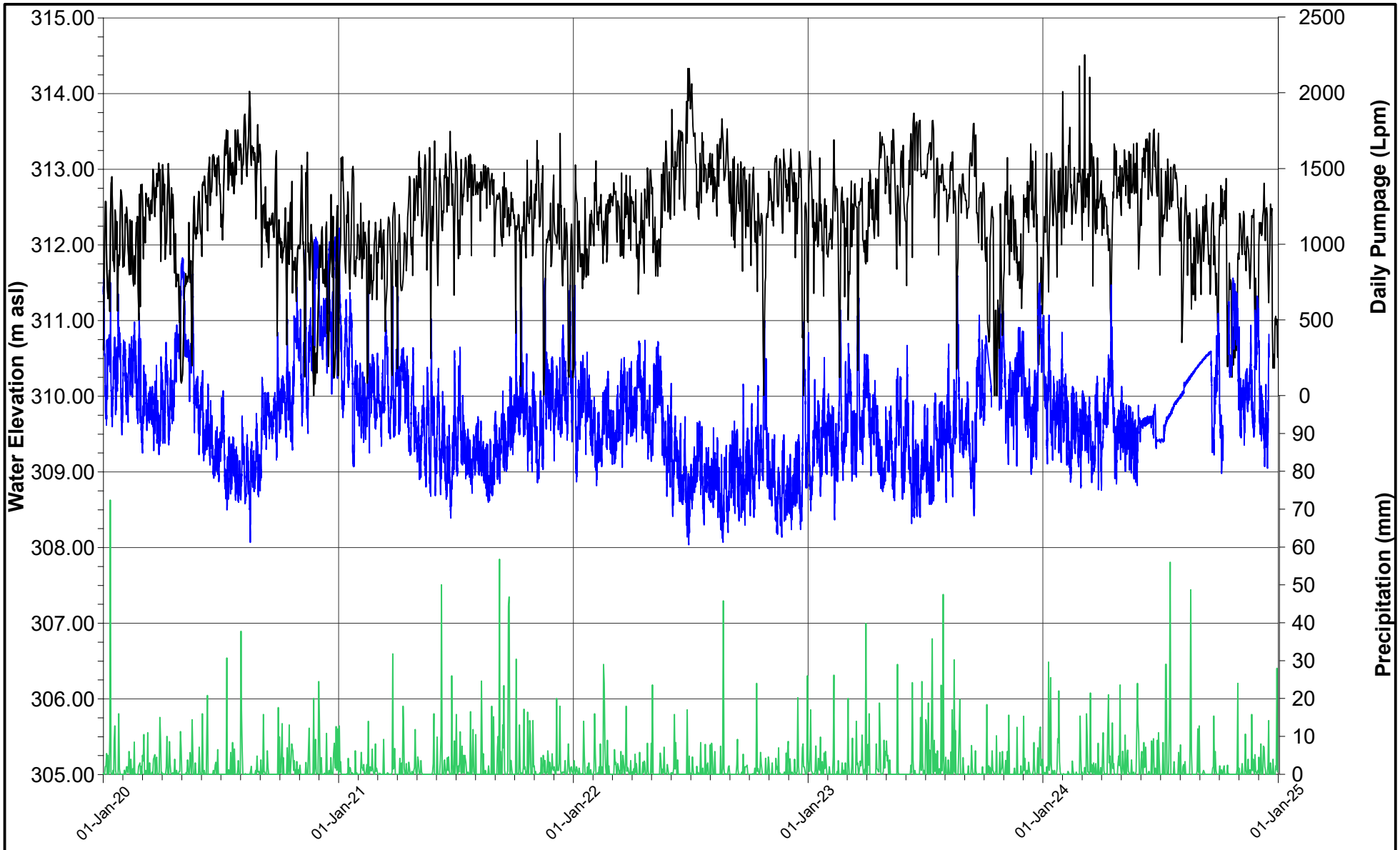


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D15



NOTE: packer installed May 28, 2024
and was removed Oct 15, 2025

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

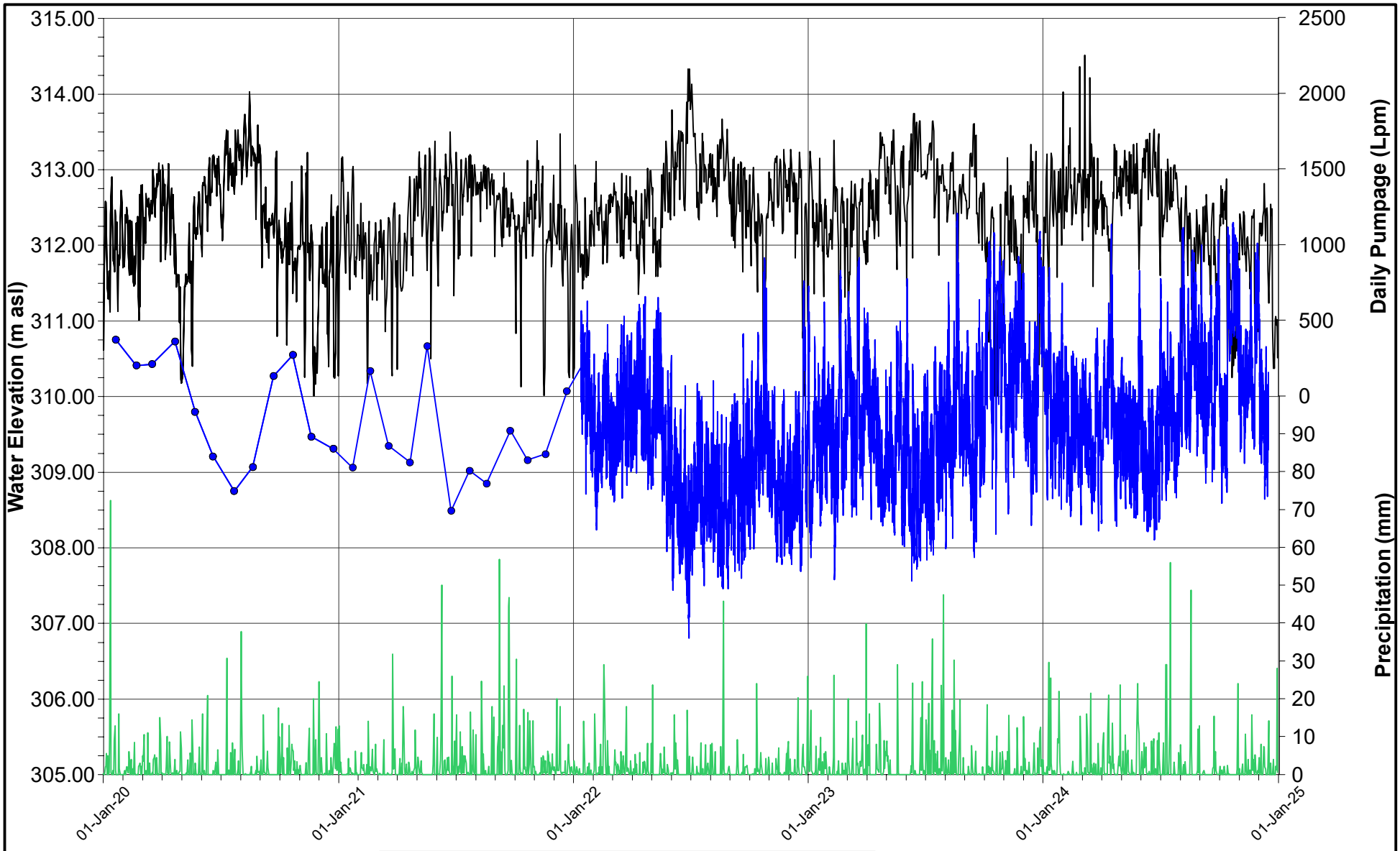
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D16



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

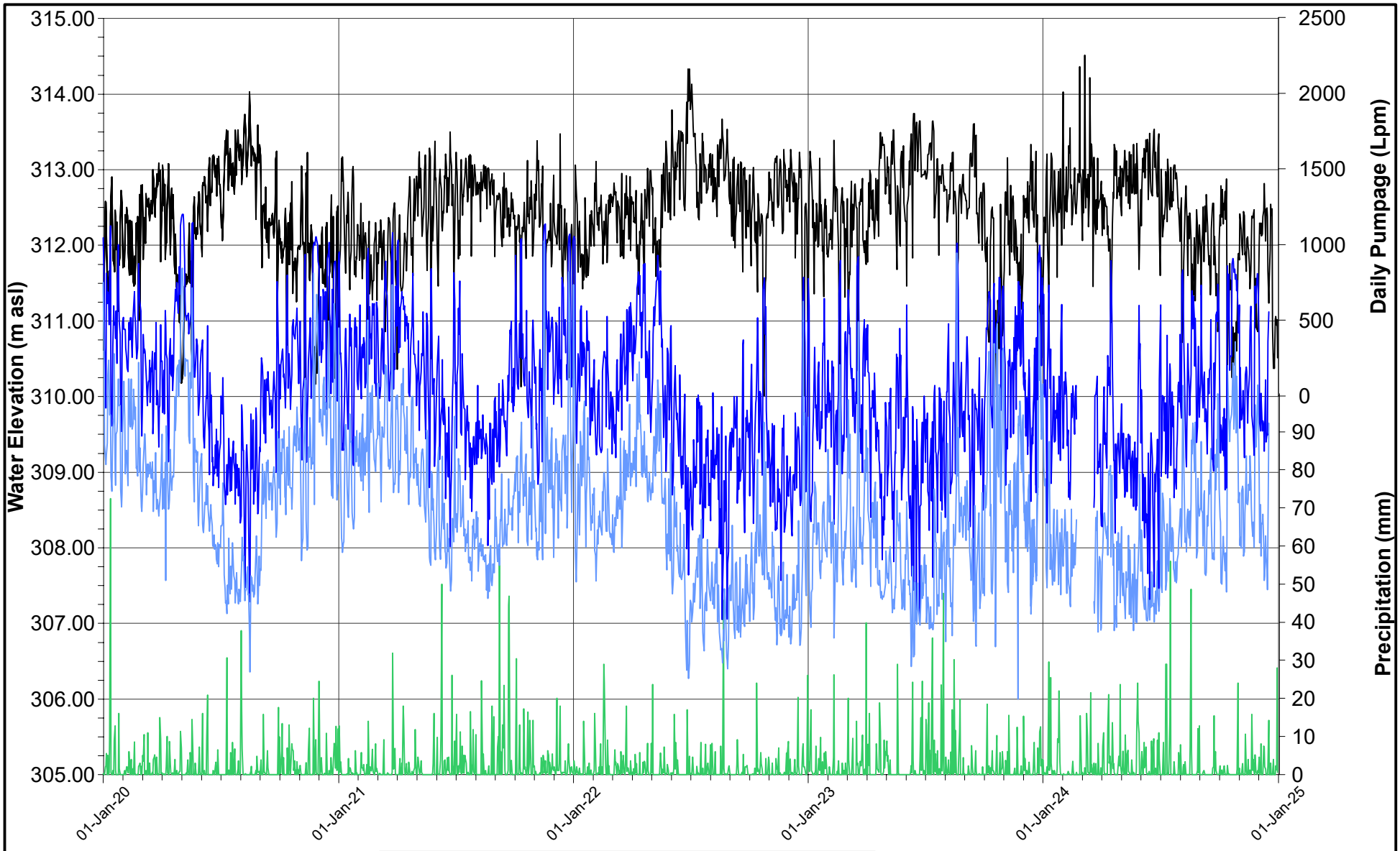
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D17



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

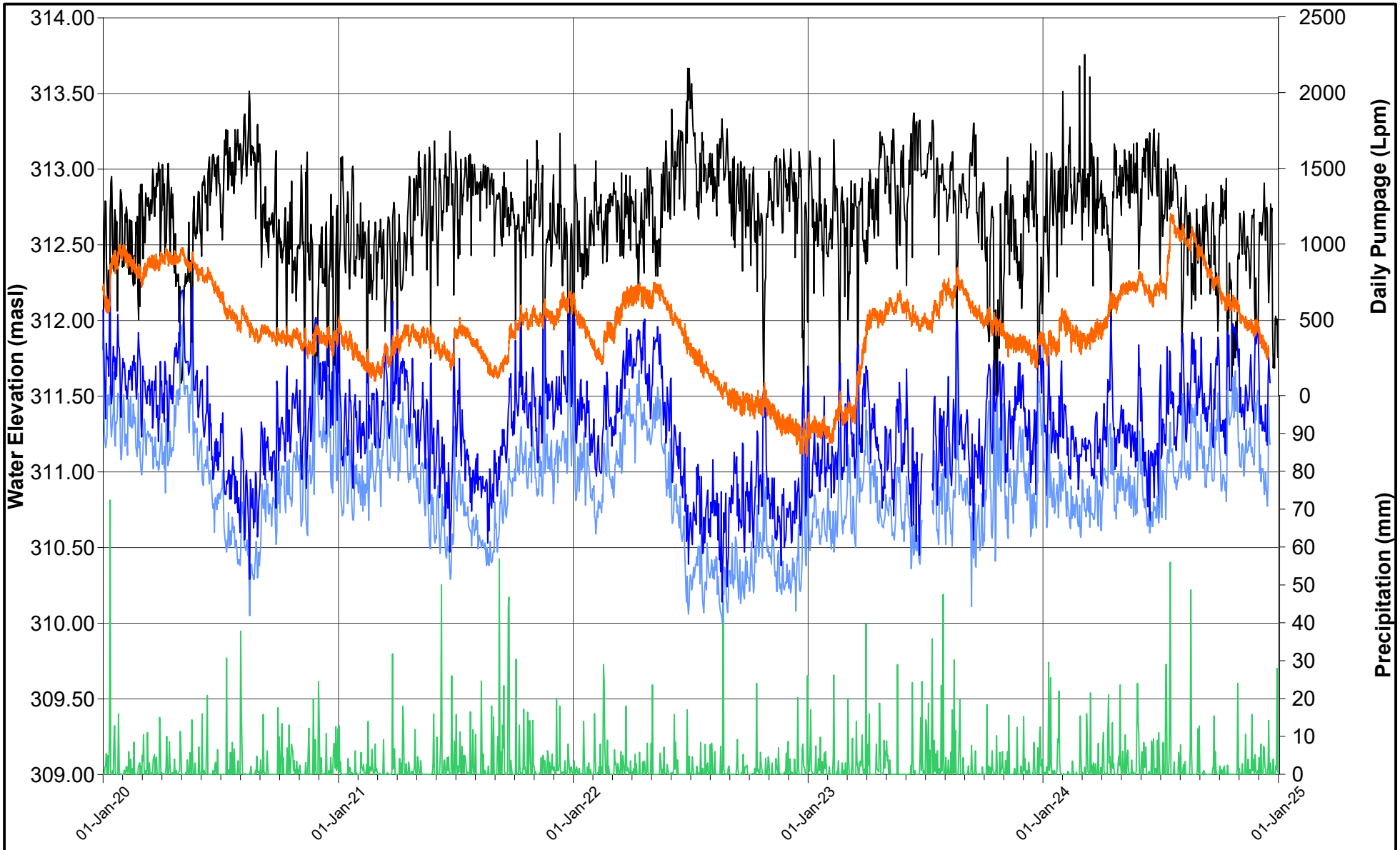
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

LOWER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D18



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

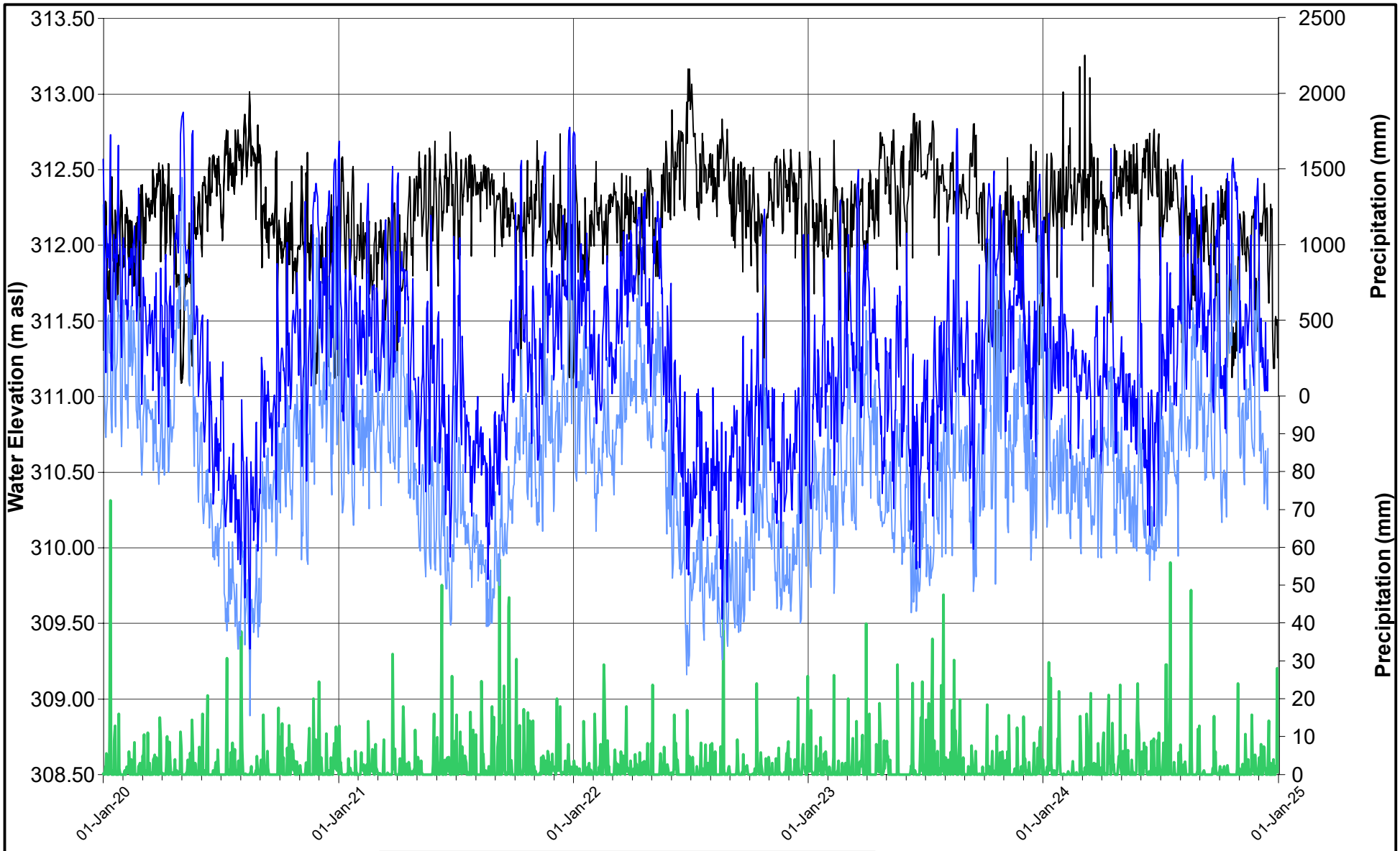
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D19



wsp

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

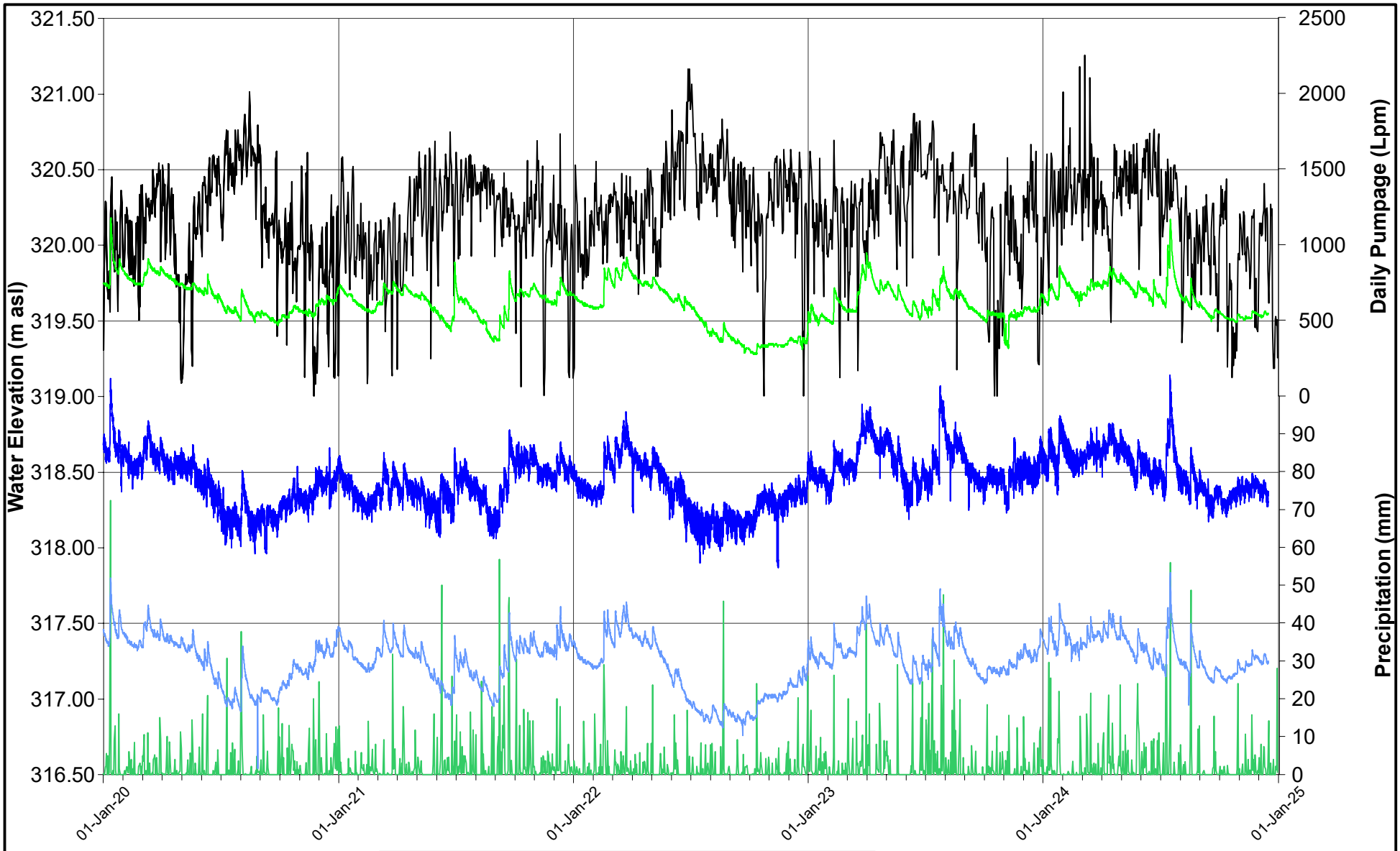
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D20



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

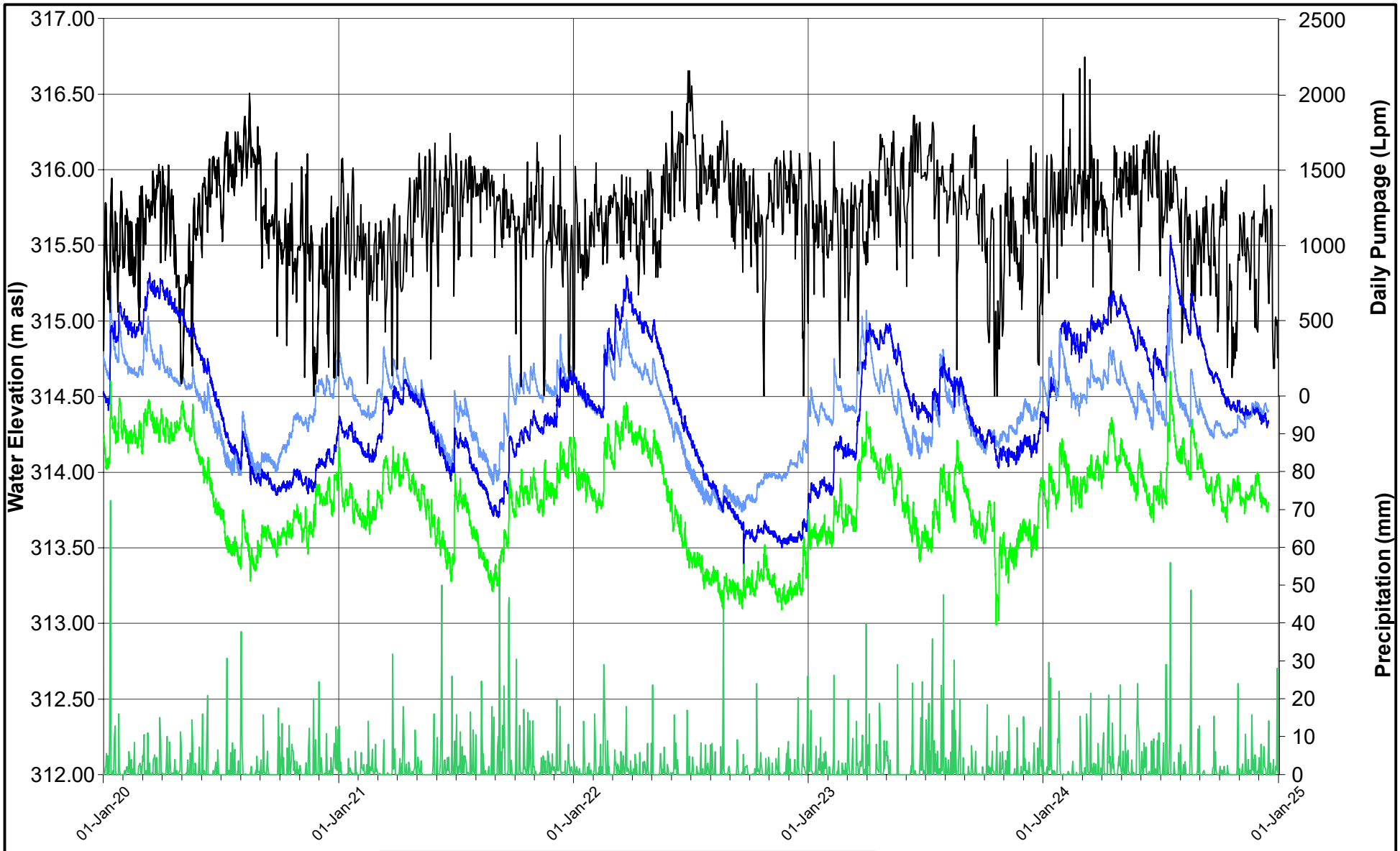
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D21



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

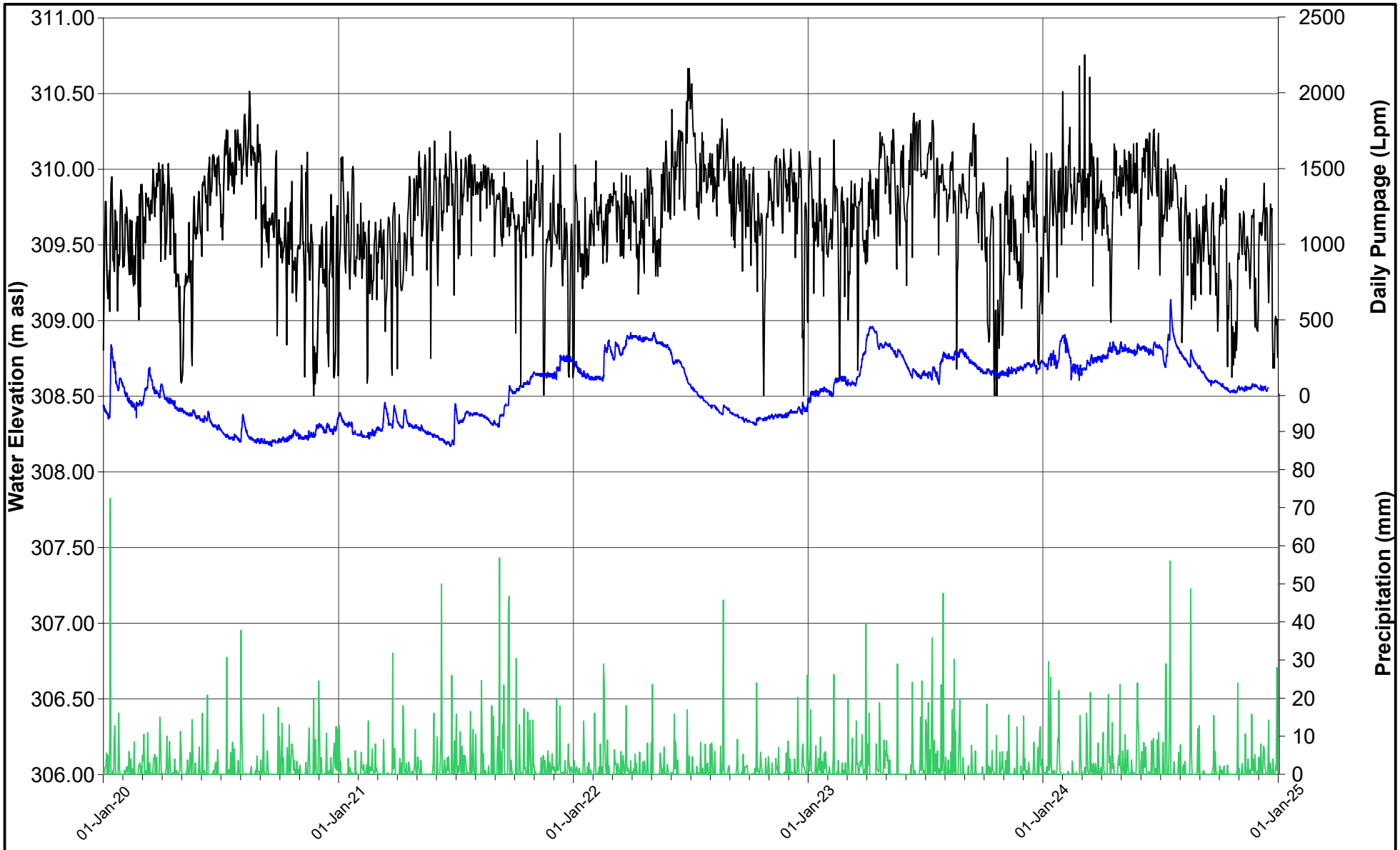
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D22



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

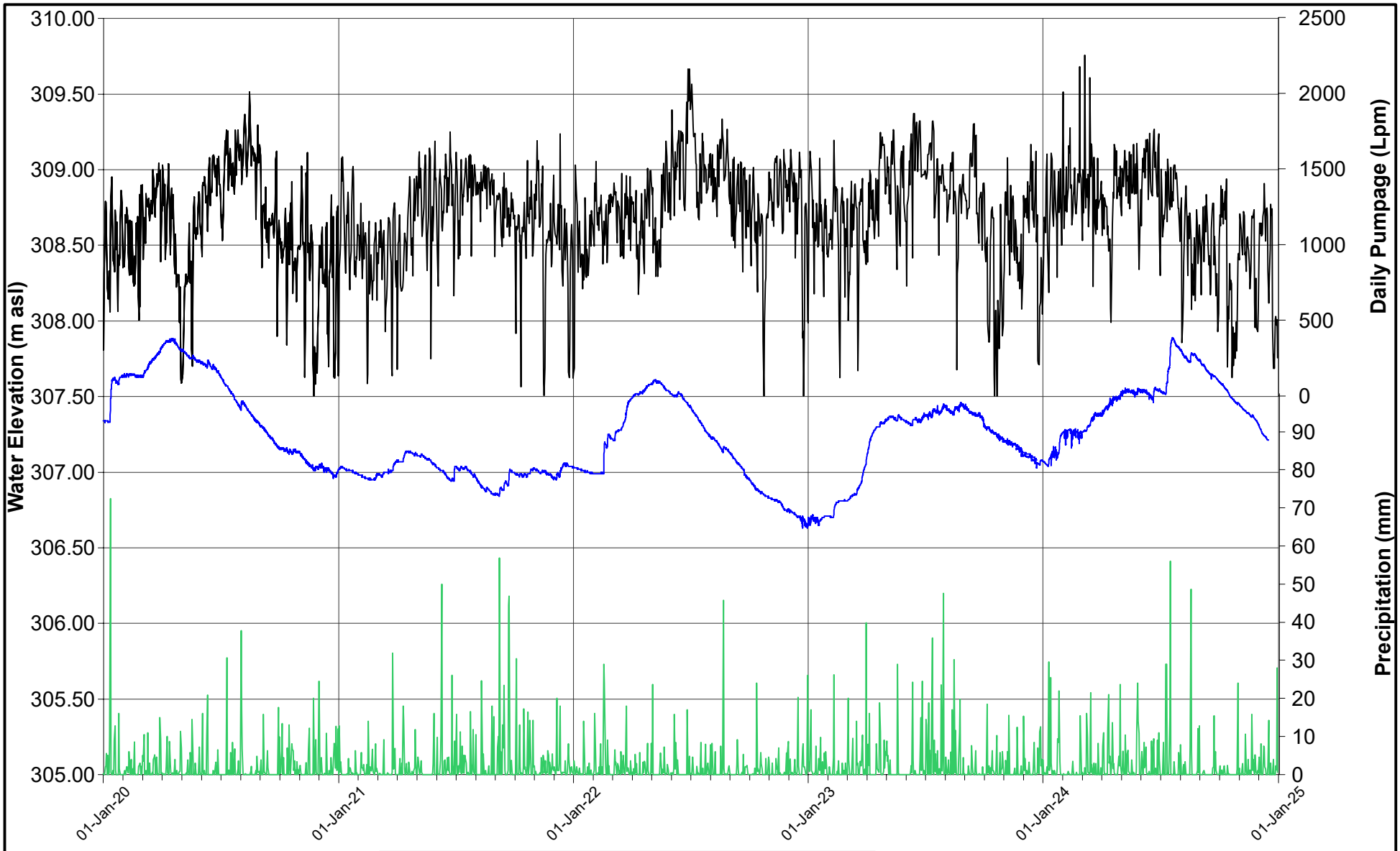
Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D23

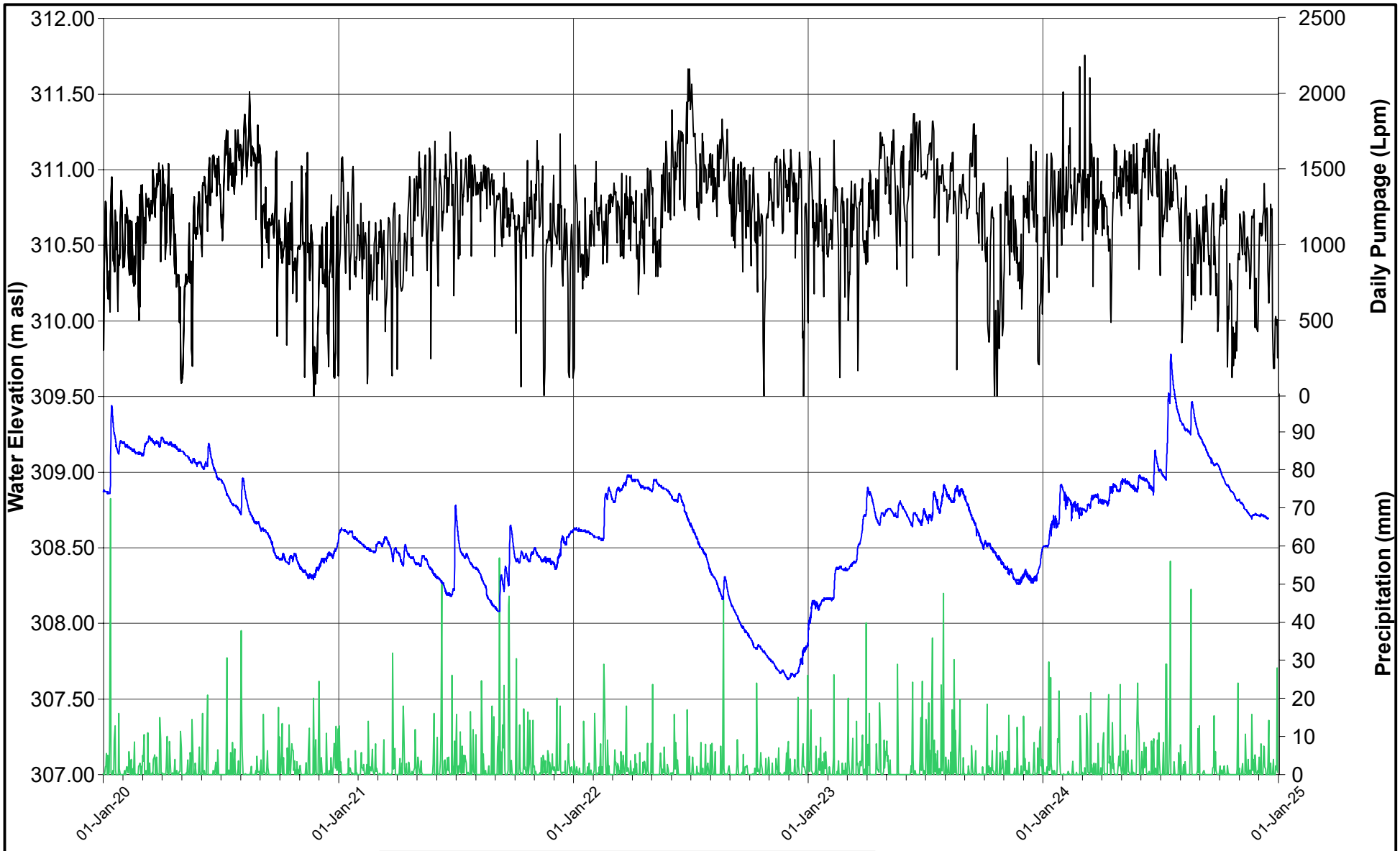


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D24



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

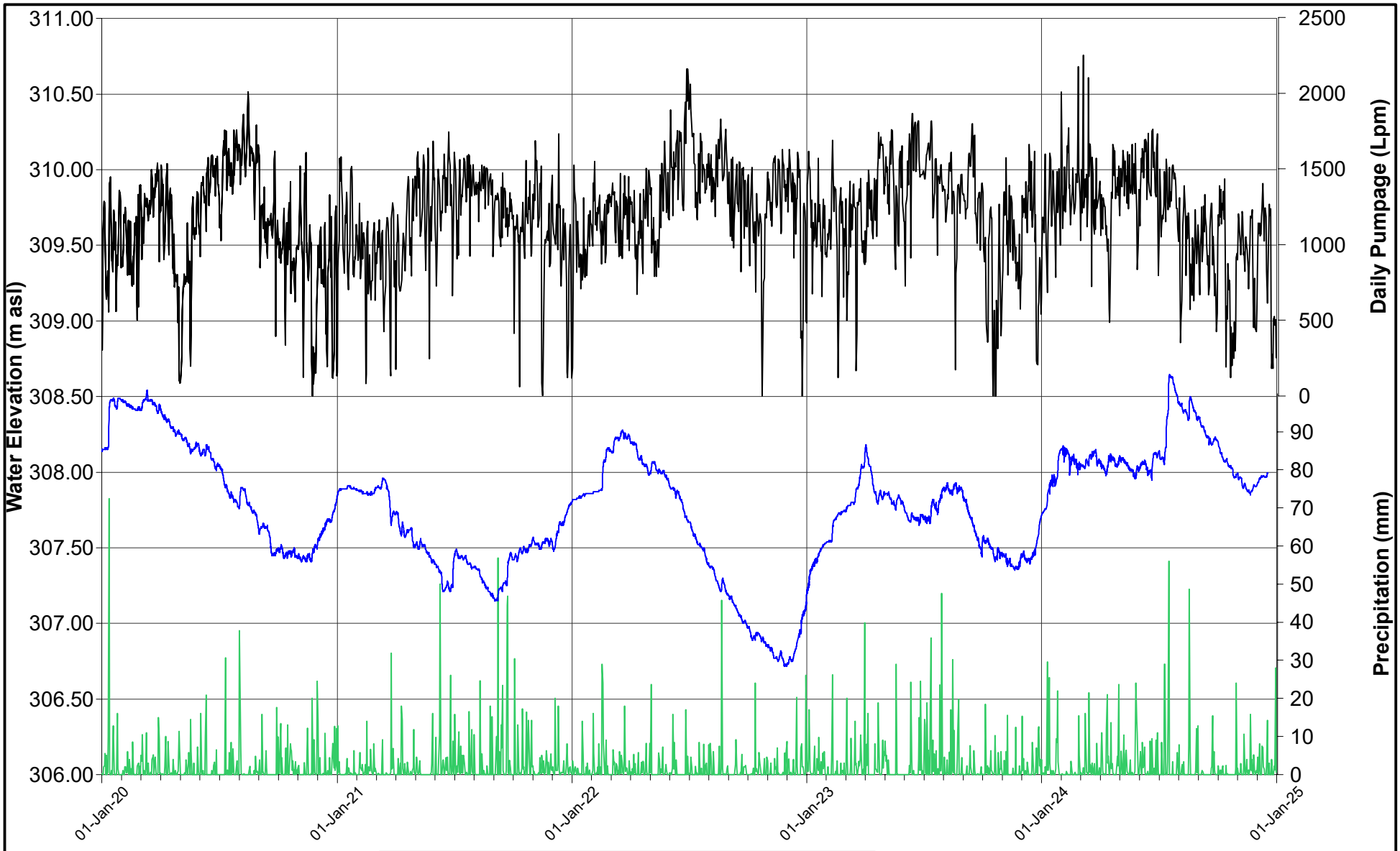
Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D25



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

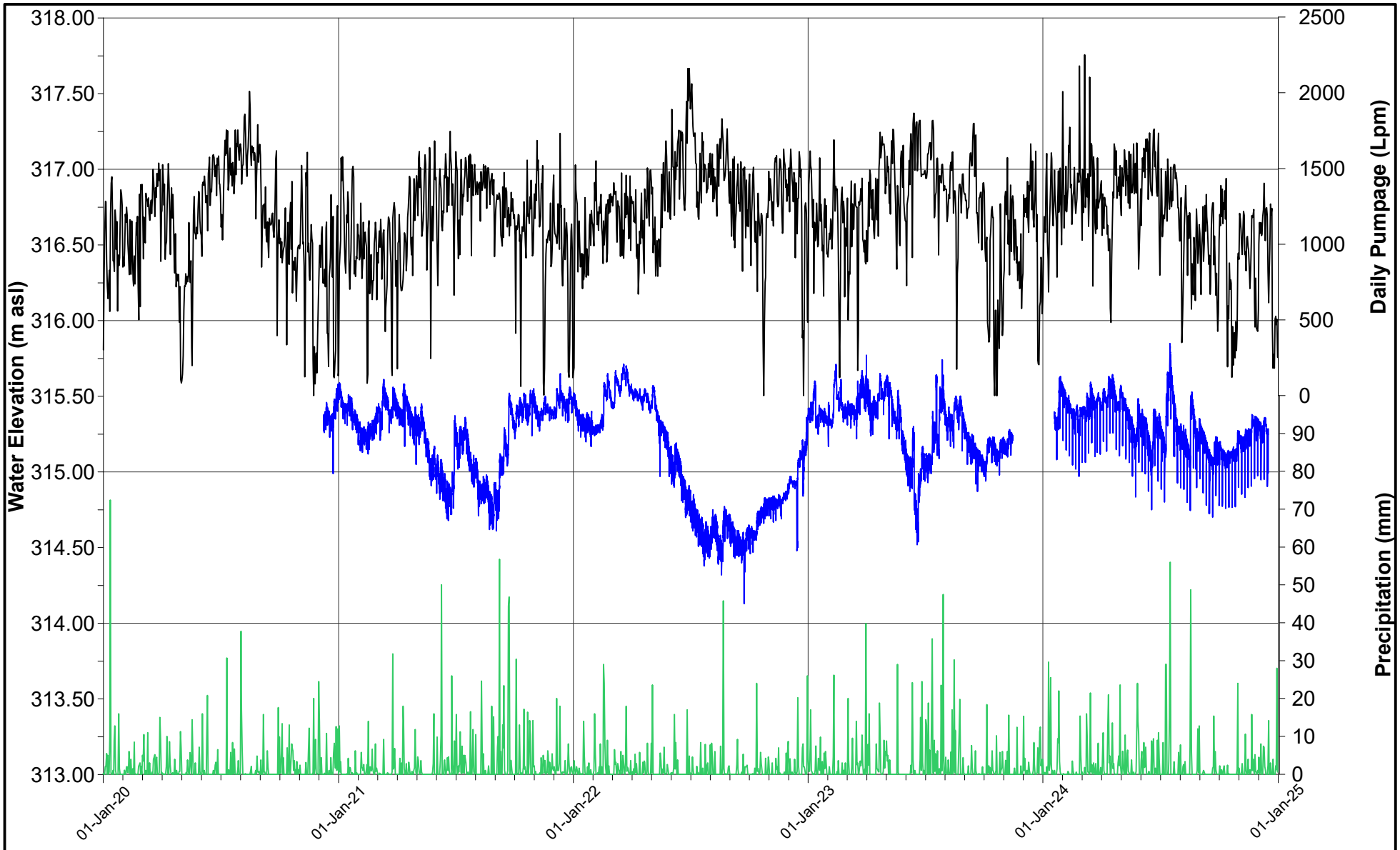
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D26



Datalogger failed November 2023, and was replaced January 2024

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

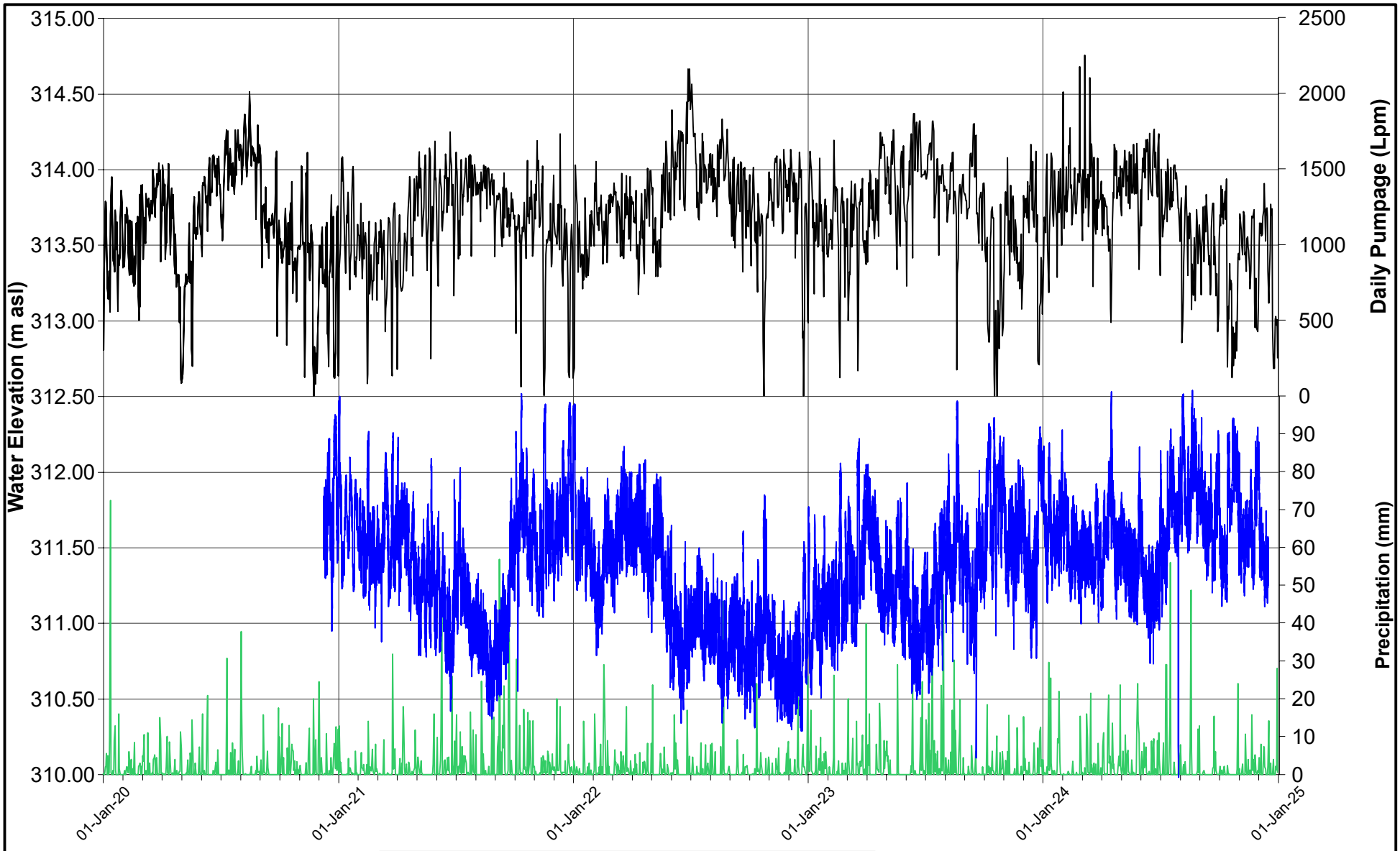
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D27

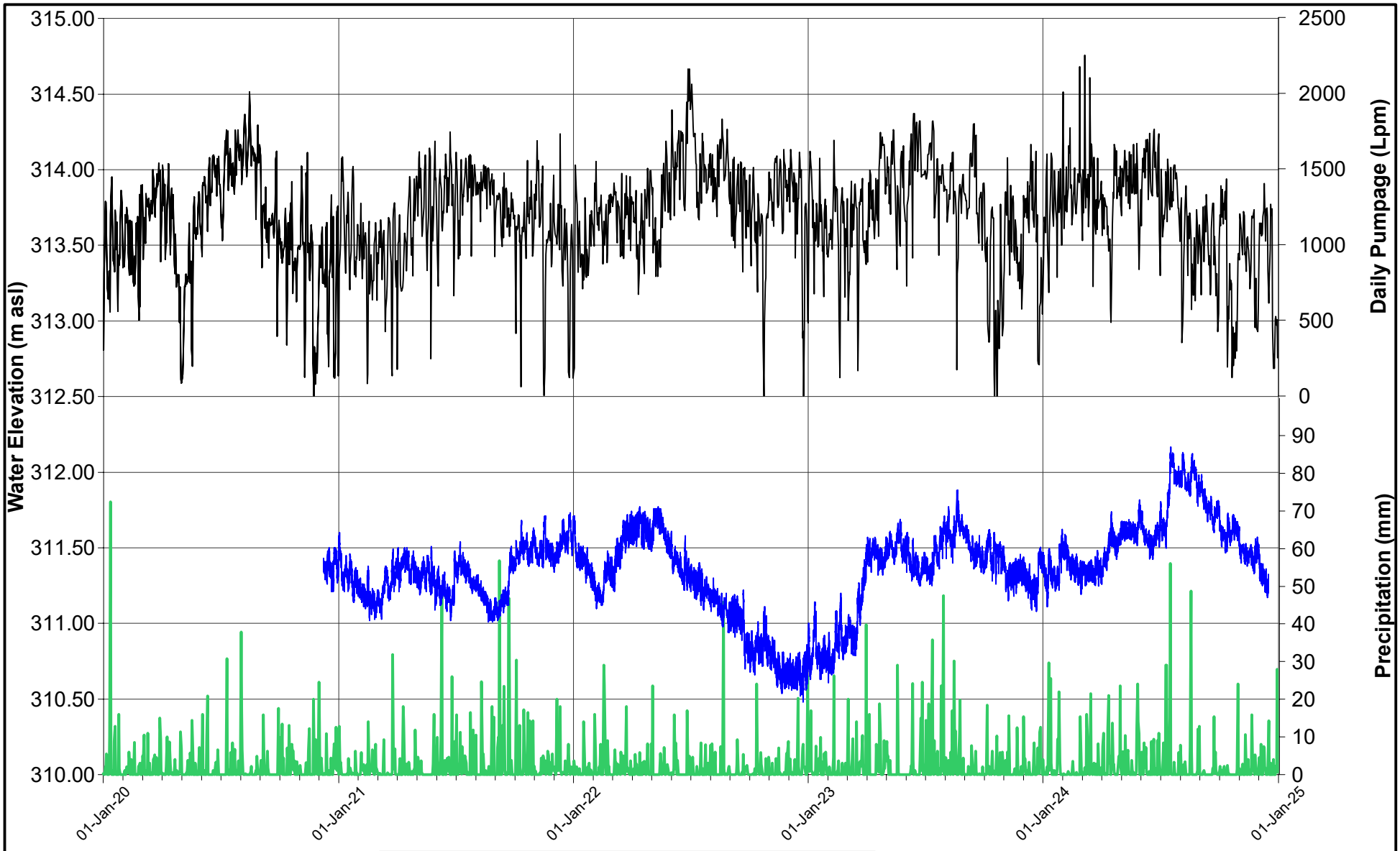


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D28



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

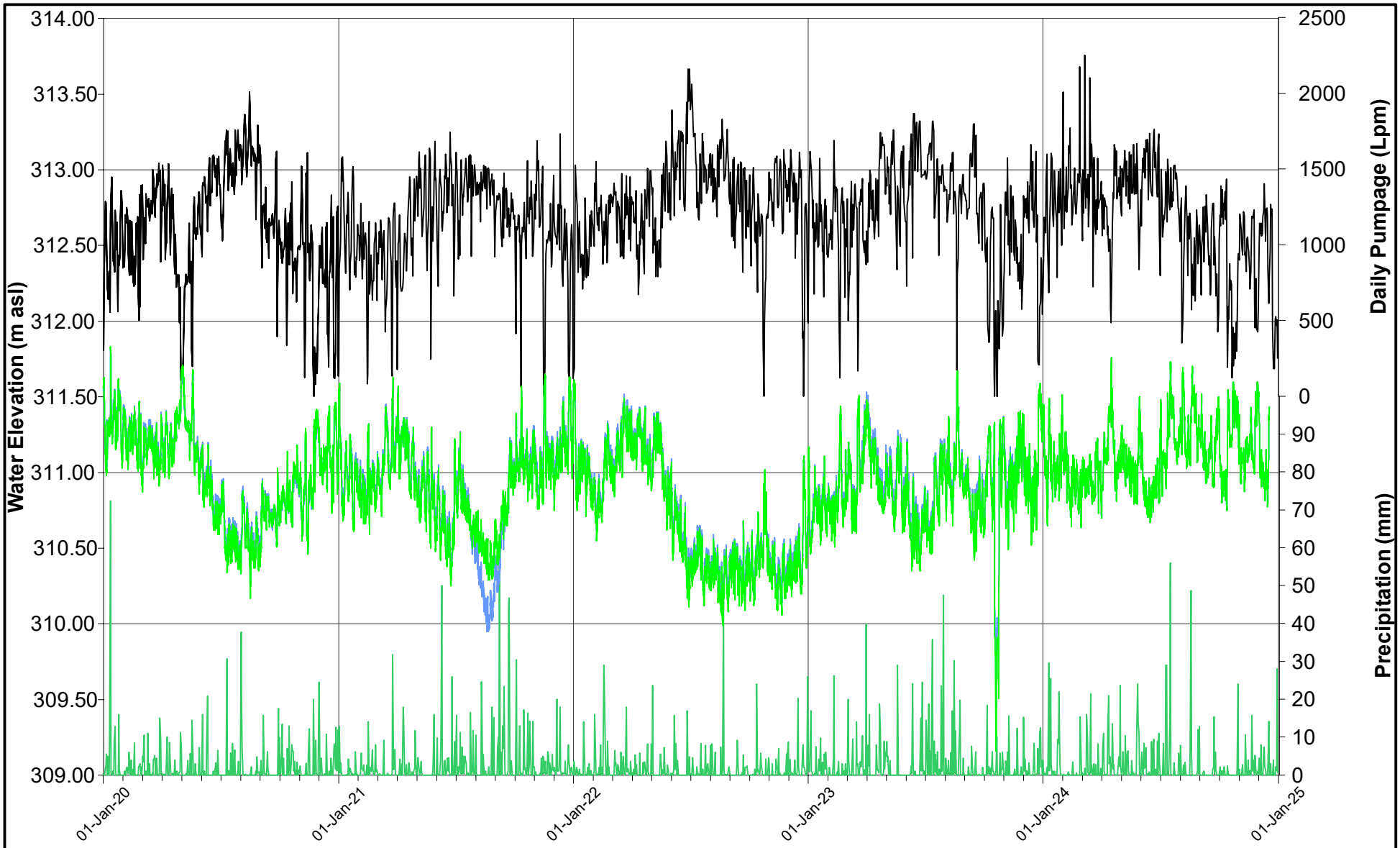
Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D29

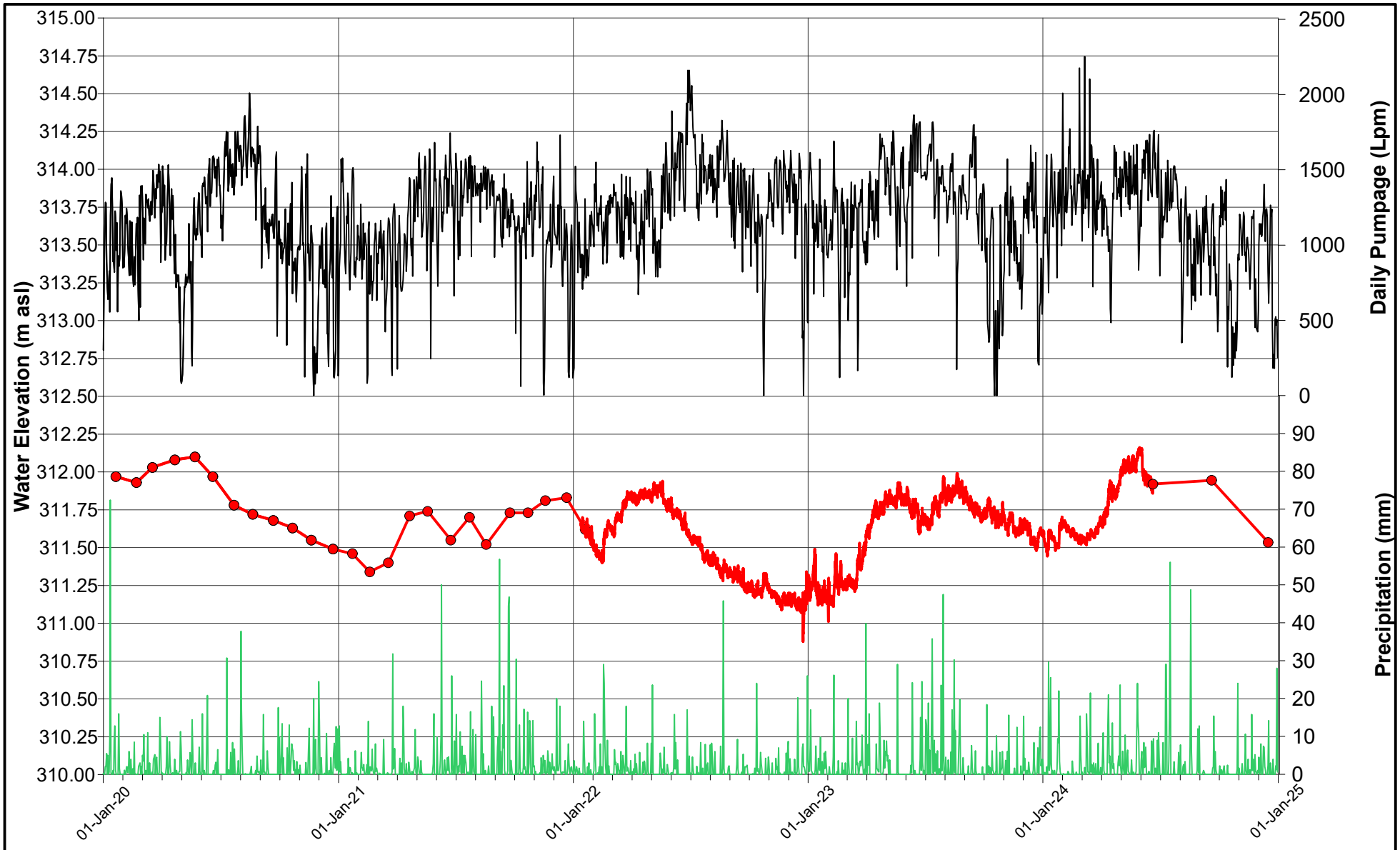


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D30



Note: Data Logger Failed June 2024 and replaced December 2024

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

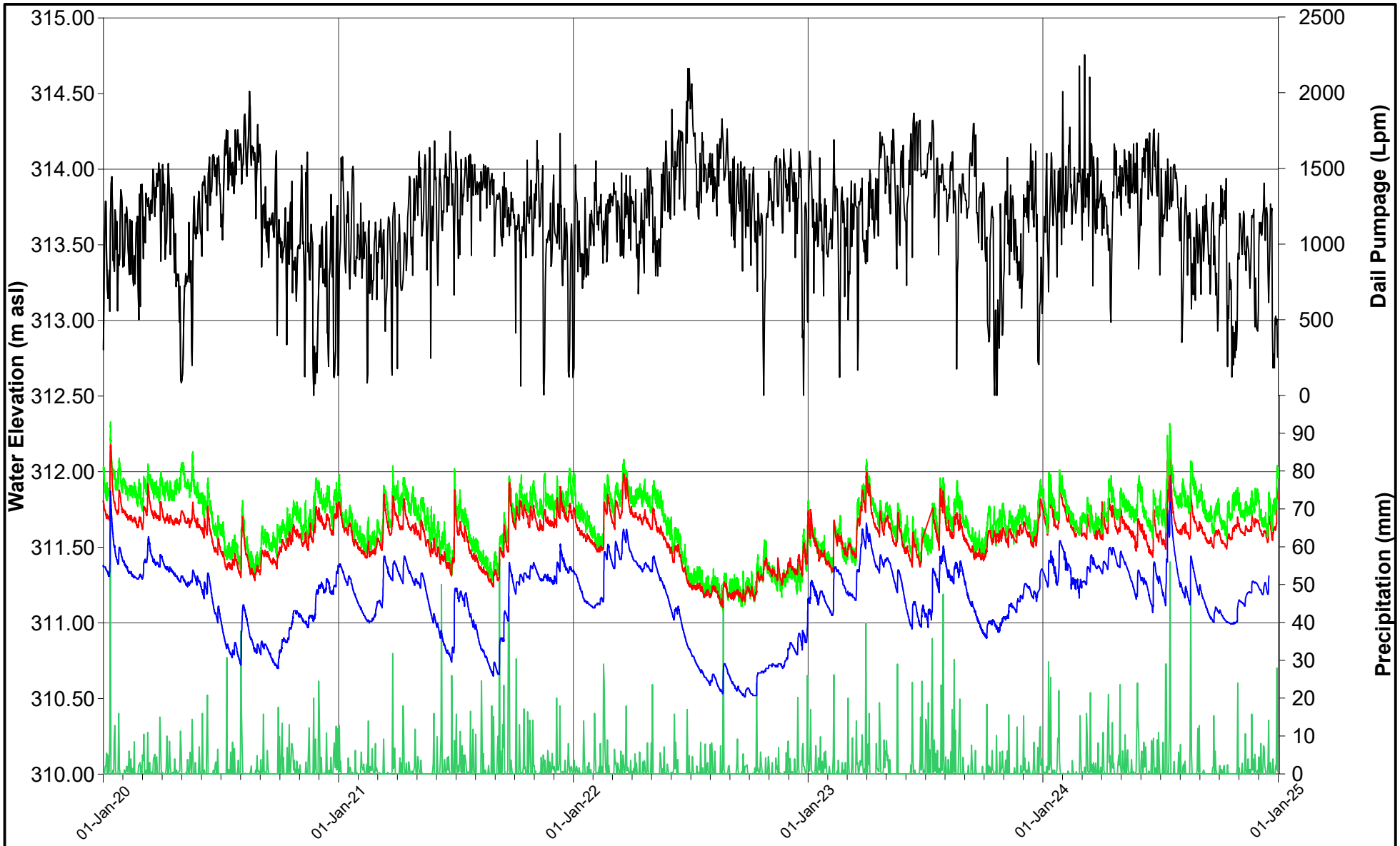
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

UPPER BEDROCK HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D31



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

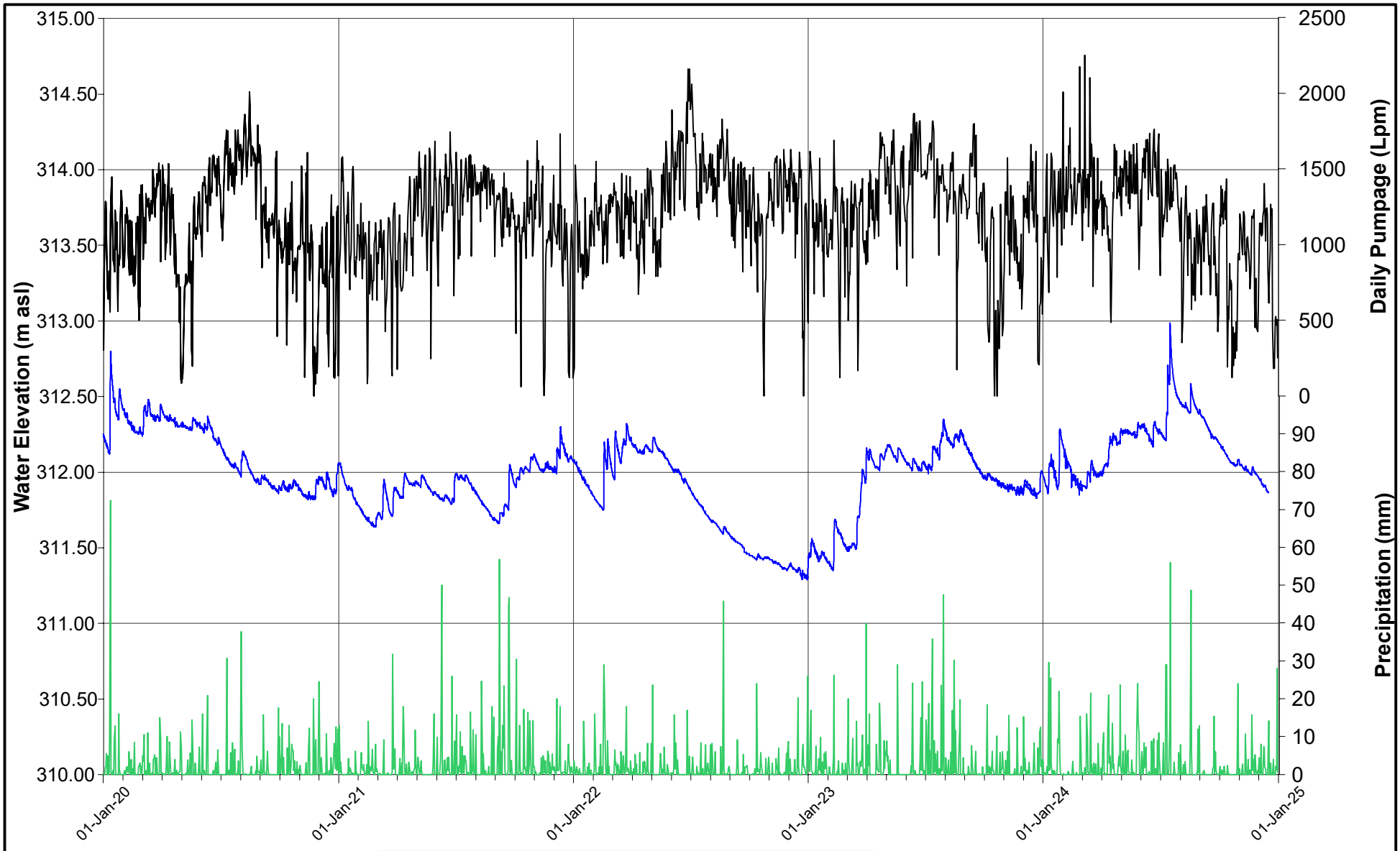
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

OVERBURDEN HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D32



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

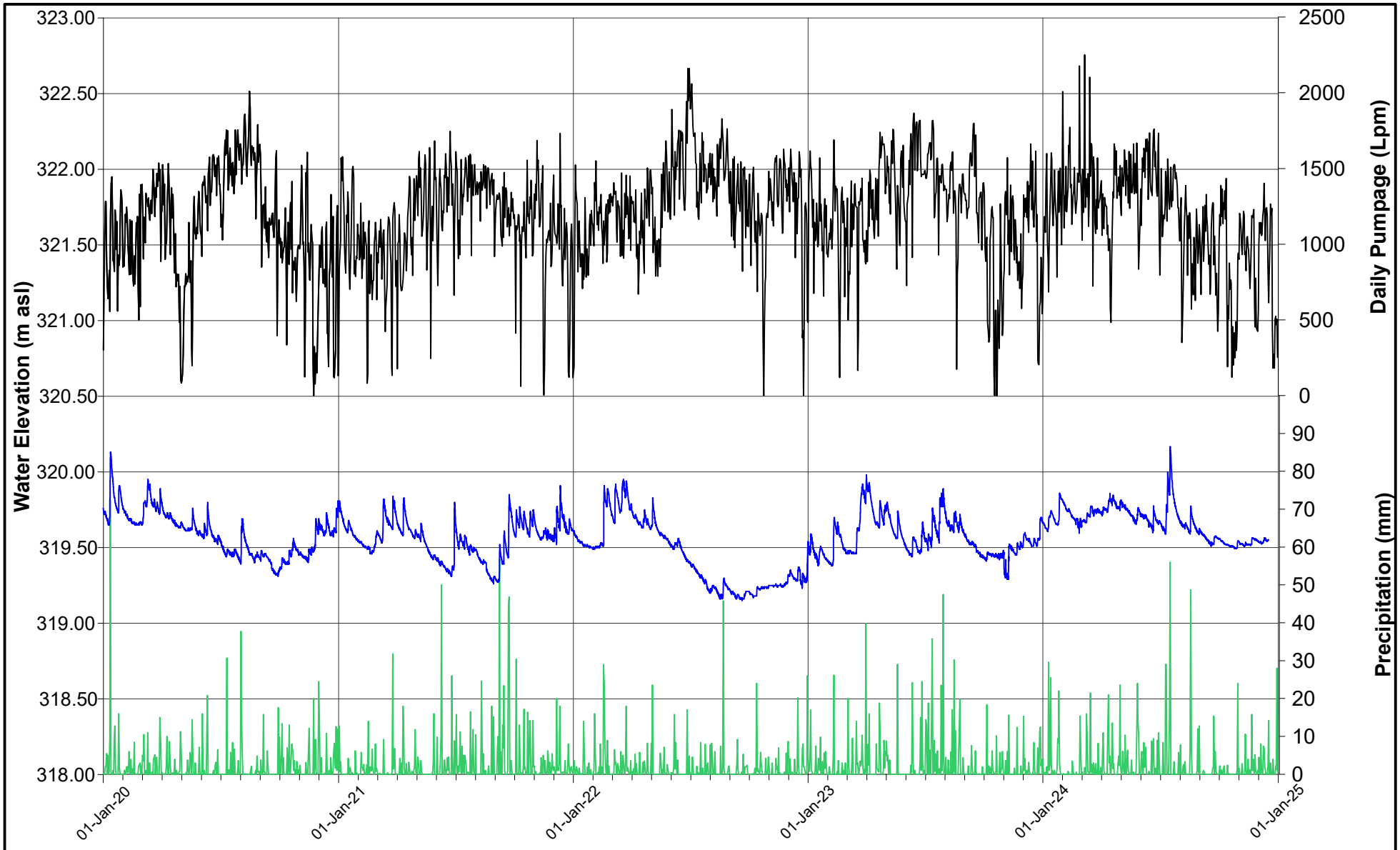
Town of Aberfoyle, Ontario

TITLE

OVERBURDEN HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D33



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

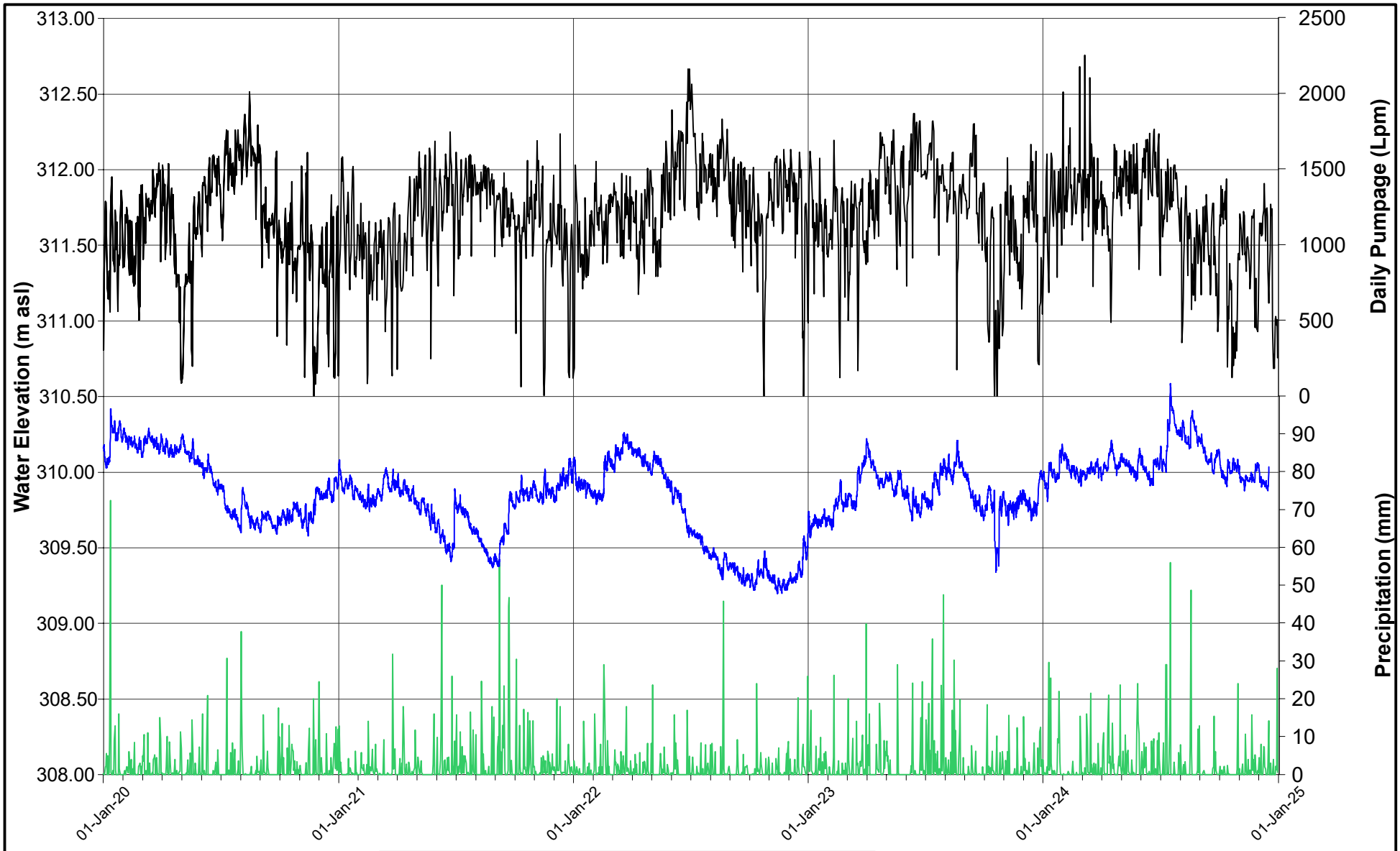
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

OVERBURDEN HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D34



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

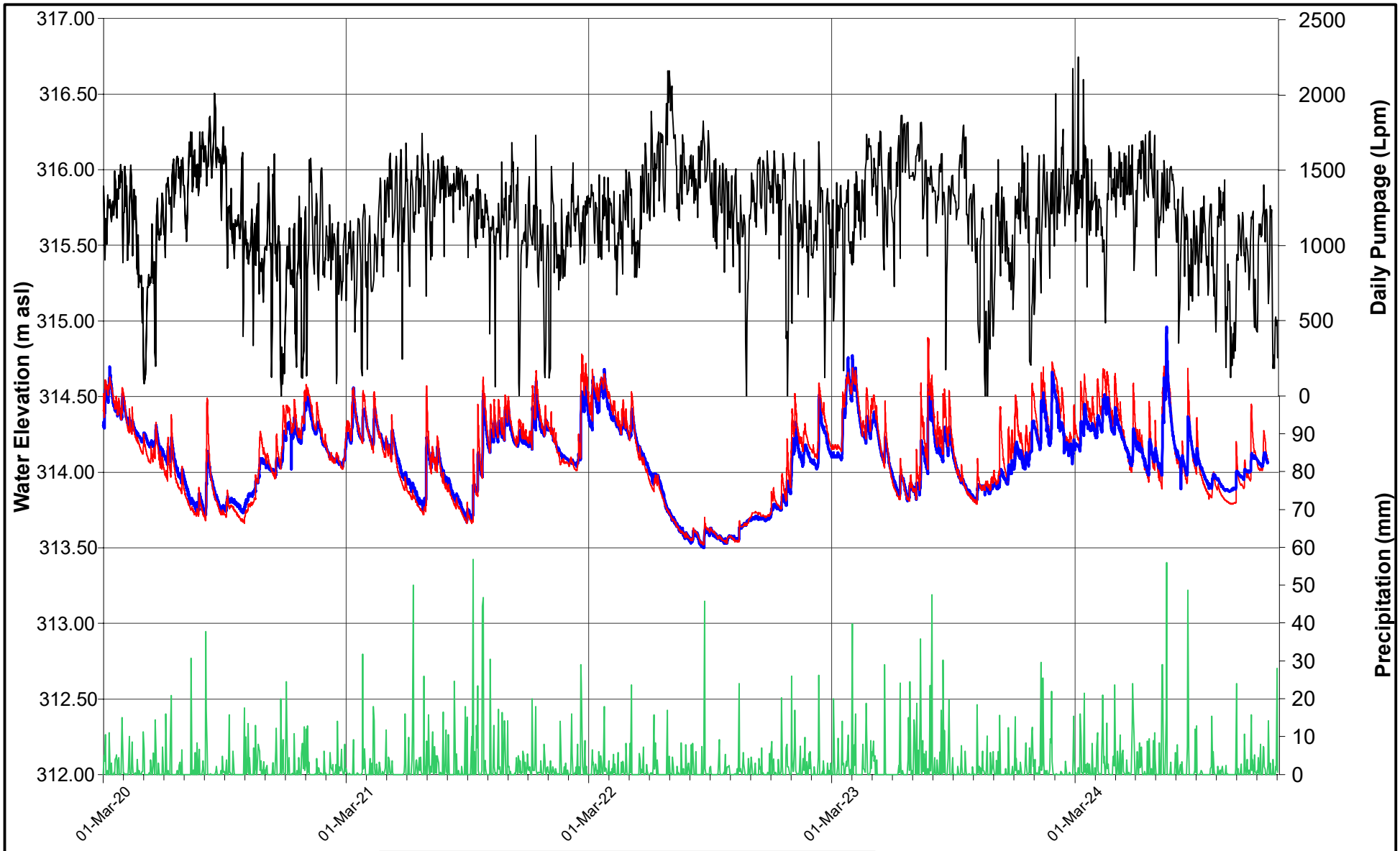
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

OVERBURDEN HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D35



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

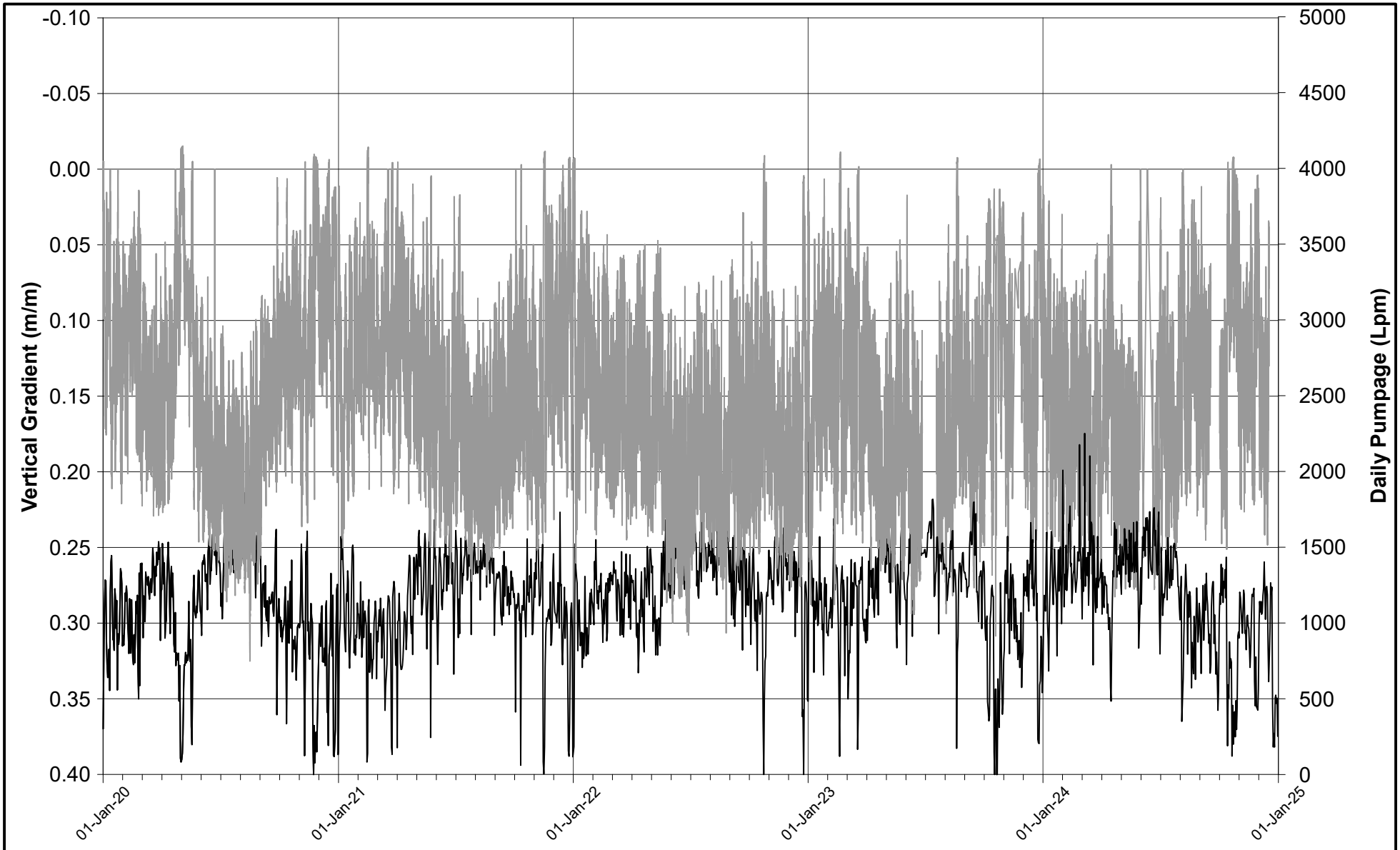
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

OVERBURDEN HYDROGRAPHS
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D36



Note: Vertical gradient between MW2C-07 and MW2A-07

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

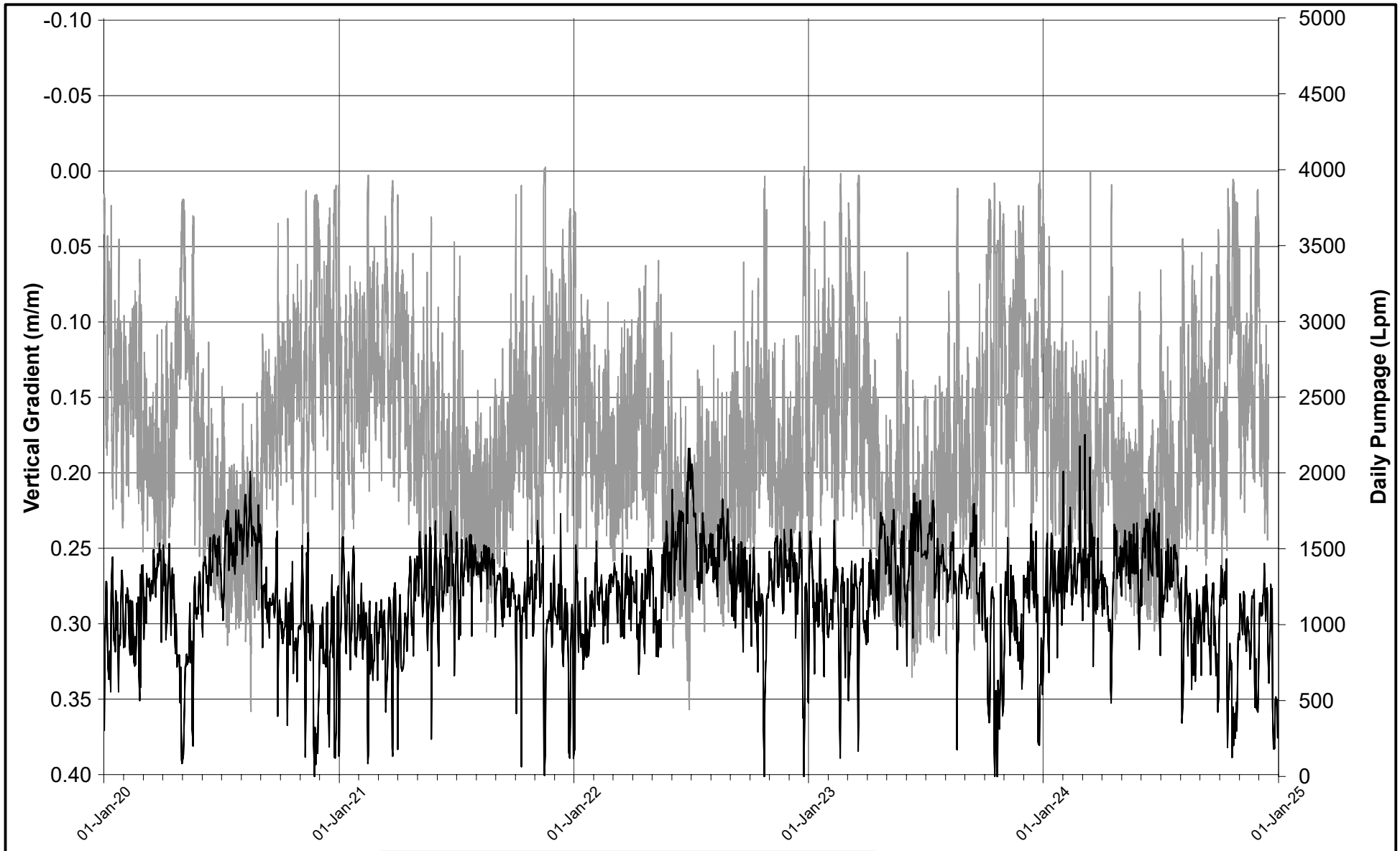
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW2-07 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D37



Note: Vertical gradient between MW4B-07 and MW4A-07

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

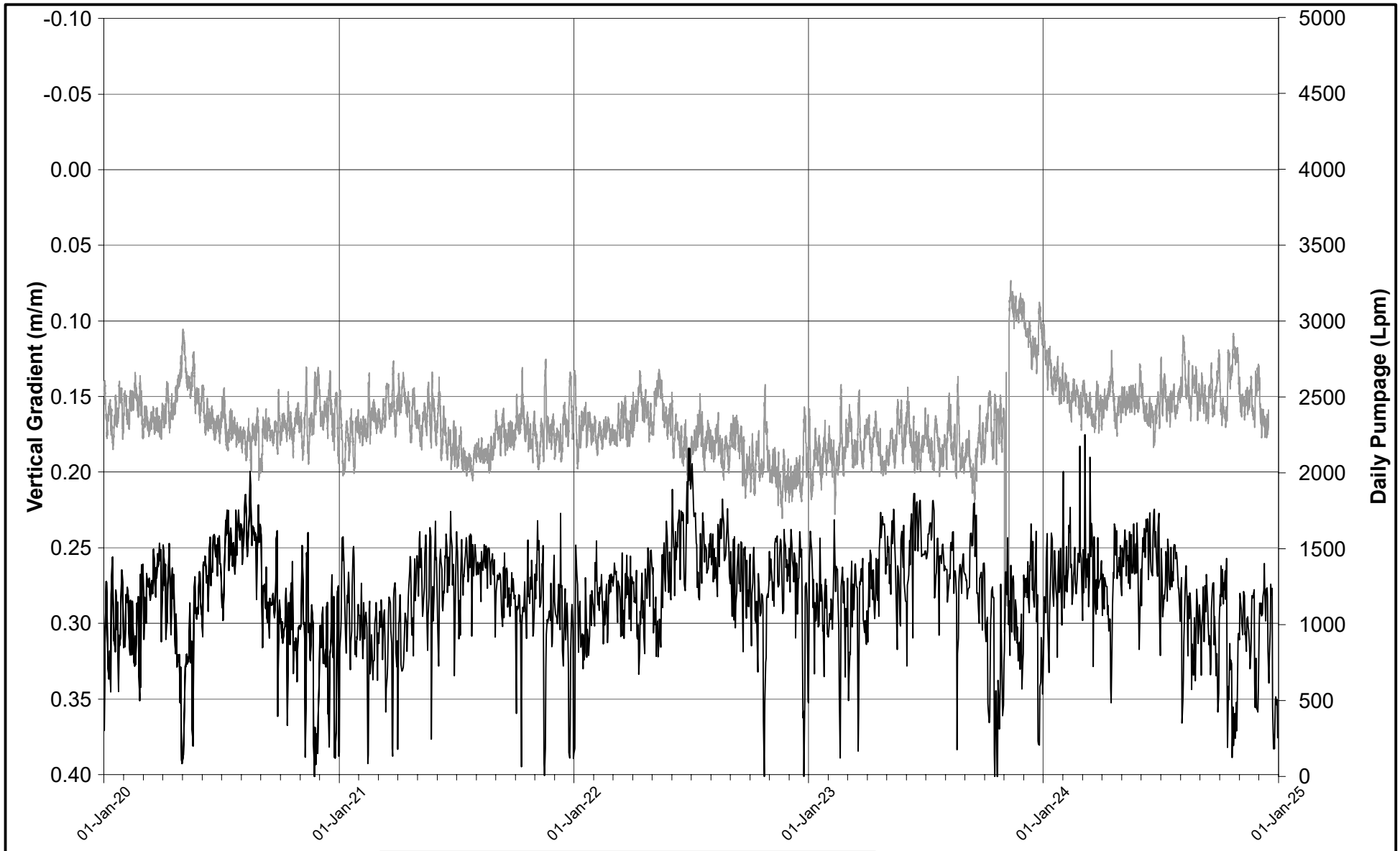
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW4-07 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D38



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

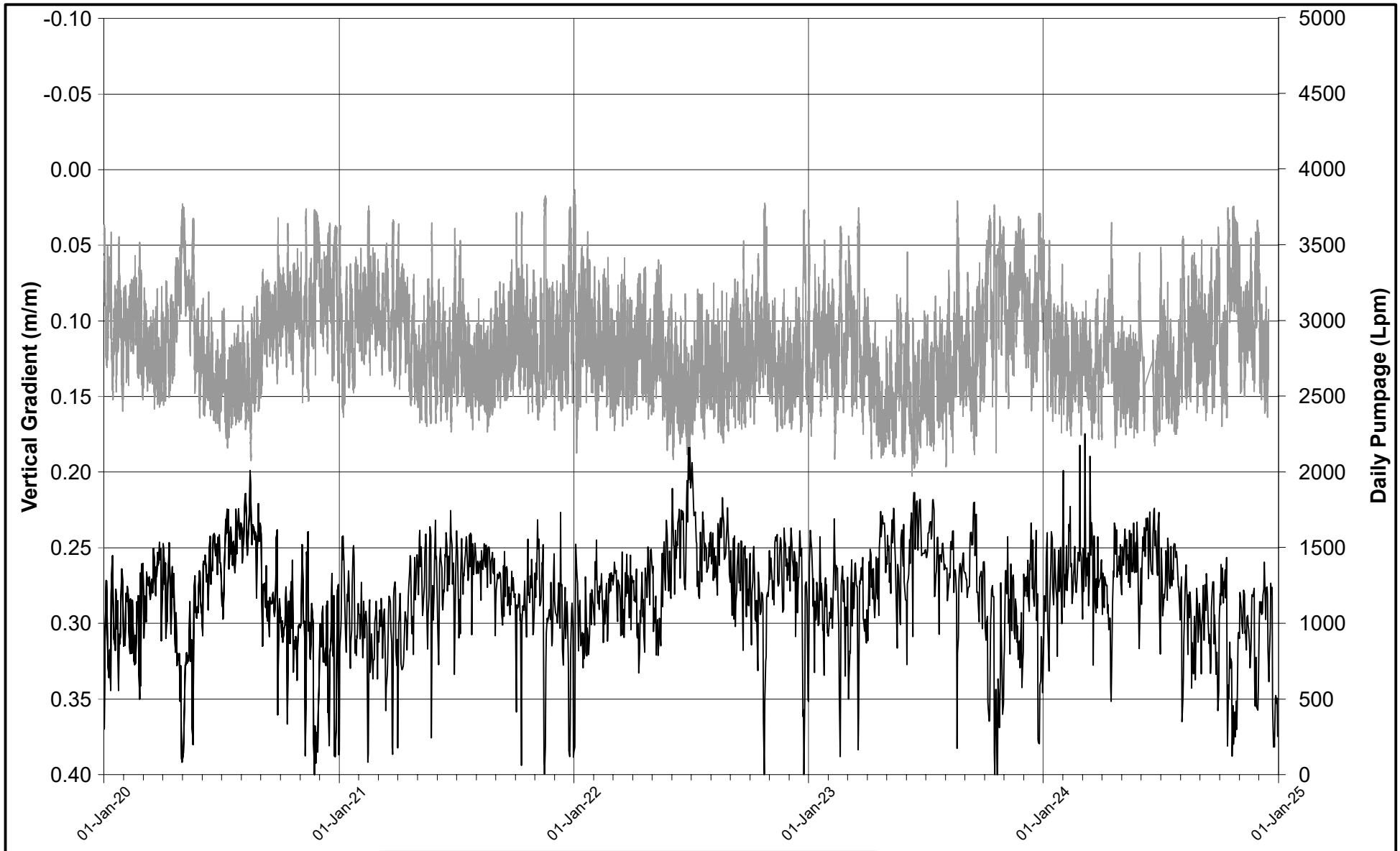
Town of Aberfoyle, Ontario

TITLE

MW6-08 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D39



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

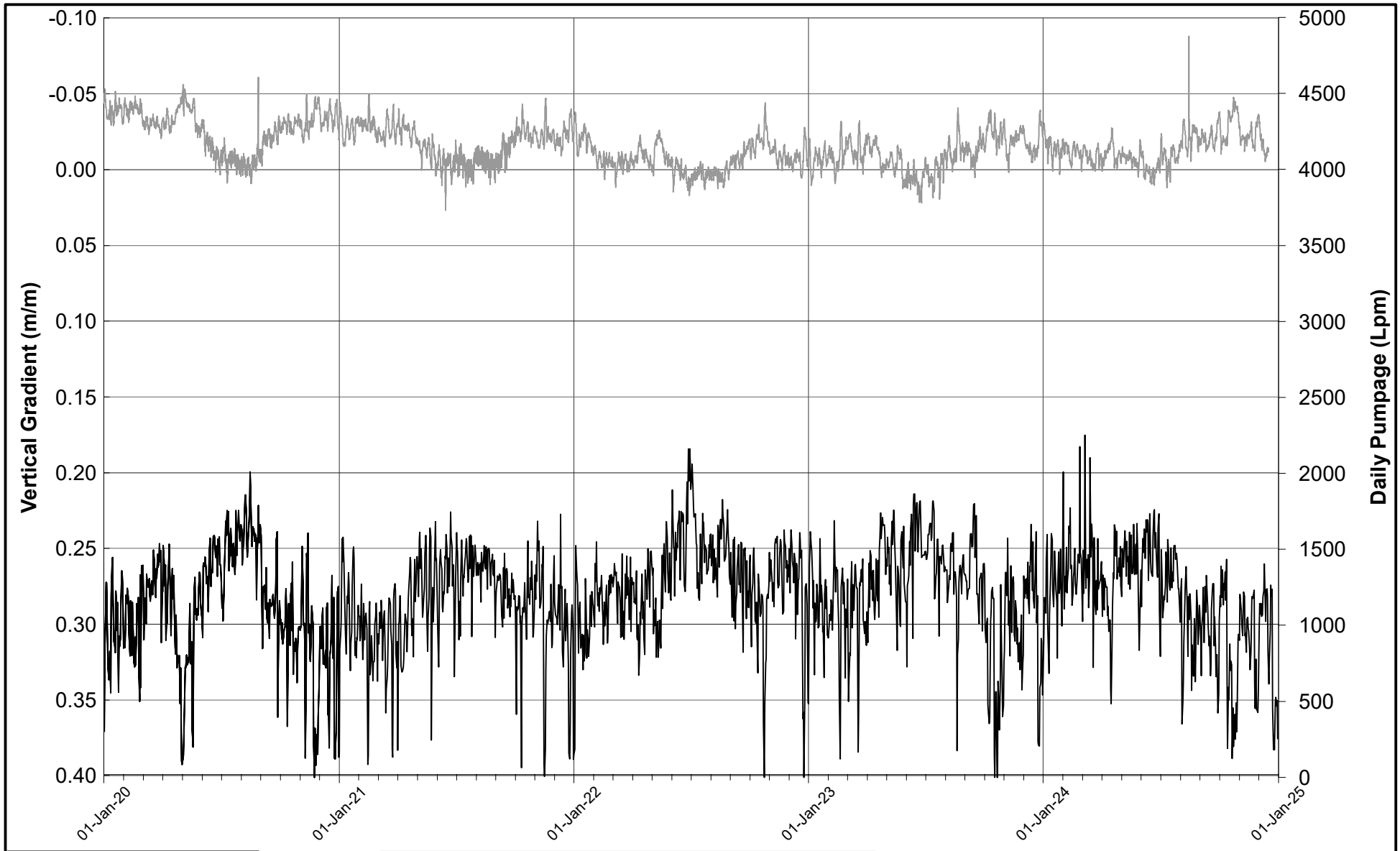
Town of Aberfoyle, Ontario

TITLE

MW7-08 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D40



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

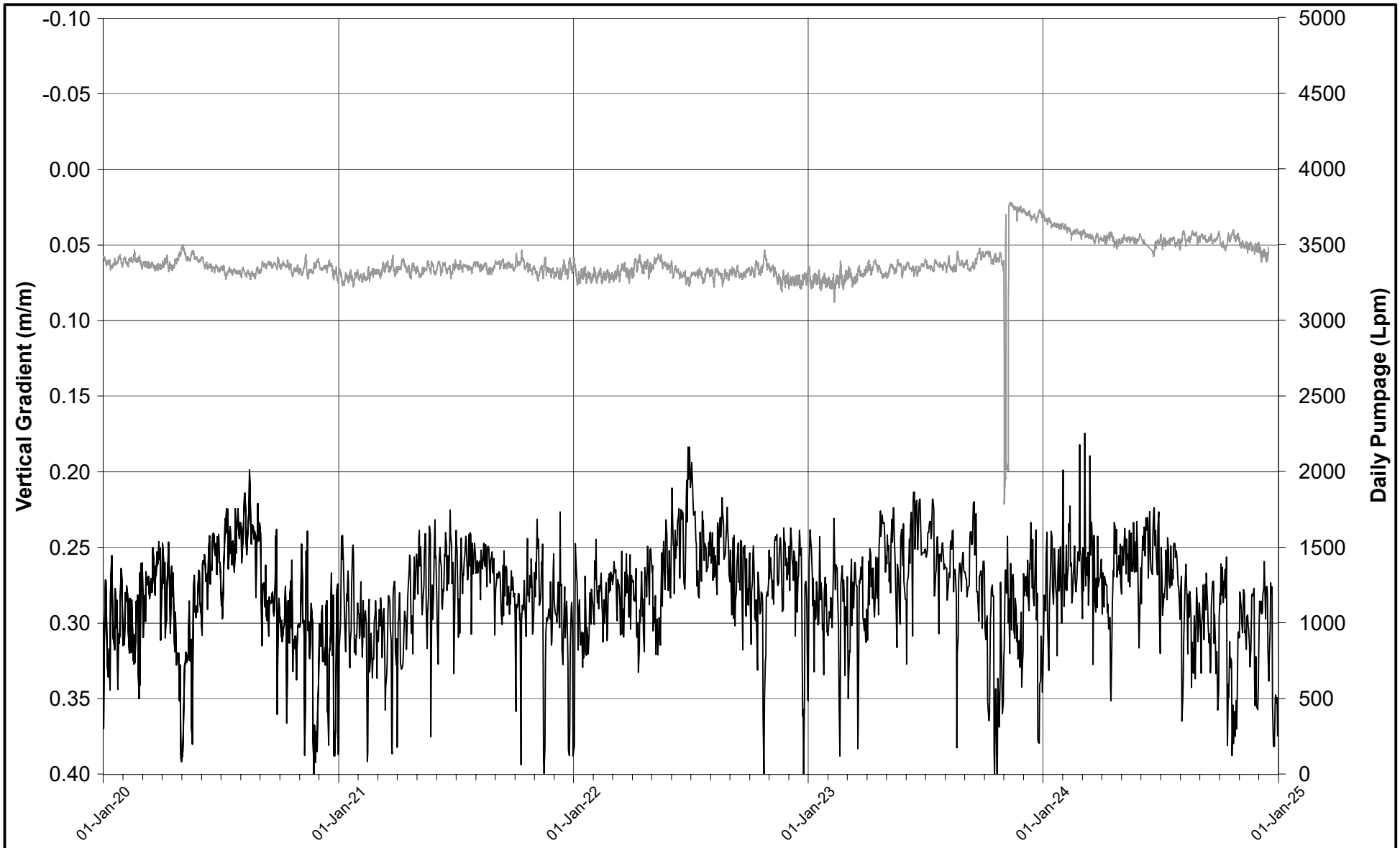
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW8-08 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D41



Note: Vertical gradient between MW10B-09 and MW10C-09

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

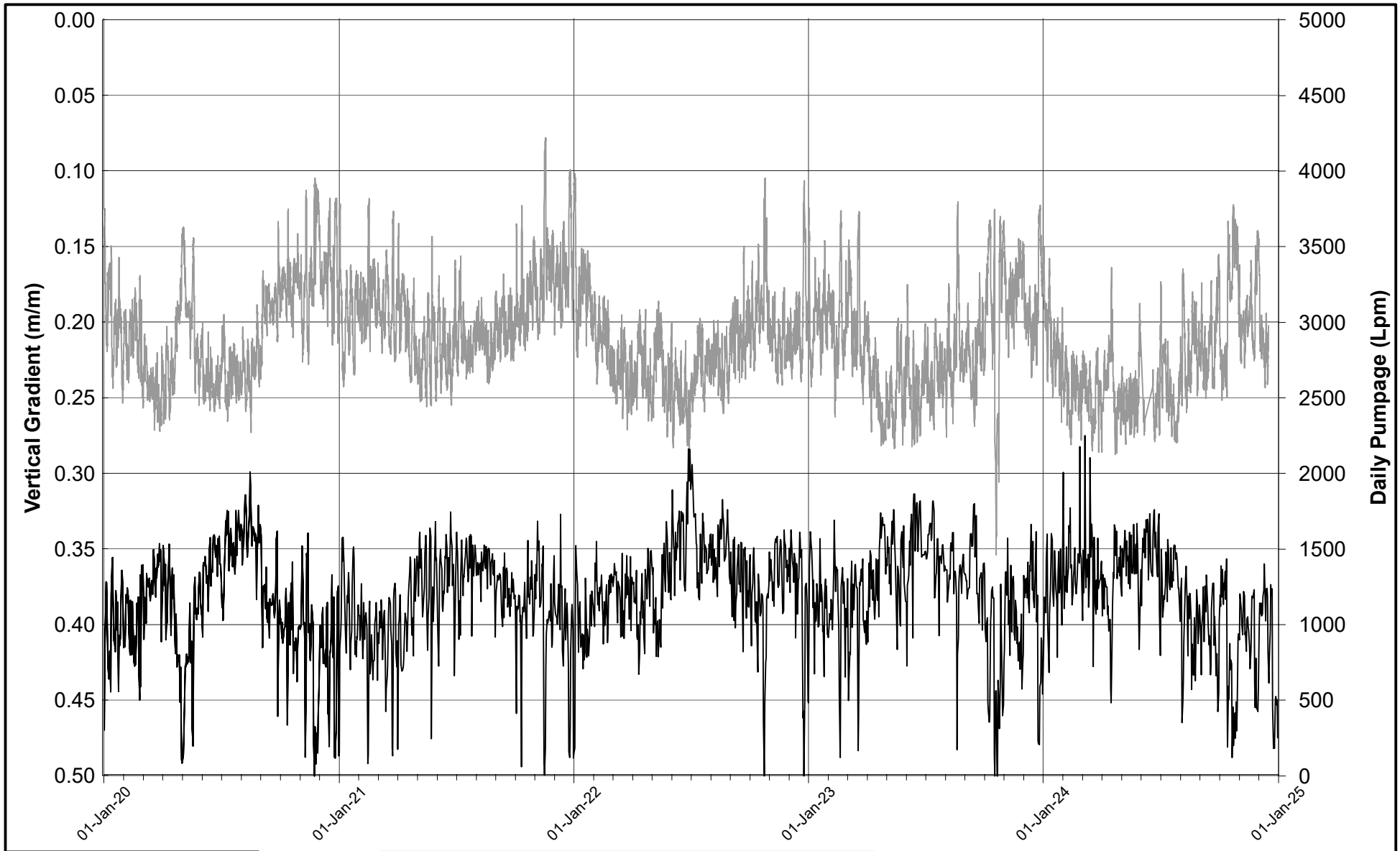
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW10-09 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D42



Note: Vertical gradient between MW14C-11 and MW14A-11.

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

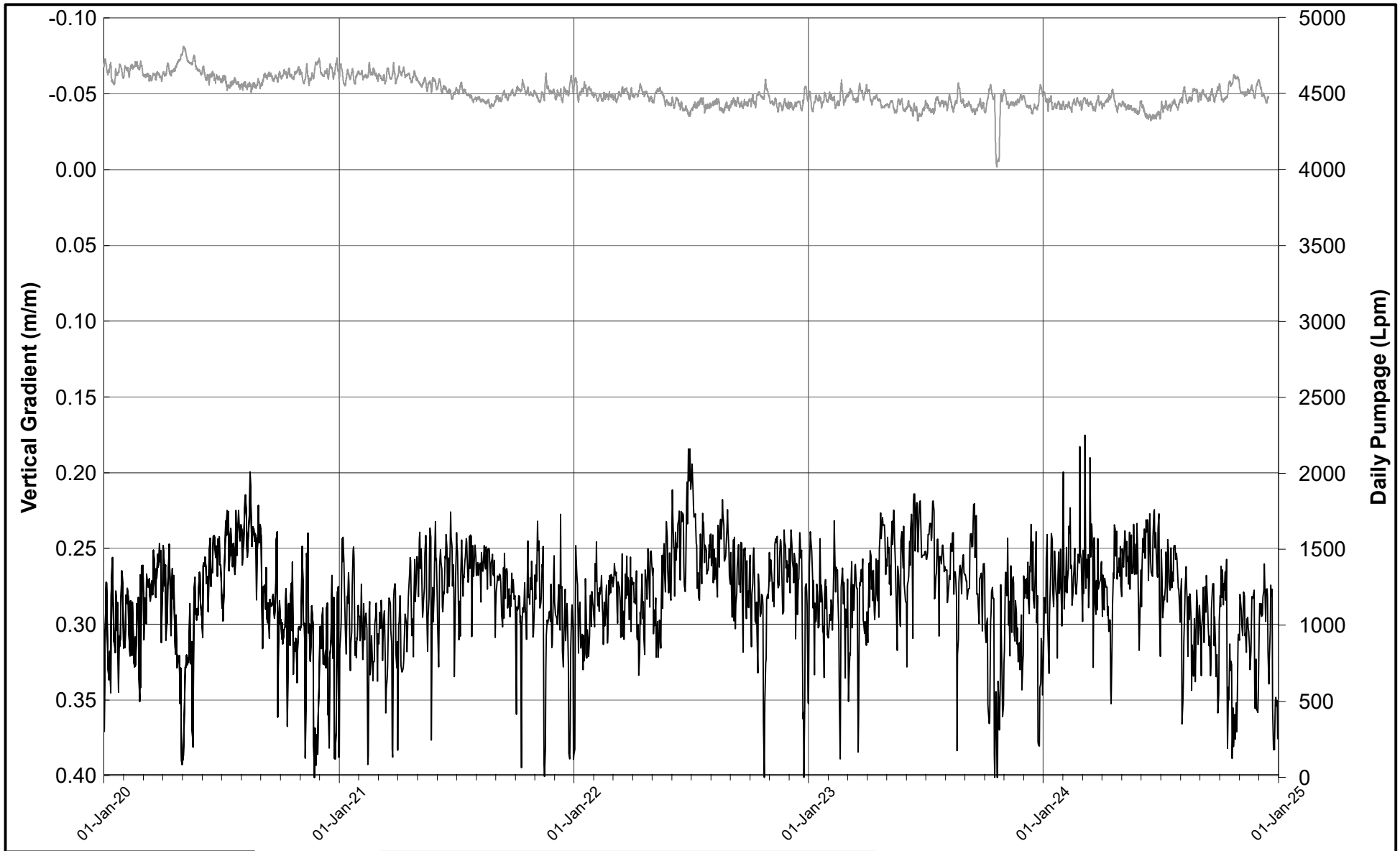
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW14-11 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D43



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

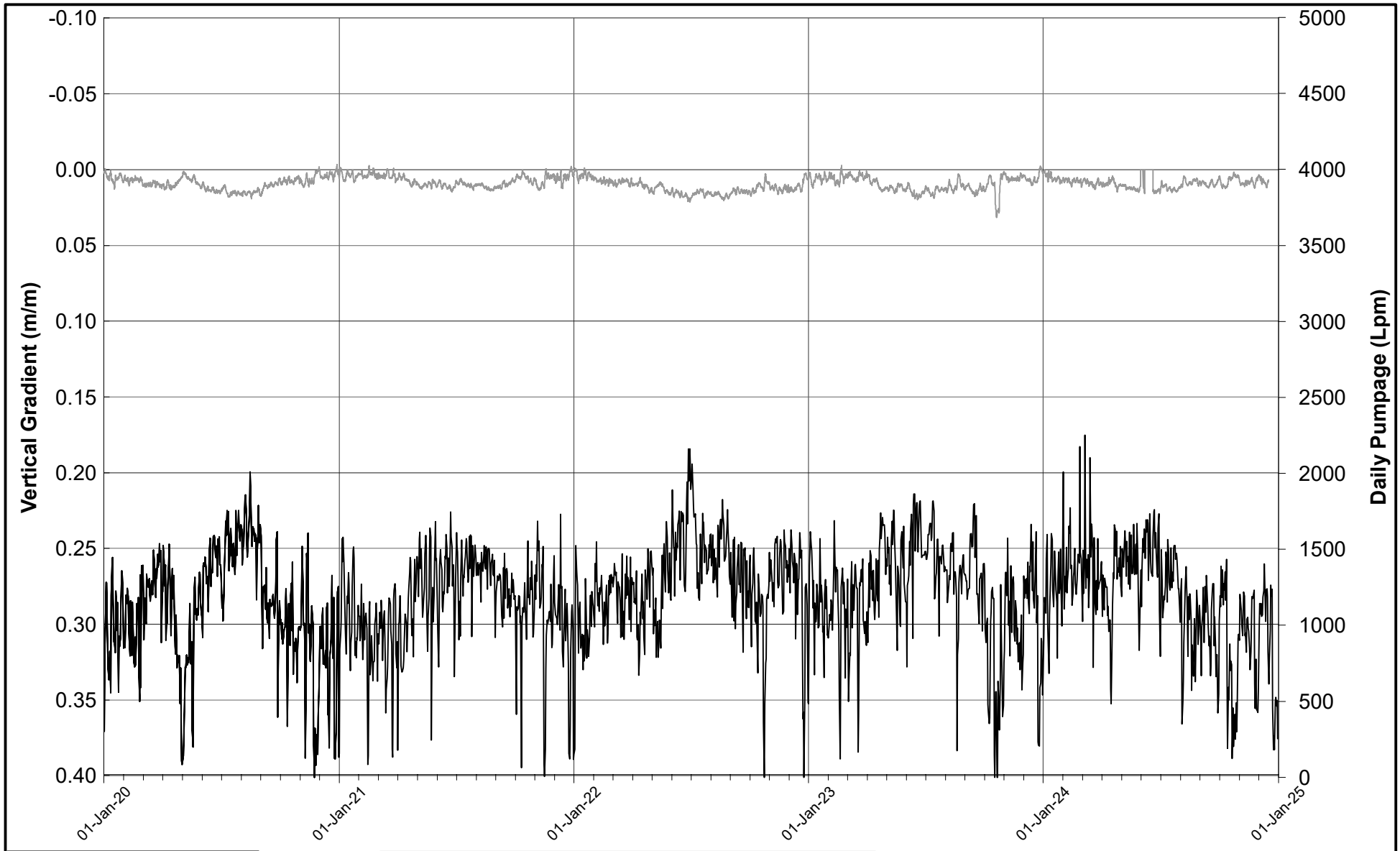
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW15-12 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D44



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

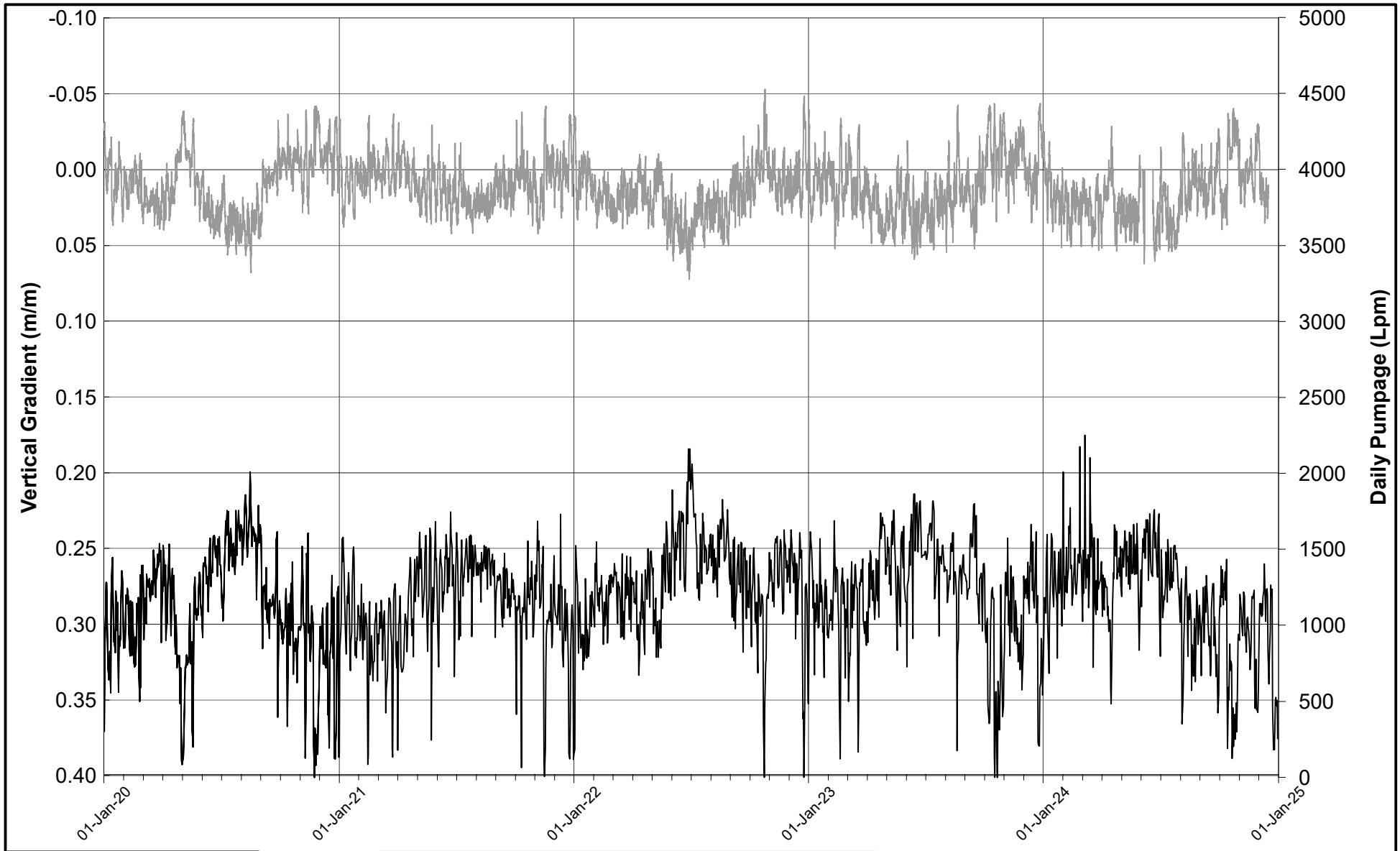
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW16-12 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D45



PROJECT

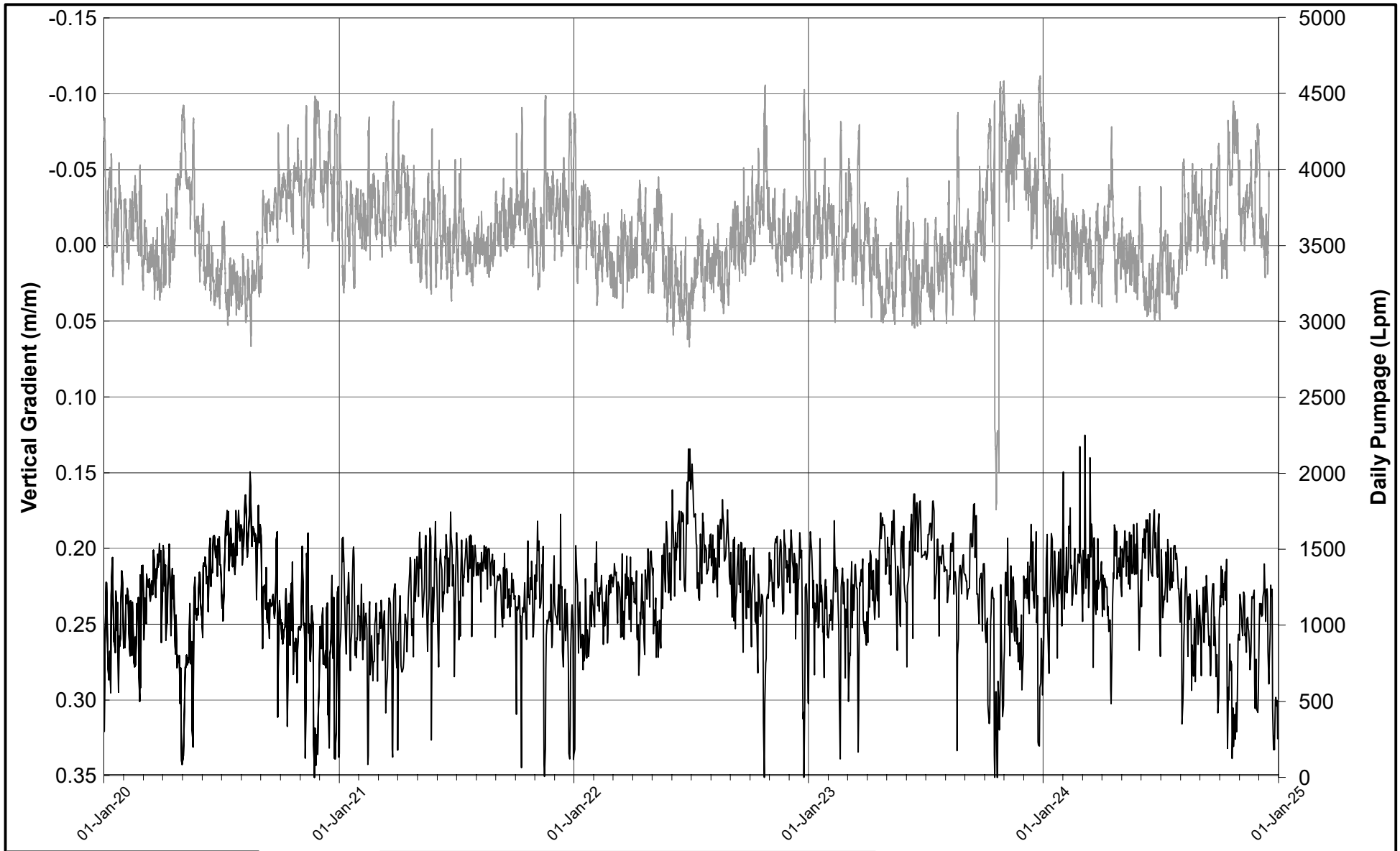
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MW17-12 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D46



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

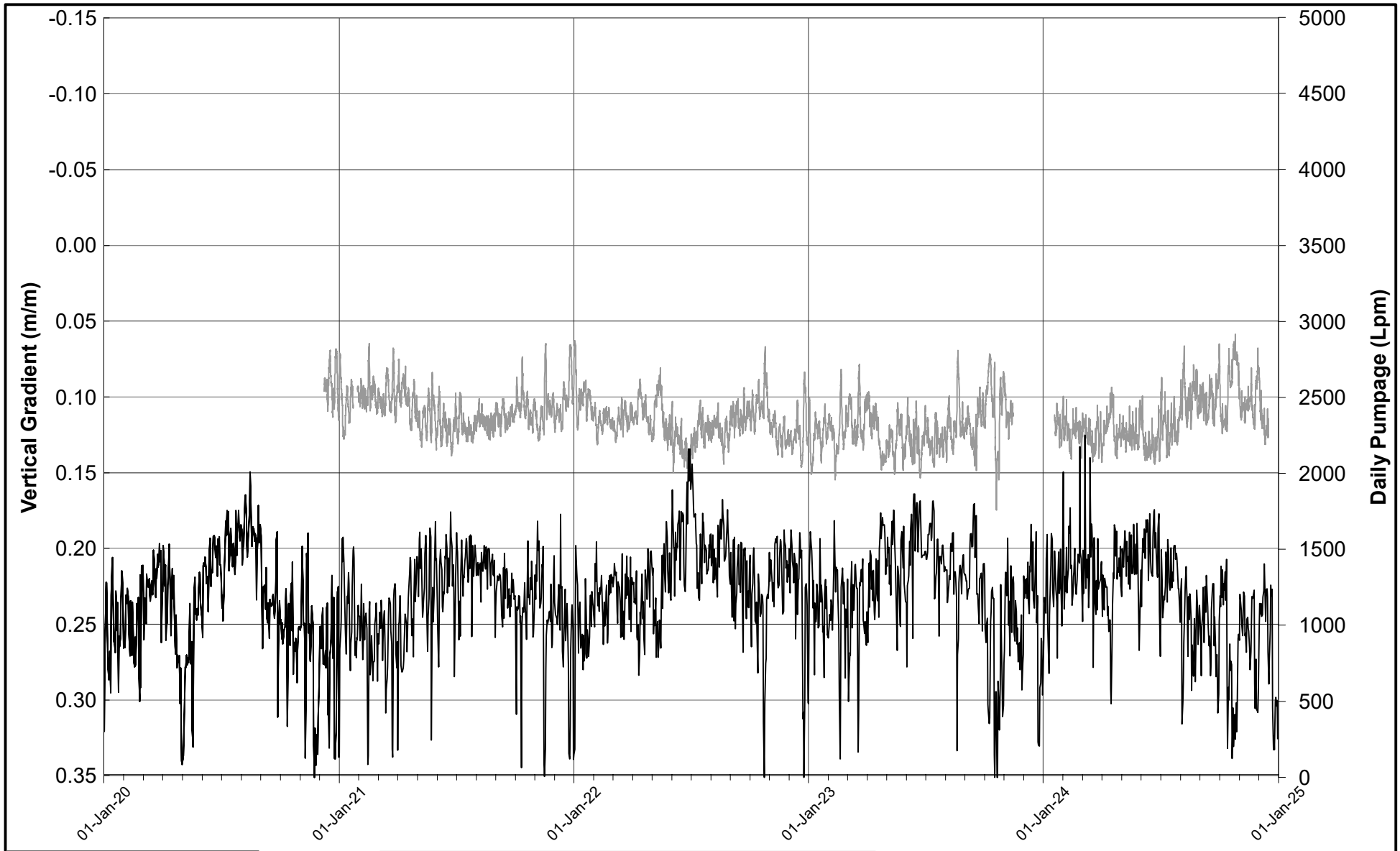
Town of Aberfoyle, Ontario

TITLE

MW18-12 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D47



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

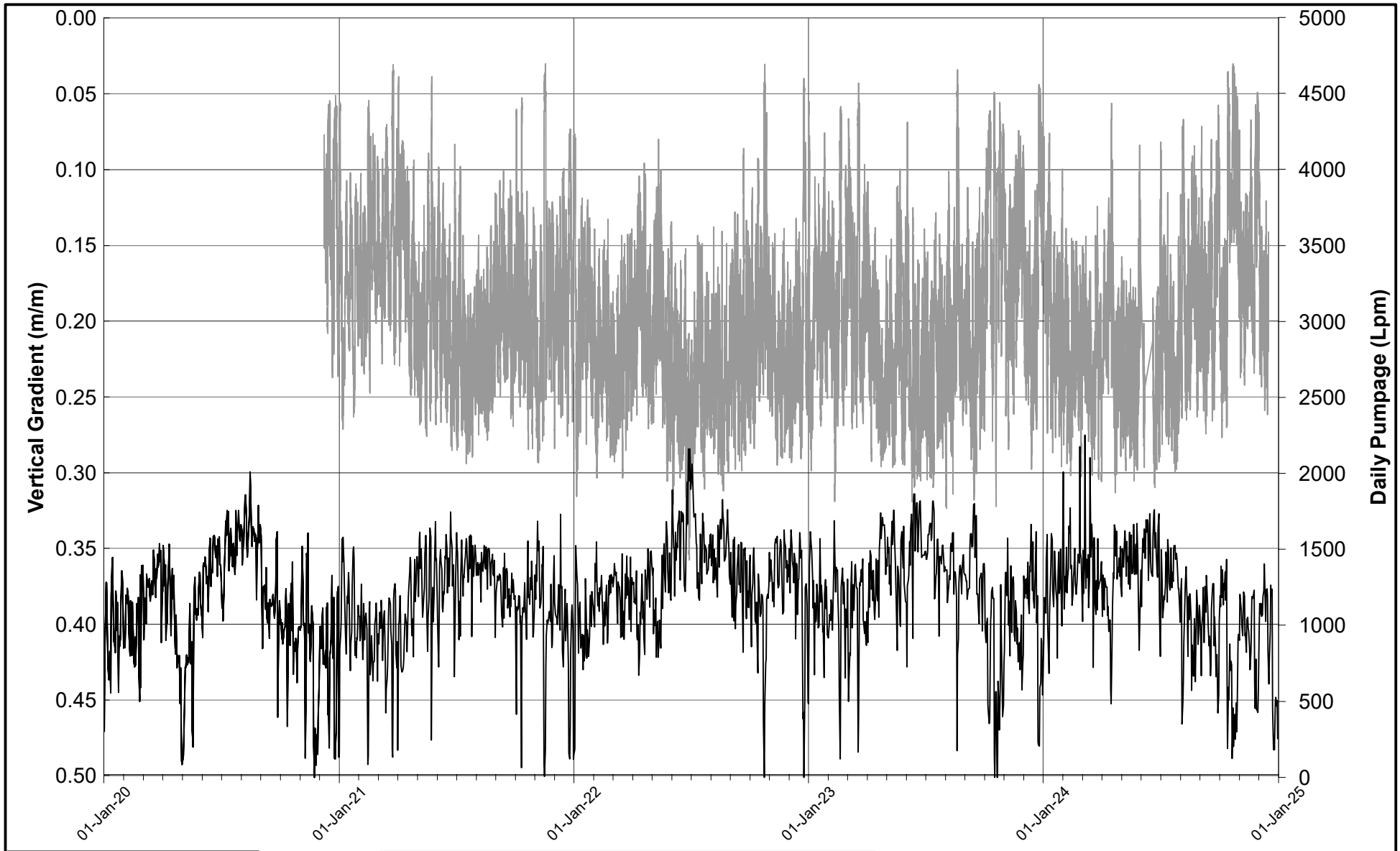
Town of Aberfoyle, Ontario

TITLE

MW19-18 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D48

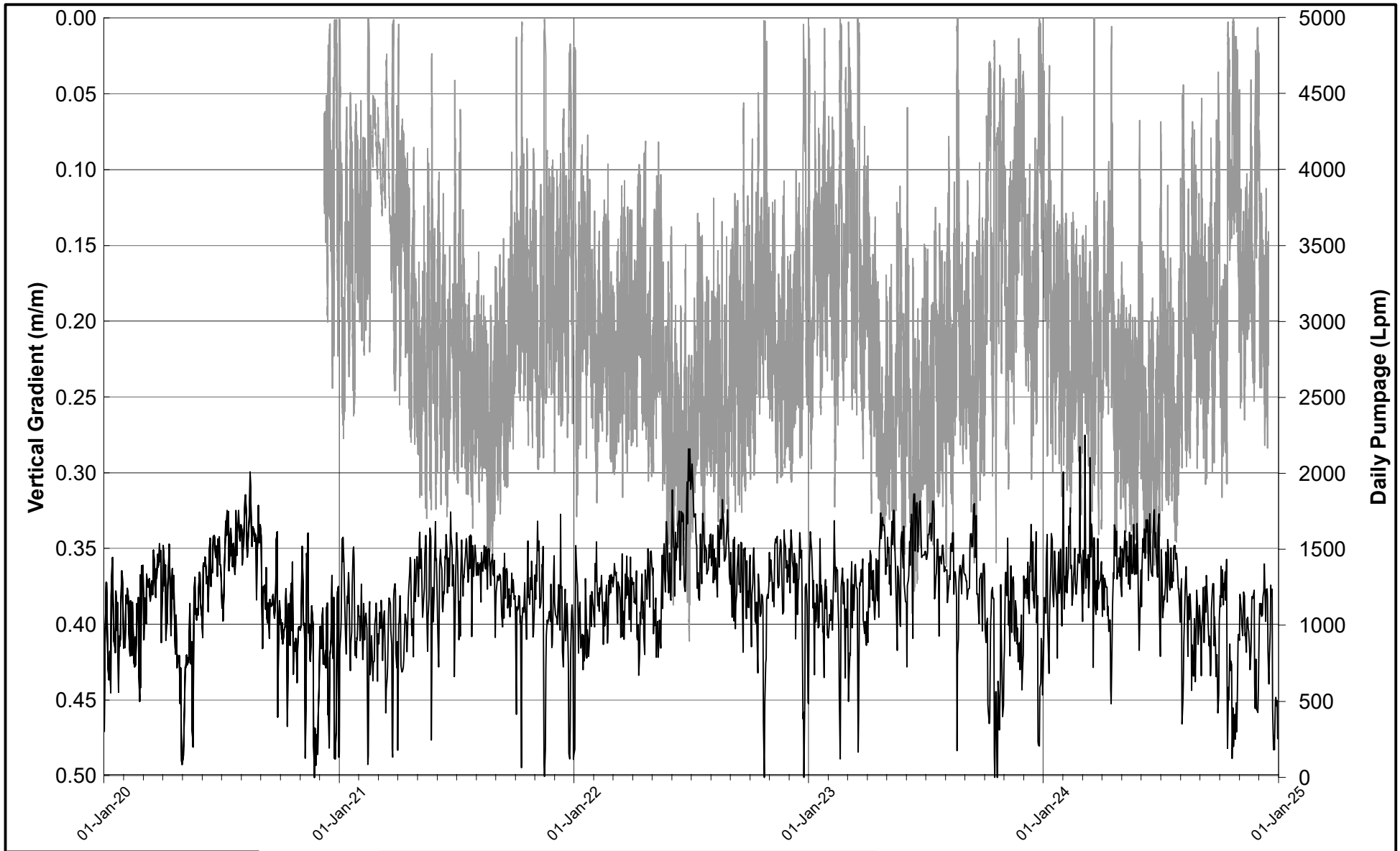


PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
MW20-19 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D49



PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
MW21-18 VERTICAL GRADIENT
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	D50

TABLE D1
Manual Groundwater Elevations
2024 Annual Report

Date	Water Level (masl)							
	TW3-80	MW2A-07	MW2B-07	MW2C-07	MW2D-07	MW2E-07	MW4A-07	MW4B-07
19/20-Mar-2024	304.69	307.21	308.04	310.83	311.65	311.61	308.18	311.85
19/20-Jun-2024	303.64	307.91	308.81	310.99	311.60	311.47	307.18	312.10
18/19-Sep-2024	306.37	309.90	310.65	311.47	311.74	311.58	309.65	312.32
16/17-Dec-2024	306.99	309.06	309.91	311.45	311.81	311.70	309.40	311.82

TABLE D1
Manual Groundwater Elevations
2024 Annual Report

Date	Water Level (masl)							
	MW4C-07	MW6A-08	MW6B-08	MW7A-08	MW7B-08	MW8A-08	MW8B-08	MW10A-09
19/20-Mar-2024	312.00	315.68	318.55	308.28	310.37	317.46	317.41	319.67
19/20-Jun-2024	312.17	315.46	318.37	307.55	309.98	317.16	317.22	319.54
18/19-Sep-2024	312.24	315.86	318.28	309.94	311.40	317.55	317.14	319.43
16/17-Dec-2024	311.85	315.53	318.33	309.68	311.16	317.45	317.24	319.49

TABLE D1
Manual Groundwater Elevations
2024 Annual Report

Date	Water Level (masl)							
	MW10B-09	MW10C-09	MW10D-09	MW14A-11	MW14B-11	MW14C-11	MW15A-12	MW15B-12
19/20-Mar-2024	319.76	317.72	317.04	309.45	314.01	314.94	310.18	308.76
19/20-Jun-2024	319.64	317.18	316.46	309.13	314.04	314.54	310.02	308.80
18/19-Sep-2024	319.52	317.53	316.93	310.49	313.97	314.65	310.47	308.65
16/17-Dec-2024	319.57	317.17	316.43	310.10	313.80	314.31	310.23	308.56

TABLE D1
Manual Groundwater Elevations
2024 Annual Report

Date	Water Level (masl)							
	MW16A-12	MW16B-12	MW17A-12	MW17B-12	MW18A-12	MW18B-12	MW-D	MW-I
19/20-Mar-2024	307.05	307.37	307.85	308.82	307.64	308.10	310.90	310.84
19/20-Jun-2024	307.05	307.46	307.90	308.85	307.69	307.97	310.83	310.77
18/19-Sep-2024	307.47	307.92	309.04	309.09	309.31	308.21	311.26	311.26
16/17-Dec-2024	306.99	307.20	308.49	308.71	309.10	307.98	311.31	311.20

TABLE D1
Manual Groundwater Elevations
2024 Annual Report

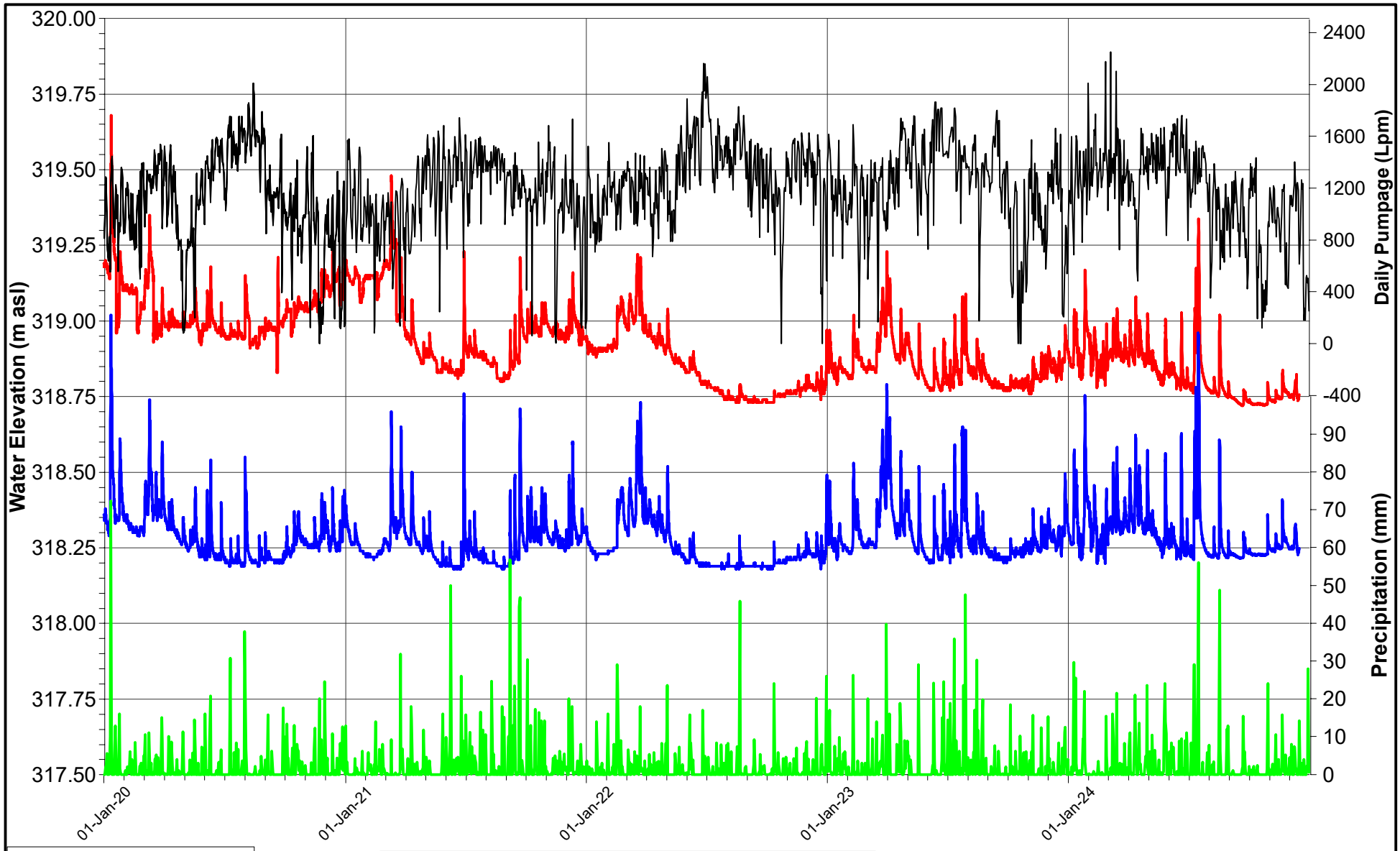
Date	Water Level (masl)							
	MW-S	PCC-D	PCC-I	PCC-S	TW1-93	TW2-11	PW5 Meadows of Aberfoyle	#125 Brock S. (Y Well)
19/20-Mar-2024	311.41	314.60	314.30	314.42	310.00	309.21	308.90	311.59
19/20-Jun-2024	311.09	314.32	314.00	314.10	309.85	308.57	308.42	311.92
18/19-Sep-2024	311.03	314.24	313.89	313.84	310.12	310.59	310.50	311.95
16/17-Dec-2024	311.22	314.40	314.03	314.07	310.03	310.82	309.95	311.54

TABLE D1
Manual Groundwater Elevations
2024 Annual Report

Date	Water Level (masl)					
	MW19-18-4	MW19-18-7	MW20-19-5	MW20-19-7	MW21-18-3	MW21-18-4
19/20-Mar-2024	312.40	315.50	307.60	311.13	307.41	311.27
19/20-Jun-2024	312.25	315.16	307.07	310.90	308.26	311.52
18/19-Sep-2024	313.00	315.08	309.15	311.60	309.14	311.75
16/17-Dec-2024	312.55	315.23	309.46	311.48	308.31	311.33

APPENDIX E

Surface Water Level Monitoring



Note: MP1-16S and MP1-16D Reference elevations are taken from a topographic map.

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

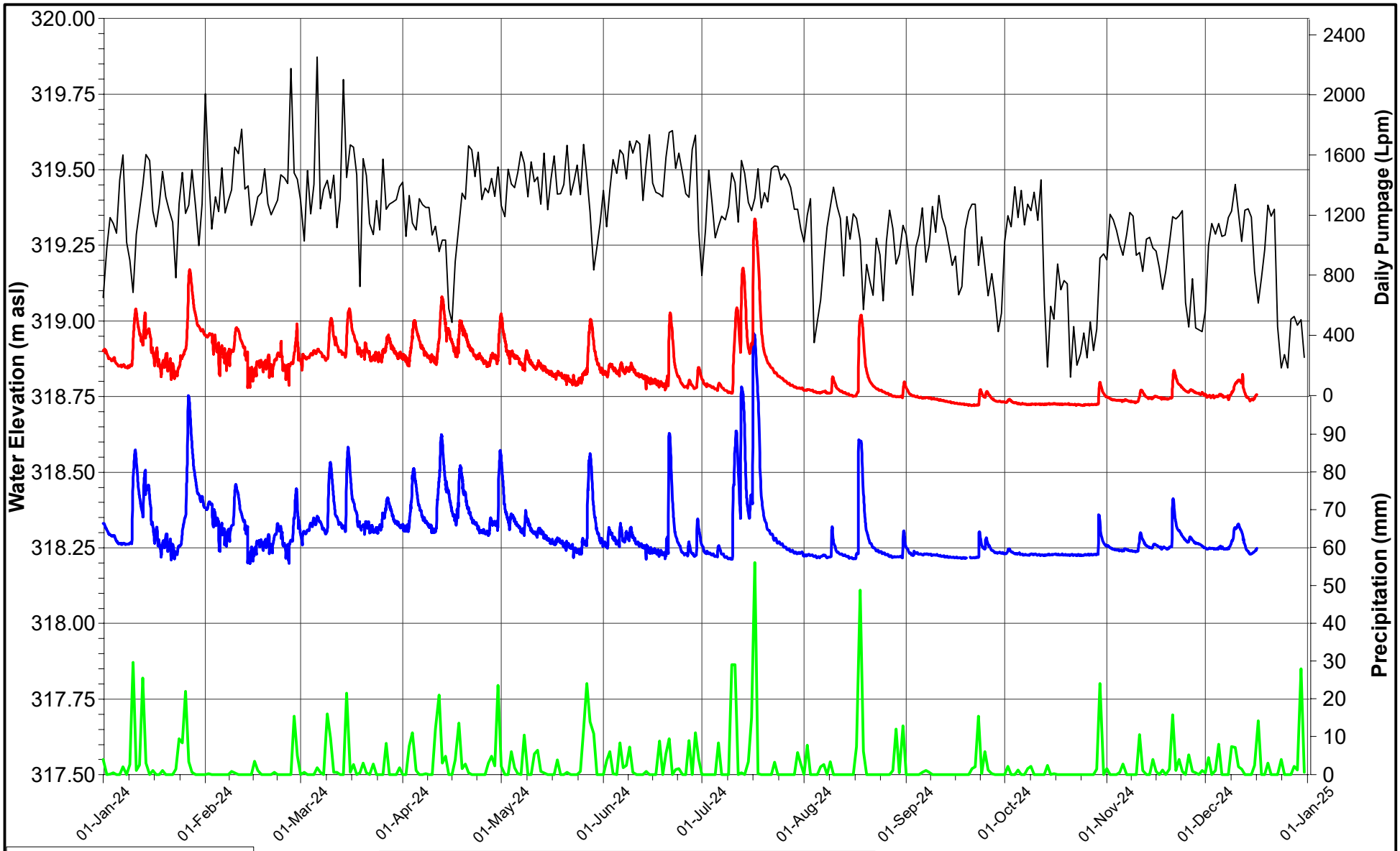
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP1-16 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E1a



Note: MP1-16S and MP1-16D Reference elevations are taken from a topographic map.

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

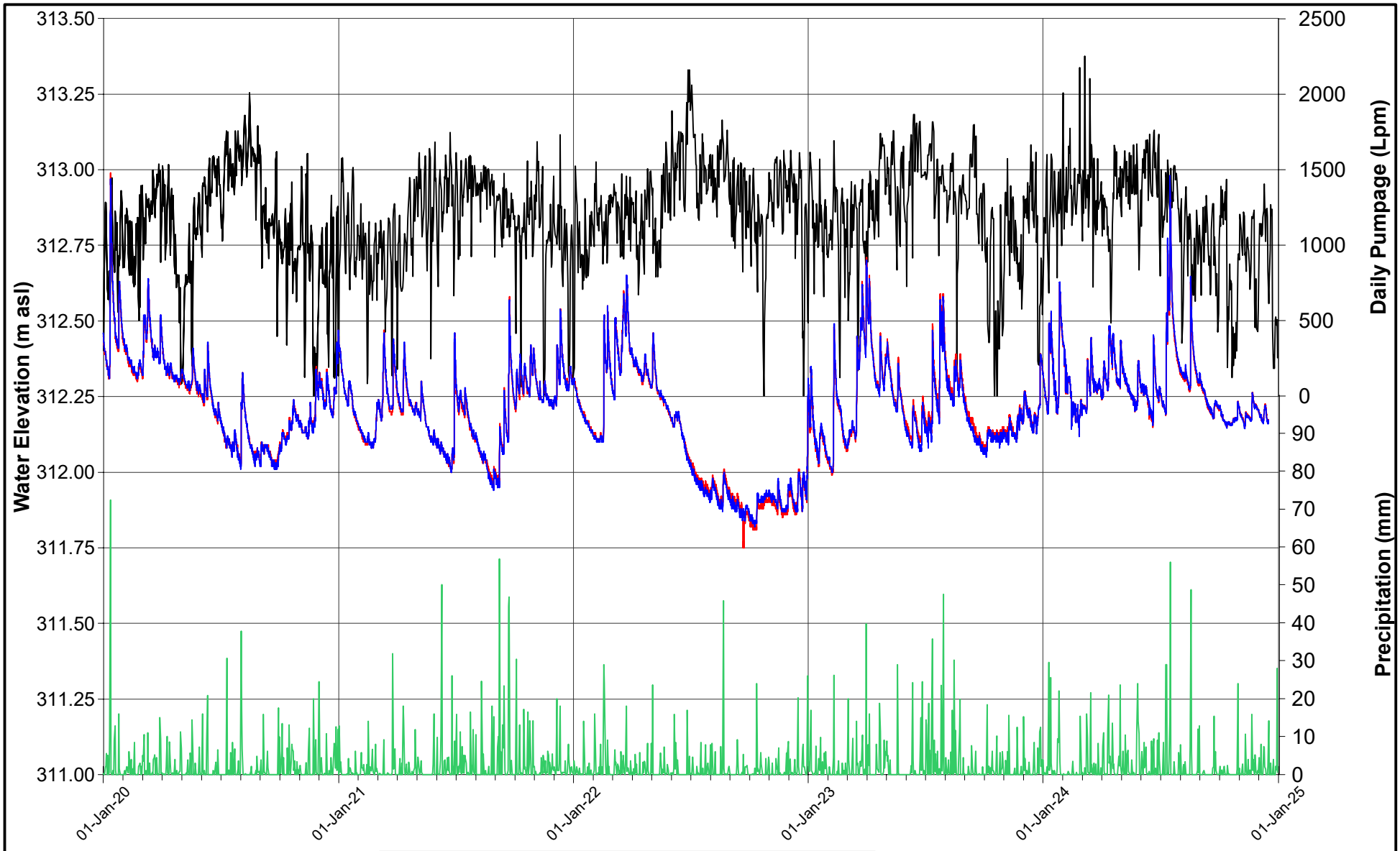
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP1-16 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E1b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

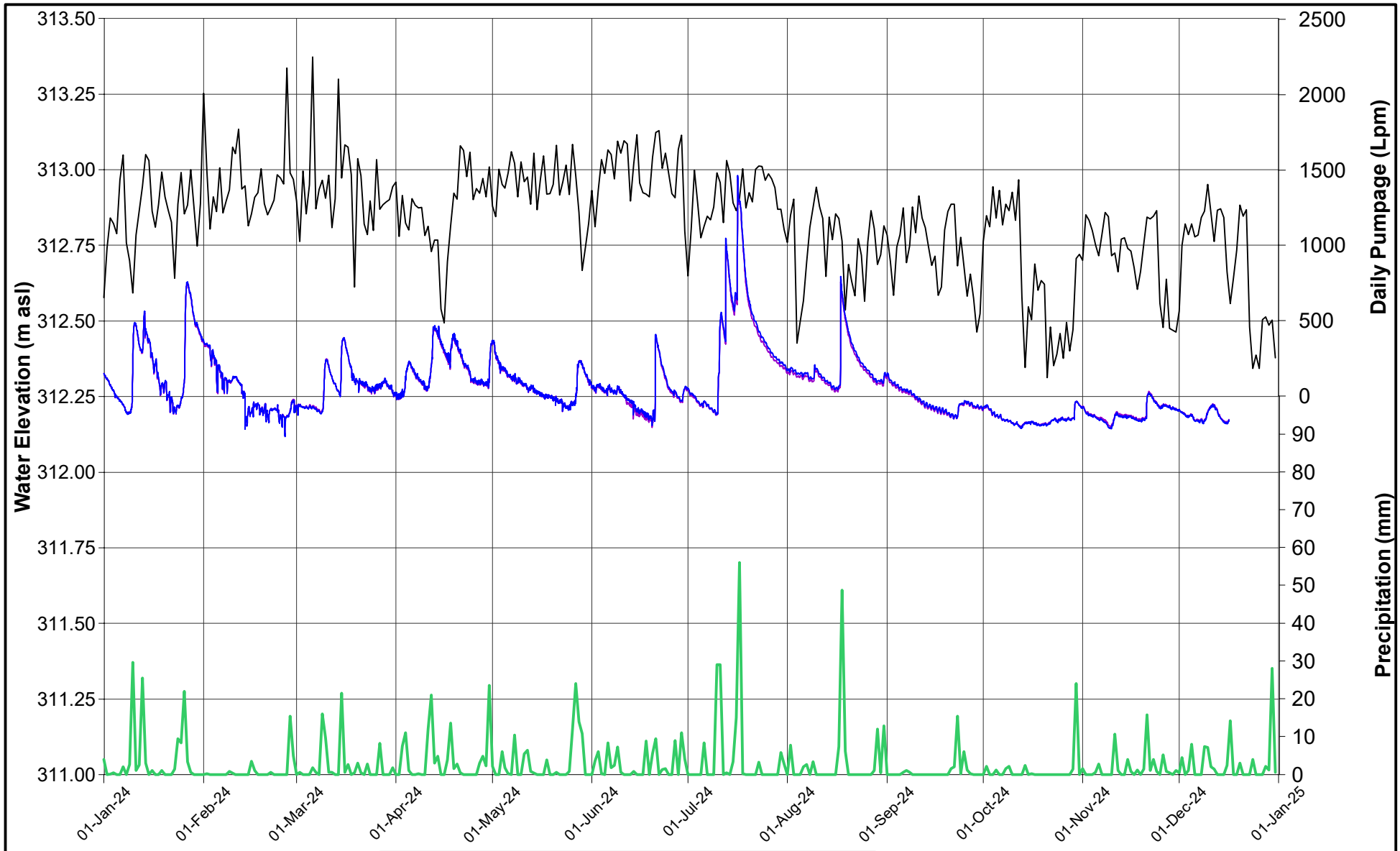
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP16 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E2a



PROJECT

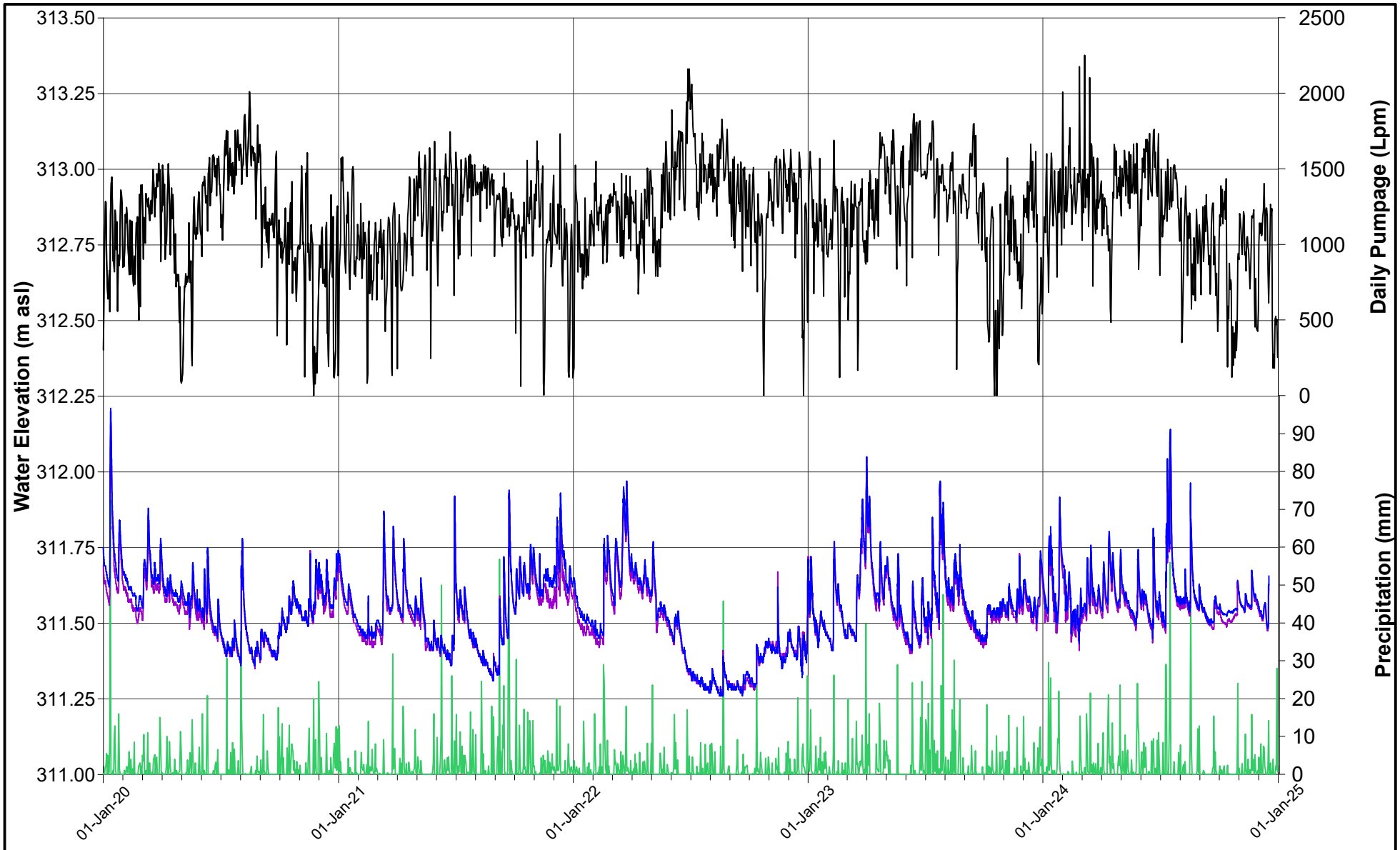
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP16 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E2b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

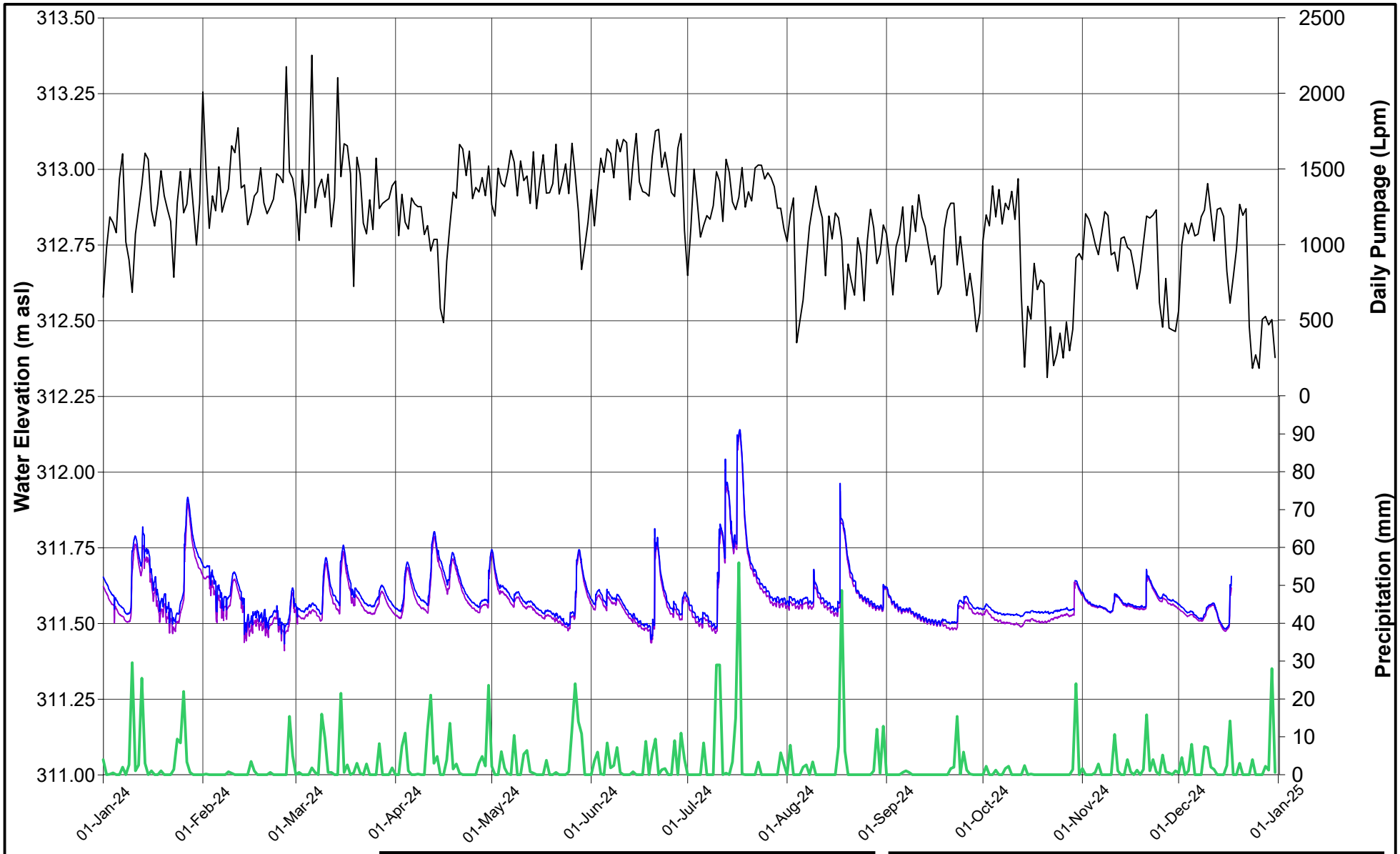
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

MP6 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E3a



PROJECT

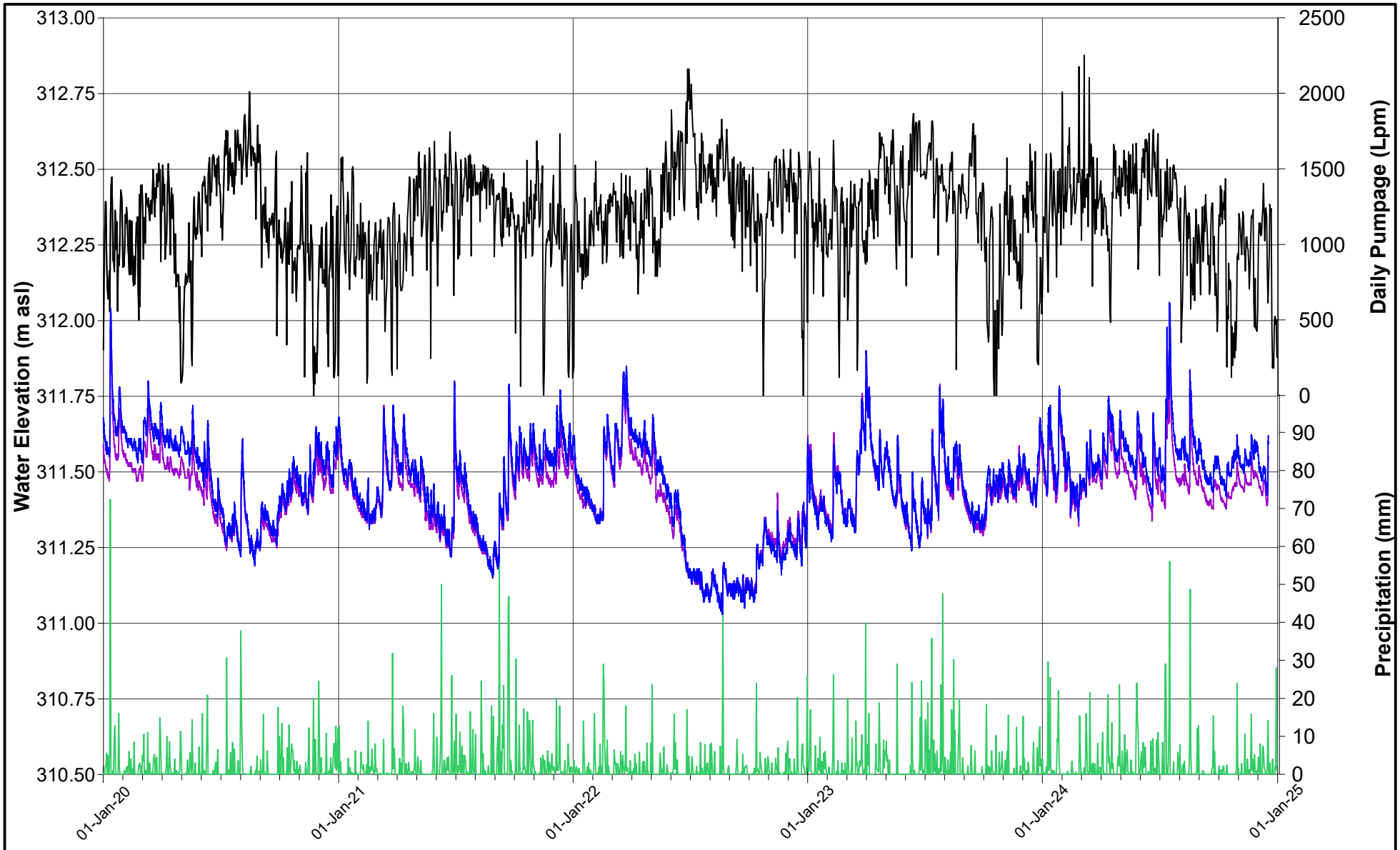
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP6 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E3b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

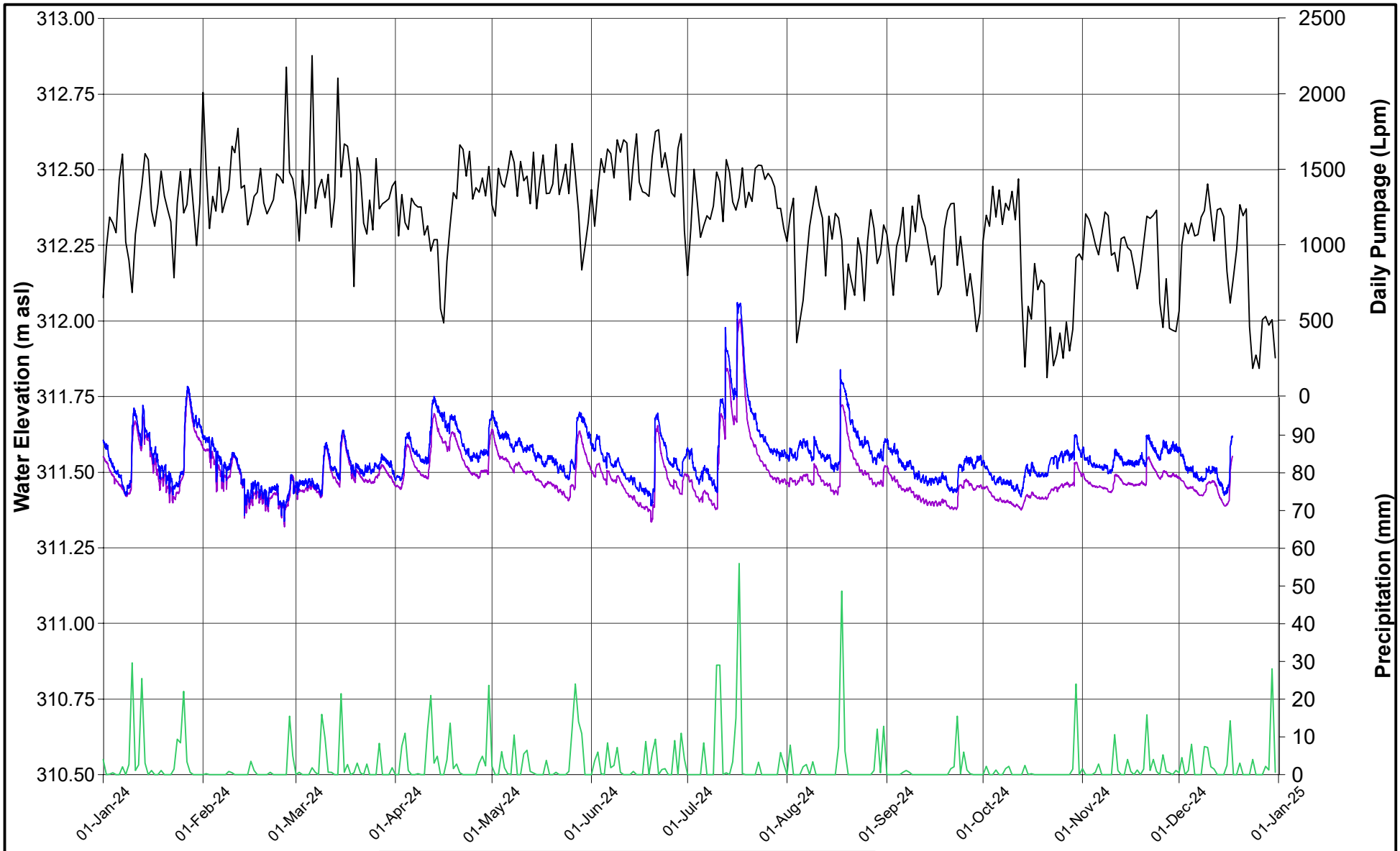
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP12 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E4a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

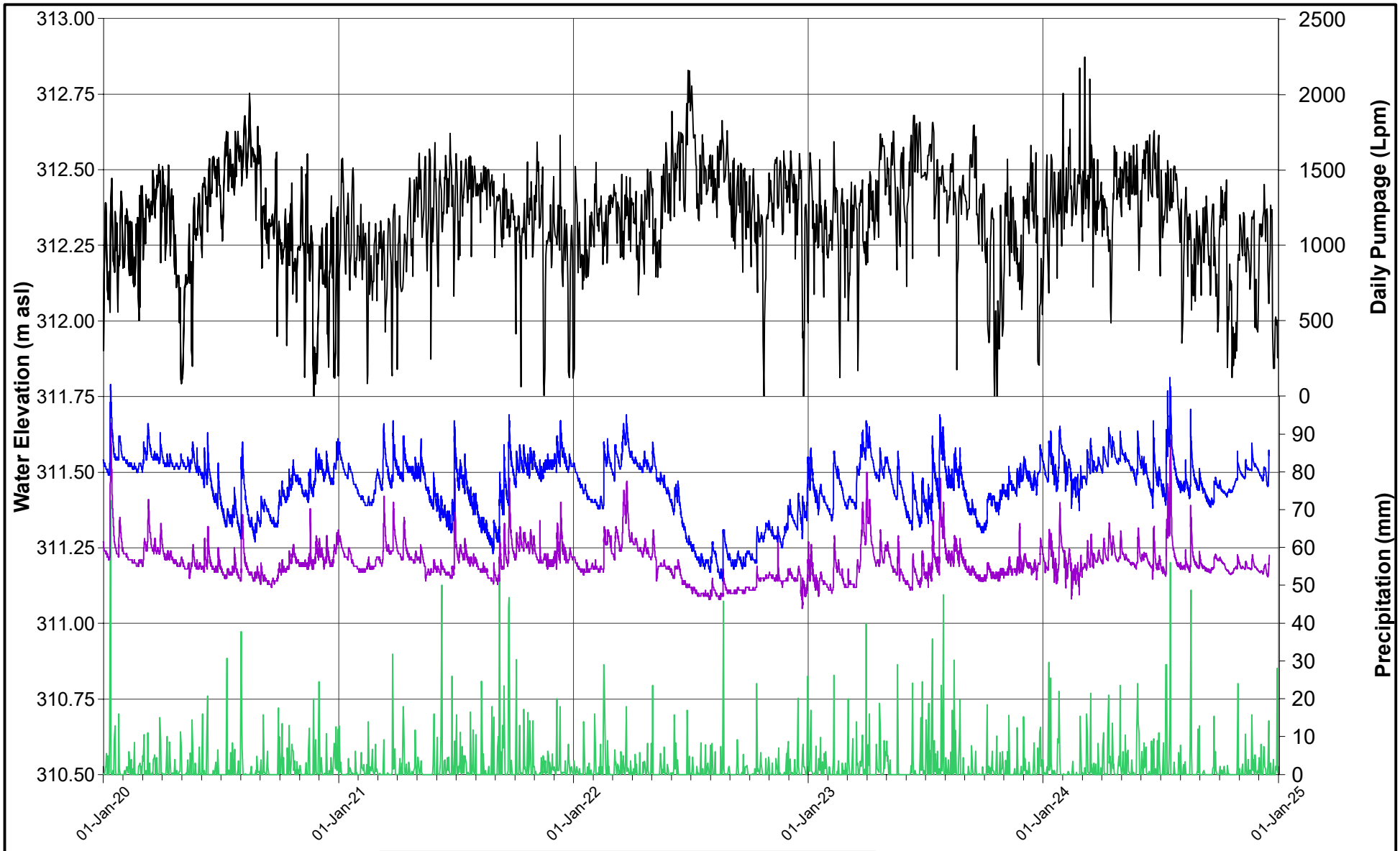
Town of Aberfoyle, Ontario

TITLE

MP12 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E4b



wsp

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

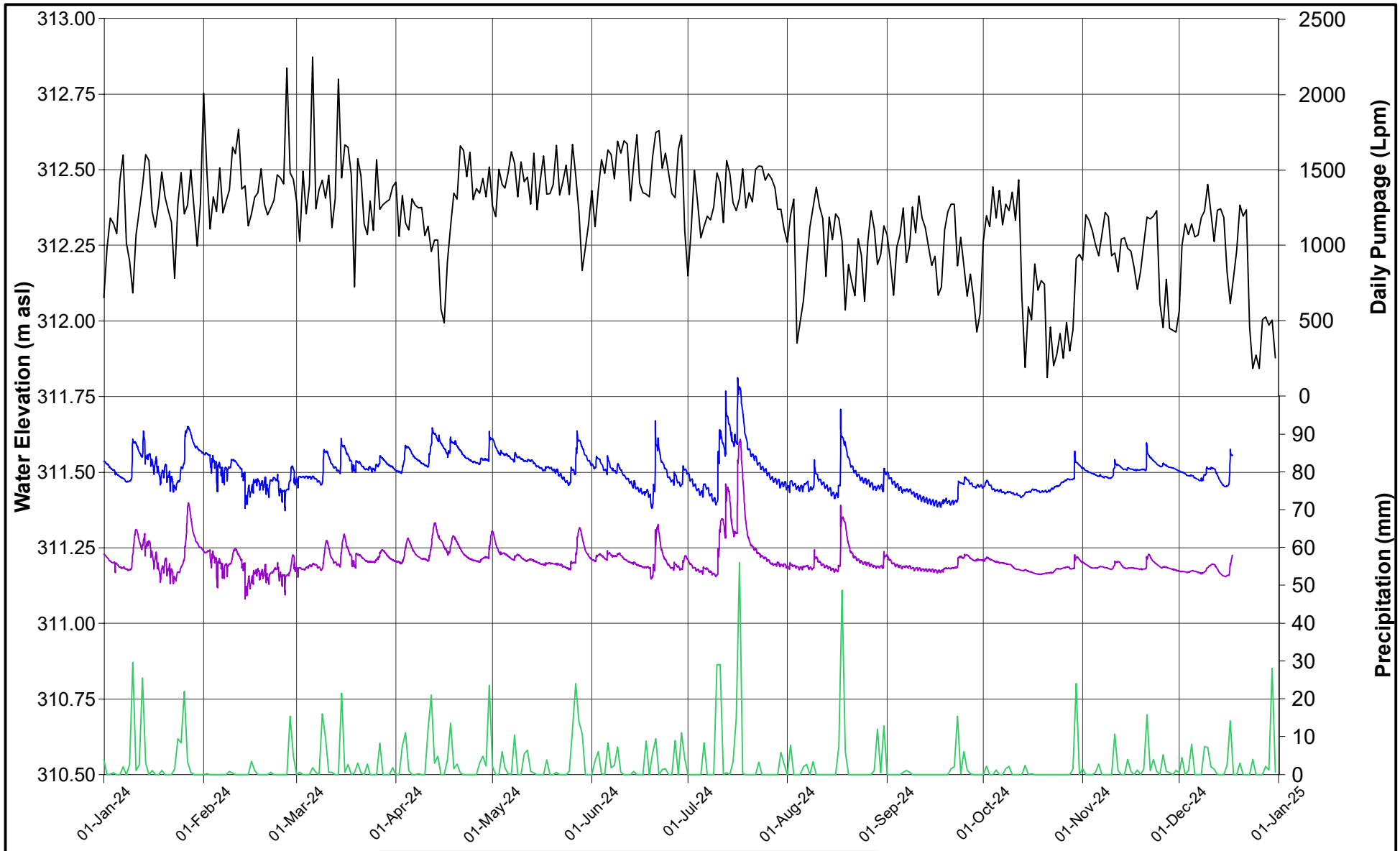
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

MP14 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E5a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

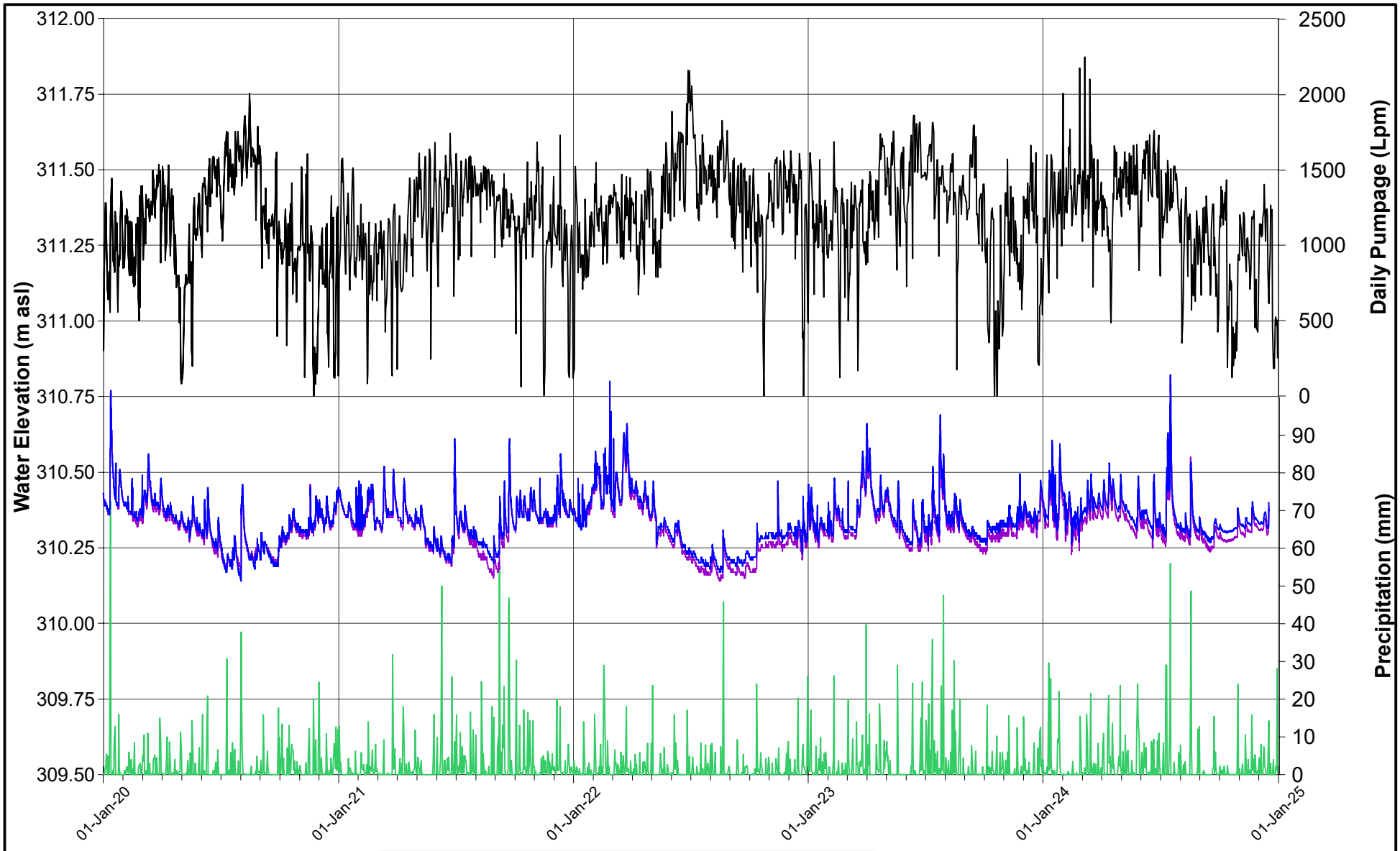
Town of Aberfoyle, Ontario

TITLE

MP14 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E5b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

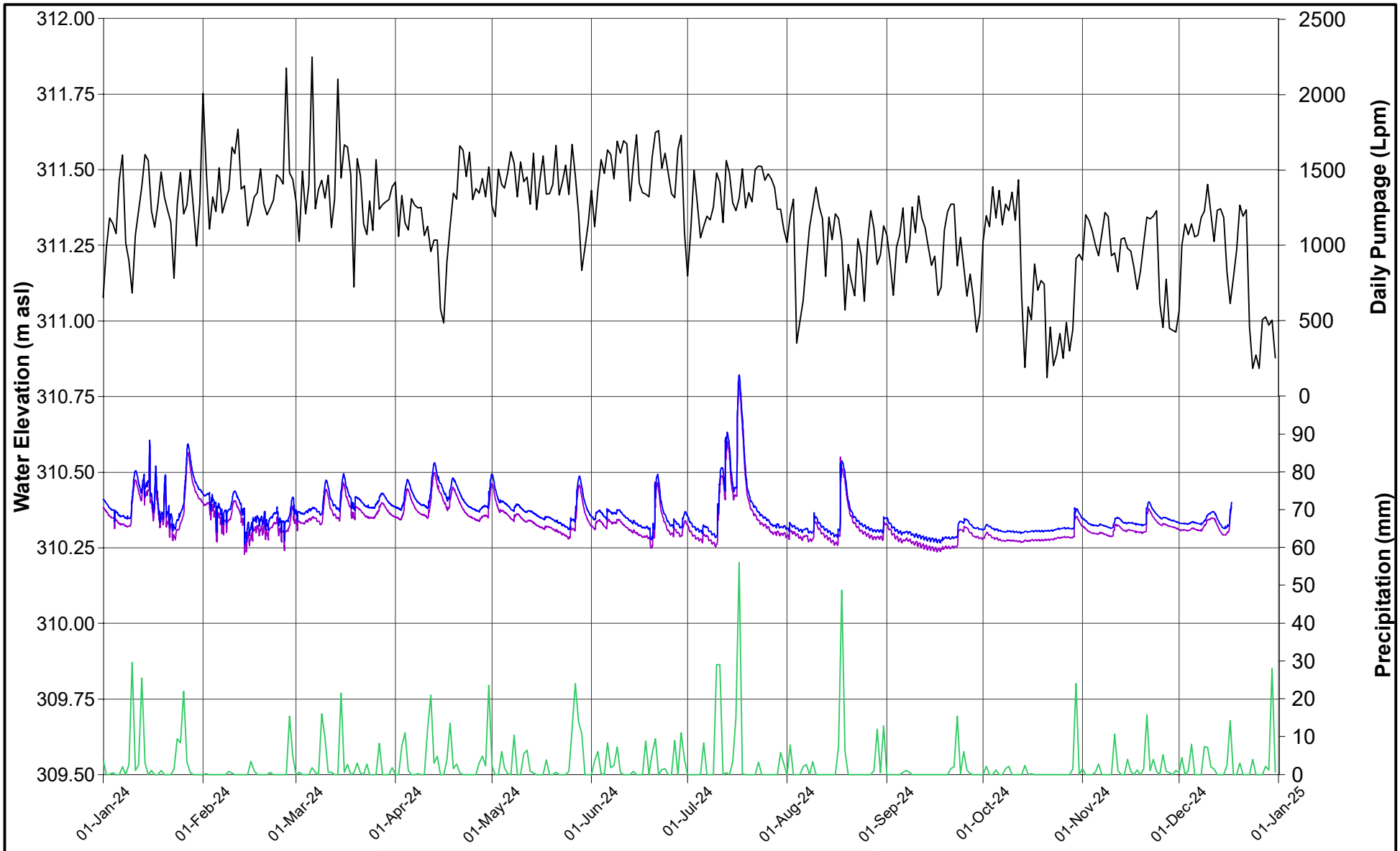
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP8 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E6a



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

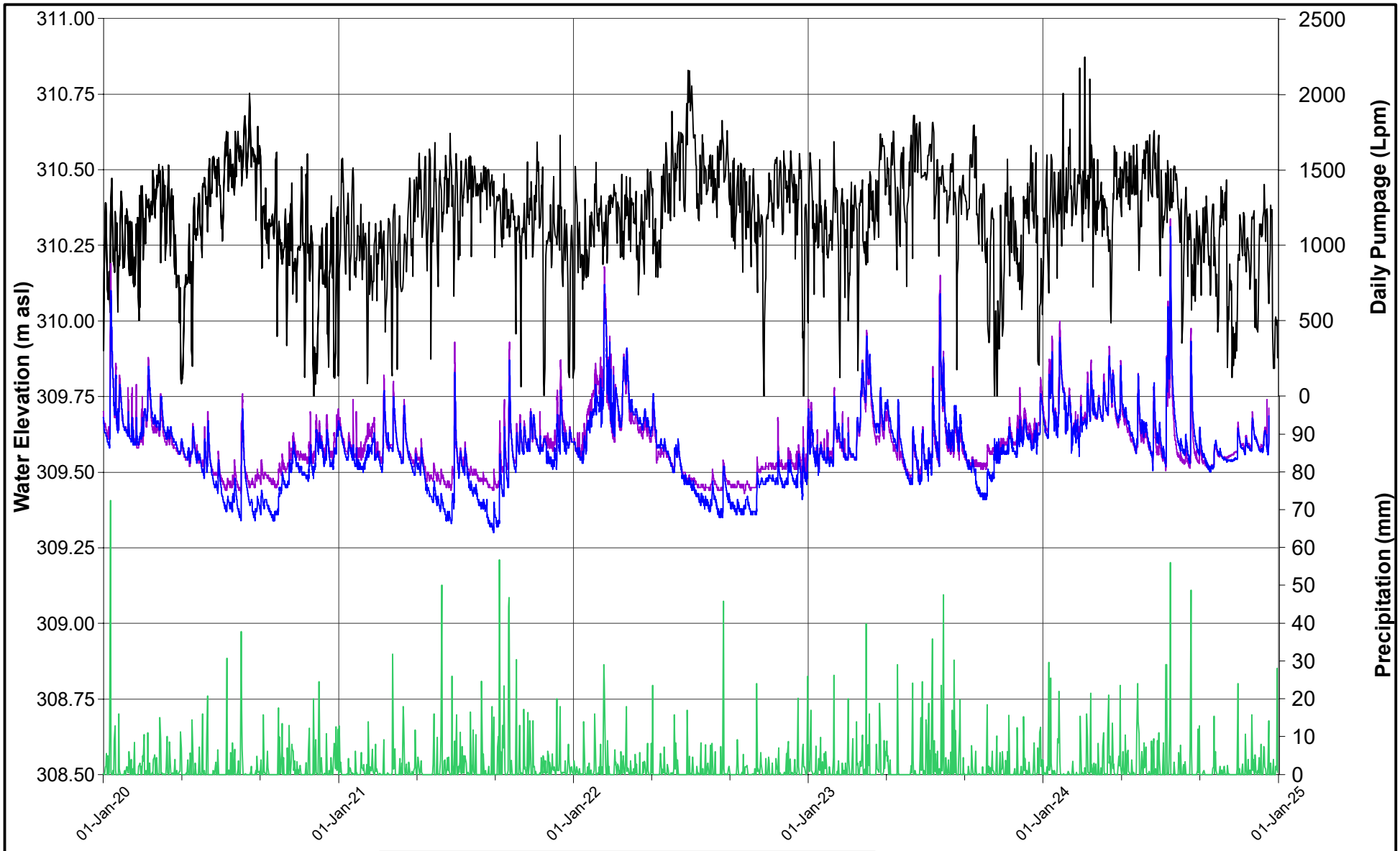
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

MP8 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E6b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

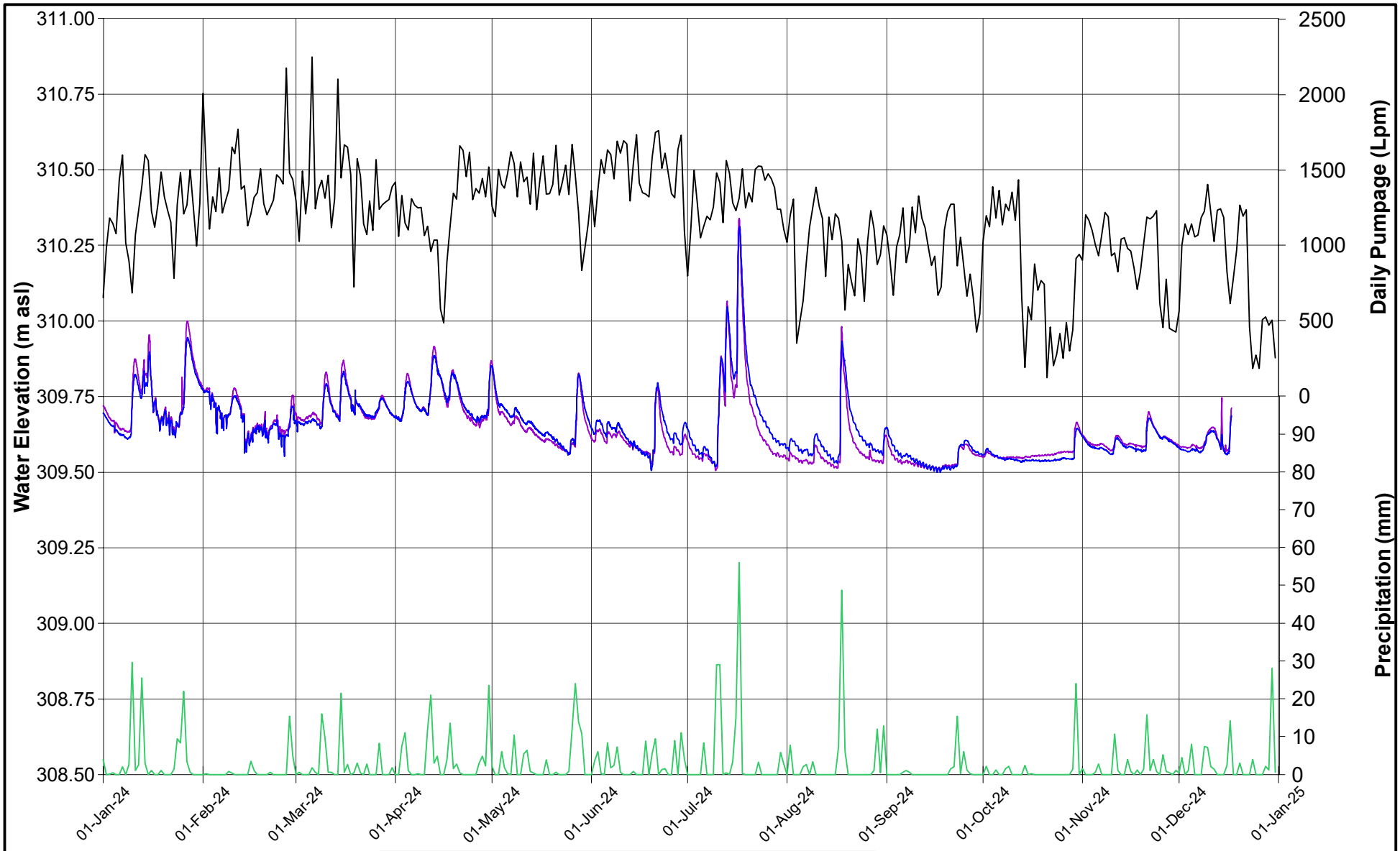
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

MP17 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E7a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

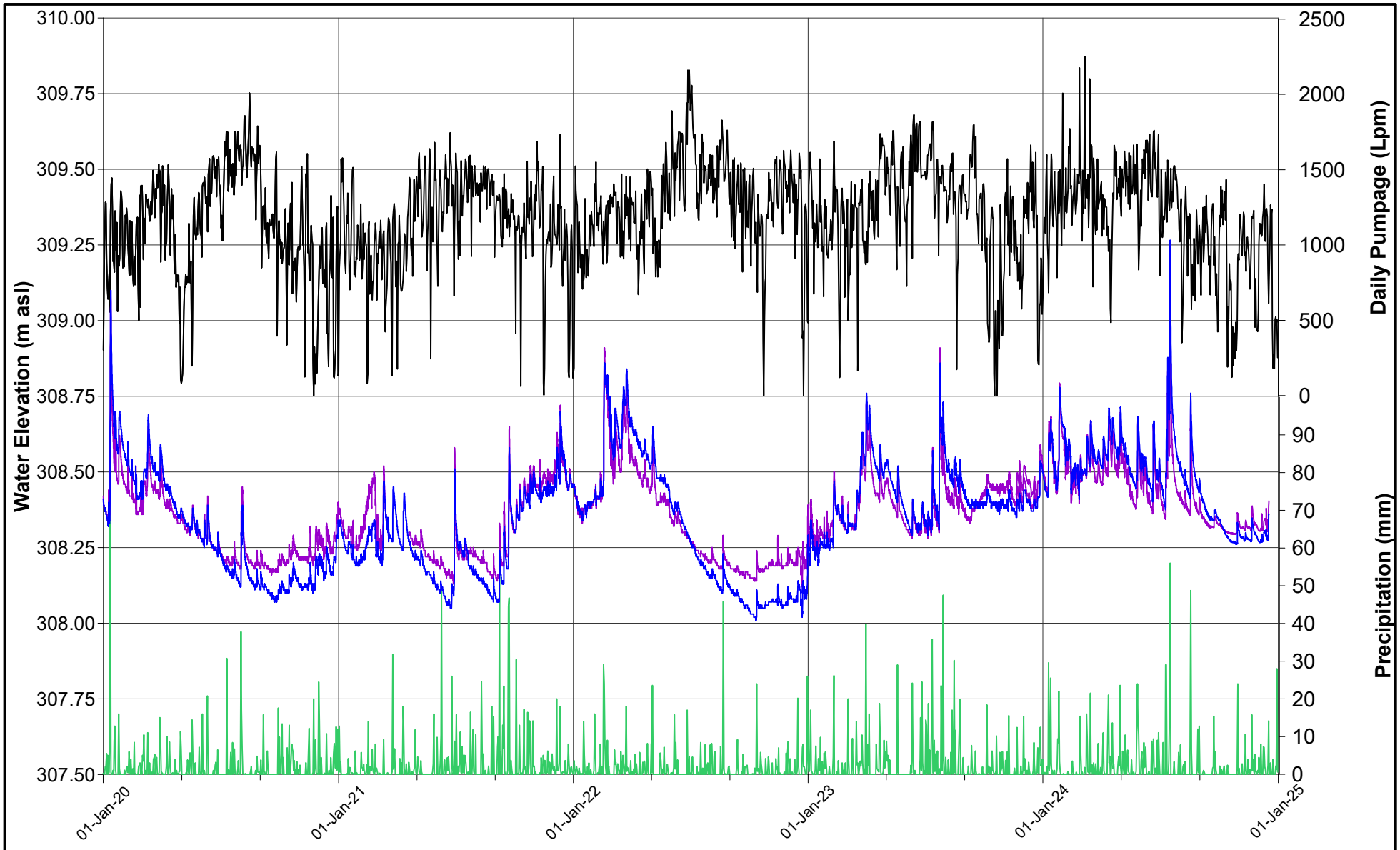
Town of Aberfoyle, Ontario

TITLE

MP17 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E7b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

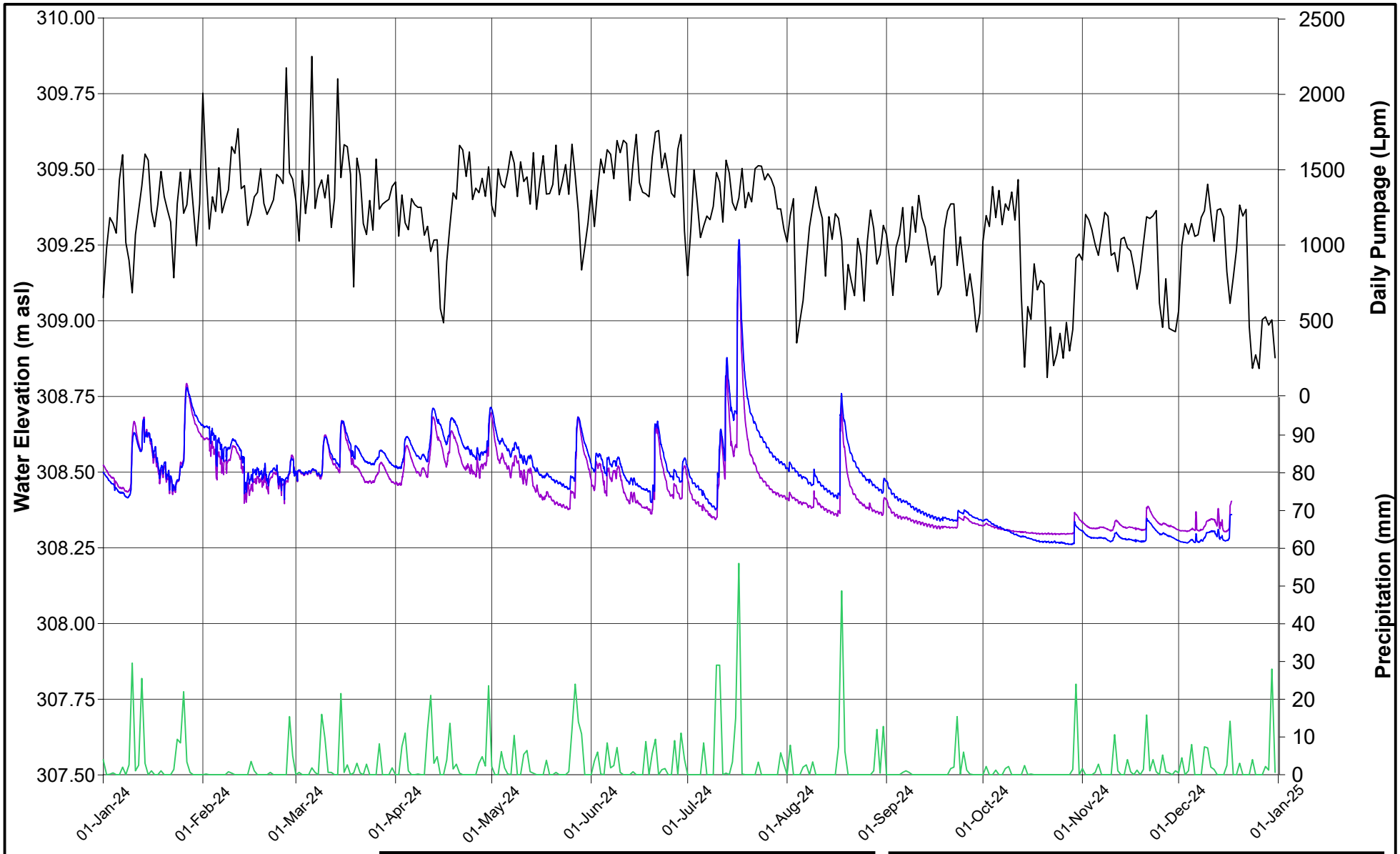
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

MP18 NEST HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E8a



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

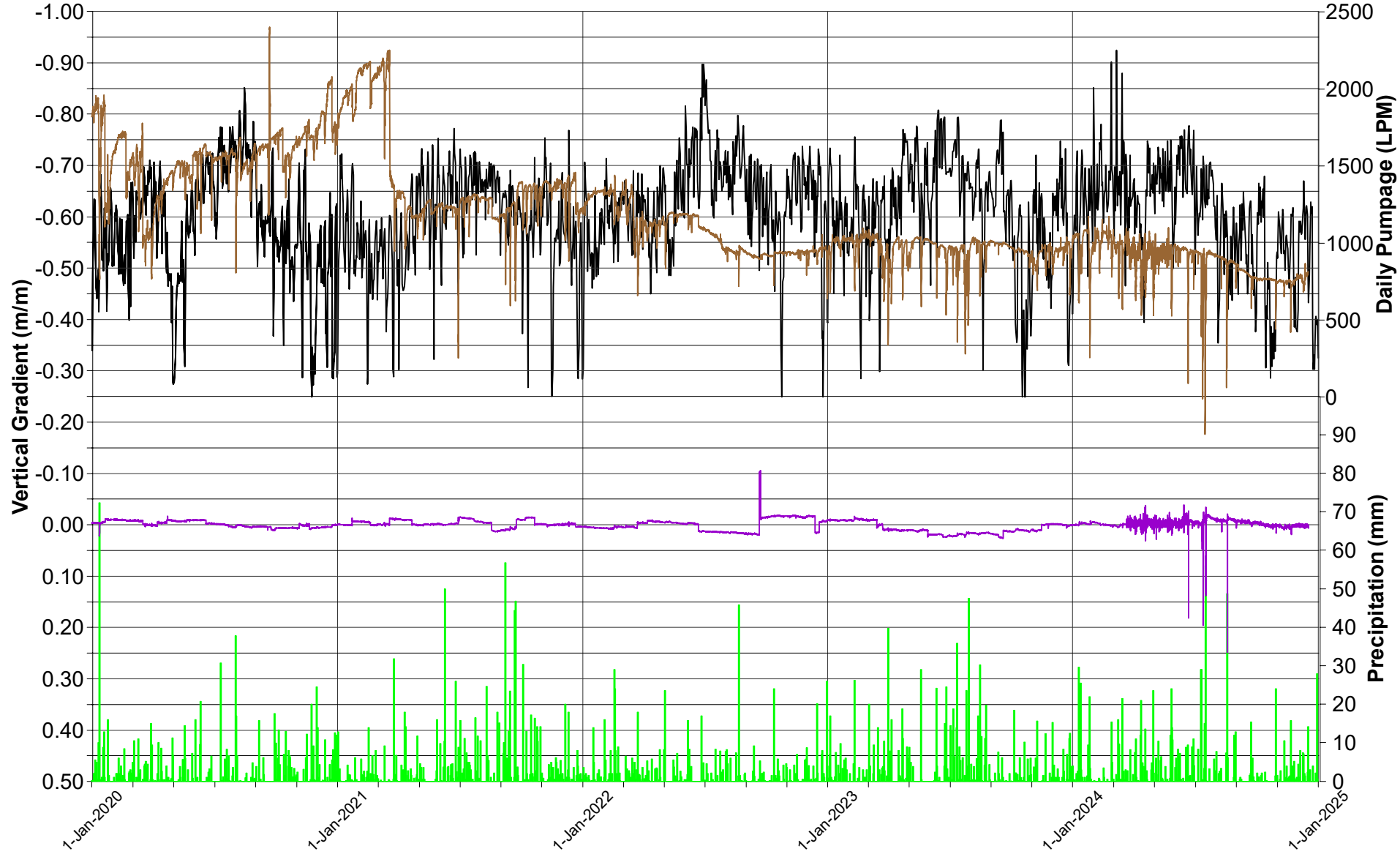
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

MP18 NEST HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E8b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

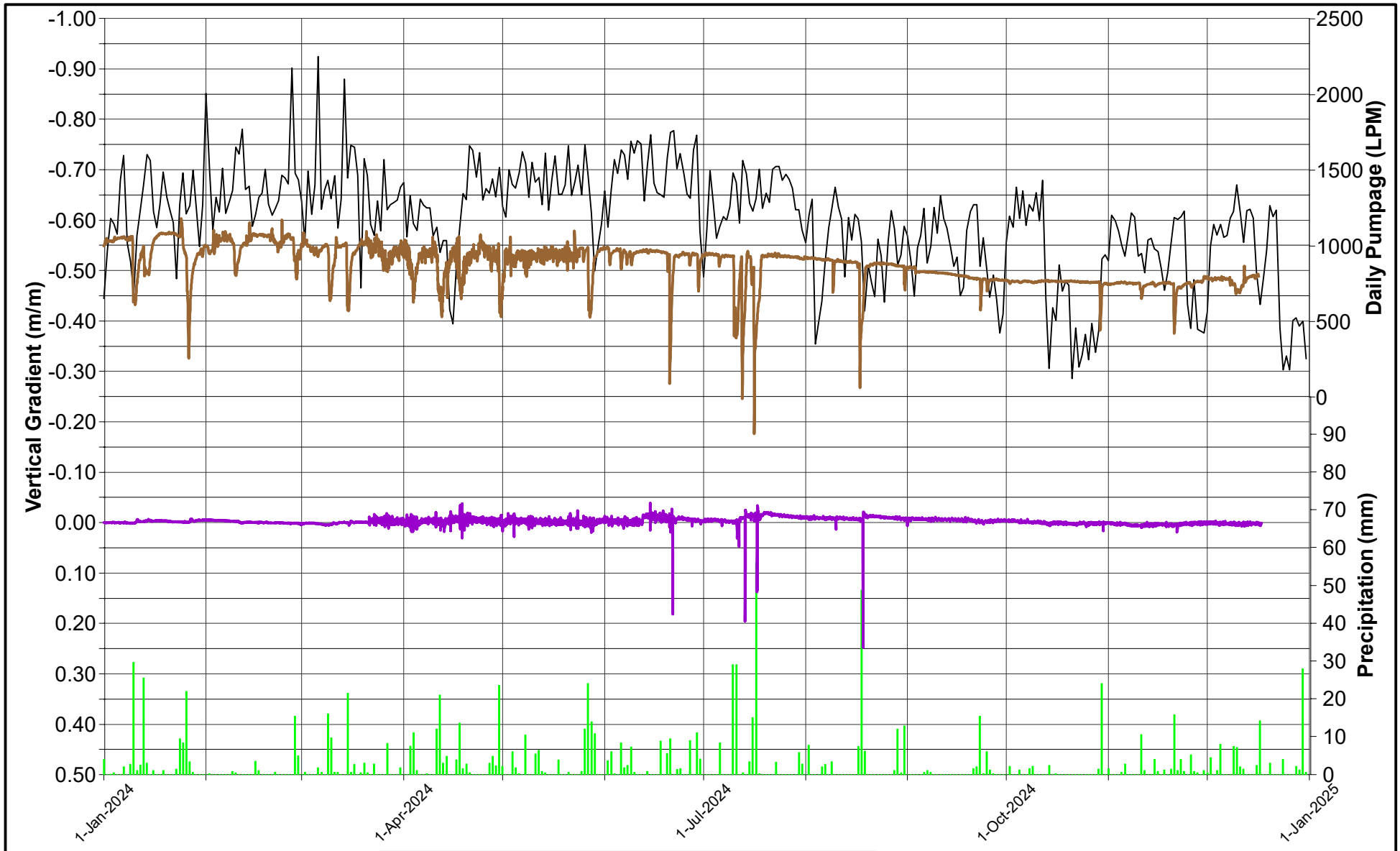
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

VERTICAL GRADIENT VERSUS TIME
MINI-PIEZOMETER NESTS (UPGRADIENT)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E9a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

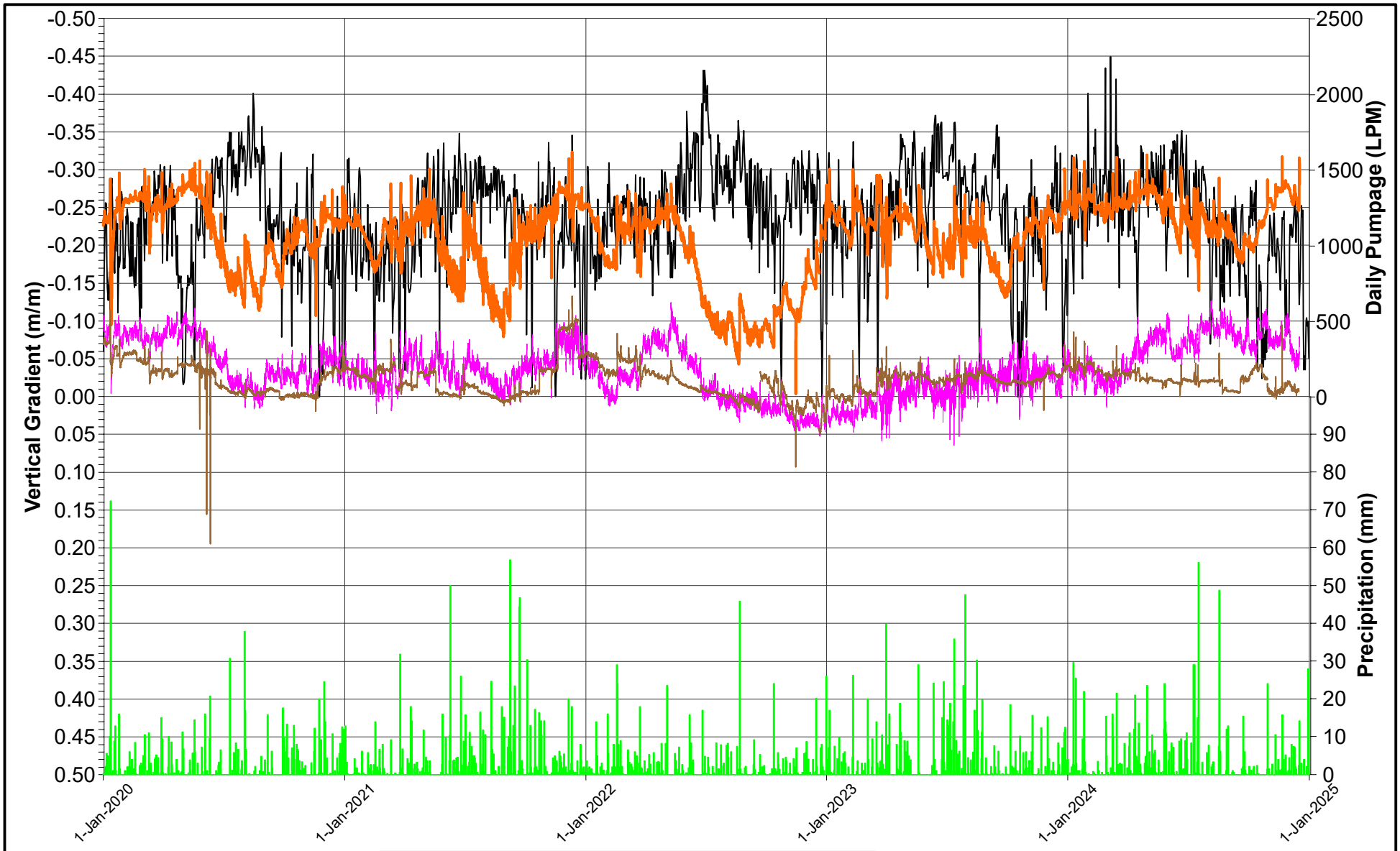
Town of Aberfoyle, Ontario

TITLE

VERTICAL GRADIENT VERSUS TIME
MINI-PIEZOMETER NESTS FOR 2024 (UPGRADIENT)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	JH
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E9b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

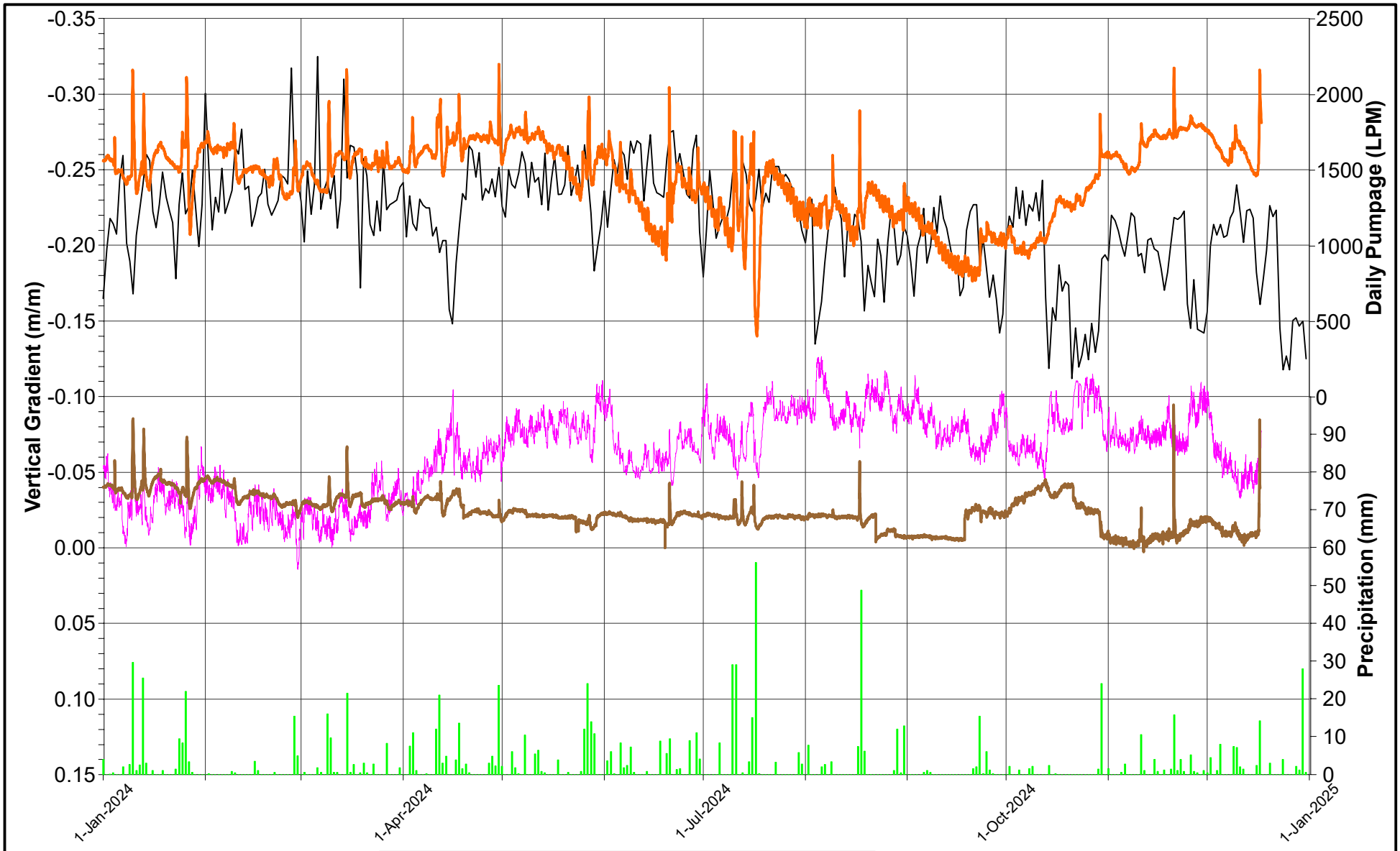
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

VERTICAL GRADIENT VERSUS TIME
MINI-PIEZOMETER NESTS (ONSITE)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E10a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

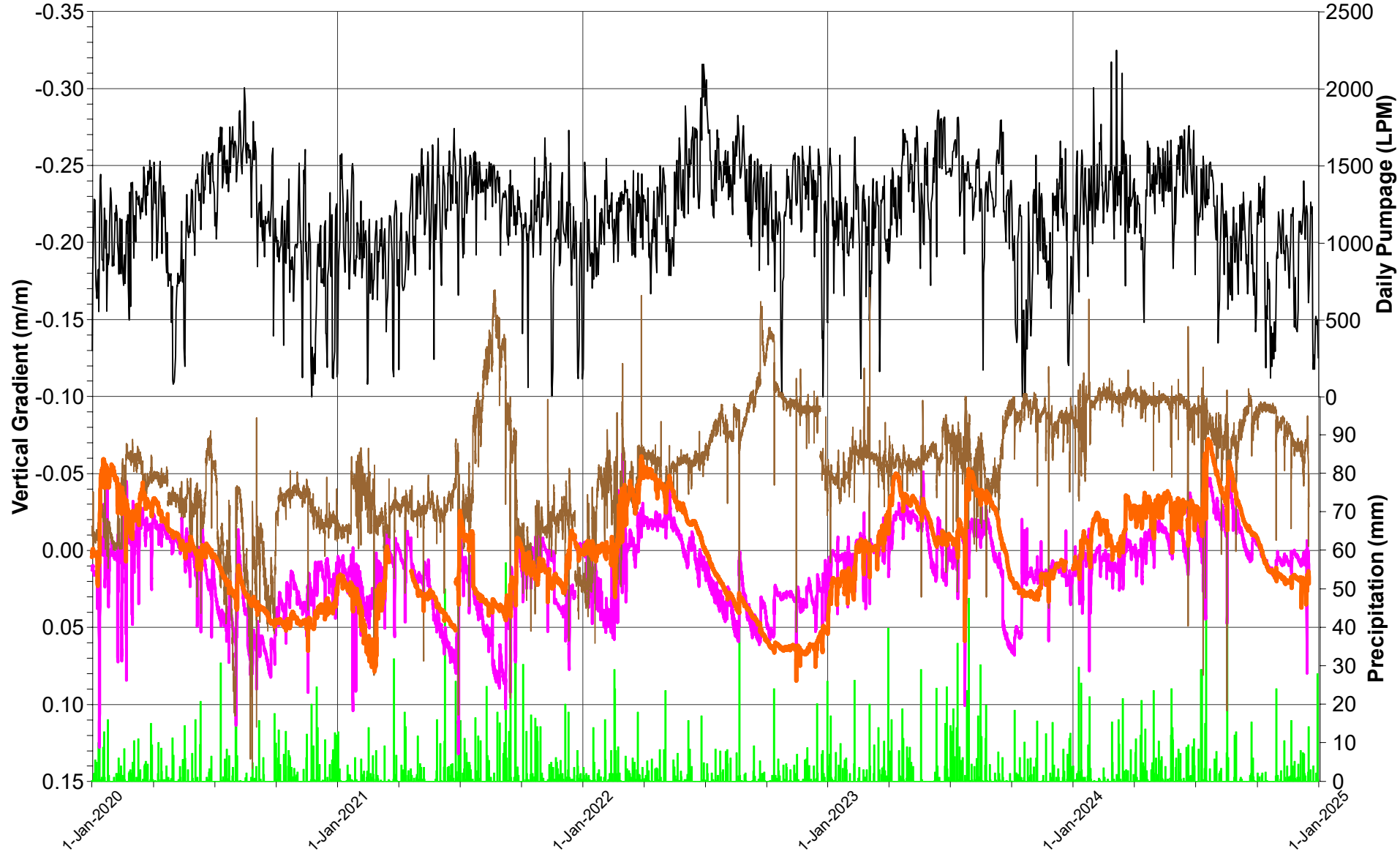
Town of Aberfoyle, Ontario

TITLE

VERTICAL GRADIENT VERSUS TIME
MINI-PIEZOMETER NESTS FOR 2024 (ONSITE)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E10b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

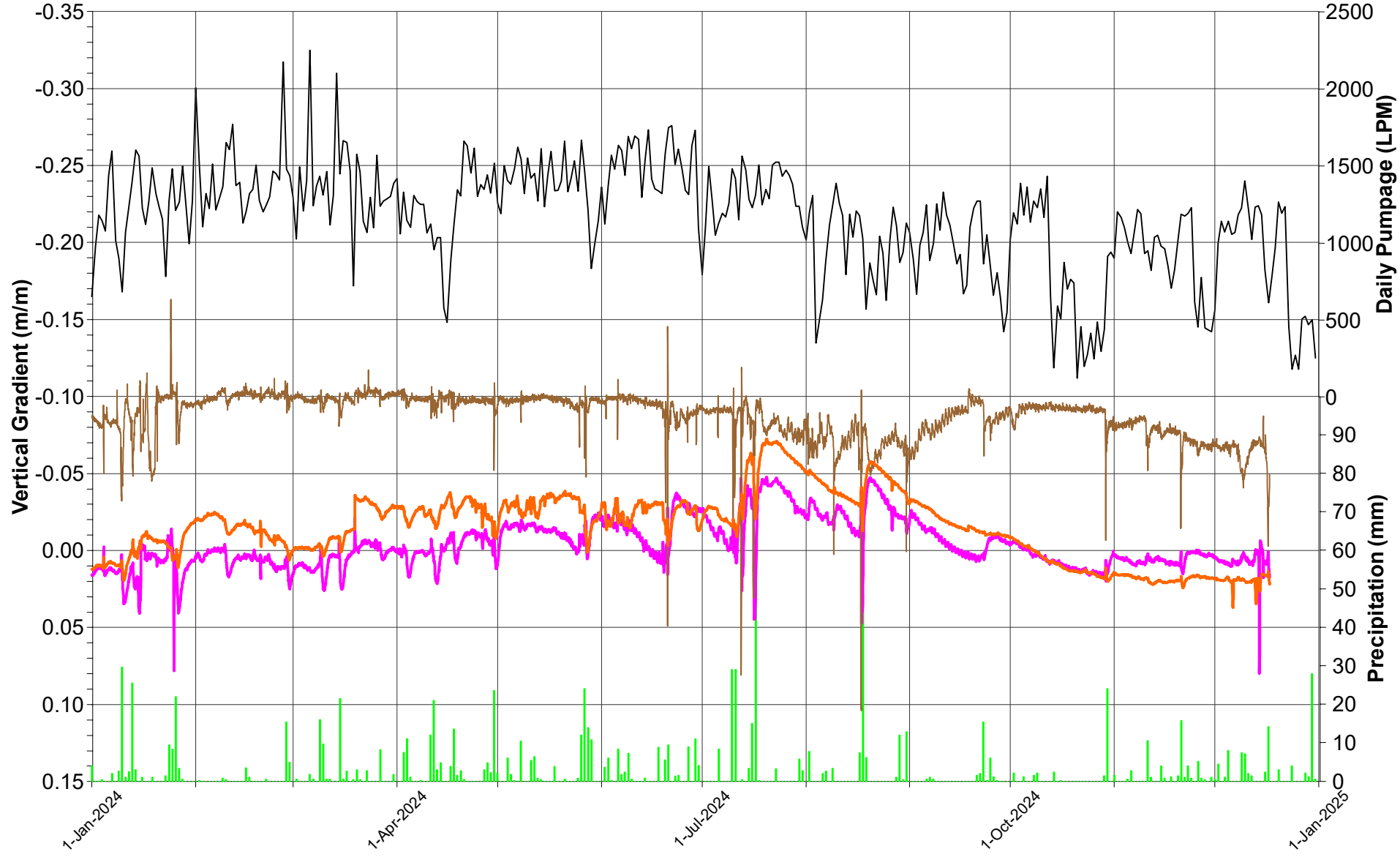
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

VERTICAL GRADIENT VERSUS TIME
MINI-PIEZOMETER NESTS (DOWNGRADIENT)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E11a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

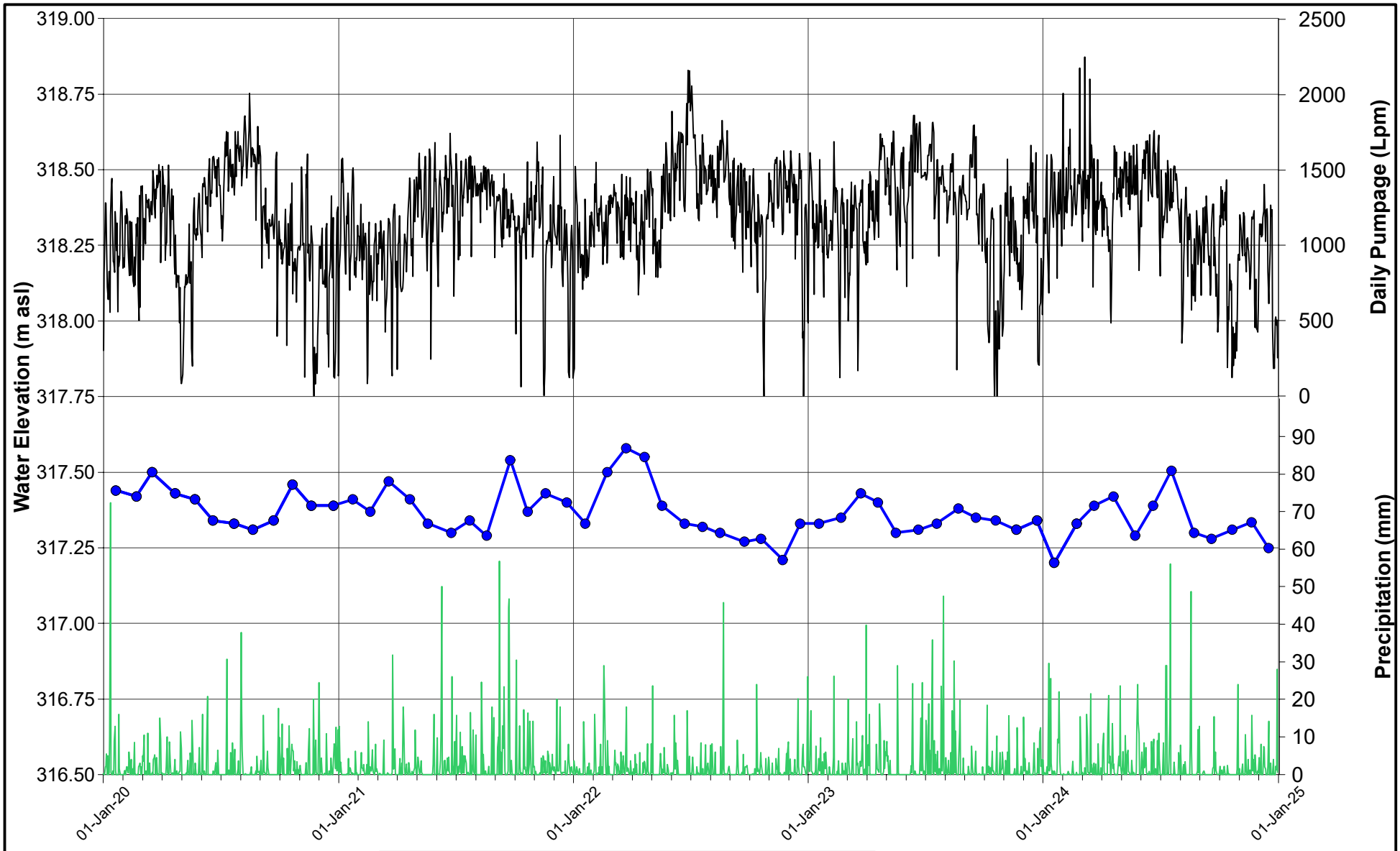
Town of Aberfoyle, Ontario

TITLE

VERTICAL GRADIENT VERSUS TIME
MINI-PIEZOMETER NESTS FOR 2024 (DOWNGRADIENT)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E11b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

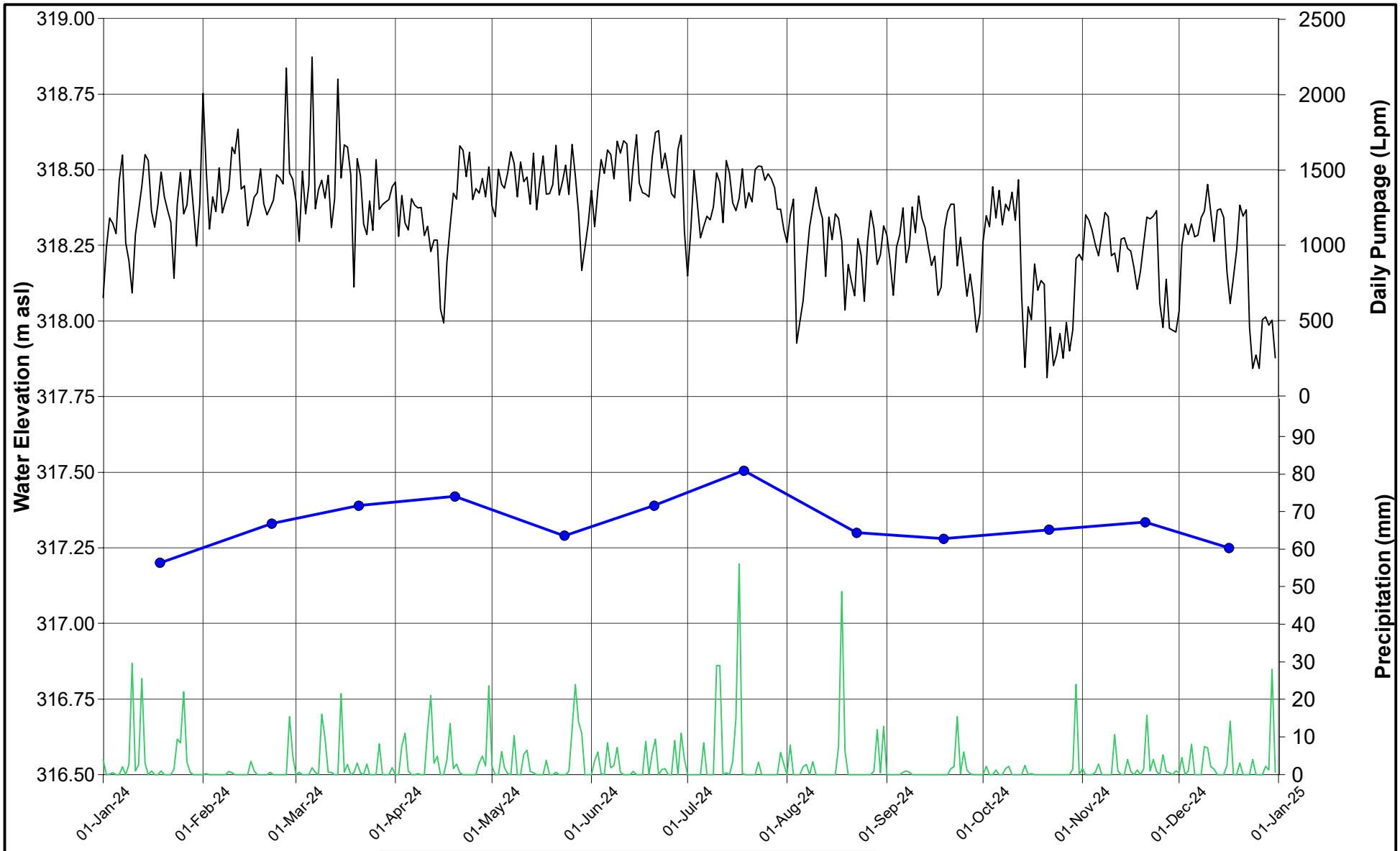
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

SW3 HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E12a



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

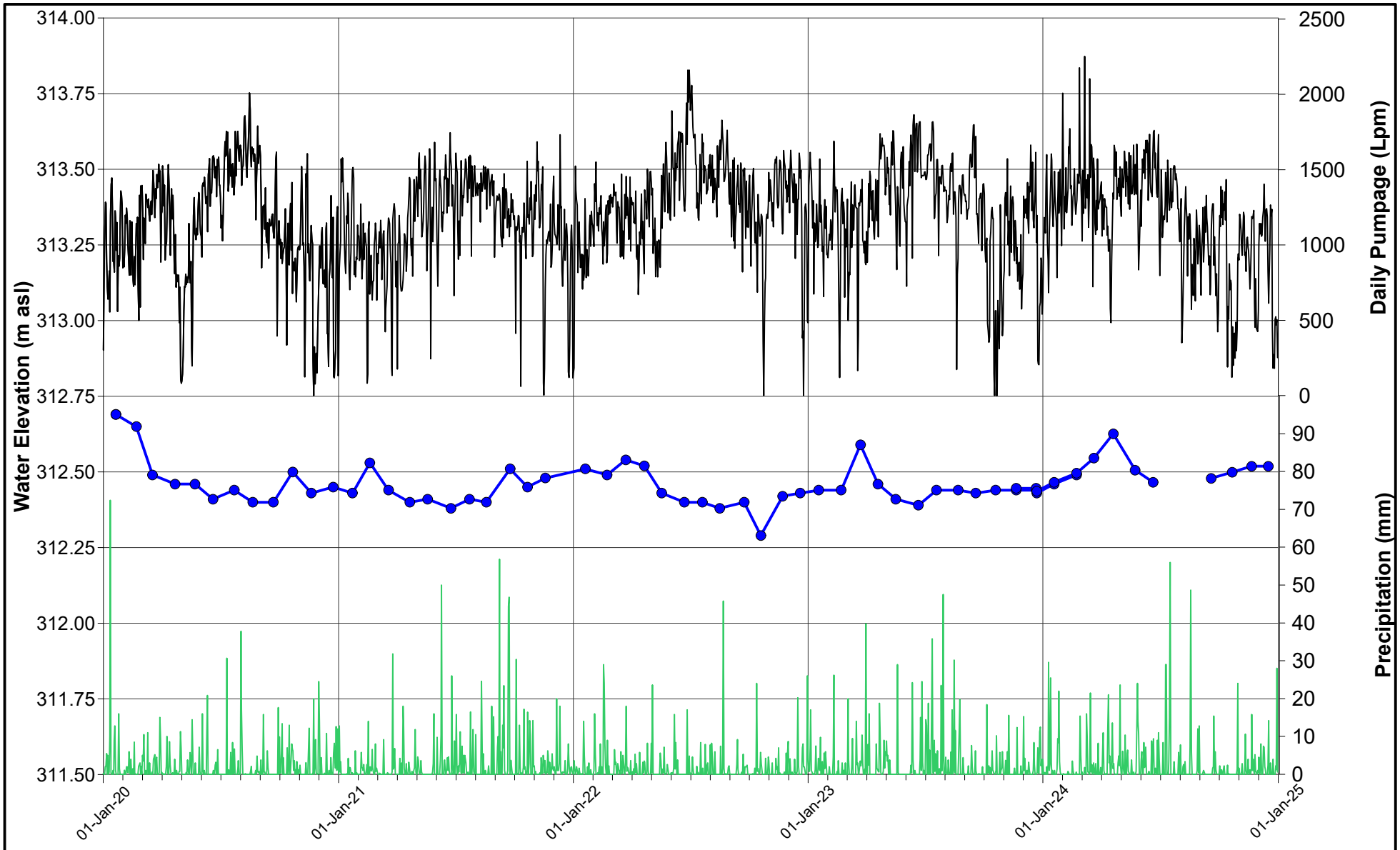
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

SW3 HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E12b



Monitoring station was destroyed summer 2024,
T post replaced monitoring point in September 2024

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

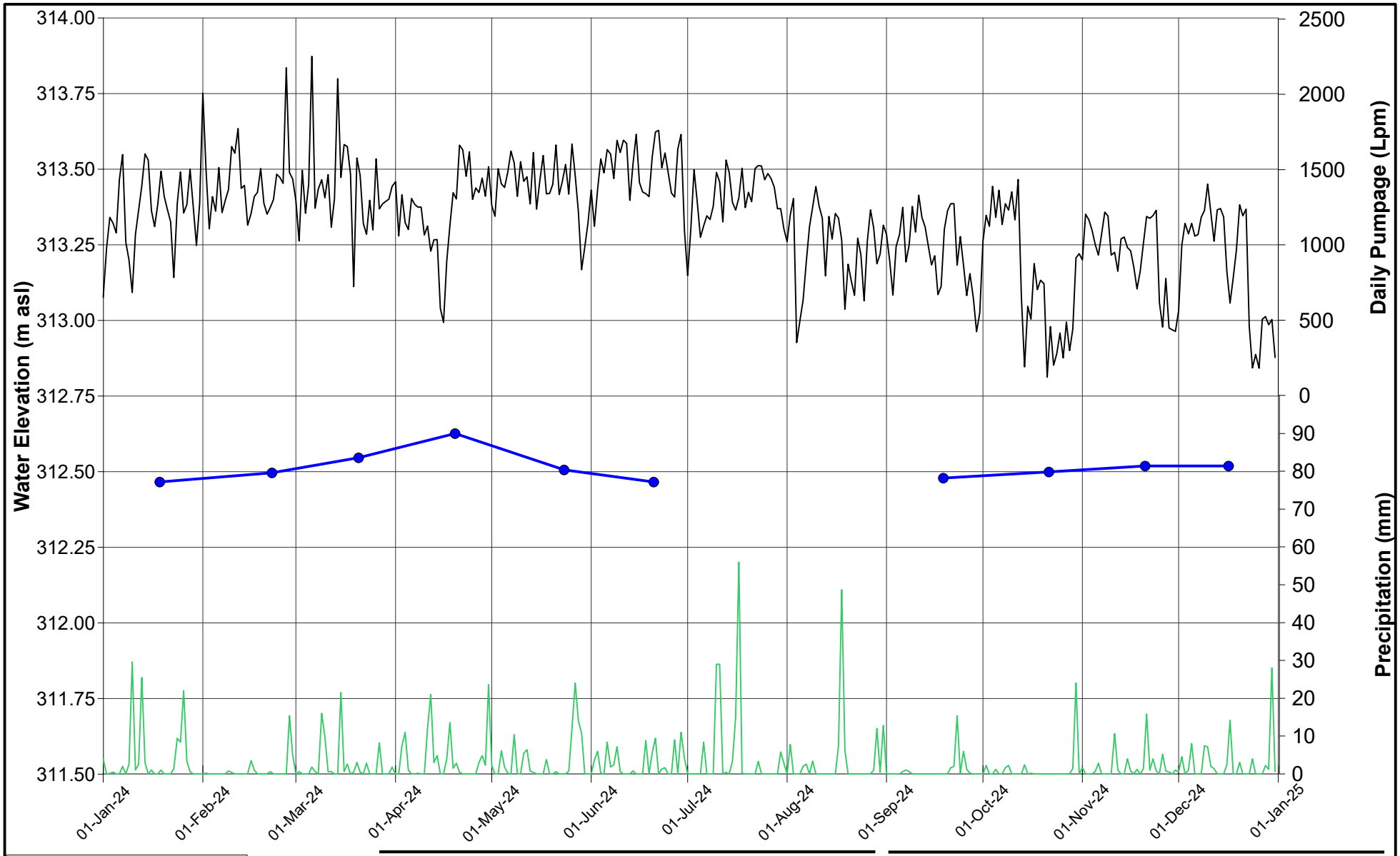
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

SW4 HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E13a



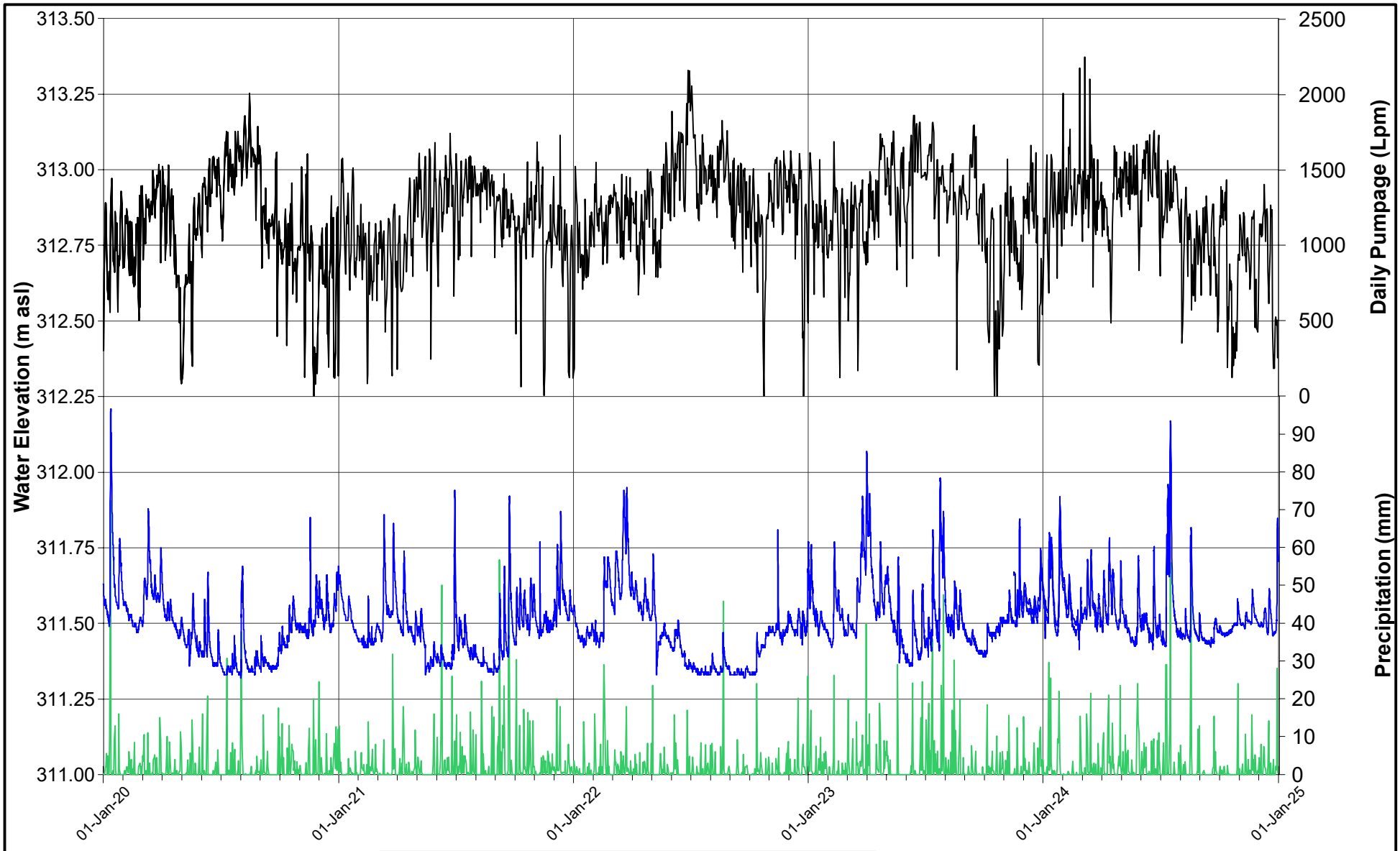
Monitoring station destroyed summer of 2024.
T Post installed as new monitoring station in September 2024

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE
SW4 HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E13b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

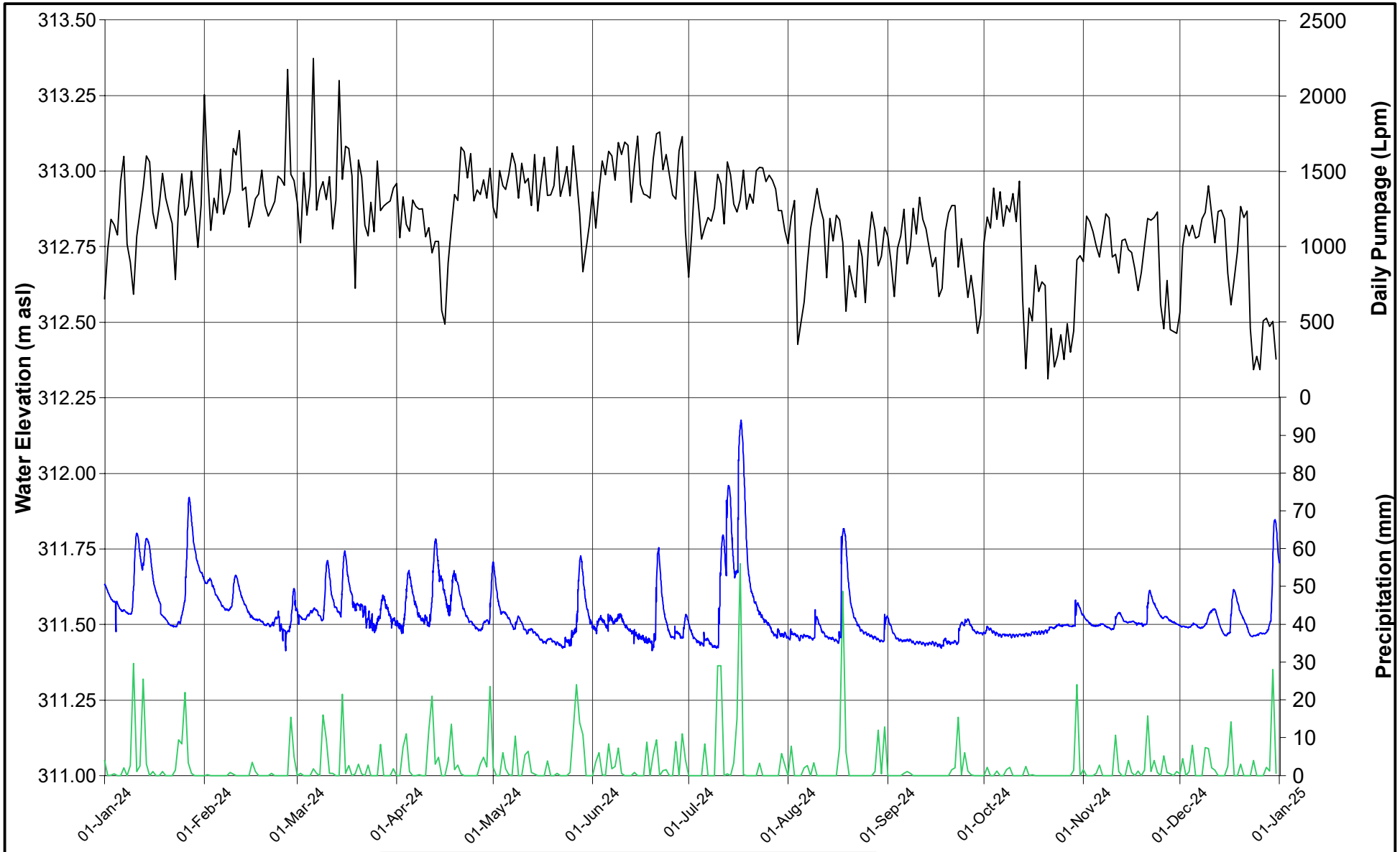
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

SW1 HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E14a



PROJECT

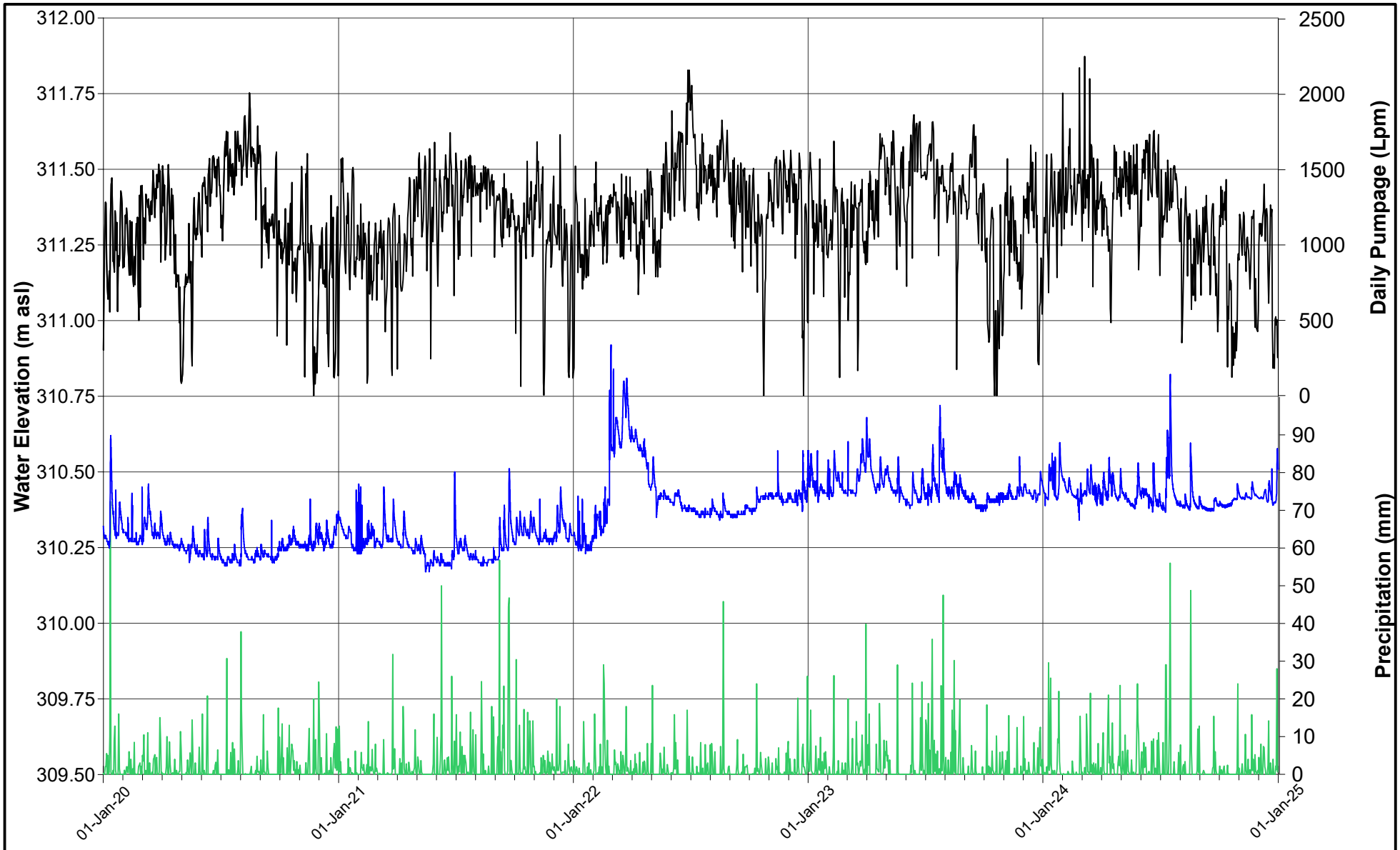
WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

SW1 HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E14b



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

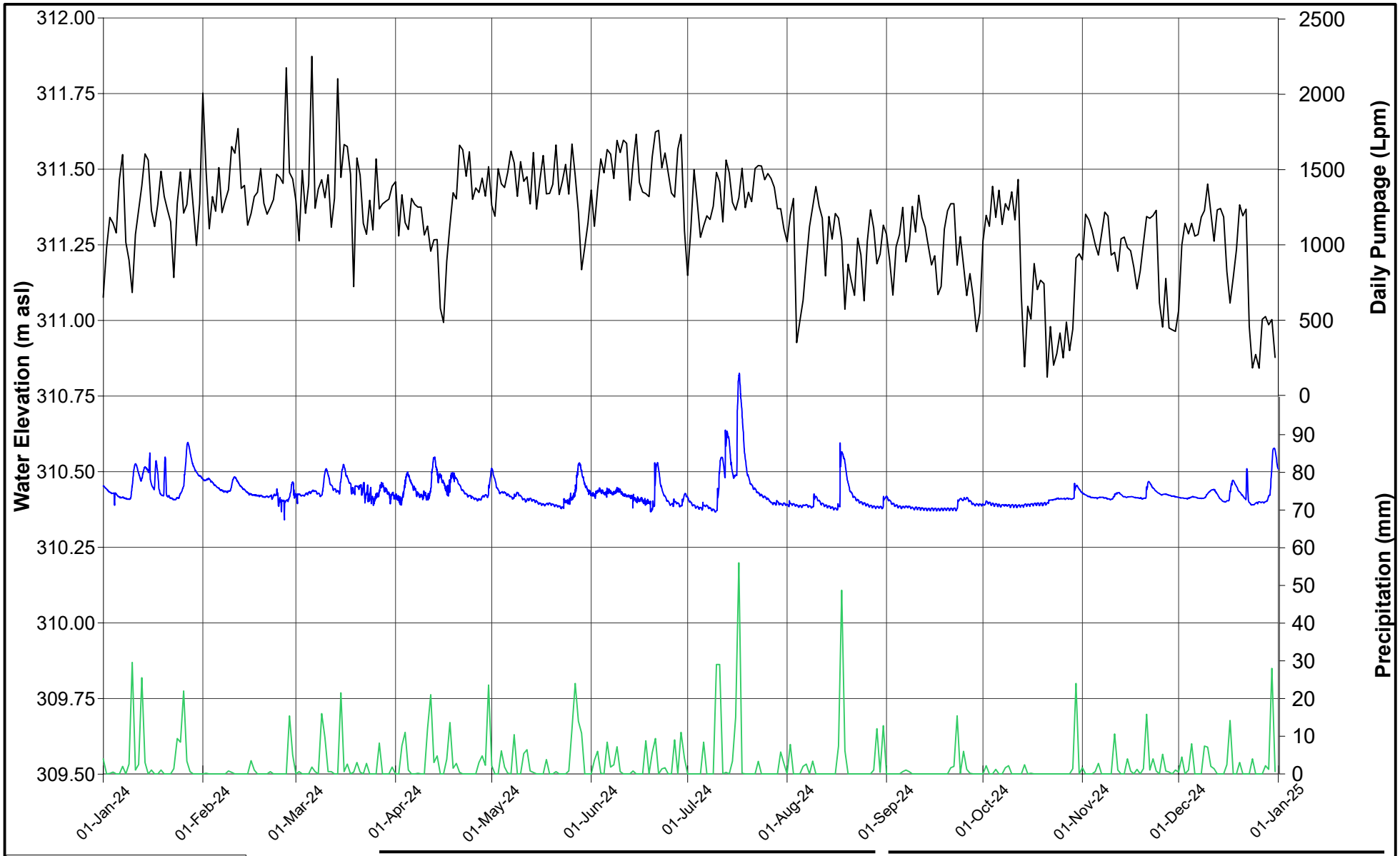
Town of Aberfoyle, Ontario

TITLE

SW2 HYDROGRAPH
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E15a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

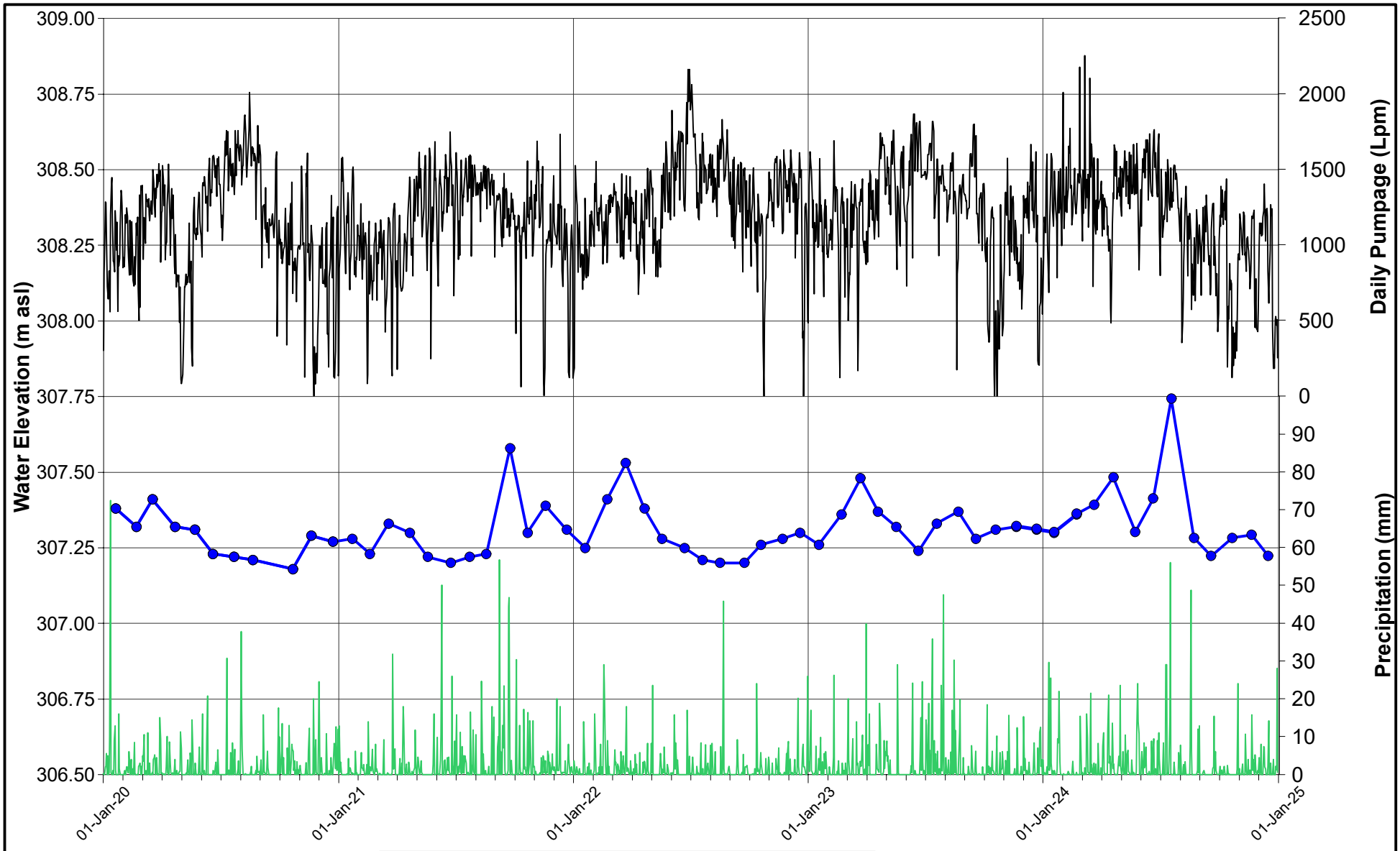
Town of Aberfoyle, Ontario

TITLE

SW2 HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E15b



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

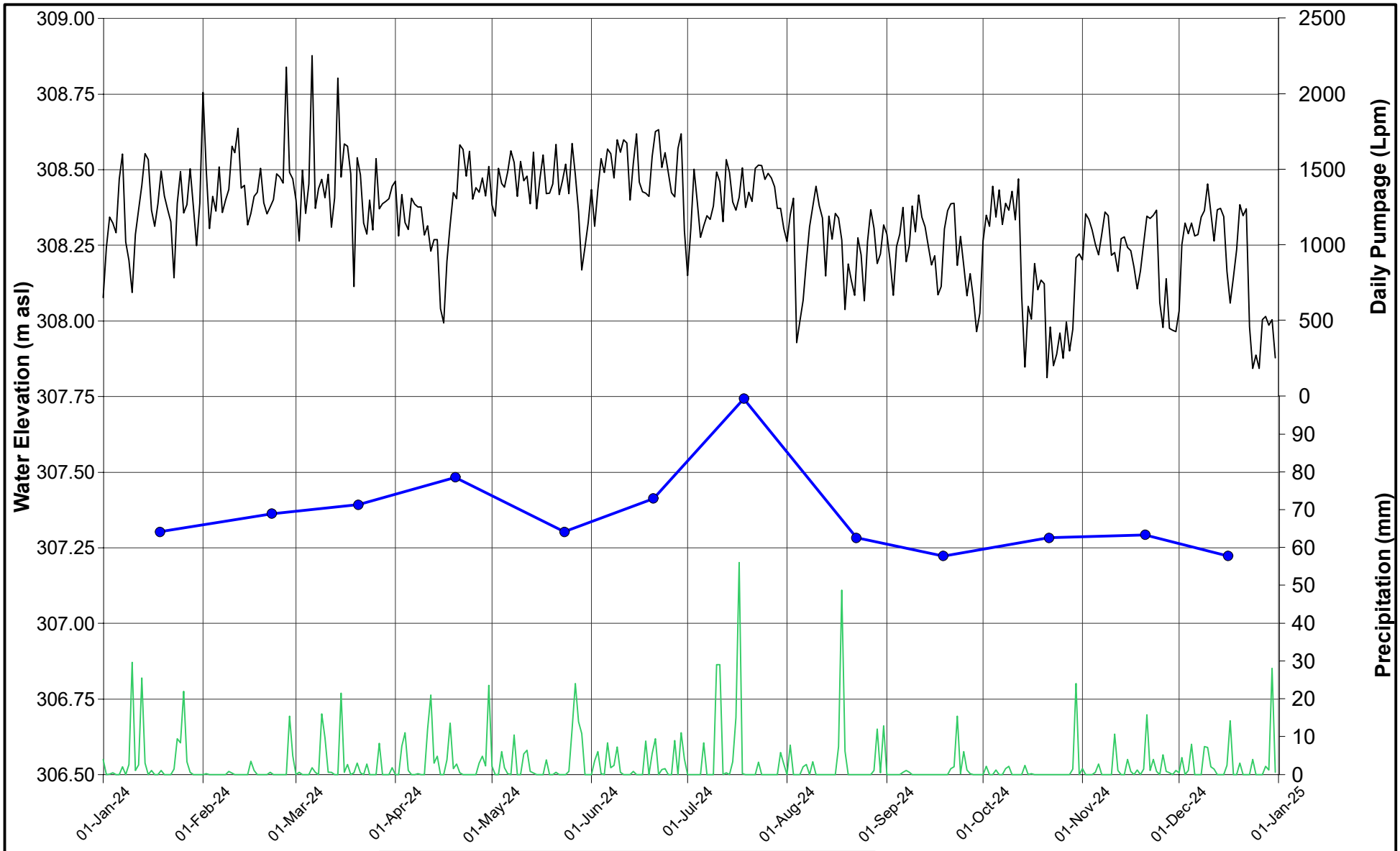
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

SW5 HYDROGRAPH
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E16a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

SW5 HYDROGRAPH (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	E16b

TABLE E1
Manual Surface Water Elevations (Mini Piezometers)
2024 Annual Report

Date	Water Level (masl)									
	MP1D-16	MP1S-16	MP16D-08	MP16S-08	MP6D-04	MP6S-08	MP12D-04	MP12S-04	MP14D-07	MP14S-07
19/20-Mar-2024	318.89*	318.32	312.28	312.28	311.59	311.57	311.48	311.46	311.52*	311.20
19/20-Jun-2024	318.78	318.27	312.16	312.16	311.46	311.45	311.38	311.32	311.40	311.16
18/19-Sep-2024	318.71	318.22	312.20	312.20	311.47	311.52	311.47	311.40	311.41	311.19
16/17-Dec-2024	318.76	318.24	312.15	312.17	311.66	311.62	311.57	311.52	311.56	311.25

* Water frozen

TABLE E1
Manual Surface Water Elevations (Mini Piezometers)
2024 Annual Report

Date	Water Level (masl)					
	MP8D-04	MP8S-04	MP17D-11	MP17S-11	MP18D-11	MP18S-11
19/20-Mar-2024	310.39	310.36	309.69	309.69	308.52	308.48
19/20-Jun-2024	310.28	310.27	309.51	309.52	308.42	308.35
18/19-Sep-2024	310.29	310.27	309.51	309.52	308.34	308.32
16/17-Dec-2024	310.39	310.38	309.64	309.69	308.34	308.38

* Water frozen

TABLE E2
Manual Surface Water Elevations (Surface Water Stations)
2024 Annual Report

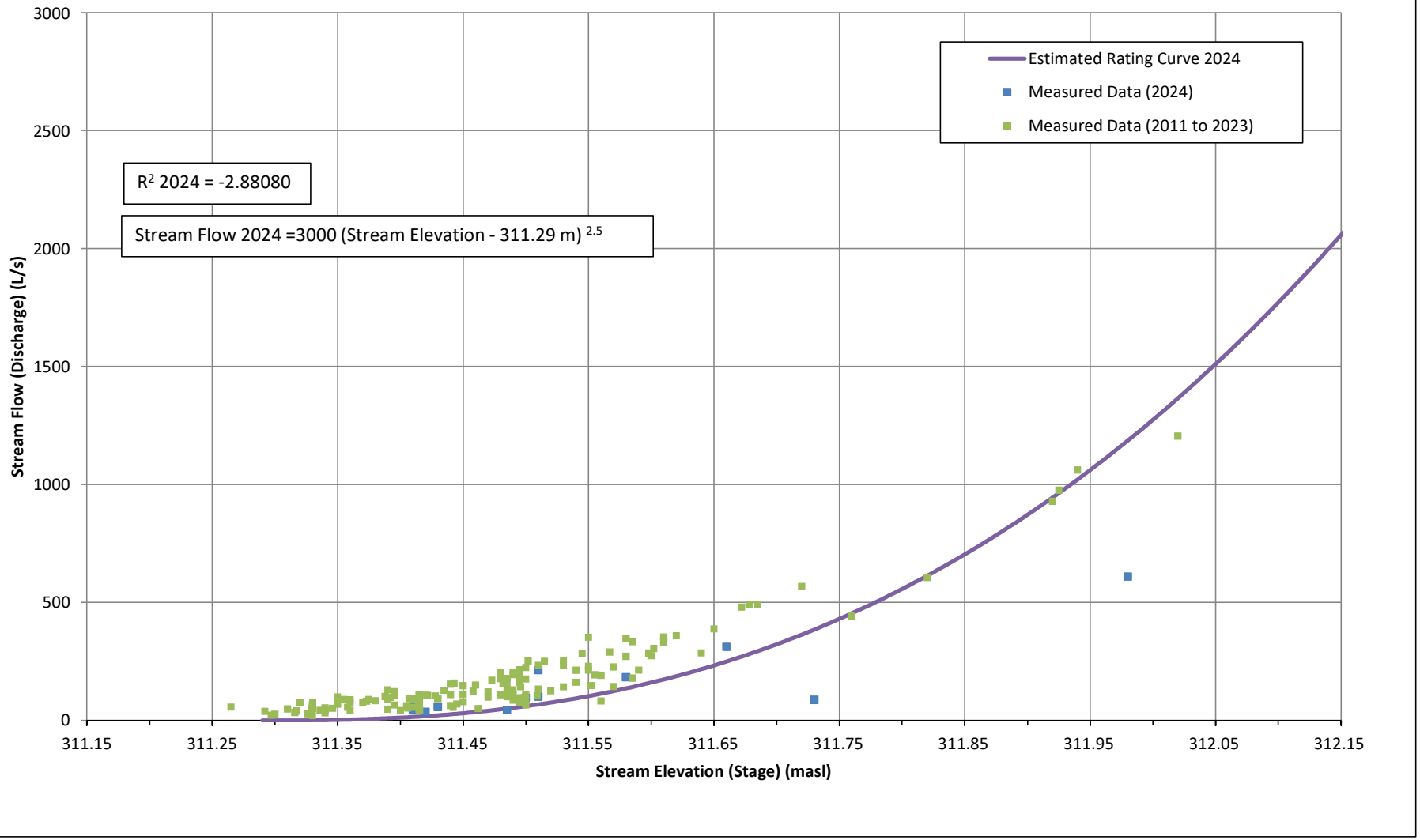
Date	Water Level (masl)				
	SW1	SW2	SW3	SW4	SW5
18-Jan-24	311.73*	310.43	317.20	312.47	307.30
22-Feb-24	311.51	310.43	317.33	312.50	307.36
19-Mar-24	311.58	310.47	317.39	312.55	307.39
19-Apr-24	311.66	310.53	317.42	312.63	307.48
23-May-24	311.43	310.40	317.29	312.51	307.30
19-Jun-24	311.41	310.41	317.39	312.47	307.41
18-Jul-24	311.98	310.67	317.51	NA	307.74
22-Aug-24	311.50	310.44	317.30	NA	307.28
18-Sep-24	311.42	310.41	317.28	312.48	307.22
21-Oct-24	311.49	310.43	317.31	312.50	307.28
20-Nov-24	311.41	310.43	317.34	312.52	307.29
17-Dec-24	311.51	310.50	317.25	312.52	307.22

* Water frozen

NA - Data not available

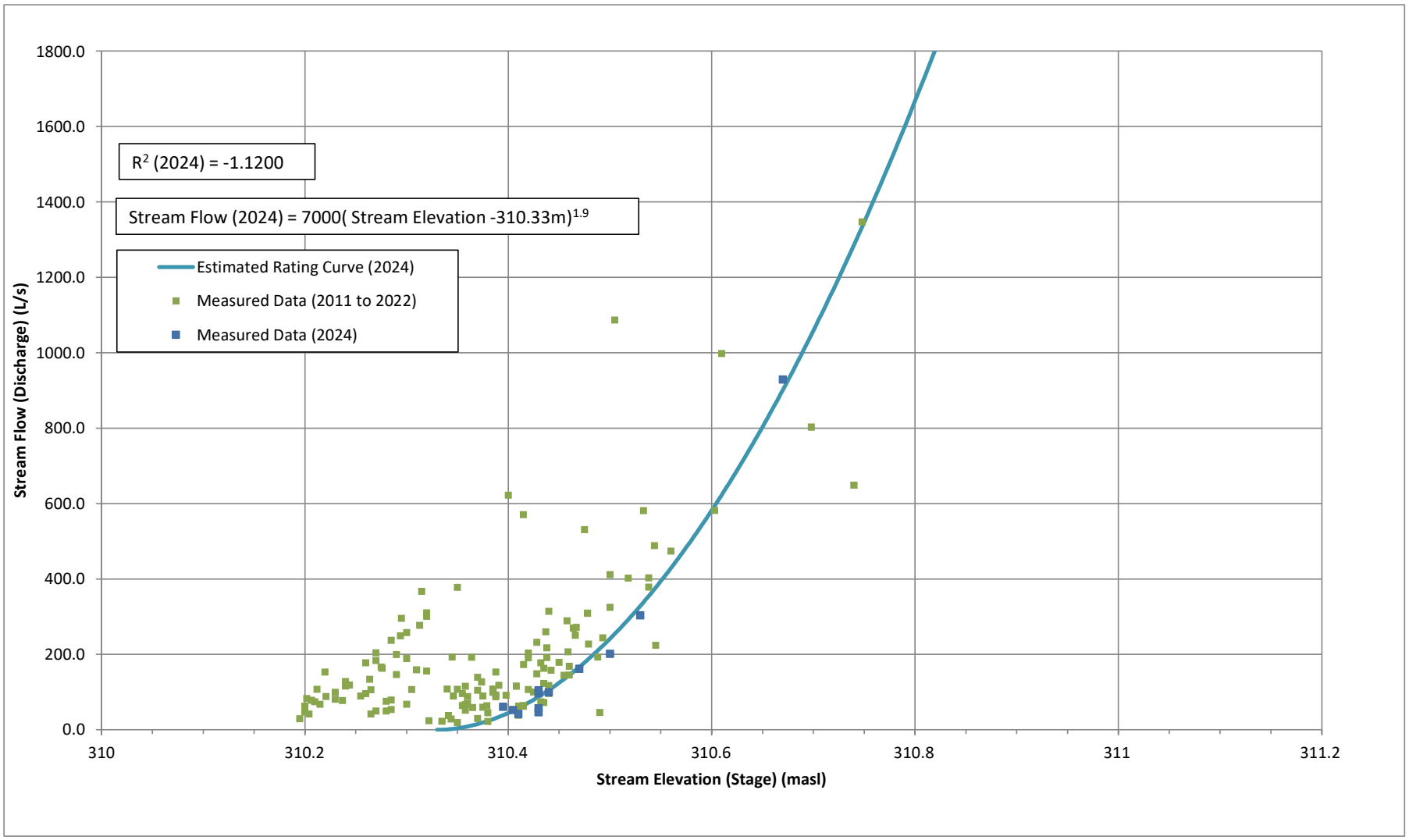
APPENDIX F

Surface Water Flow Monitoring



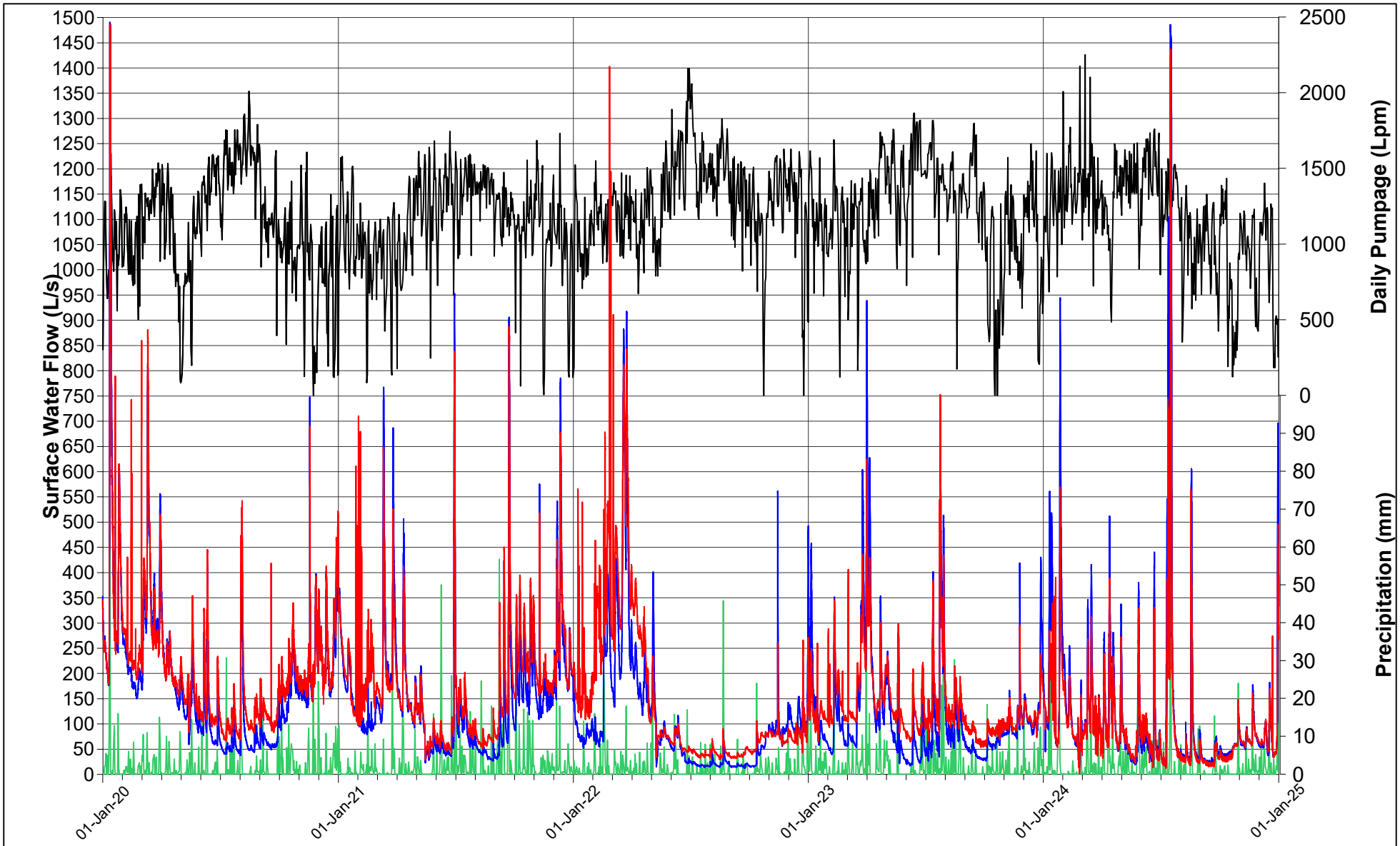
2024 Data Notes:
In 2024, the range of water levels recorded during manual flow measurements (and used to determine the stage-discharge relationship) = ~311.41 to 311.98 masl. The full range of water levels recorded in 2024 = ~311.41 to 312.17 masl.

Figure. F1
STAGE-DISCHARGE MEASUREMENTS FOR SW1 (2024)
2024 ANNUAL MONITORING REPORT
WHITE WOLF PROPERTY MANAGEMENT
Aberfoyle, Ontario



2024 Data Notes:
In 2024, the range of water levels recorded during manual flow measurements = 310.40 to 310.67 masl. The full range of water levels recorded in 2024 = ~310.34 to 310.82 masl.

Figure. F2
STAGE-DISCHARGE MEASUREMENTS FOR SW2 (2024)
2024 ANNUAL MONITORING REPORT
WHITE WOLF PROPERTY MANAGEMENT
Aberfoyle, Ontario



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

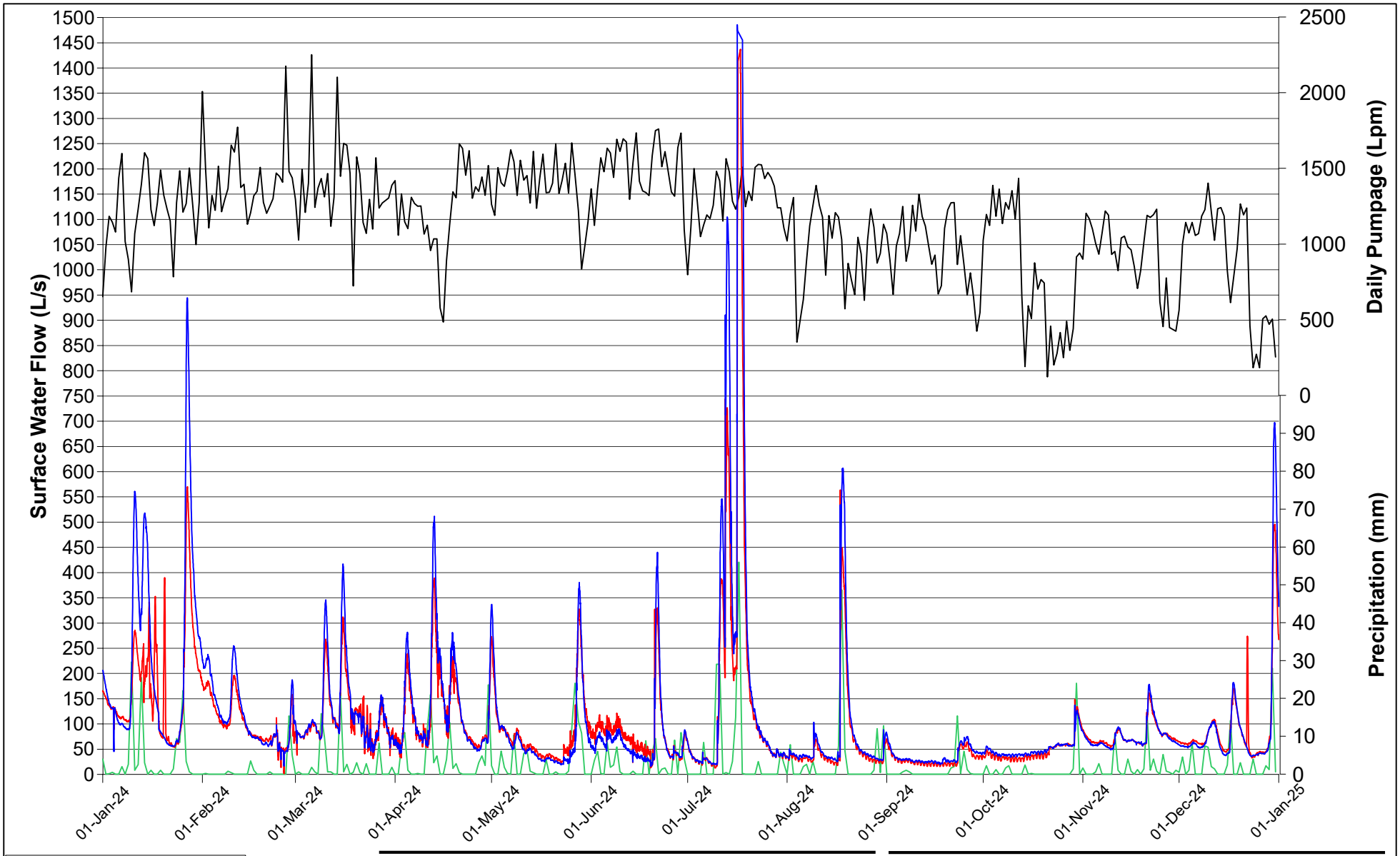
PROJECT

WHITE WOLF PROPERTY MANAGEMENT
Town of Aberfoyle, Ontario

TITLE

SURFACE WATER FLOW VS. TIME
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	F3a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

SURFACE WATER FLOW VS. TIME (2024)
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

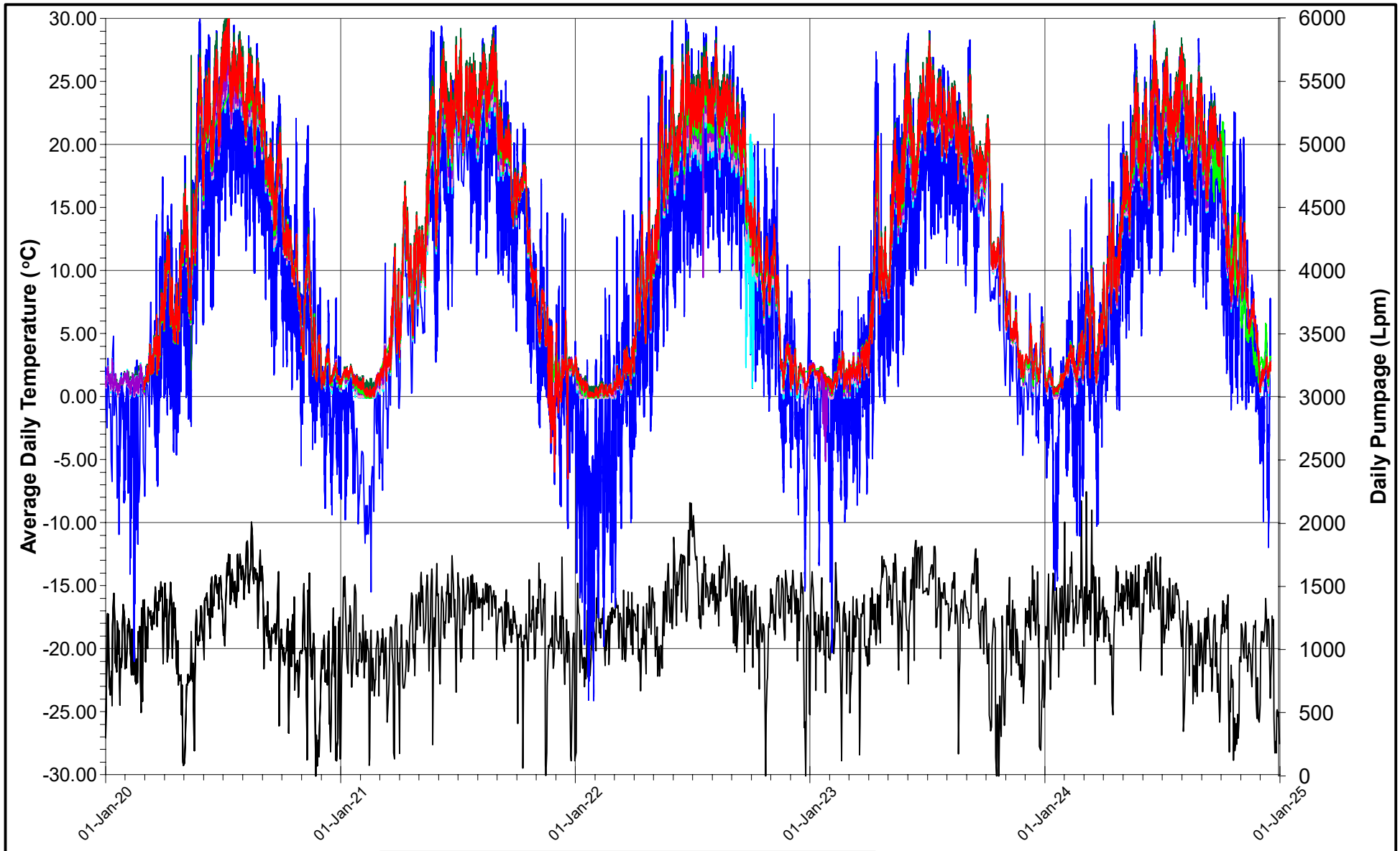
PROJECT NO.	REV	FIGURE
CA0049769.2148	A	F3b

TABLE F1
Surface Water Flow
2024 Annual Report

DATE	SW-1 Flow (L/sec)	SW-2 Flow (L/sec)
18-Jan-24	86.6	96.7
22-Feb-24	100.5	104.8
19-Mar-24	182.6	161.9
19-Apr-24	311.3	302.8
23-May-24	55.8	60.9
19-Jun-24	42.8	52.6
18-Jul-24	609.1	928.9
22-Aug-24	95.9	99.3
18-Sep-24	36.3	41.6
21-Oct-24	44.5	46.3
20-Nov-24	54.3	56.9
17-Dec-24	212.5	201.2

APPENDIX G

Stream Temperature Monitoring



DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT

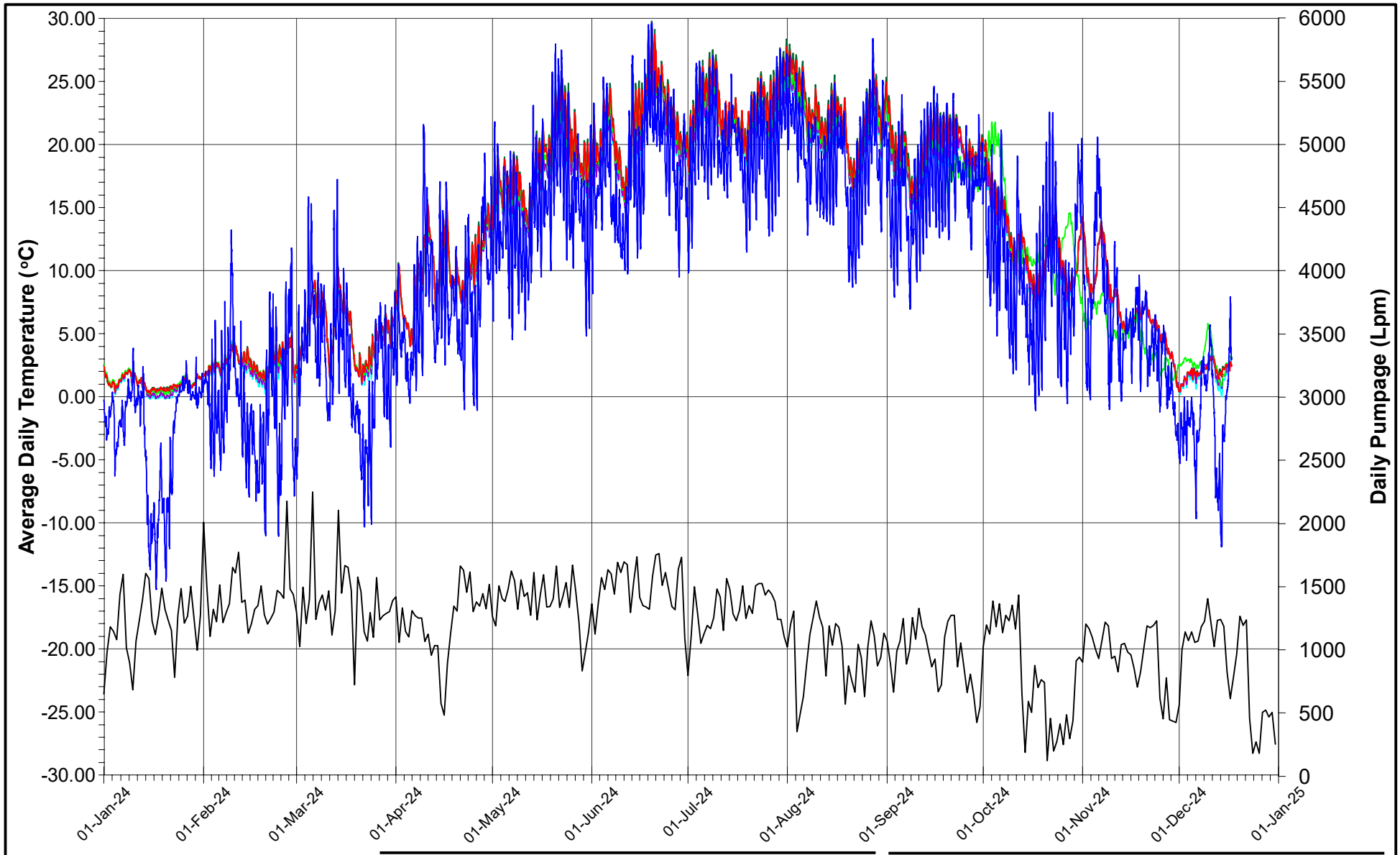
WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

AVERAGE DAILY SURFACE WATER TEMPERATURE VS. TIME
2024 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	G1a



PROJECT

WHITE WOLF PROPERTY MANAGEMENT

Town of Aberfoyle, Ontario

TITLE

AVERAGE DAILY SURFACE WATER TEMPERATURE VS. TIME
2024 ANNUAL MONITORING REPORT

DATE	MARCH 2025
DESIGN	KS
REVIEW	GP
APPROVED	GP

PROJECT NO.	REV	FIGURE
CA0049769.2148	A	G1b

Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2024

Prepared for Blue Triton Brands

Prepared by Cam Portt and Jim Reid

C. Portt and Associates

December 2024

Table of Contents

List of Tables

List of Figures

Introduction

Condition 4.4 of the Permit to Take Water (PTTW Number 1763-8FXR29) issued to Nestlé Waters Canada (Nestlé), now Blue Triton Brands (Blue Triton), by the Ontario Ministry of Environment (MOE, now Ministry of Environment, Conservation and Parks) on April 29, 2011, required that Nestlé review the appropriateness of the methodology of their water temperature monitoring program in Aberfoyle Creek (the Nestlé program). C. Portt and Associates conducted that review for Nestlé and made a number of recommendations (Portt, 2011). The recommendations of the review were accepted by the MOE and were to be incorporated commencing in the 2012 field season (letter from Carl Slater, MOE, to Don DeMarco, Nestlé, October 26, 2011). One of those recommendations was that historical and future temperature data be analyzed using ThermoStat software, which has been developed to evaluate the thermal suitability of Ontario streams for thermal guilds for individual species of fishes in order to provide insight into the ecological implications of the current temperature regime. The monitoring is now required under Condition 4.4 of PTTW 3133-C5BUH9. Subsequently, the results of these analyses have been reported annually (Portt and Reid, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024). This report presents the results of the analyses of the 2024 data, together with the data from previous years.

Methods

Water temperature is monitored at the sediment-water interface at six locations in Aberfoyle Creek (Figure 1) using Tidbit© V2 and MX2203 temperature loggers manufactured by Onset Computer Corporation. (http://www.onsetcomp.com/products/data-loggers/utbi-001 or mx2203). The loggers have an accuracy of ±0.2°C between 0°C and 50°C and drift is 0.1°C per year. Monitoring at Stations 1 – 5 began in 2005; monitoring at Station 6, which is the station furthest upstream, began in 2008. The data are logged at half-hour intervals.

The data were analyzed using ThermoStat Version 3.1 temperature analysis software (Jones and Schmidt, http://people.trentu.ca/ nicholasjones/thermostat.htm). ThermoStat calculates the thermal suitability for individual fish species based on laboratory determined optimal and lethal temperatures, compiled by Hasnain et al. (2010), and the water temperature record.

Hasnain *et al*. (2010) provide the following definitions for the temperature criteria:

Optimum growth temperature (OGT)*: The optimum growth temperature is that which supports the highest growth rate in an experiment where separate groups of fish are exposed to one of a set of constant temperatures under ad libitum feeding conditions. The range of these constant temperatures is chosen so that reduced growth is observed at both extremes (McCauley and Casselman 1980 cited in Wismer and Christie 1987, Jobling 1981).*

Final temperature preferendum (FTP)*: Final temperature preferendum is that towards which fish gravitate when exposed to an 'infinite' temperature range (Giattina and Garton 1982 cited in Wismer and Christie 1987). Two methods are used to determine FTP: the gravitation method and the acclimation*

method (Jobling 1981). The gravitation method involves exposing fish to a temperature gradient until they gravitate towards a specific temperature. The acclimation method extends the gravitation method by carrying out repeated 'gravitation trials' with fish acclimated to progressively higher temperatures. The preferred temperature exhibited in each trial is then plotted against the acclimation temperature and the FTP is the temperature at which the best fit line for these data crosses the line of equality (Jobling 1981). An informal survey of a subset of the original sources indicated that most estimates were determined via the gravitation method. FTP estimates obtained using both methods were compiled in the database.

***Upper incipient lethal temperature (UILT)**: The upper incipient lethal temperature is that at which 50% of the fish in an experimental trial survive for an extended period (Spotila et al. 1979, Jobling 1981, Wismer and Christie 1987). Testing for UILT involves placing groups of fish in separate baths, each held at a different constant temperature, using a sufficiently wide range of constant temperatures that rapid mortality is observed in some baths whereas slow incomplete mortality occurs in others (Spotila et al. 1979).*

***Critical thermal maximum (CTMax)**: The critical thermal maximum is an indicator of 'thermal resistance' and is defined as the temperature at which a fish loses its ability to maintain a 'normal' upright posture in the water (loss of equilibrium; Jobling 1981). It is determined by exposing fish in a tank to steadily increasing water temperatures (typically at a rate of 1 °C min-1) and noting the temperature at which the fish exhibit spasms and loss of equilibrium (Jobling 1981, Wismer and Christie 1987). Remaining at, or above, CTMax results in mortality (Jobling 1981, Wismer and Christie 1987).*

Thermal indices that reflect suitability are calculated based on the temperature record for a location and the laboratory derived criteria (Table 1). The proportion of the June through August temperature measurements that are within ±2 °C of the optimal or preferred temperature and the proportion of the June through August temperature measurements that equal or exceed the lethal threshold temperatures are expressed as a percentage of the total number of temperature measurements during this period. Because the temperature measurements occurred at fixed intervals, this percentage of measurements is equivalent to the percentage of the time from June 1st through August 31st that the temperature conditions are met.

Table 1. Indices used to evaluate the thermal suitability for individual fish species.

Optimal Range Indices	
%OGT	Percent of temperature measurements within ±2°C of the optimal growth temperature. Higher values indicate better conditions, to a theoretical maximum of 100%.
%FTP	Percent of temperature measurements within ±2°C of the final temperature preferendum. Higher values indicate better conditions, to a theoretical maximum of 100%.
Lethal Threshold Indices	
%>UILT	Percent of temperature measurements that equal or exceed the upper incipient lethal temperature. Lower values indicate better conditions. 0% is optimum.
%>CTmax	Percent of temperature measurements that equal or exceed the critical thermal maximum. Lower values indicate better conditions. 0% is optimum.

Not all the temperature criteria are available from the scientific literature (Hasnain et al, 2010) and, therefore, some of the thermal suitability indices cannot be calculated for some species. The temperature criteria that were available and used by ThermoStat for the fish species that were captured in Aberfoyle Creek during electrofishing conducted in 2008 are presented in (Table 2), together with the number of individuals of each species that was captured on each of the two sampling dates.

Table 2. Number of individuals of each species that were captured by electrofishing Aberfoyle Creek on January 31 and September 24, 2008 and the temperature criteria that are available from the scientific literature, from Hasnain et al (2010), and are used by ThermoStat to calculate thermal indices.

Common name	Scientific name	Number of individuals captured Sampling date		Temperature criteria available from the scientific literature			
		01/31/2008	09/24/2008	OGT	FTP	UILT	CTmax
blacknose dace	*Rhinichthys atratulus*	25	29	na[1]	19.6	28.6	30.2
bluntnose minnow	*Pimephales notatus*	3	2	26.2	24.1	31.5	29.9
brook trout	*Salvelinus fontinalis*	1	0	14.2	14.8	24.9	29.3
brown trout	*Salmo trutta*	4	3	12.6	15.7	25.0	28.3
common shiner	*Luxilus cornutus*	96	36	22.0	21.9	30.4	31.2
common white sucker	*Catostomus commersonii*	49	76	25.5	23.4	27.8	31.6
creek chub	*Semotilus atromaculatus*	154	353	na	24.9	29.1	33.0
johnny darter	*Etheostoma nigrum*	59	52	na	na	na	na
largemouth bass	*Micropterus salmoides*	0	3	26.6	28.6	31.9	38.4
pumpkinseed	*Lepomis gibbosus*	2	10	25.0	27.7	31.7	37.6
rainbow darter	*Etheostoma caeruleum*	3	28	na	19.9	na	32.1
rock bass	*Ambloplites rupestris*	9	37	28.4	24.9	33.9	36.0

1. na indicates that the temperature metric was not available.

The water temperature data were analyzed for each year at each monitoring location, excluding cases for which a significant portion of the potential temperature measurements was missing for the June through August period. Temperature logging at Sites 1 through 5 began on July 1, 2005; consequently, 2006 is the first year for which thermal suitability indices were calculated. Temperature logging at Site 6 began on May 15, 2008, so there are no thermal suitability indices for that site prior to 2008. There are significant gaps in the summer temperature data for Site 4 in 2010, so the thermal suitability indices were not calculated. Approximately 3.5 days of data were missing for Sites 2 and 3, at the end of August in 2010, and 9.5 hours of data for June 1 were missing for Site 1 in 2010; it was assumed that these amounts of missing data would not materially alter the calculated thermal suitabilities. There are no gaps in the summer temperature data series after 2010.

The mean air temperature at the Guelph Turfgrass weather station, which is the closest Environment Canada weather station to the site, was calculated for the period June 1 through August 31 for the years 2007-2009 and 2011-2023. The weather station began operating during the summer of 2006, and there are missing data during June of 2010, so the June – August mean could not be calculated for those years. The relationship between mean June – August air temperature and mean June – August water temperature was explored graphically and using regression analyses.

Results

Graphs of the thermal suitability indices are presented in Figure 2 (%>UILT), Figure 3 (%>CTmax), Figure 4 (%FTP) and Figure 5 (%OTG). The indices values are presented in Appendix A. Summer water temperatures are highest at the most upstream location, which is closest to the Aberfoyle Mill pond, and decrease with distance downstream. This is reflected in the thermal indices, which improve from upstream to downstream for species that require cold temperatures and improve from downstream to upstream for species that require warm temperatures. Mean June – August air temperature was 19.32 °C in 2024, which is the fifth warmest for the period 2007 – 2024 (Figure 6). This is reflected in the thermal suitability indices.

Lethal temperatures are arguably the most critical thermal factor in determining fish distributions. If lethality occurs, other factors such as growth are immaterial. It is clear from Figure 2 that brook trout and brown trout are the species whose upper incipient lethal temperature is equaled or exceeded most frequently from June 1st to August 31st; in the warmest years, at the warmest site (Site 6), the %>UILT exceeds 40% for those species. The upper incipient lethal temperature is also exceeded, but infrequently, for blacknose dace, common shiner, creek chub and white sucker. In 2024, the upper incipient lethal temperature for brook trout and brown trout was exceeded 22% and 21% of the time, respectively, at the farthest upstream station and 4% of the time for brook trout and for brown trout at the station farthest downstream.

In 2024, the *CTMax* was exceeded briefly for Brook Trout at Site 6 and for brown trout at Site 6, 1 and 2 (Figure 3).

The percentage of the time, from June 1st to August 31st, that water temperature is within 2°C of the final temperature preferendum (%FTP) is lowest for brown trout and brook trout, which have the lowest preferred temperatures, at all sites in all years (Figure 4; Table 2). The next lowest %FTP values, in most years, are for pumpkinseed and largemouth bass (Figure 4), which have the highest preferred temperatures (Table 2). In 2024, as in past years, the %FTP was highest for species with intermediate temperature requirements.

The percentage of the time, from June 1st to August 31st, that water temperature was within 2°C of the optimal temperature for growth (%OGT) is presented in Figure 5. The lowest %OGT values are for brown trout and brook trout, which have the lowest optimum temperature for growth among the species that occur in this portion of Aberfoyle Creek (Table 2). In 2024, %OGT was zero for brown trout at all sites and ranged from 0.3 at the farthest upstream site to 2.0% at the farthest downstream site for brook trout. The next lowest value was for rock bass, which is the species with the highest optimum temperature for growth (Table 2). As in previous years, the highest mean %OGT in 2024 was for species with intermediate optimum temperatures for growth.

The mean June – August water temperature at each monitoring location is plotted versus mean June – August air temperature at the Guelph Turfgrass Institute in Figure 6. Mean June – August water temperature typically decreases in a downstream direction through the Blue Triton property (Figure 6). This is also evident in the plots of the temperature indices (Figures 2 – 5). For example, the percent of

temperature measurements that exceed the ultimate upper incipient lethal temperature (%>UILT) for brook trout decreases with distance downstream (Figure 2).

As Figure 6 illustrates, the mean June – August water temperature is highly correlated with the mean June – August air temperature. The regressions shown are two-stage polynomials. At the three furthest upstream sites, mean June – August air temperature accounts for 85% of the variation in mean June – August water temperature. The rate of increase in water temperature with air temperature tends to decrease in a downstream direction, as does the proportion of the variation accounted for (the r^2). In 2024, the mean June – August water temperatures were lower than is predicted based on the equations derived from previous years' data at all six locations.

Discussion

The 2024 fish suitability results were consistent with those of previous years. In the reach of Aberfoyle Creek that flows through the Blue Triton property, some species (i.e. largemouth bass, rock bass) are limited by low temperatures and the individuals that occur there probably originate from the mill pond that is just upstream. Brook trout and brown trout, conversely, are limited by high temperatures that exceed their upper incipient lethal temperature frequently during the summer (Figure 2) and often exceed their preferred temperature and their optimum temperature for growth (Figure 5), even in cool summers. The 2024 results continue to support the previously expressed opinion that water temperature is the principal factor limiting trout abundance in the Blue Triton reach of Aberfoyle Creek, which was based on an analysis by C. Portt using the thermal suitability model of Wehrly et al. (2007) and presented in the Response to Technical Stakeholders' Comments on the TW3-80 Permit Renewal Application (Distributed: March 4, 2011).

The data continue to demonstrate a strong correlation between mean June – August air temperature and mean water temperature in Aberfoyle Creek during the same period, however, in 2024, as in 2023, mean water temperature was lower at all six monitoring locations than predicted by the relationship during previous years. In fact, in 2024, mean summer water temperatures were lower than in any of the previous years in the data set except 2023 and 2009. It is unclear what is responsible for the lower water summer temperatures. In 2024 the summer water temperature was about two degrees less than would be predicted from the relationship between air temperature and water temperature based on previous years. This suggests that a reduction in the temperature of water discharged from the mill pond has occurred, as little change in temperature would be expected over the short distance between the pond outlet and Site 6.

Conclusions

In 2024, mean summer (June – August) air temperature was fifth highest among those observed during the period 2007 – 2024. The overall pattern of water temperature suitability for the fish species found in the Aberfoyle Branch of Mill Creek from Brock Road downstream through the Blue Triton property in 2024 are consistent with previous years. Water temperatures during the June 1 – August 31 period are usually too warm for coldwater species such as brook trout and brown trout and too cold for warmwater species

such as largemouth bass. The water temperatures during this period are most favorable for species such as common shiner which have intermediate thermal requirements. During the summer, the water in the mill pond upstream from Brock Road becomes warm and, although the creek temperature decreases with distance downstream, it frequently exceeds the ultimate upper incipient lethal temperature for brook trout and brown trout at the furthest downstream temperature monitoring site.

The 2024 stream temperatures were lower than predicted from the mean water temperature versus mean air temperature regression at all six sites. The cause of the lower stream temperature in 2024 is unknown.

References

Hasnain S., Minns C. and B. Shuter. 2010. Key Ecological Temperature Metrics for Canadian Freshwater Fishes. Climate change research report: CCRR-17. Applied Research and Development Branch, Ontario Ministry of Natural Resources, Canada. 54 p.

Jobling, M. 1981. Temperature tolerance and the final preferendum -- rapid methods for the assessment of optimum growth temperatures. J. Fish Biol. 19: 439-455.

McCauley, R.W. and J.M. Casselman 1980. The final preferendum as an index of the temperature for optimum growth in fish. Pp 83-93 In United Nations Food and Agriculture Organization, European Inland Fisheries Advisory Commission, Symposium 80/E76, Rome, Italy.

Post, J.R., and Evans, D.O. 1989. Size-dependent overwinter mortality in young-of-the-year yellow perch (Perca flavescens): laboratory, in situ enclosure, and field experiments. Can. J. Fish. Aquat. Sci. 46: 1958–1968.

Portt, C. 2011. Review of the Aberfoyle Creek Water Temperature Monitoring Program. Report prepared for Nestle Waters Canada by C. Portt and Associates. 15p.

Portt, C. and J. Reid. 2013. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes. Report prepared for Nestle Waters Canada by C. Portt and Associates. 25p.

Portt, C. and J. Reid. 2014. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2013. Report prepared for Nestle Waters Canada by C. Portt and Associates. 22p.

Portt, C. and J. Reid. 2015. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2014. Report prepared for Nestle Waters Canada by C. Portt and Associates. 22p.

Portt, C. and J. Reid. 2016. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2015. Report prepared for Nestle Waters Canada by C. Portt and Associates. 21p.

Portt, C. and J. Reid. 2017. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2016. Report prepared for Nestle Waters Canada by C. Portt and Associates. 21p.

Portt, C. and J. Reid. 2018. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2017. Report prepared for Nestle Waters Canada by C. Portt and Associates. 22p.

Portt, C. and J. Reid. 2019. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2018. Report prepared for Nestle Waters Canada by C. Portt and Associates. 25p.

Portt, C. and J. Reid. 2020. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2019. Report prepared for Nestle Waters Canada by C. Portt and Associates. 25p.

Portt, C. and J. Reid. 2021. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2020. Report prepared for Nestle Waters Canada by C. Portt and Associates. 25p.

Portt, C. and J. Reid. 2022. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2021. Report prepared for Nestle Waters Canada by C. Portt and Associates. 25p.

Portt, C. and J. Reid. 2023. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2022. Report prepared for Nestle Waters Canada by C. Portt and Associates. 26p.

Portt, C. and J. Reid. 2024. Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2023. Report prepared for Nestle Waters Canada by C. Portt and Associates. 26p.

Spotila, J.R., K.N. Terpin, R.R. Koons and R.L. Bonati. 1979. Temperature requirements of fishes from eastern Lake Erie and the upper Niagara River: A review of the literature. Env. Biol. Fish. 4: 281-307.

Wehrly, K.E., L. Wang, and M. Mitro. 2007. Field-based estimates of thermal tolerance limits for trout: incorporating exposure time and temperature fluctuation. Transactions of the American Fisheries Society. 136: 365-374.

Wismer, D.A. and A.E. Christie. 1987. Temperature relationships of Great Lakes fishes: A data compilation. Great Lakes Fishery Commission, Ann Arbor, MI. Spec. Publ. 87-3. 196 p.

Figure 1. Temperature logging locations used in the Blue Triton monitoring program in Aberfoyle Creek.

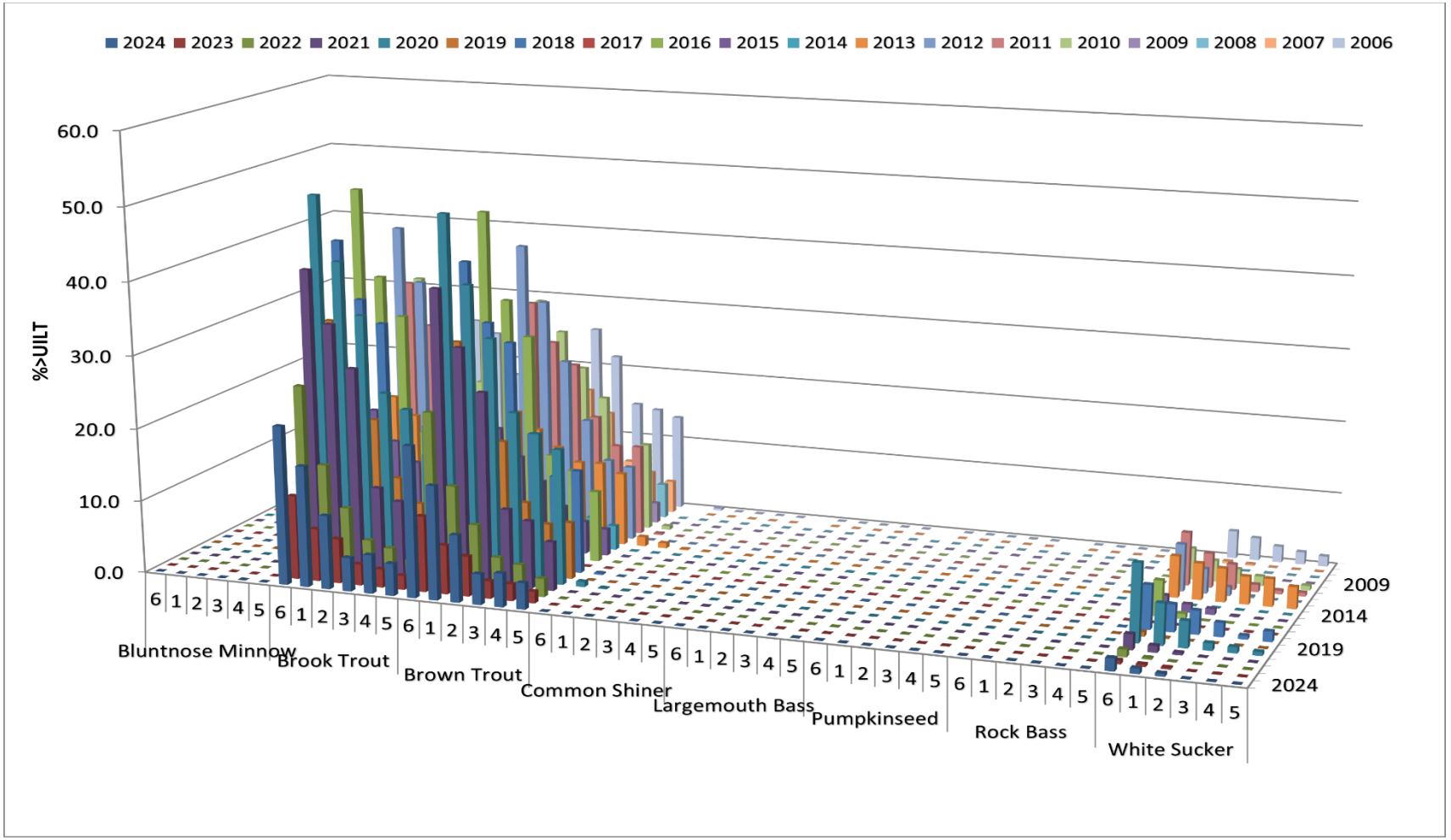


Figure 2. Percent of temperature measurements that exceed the ultimate upper incipient lethal temperature (%>UILT) during the period June 1 to August 31, by species, station, and year.

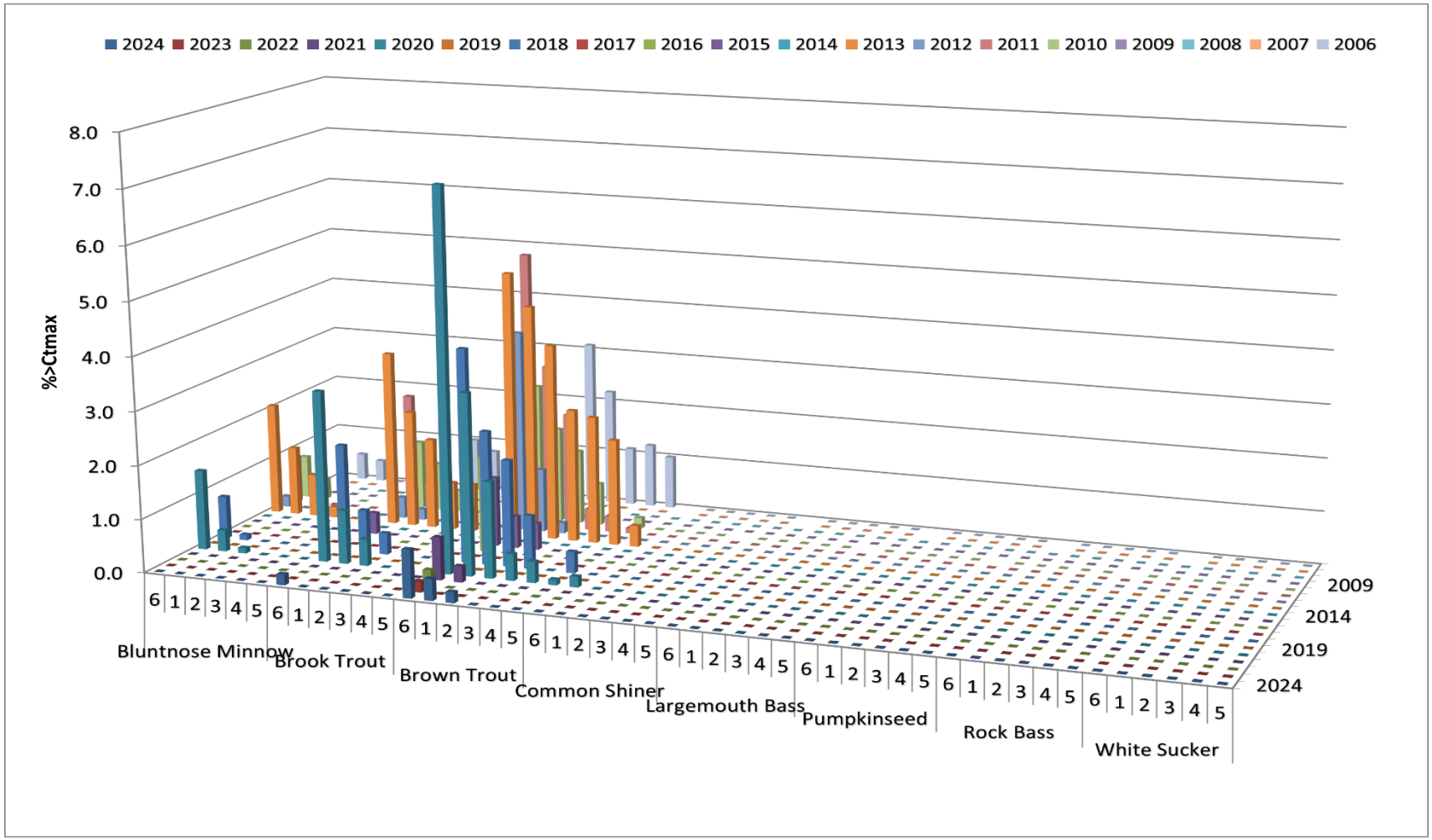


Figure 3. Percent of temperature measurements that exceed the critical thermal maximum temperature (%>CTmax) during the period June 1 to August 31, by species, station, and year.

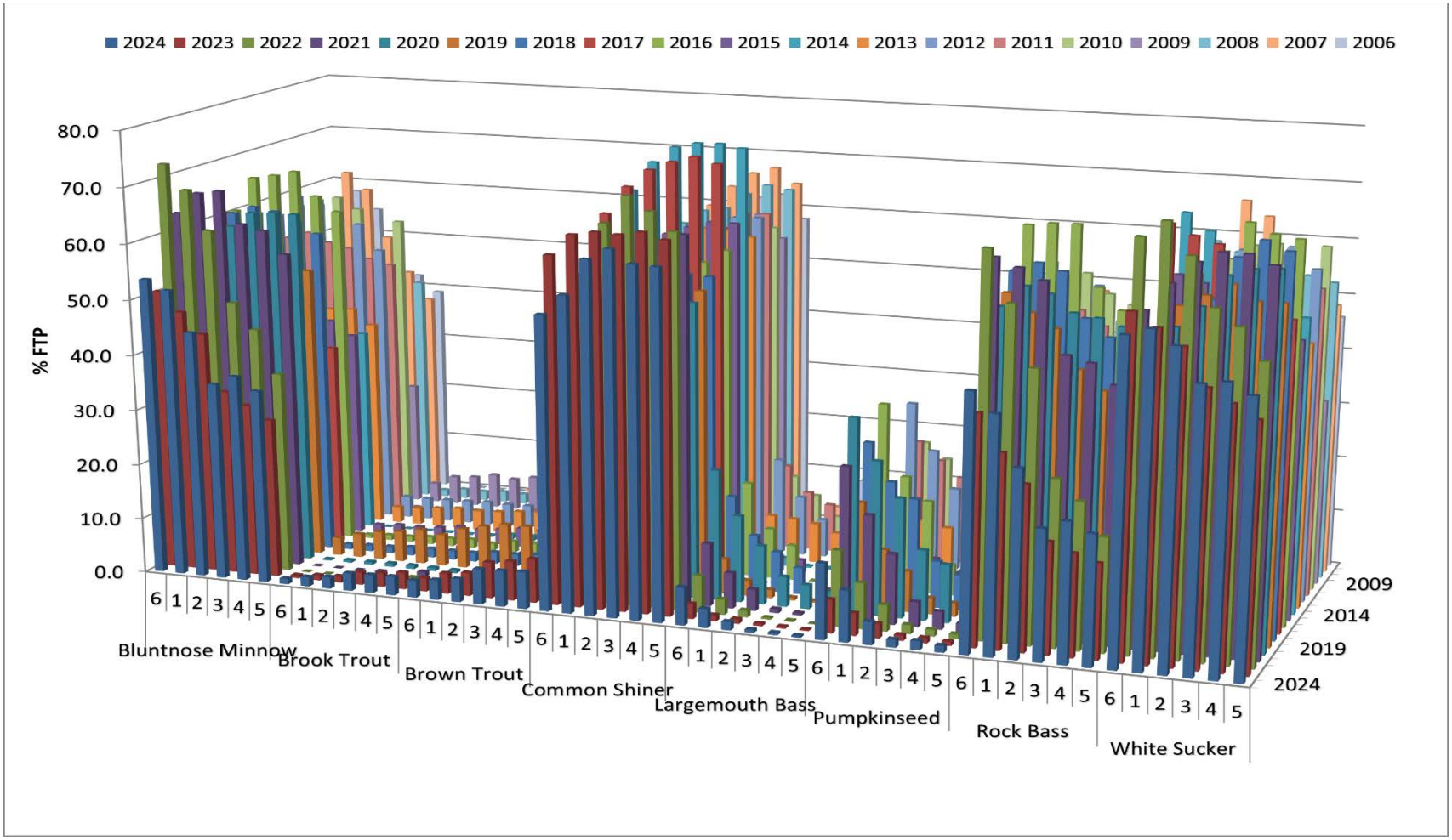


Figure 4. Percent of temperature measurements within ±2°C of the final temperature preferendum (%FTP) during the period June 1 to August 31, by species, station, and year.

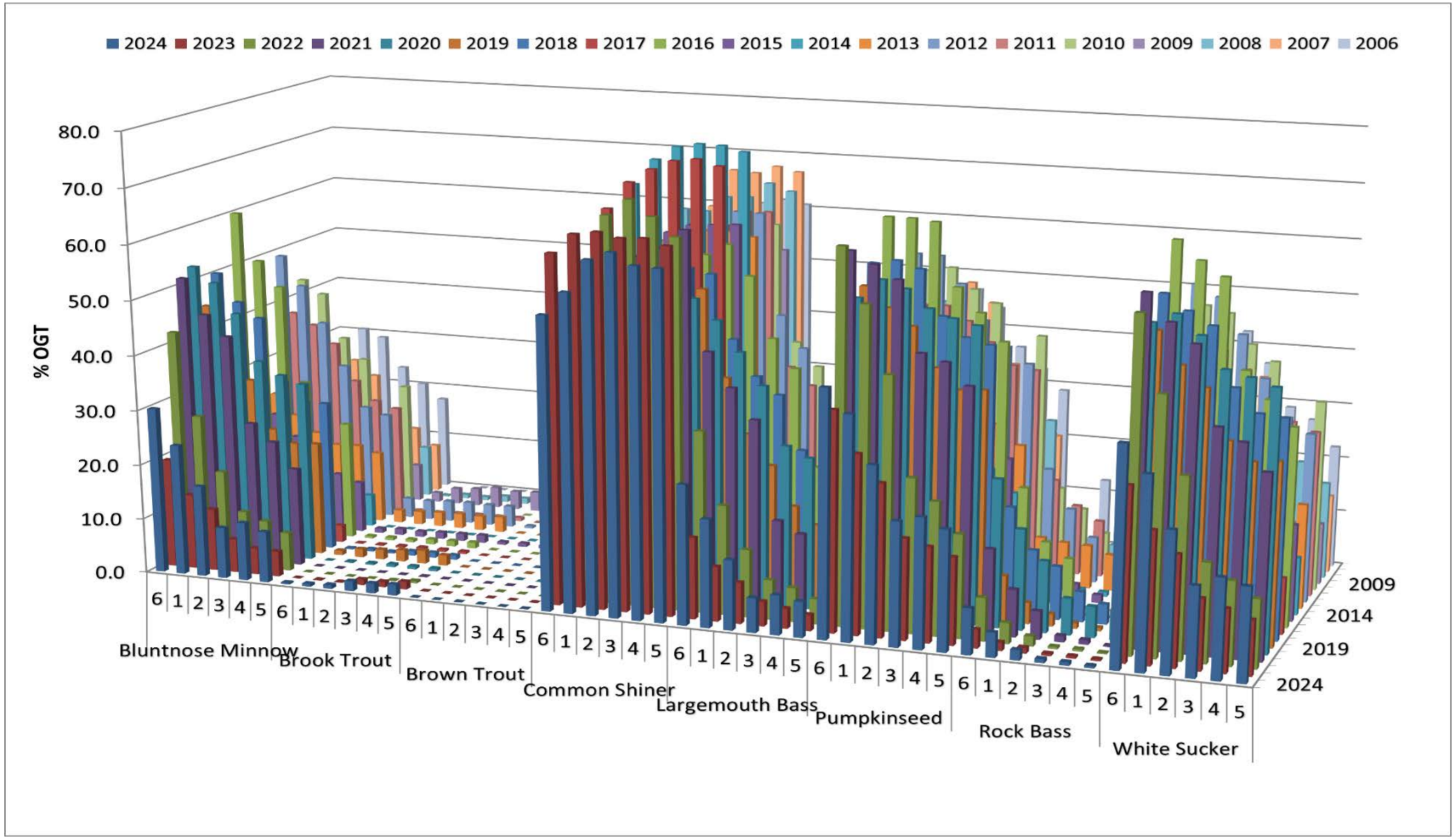


Figure 5. Percent of temperature measurements within ±2°C of the optimal temperature for growth (%OTG) during the period June 1 to August 31, by species, station, and year.

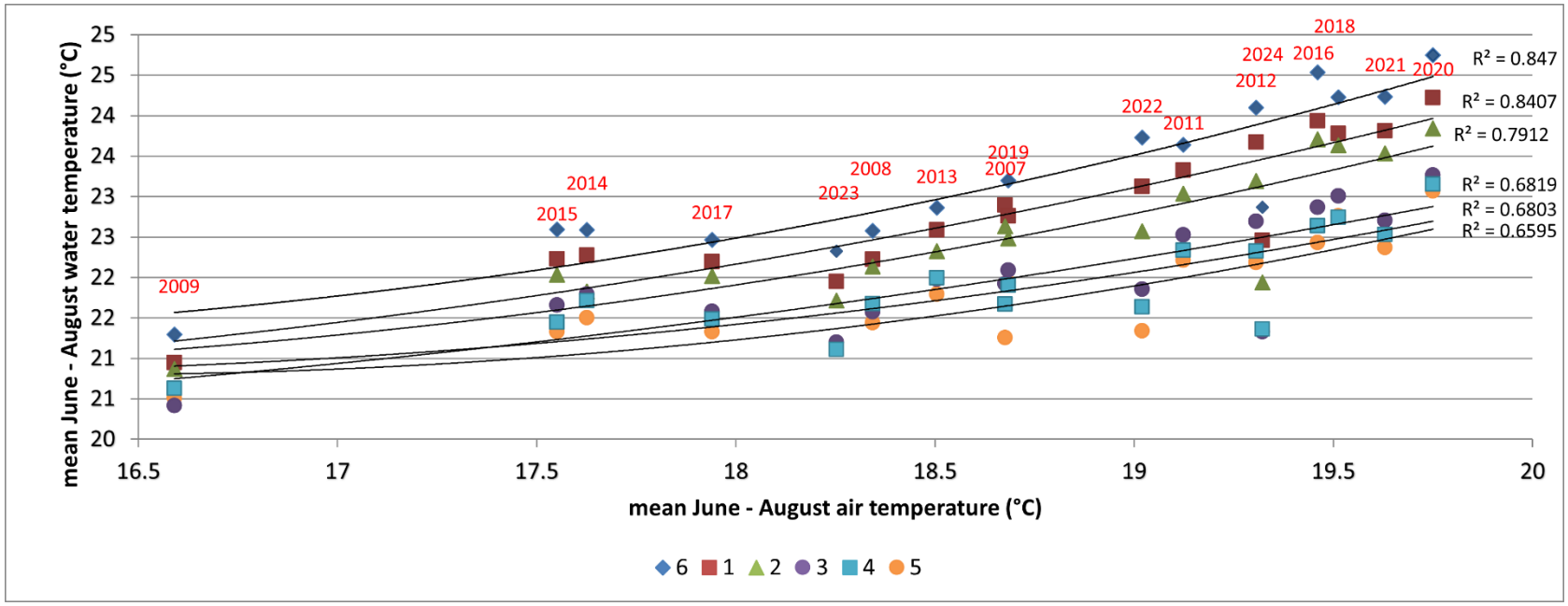


Figure 6. Plot of the mean June 1 - August 31 water temperature at each site versus mean June 1 – August 31 air temperature at the Guelph Turfgrass Institute weather station, by year. The lines and R^2 values are for second order polynomial regressions.

APPENDIX A

Thermal suitability indices

Percent of temperature measurements within ±2°C of the optimum growth temperature (%OGT)																					
		Year																			
Species	Station	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Mean
Blunt-nose Minnow	6	30.2	19.8	42.5	51.6	53.0	45.0	50.3	20.9	60.1	27.0	18.2	23.2	49.2	37.4	43.1	12.3	26.2			37.0
	1	23.8	13.6	27.3	45.2	50.3	36.5	45.2	14.0	51.4	21.3	13.0	19.3	43.7	35.3	40.6	8.5	19.3	25.0	30.5	31.2
	2	16.6	11.3	17.3	41.5	44.9	31.7	42.5	10.6	46.8	17.3	8.5	16.2	36.8	31.9	32.2	7.2	19.3	22.2	29.1	27.4
	3	9.3	6.1	10.2	25.7	36.4	22.8	30.9	5.5	29.0	13.2	7.9	14.2	28.7	24.9	28.3	5.9	11.7	15.1	23.3	20.2
	4	10.6	4.8	8.8	22.6	34.1	20.5	27.4	4.5	24.9	10.7	7.0	14.3	20.9	21.3		7.0	11.9	12.1	20.3	17.3
	5	9.3	4.6	7.0	17.9	32.8	20.7	27.4	3.1	21.6	9.4	5.9	13.2	19.7	20.1	23.5	6.9	9.5	9.0	17.5	16.1
	Mean	16.6	10.0	18.9	34.1	41.9	29.5	37.3	9.8	39.0	16.5	10.1	16.7	33.2	28.5	33.5	8.0	16.3	16.7	24.1	24.7
Brook Trout	6	0.3	0.0	0.0	0.0	0.0	0.8	0.2	0.1	0.4	0.8	0.0	2.3	3.6	0.2	0.0	1.7	0.2			0.7
	1	0.5	0.1	0.0	0.0	0.2	1.5	0.4	0.2	0.5	1.1	0.0	2.4	3.5	0.2	0.0	2.9	0.7	0.0	0.0	0.9
	2	0.7	0.1	0.0	0.0	0.3	1.8	0.3	0.3	0.5	1.0	0.0	2.6	3.8	0.4	0.0	3.2	0.6	0.0	0.0	0.9
	3	1.8	1.0	0.0	0.0	0.5	2.1	0.8	0.4	0.9	1.2	0.0	2.7	3.9	0.5	0.0	3.8	1.1	0.1	0.0	1.1
	4	1.8	1.0	0.1	0.0	0.5	2.4	0.9	0.4	1.0	1.3	0.0	2.6	3.8	0.5		3.4	1.0	0.2	0.0	1.2
	5	2.0	1.4	0.4	0.1	0.5	1.9	0.8	0.4	1.1	1.4	0.0	2.8	3.9	0.6	0.0	3.6	1.4	0.7	0.1	1.2
	Mean	1.2	0.6	0.1	0.0	0.3	1.8	0.6	0.3	0.7	1.1	0.0	2.6	3.8	0.4	0.0	3.1	0.8	0.2	0.0	1.0
Brown Trout	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.0			0.1
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.5	0.0	0.0	0.0	0.1
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.5	0.0	0.0	0.0	0.1
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.0	0.1
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.3	0.0		0.6	0.0	0.0	0.0	0.1
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.5	0.0	0.0	0.6	0.1	0.0	0.0	0.1
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.5	0.0	0.0	0.0	0.1
Common Shiner	6	52.5	62.4	46.6	42.4	33.7	37.6	35.4	66.0	29.5	53.7	68.5	55.0	36.4	47.3	44.8	63.9	60.0			48.2
	1	56.7	65.9	60.3	48.3	38.3	43.0	41.6	70.9	38.8	56.7	73.1	57.7	43.1	51.0	47.0	60.8	59.8	60.1	56.3	52.9
	2	62.5	66.5	68.7	51.3	43.7	46.5	43.3	73.4	42.4	60.9	75.6	59.1	51.8	53.4	54.8	62.8	62.7	67.1	61.5	56.9
	3	64.0	65.7	71.6	61.1	51.6	53.4	52.9	75.1	55.8	62.4	76.3	60.1	56.8	59.7	56.7	51.4	62.9	66.8	60.5	60.2
	4	62.0	65.9	68.9	62.8	52.9	54.6	57.2	75.6	58.1	62.7	76.2	60.1	63.1	62.5		57.9	65.7	68.2	61.4	62.6
	5	61.8	64.9	65.7	66.2	53.6	54.5	56.4	74.6	60.2	63.0	75.3	59.4	63.0	62.6	59.6	54.2	64.4	67.4	60.7	62.2

	Mean	59.9	65.2	63.6	55.4	45.6	48.3	47.8	72.6	47.5	59.9	74.2	58.6	52.4	56.1	52.6	58.5	62.6	65.9	60.1	57.3
Large-mouth Bass	6	25.0	14.6	32.4	45.4	50.1	39.1	45.1	14.8	54.8	20.6	13.4	17.5	44.6	34.2	38.0	9.0	19.6			31.9
	1	19.3	9.8	19.6	39.4	44.8	29.4	38.8	8.6	43.9	16.5	9.1	15.1	38.8	31.0	33.7	6.8	15.1	19.9	26.6	26.1
	2	12.5	7.4	12.1	34.1	39.2	24.1	35.8	6.1	38.8	13.6	6.2	13.4	31.5	26.6	26.5	4.4	14.8	18.7	25.5	22.5
	3	6.2	4.4	7.1	16.6	28.9	17.1	26.2	2.7	21.2	9.5	5.6	11.3	22.3	20.4	22.7	4.3	8.9	12.1	20.2	15.6
	4	7.1	3.6	6.1	14.6	27.1	14.1	20.1	1.9	18.1	7.7	5.3	11.3	15.8	16.9		5.2	8.9	9.3	17.6	12.9
	5	6.4	2.9	4.5	11.1	25.9	14.3	21.2	1.1	15.7	6.4	4.7	10.2	15.0	16.3	18.0	4.6	7.0	6.4	15.3	12.1
	Mean	12.8	7.1	13.6	26.9	36.0	23.0	31.2	5.9	32.1	12.4	7.4	13.1	28.0	24.2	27.8	5.7	12.4	13.3	21.0	20.0
Pump-kinseed	6	43.8	39.1	66.0	64.5	55.7	57.0	60.2	42.9	66.8	42.5	39.8	39.5	57.5	47.5	53.0	23.4	45.8			49.7
	1	39.6	31.9	56.5	62.4	59.1	53.5	60.9	36.0	66.8	38.3	33.2	36.5	57.4	47.6	53.8	18.3	38.3	48.8	46.8	47.4
	2	31.3	27.2	44.8	60.1	57.8	50.6	59.7	32.6	66.4	35.8	23.5	33.0	52.6	45.1	50.1	15.4	38.2	45.3	43.6	44.4
	3	22.0	18.0	27.4	47.9	54.7	43.7	51.8	23.5	55.3	29.3	23.3	28.2	46.3	41.5	47.8	13.7	29.0	34.1	36.5	37.9
	4	23.1	16.9	23.7	46.7	53.3	40.2	48.4	21.5	51.1	26.6	21.4	28.6	41.8	37.6		14.4	29.5	27.2	32.6	34.7
	5	21.4	15.5	18.4	42.9	52.4	40.5	47.4	18.7	46.3	24.6	17.4	25.1	39.0	37.0	42.4	14.2	25.0	21.2	28.9	32.7
	Mean	30.2	24.8	39.5	54.1	55.5	47.6	54.7	29.2	58.8	32.9	26.4	31.8	49.1	42.7	49.4	16.6	34.3	35.3	37.7	41.0
Rock Bass	6	8.2	3.3	7.7	15.1	26.3	8.2	19.3	0.2	20.7	5.5	3.1	8.5	20.1	17.1	14.6	1.6	5.4			11.8
	1	4.4	1.5	3.7	8.4	17.9	3.8	12.0	0.0	11.3	3.3	1.9	8.0	13.1	12.7	11.1	1.0	2.5	3.8	12.4	7.7
	2	1.8	1.0	1.8	5.0	12.7	2.2	9.5	0.0	8.7	3.0	1.0	7.8	8.2	10.2	6.9	0.8	2.5	3.3	9.3	5.7
	3	0.7	0.4	0.4	1.1	6.5	1.0	5.4	0.0	0.4	1.4	0.8	6.5	4.9	5.2	4.2	0.2	0.5	1.4	6.5	2.9
	4	0.6	0.4	0.4	0.8	5.5	0.6	3.6	0.0	0.1	1.1	0.5	6.5	1.7	4.2		0.3	0.5	0.6	6.0	2.1
	5	0.4	0.3	0.2	0.2	5.0	0.6	4.6	0.0	0.1	0.8	0.2	5.7	2.3	3.3	2.5	0.3	0.2	0.1	4.7	1.9
	Mean	2.7	1.2	2.4	5.1	12.3	2.7	9.1	0.0	6.9	2.5	1.3	7.2	8.4	8.8	7.9	0.7	1.9	1.8	7.8	5.3
White Sucker	6	38.5	30.5	58.2	60.8	55.0	52.9	58.3	34.0	65.9	36.6	30.4	33.6	55.3	44.6	50.0	18.0	37.3			45.2
	1	33.7	23.3	45.1	56.1	56.7	47.3	55.6	26.9	62.6	32.0	23.7	30.0	53.3	43.0	48.9	15.0	27.5	37.0	42.4	41.1
	2	24.8	19.6	31.8	52.8	53.4	43.8	53.4	22.4	60.1	28.0	15.7	25.8	47.0	39.9	43.6	12.8	28.5	35.1	36.8	37.4
	3	15.8	12.5	17.5	39.3	48.0	35.1	43.2	14.1	44.4	22.4	14.9	20.8	39.5	34.6	40.8	9.5	19.4	21.9	29.0	29.8
	4	17.6	11.2	14.8	37.1	47.0	31.9	39.1	11.7	39.7	18.9	12.8	21.1	32.9	31.2		10.8	21.1	18.9	27.0	26.7
	5	16.5	9.7	12.1	32.4	45.7	32.3	38.7	10.0	35.3	17.2	10.3	18.7	30.3	29.7	34.2	11.1	17.5	14.2	22.3	25.0
	Mean	24.5	17.8	29.9	46.4	51.0	40.6	48.1	19.9	51.3	27.6	18.0	25.0	43.1	37.2	43.5	12.9	25.2	25.4	31.5	34.1

Percent of temperature measurements within ±2°C of the final temperature preferendum (%FTP)																					
		Year																			
Species	Station	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Mean
Black-nose Dace	6	26.5	34.8	13.8	11.5	10.9	17.8	13.7	27.4	9.2	28.0	26.7	26.9	10.2	21.6	21.1	51.1	30.5			22.5
	1	30.8	38.9	19.3	15.1	14.1	20.4	16.1	33.2	12.0	33.3	31.4	30.7	12.9	24.7	22.5	57.2	35.1	24.9	24.8	26.2
	2	39.0	41.9	28.3	17.9	16.3	23.5	17.0	35.5	13.6	36.1	42.3	34.0	17.1	28.4	24.8	53.2	34.1	26.7	26.5	29.3
	3	46.7	49.7	39.1	27.4	20.8	28.1	22.0	42.2	20.6	41.7	42.0	38.9	22.9	34.1	29.2	59.9	40.2	37.8	37.7	35.8
	4	46.4	51.4	43.4	28.4	21.5	31.0	23.9	43.9	24.1	45.0	43.9	38.6	27.4	36.4		58.4	39.6	41.2	42.2	38.2
	5	48.7	53.4	48.7	31.0	22.1	31.4	24.7	46.6	26.9	46.9	48.7	42.1	30.9	38.9	34.1	59.7	43.3	49.8	48.4	40.9
	Mean	39.7	45.0	32.1	21.9	17.6	25.4	19.6	38.1	17.7	38.5	39.2	35.2	20.2	30.7	26.3	56.6	37.1	36.1	35.9	32.2
Blunt-nose Minnow	6	53.6	50.7	72.8	63.4	53.7	57.8	57.3	60.8	60.5	54.3	58.7	51.1	57.0	52.0	57.4	33.9	56.3			56.0
	1	51.9	47.2	68.4	67.2	58.9	59.9	61.6	55.3	66.8	50.5	52.9	48.1	60.7	53.2	58.8	28.9	53.8	62.2	58.0	56.0
	2	44.6	43.5	61.4	67.8	60.8	58.7	63.0	51.8	67.5	48.0	43.0	44.9	59.9	51.5	59.5	26.6	52.5	59.1	54.6	53.6
	3	35.6	33.3	48.7	62.1	63.5	55.2	62.4	41.9	68.4	43.3	42.3	40.5	57.6	50.7	57.5	23.6	47.4	50.0	47.6	49.0
	4	37.3	31.2	44.1	61.2	63.7	52.5	60.7	40.5	64.1	40.1	40.9	40.7	56.2	48.9		23.4	46.1	43.4	42.0	46.5
	5	35.0	28.8	36.3	57.2	63.7	52.8	58.8	36.9	61.5	37.6	37.1	38.0	51.5	48.0	55.6	22.6	42.3	38.3	39.0	44.3
	Mean	43.0	39.1	55.3	63.2	60.7	56.2	60.6	47.9	64.8	45.6	45.8	43.9	57.2	50.7	57.8	26.5	49.7	50.6	48.2	50.8
Brook Trout	6	1.0	0.5	0.0	0.0	0.2	3.2	0.9	0.3	0.6	1.5	0.0	2.9	3.9	0.8	0.0	3.5	1.2			1.2
	1	1.7	0.9	0.0	0.0	0.4	4.3	1.1	0.4	0.9	1.8	0.0	3.0	3.9	0.8	0.0	5.2	1.7	0.2	0.0	1.4
	2	2.1	1.1	0.0	0.0	0.5	5.1	1.2	0.5	1.0	1.8	0.0	3.4	4.0	1.0	0.0	5.5	1.6	0.3	0.0	1.5
	3	3.2	2.3	0.4	0.2	0.6	5.6	1.5	0.8	1.3	2.1	0.1	3.7	4.1	1.2	0.0	6.3	1.9	0.5	0.1	1.9
	4	3.3	2.5	0.7	0.4	0.6	6.3	1.6	0.8	1.4	2.6	0.1	3.6	4.3	1.2		5.8	1.8	1.7	0.2	2.2
	5	3.4	3.0	1.0	0.9	0.6	5.7	1.6	1.4	1.6	2.5	0.3	3.8	4.2	1.2	0.0	6.5	2.6	3.8	0.4	2.3
	Mean	2.5	1.7	0.4	0.3	0.5	5.0	1.3	0.7	1.1	2.1	0.1	3.4	4.1	1.0	0.0	5.5	1.8	1.3	0.1	1.8
Brown Trout	6	3.1	2.4	0.0	0.0	0.5	7.2	1.6	0.8	1.2	2.9	0.8	4.2	4.3	2.3	0.7	8.3	3.8			2.6
	1	3.6	3.7	0.0	0.1	0.5	8.1	2.1	1.1	2.0	3.4	0.9	4.4	4.3	2.3	0.6	9.7	4.5	2.6	0.2	2.8
	2	4.2	4.2	0.5	0.3	0.8	8.8	2.1	1.4	2.0	3.5	1.2	4.8	4.8	2.6	1.1	10.1	4.7	2.8	0.4	3.2
	3	6.4	6.5	2.1	1.2	1.4	8.8	2.4	3.2	2.7	3.9	1.4	5.4	5.0	3.1	1.4	11.6	5.6	4.0	1.0	4.1
	4	6.5	7.1	2.4	1.7	1.5	9.3	2.6	3.4	2.9	4.1	1.4	5.4	5.4	3.1		10.5	5.1	5.0	1.6	4.4
	5	6.7	7.9	3.3	2.0	1.6	8.9	2.6	4.1	3.4	4.4	1.8	5.9	5.3	3.3	2.1	11.8	5.9	6.6	2.8	4.8

	Mean	5.1	5.3	1.4	0.9	1.1	8.5	2.2	2.3	2.4	3.7	1.3	5.0	4.9	2.8	1.2	10.3	4.9	4.2	1.2	3.6
Com-mon Shiner	6	52.5	62.0	44.6	40.9	32.7	36.8	34.3	65.0	28.1	53.2	67.2	54.2	34.8	46.0	43.9	62.5	57.2			48.0
	1	56.1	65.7	58.1	46.8	37.3	42.0	40.0	70.0	37.1	56.6	72.5	56.9	41.5	50.3	46.2	60.8	59.8	60.1	56.3	53.4
	2	62.5	66.4	67.2	50.5	42.2	45.3	42.1	73.2	40.7	60.5	75.4	59.1	50.7	52.6	53.0	62.8	60.5	63.9	58.9	57.2
	3	64.5	66.2	72.1	60.0	50.0	52.3	52.1	74.8	54.0	62.0	76.3	60.4	55.9	59.1	55.7	56.5	63.4	66.6	61.4	61.2
	4	62.2	66.9	69.7	61.7	51.7	53.9	56.0	75.9	56.6	63.1	76.4	60.3	61.9	62.0		60.5	65.2	67.8	62.2	63.0
	5	62.0	65.8	66.5	65.3	52.8	54.1	55.8	74.9	59.0	63.1	75.8	59.3	62.1	62.1	58.9	56.3	64.6	65.1	57.9	62.2
	Mean	60.0	65.5	63.0	54.2	44.5	47.4	46.7	72.3	45.9	59.8	73.9	58.4	51.2	55.4	51.5	59.9	61.8	64.7	59.3	57.6
Creek Chub	6	45.1	40.5	67.1	64.9	55.9	57.4	60.4	44.9	66.8	43.9	42.1	40.5	57.4	47.9	53.6	23.3	45.2			50.4
	1	41.6	34.1	58.2	63.4	59.6	54.3	62.0	38.1	67.3	39.4	34.8	37.7	58.0	48.4	54.3	18.1	38.3	48.8	45.0	47.4
	2	32.8	29.1	47.7	61.5	58.5	51.9	60.8	34.3	67.4	37.1	25.3	33.9	53.8	45.8	50.8	19.2	38.0	44.9	43.0	44.0
	3	23.0	19.7	29.4	49.3	55.6	45.2	53.1	25.7	56.8	30.9	24.9	29.4	47.8	42.9	49.1	13.7	29.0	34.1	36.5	36.6
	4	24.6	18.1	25.9	48.3	55.0	41.9	50.1	23.1	53.1	27.8	23.3	30.0	43.5	38.6		16.2	32.1	30.1	34.1	34.2
	5	22.9	16.8	20.2	44.9	53.8	42.2	48.8	20.5	48.4	25.9	18.9	26.9	40.4	38.4	43.9	14.9	26.7	21.2	28.9	31.8
	Mean	31.7	26.4	41.4	55.4	56.4	48.8	55.9	31.1	60.0	34.2	28.2	33.1	50.2	43.7	50.3	17.6	34.9	35.8	37.5	40.6
Large-mouth Bass	6	6.8	2.7	6.6	11.3	23.5	6.3	16.7	0.1	17.1	4.8	2.4	8.0	17.5	15.4	12.4	1.1	4.4			9.2
	1	3.4	1.1	2.8	6.4	15.6	2.8	9.9	0.0	9.0	2.9	1.4	7.7	10.8	10.7	9.1	0.5	2.5	3.8	10.0	5.8
	2	1.5	0.8	1.2	3.8	10.6	1.5	7.3	0.0	6.3	2.5	0.3	7.2	6.9	8.7	5.4	0.5	1.8	2.7	8.3	4.1
	3	0.5	0.4	0.3	0.7	5.4	0.5	4.8	0.0	0.1	1.2	0.3	5.8	3.7	4.2	3.6	0.2	0.5	1.4	6.5	2.1
	4	0.4	0.3	0.2	0.4	4.3	0.3	3.1	0.0	0.0	0.7	0.2	5.7	1.1	3.3		0.2	0.2	0.4	5.4	1.5
	5	0.3	0.2	0.0	0.0	3.6	0.4	3.7	0.0	0.0	0.5	0.0	5.1	1.5	2.6	2.1	0.1	0.2	0.1	4.7	1.3
	Mean	2.2	0.9	1.9	3.8	10.5	2.0	7.6	0.0	5.4	2.1	0.8	6.6	6.9	7.5	6.5	0.4	1.6	1.7	7.0	3.9
Pump-kinseed	6	13.5	6.0	13.6	27.3	34.9	18.9	28.6	3.4	33.6	9.8	5.4	10.0	30.1	22.1	21.0	3.6	9.4			17.1
	1	9.2	4.0	8.2	19.1	27.6	10.8	21.9	0.7	20.8	6.3	3.9	9.7	21.6	18.9	18.2	2.7	5.6	8.1	18.1	12.4
	2	4.1	2.6	4.7	12.6	21.4	7.3	19.2	0.1	16.7	5.2	2.2	8.7	14.9	16.0	14.2	2.3	5.9	8.0	14.0	9.5
	3	1.4	1.0	1.6	4.5	12.6	2.9	8.4	0.0	5.5	2.9	2.1	8.2	9.0	10.2	9.7	0.7	2.2	3.1	9.8	5.0
	4	1.6	0.9	1.2	3.2	10.4	2.4	6.3	0.0	4.3	2.1	2.0	8.2	5.3	7.7		0.9	2.5	2.4	9.1	3.9
	5	1.2	0.7	0.8	1.5	9.2	2.5	6.9	0.0	2.4	1.6	1.6	7.8	5.7	6.3	5.5	0.6	1.0	0.8	6.8	3.3
	Mean	5.2	2.5	5.0	11.4	19.4	7.5	15.2	0.7	13.9	4.7	2.9	8.8	14.4	13.5	13.7	1.8	4.4	4.5	11.6	8.4
Rainbow Darter	6	29.6	38.9	15.8	14.3	13.5	19.2	15.7	33.4	10.6	32.7	32.2	31.0	12.9	25.4	23.7	52.3	31.5			25.5
	1	34.9	43.1	23.5	18.8	16.8	23.1	18.5	39.1	14.4	37.8	38.4	34.7	15.9	28.1	25.6	60.5	37.5	29.1	29.4	30.0
	2	43.5	46.3	32.0	21.6	19.2	26.0	19.4	41.4	16.3	41.7	49.7	38.2	21.0	32.5	28.8	57.5	36.8	31.4	31.9	33.4
	3	52.5	54.4	44.2	31.7	23.8	31.7	25.6	49.7	23.9	47.1	49.9	43.6	27.9	38.4	33.7	62.3	45.2	42.5	42.7	40.6
	4	51.6	56.0	48.3	32.5	24.8	33.5	28.4	51.6	28.0	50.1	51.5	43.3	31.9	41.1		62.2	43.7	46.5	46.8	42.9
	5	52.9	57.9	54.8	35.8	25.2	33.8	29.6	53.9	31.3	52.1	55.6	45.7	35.6	42.9	37.4	63.2	49.0	54.7	52.3	45.5

	Mean	44.2	49.4	36.4	25.8	20.6	27.9	22.9	44.9	20.8	43.6	46.2	39.4	24.2	34.7	29.8	59.7	40.6	40.8	40.6	36.4
Rock Bass	6	45.1	40.5	67.1	64.9	55.9	57.4	60.4	44.9	66.8	43.9	42.1	40.5	57.4	47.9	53.6	23.3	45.2			50.4
	1	41.6	34.1	58.2	63.4	59.6	54.3	62.0	38.1	67.3	39.4	34.8	37.7	58.0	48.4	54.3	18.1	38.3	48.8	45.0	47.4
	2	32.8	29.1	47.7	61.5	58.5	51.9	60.8	34.3	67.4	37.1	25.3	33.9	53.8	45.8	50.8	19.2	38.0	44.9	43.0	44.0
	3	23.0	19.7	29.4	49.3	55.6	45.2	53.1	25.7	56.8	30.9	24.9	29.4	47.8	42.9	49.1	13.7	29.0	34.1	36.5	36.6
	4	24.6	18.1	25.9	48.3	55.0	41.9	50.1	23.1	53.1	27.8	23.3	30.0	43.5	38.6		16.2	32.1	30.1	34.1	34.2
	5	22.9	16.8	20.2	44.9	53.8	42.2	48.8	20.5	48.4	25.9	18.9	26.9	40.4	38.4	43.9	14.9	26.7	21.2	28.9	31.8
	Mean	31.7	26.4	41.4	55.4	56.4	48.8	55.9	31.1	60.0	34.2	28.2	33.1	50.2	43.7	50.3	17.6	34.9	35.8	37.5	40.6
White Sucker	6	56.1	59.1	70.5	57.7	47.9	52.2	50.5	69.2	51.1	59.1	69.0	57.1	52.3	54.7	56.2	43.5	59.9			56.8
	1	57.4	56.7	73.3	62.4	54.4	57.2	56.5	67.4	60.2	57.9	66.1	55.5	57.5	56.1	58.4	38.1	58.2	66.7	60.3	59.0
	2	54.9	54.0	67.9	66.2	58.1	59.2	57.8	66.2	64.3	56.9	58.3	52.8	61.7	55.4	61.1	35.8	57.6	64.1	59.3	58.5
	3	49.1	47.6	59.7	68.0	63.5	61.3	65.0	59.3	69.4	53.9	58.3	49.7	62.7	56.1	61.6	32.2	55.3	58.5	54.7	57.2
	4	49.7	45.3	56.9	68.0	64.8	58.7	68.1	57.4	67.7	51.3	57.2	50.0	62.7	57.0		33.6	54.8	54.0	49.7	55.9
	5	47.8	43.0	51.6	66.4	65.1	58.7	66.5	54.4	67.1	49.3	52.3	47.1	59.1	55.0	61.6	33.4	53.8	49.0	46.1	54.1
	Mean	52.5	51.0	63.3	64.8	59.0	57.9	60.7	62.3	63.3	54.7	60.2	52.0	59.3	55.7	59.8	36.1	56.6	58.5	54.0	56.9

Percent of temperature measurements that exceed the ultimate upper incipient lethal temperature (%>UILT)																					
		Year																			
Species	Station	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Mean
Black-nose Dace	6	0.6	0.1	0.0	0.5	5.8	0.0	3.3	0.0	0.6	1.0	0.0	4.7	2.2	4.3	2.0	0.0	0.0			1.5
	1	0.3	0.0	0.0	0.0	2.5	0.0	1.9	0.0	0.0	0.4	0.0	3.8	0.3	2.3	1.5	0.0	0.0	0.0	2.0	0.8
	2	0.0	0.0	0.0	0.0	1.2	0.0	1.6	0.0	0.0	0.2	0.0	2.8	0.0	1.4	1.0	0.0	0.0	0.0	1.6	0.5
	3	0.0	0.0	0.0	0.0	0.3	0.0	0.5	0.0	0.0	0.0	0.0	1.9	0.0	0.3	0.6	0.0	0.0	0.0	1.1	0.2
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0		0.0	0.0	0.0	0.8	0.2
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1
	Mean	0.2	0.0	0.0	0.1	1.6	0.0	1.2	0.0	0.1	0.3	0.0	2.8	0.4	1.4	1.0	0.0	0.0	0.0	1.2	0.5
Blunt-nose Minnow	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brook Trout	6	21.8	11.5	25.9	41.1	50.6	33.0	43.4	10.6	49.4	17.8	9.9	18.4	42.0	33.6	33.7	7.9	17.7			27.5
	1	16.6	7.2	15.3	33.9	41.8	23.5	35.5	5.9	37.5	13.6	7.1	15.9	34.5	27.7	29.1	4.9	11.6	17.1	25.4	21.3
	2	10.1	6.1	9.6	28.1	34.7	19.7	32.4	3.4	32.2	10.8	5.0	13.9	26.3	24.4	23.7	3.5	11.2	15.5	23.7	17.6
	3	4.6	2.9	5.4	11.9	24.3	11.8	20.6	1.2	16.1	7.3	4.8	11.5	17.8	17.1	19.3	3.1	7.2	9.8	17.8	11.3
	4	5.3	2.5	4.6	10.3	22.3	8.5	14.6	0.4	13.8	5.1	4.5	11.5	12.4	13.1		3.4	7.0	6.8	15.4	9.0
	5	4.4	1.9	3.3	7.6	20.3	9.3	15.7	0.1	11.0	4.1	3.9	10.5	11.2	13.3	13.0	2.9	5.3	4.5	13.3	8.2
	Mean	10.5	5.4	10.7	22.2	32.3	17.6	27.0	3.6	26.7	9.8	5.9	13.6	24.0	21.5	23.8	4.3	10.0	10.7	19.1	15.7
Brown Trout	6	20.7	10.4	23.8	39.8	49.2	31.4	41.7	9.2	47.4	16.7	9.1	17.7	40.6	32.0	31.7	7.0	15.6			26.1
	1	15.6	6.7	14.0	32.1	39.9	22.1	33.6	5.3	35.5	12.9	6.5	15.4	32.9	26.6	27.5	4.9	11.6	17.1	25.4	20.3
	2	9.2	5.5	9.0	26.3	32.9	18.2	31.1	2.8	30.7	9.7	4.6	13.1	24.7	23.6	22.5	3.5	10.0	13.9	21.6	16.5
	3	4.2	2.4	4.8	10.6	23.1	10.0	18.8	0.8	14.4	6.4	4.4	11.2	16.5	16.3	18.4	2.2	5.3	7.0	14.8	10.1
	4	4.6	2.3	4.1	9.3	20.5	7.3	13.2	0.2	12.5	4.5	4.3	11.3	11.0	12.4		2.9	6.0	5.6	14.2	8.1
	5	3.6	1.6	2.5	6.7	18.6	7.8	14.2	0.0	9.8	3.7	3.4	10.1	10.3	12.5	12.1	2.8	4.8	4.5	13.3	7.5

	Mean	9.7	4.8	9.7	20.8	30.7	16.1	25.4	3.1	25.1	9.0	5.4	13.1	22.7	20.6	22.4	3.9	8.9	9.6	17.9	14.6
Common Shiner	6	0.0	0.0	0.0	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.0	1.3	0.0	0.2	0.5	0.0	0.0			0.2
	1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Creek Chub	6	0.3	0.0	0.0	0.1	3.9	0.0	2.3	0.0	0.0	0.6	0.0	3.6	0.6	2.9	1.5	0.0	0.0			0.9
	1	0.0	0.0	0.0	0.0	1.3	0.0	1.2	0.0	0.0	0.0	0.0	2.5	0.2	1.2	0.9	0.0	0.0	0.0	1.0	0.4
	2	0.0	0.0	0.0	0.0	0.7	0.0	0.6	0.0	0.0	0.0	0.0	2.0	0.0	0.4	0.4	0.0	0.0	0.0	0.9	0.3
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.1	0.0	0.0	0.0	0.7	0.1
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0		0.0	0.0	0.0	0.4	0.1
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.1	0.0	0.0	0.0	1.0	0.0	0.7	0.0	0.0	0.1	0.0	1.9	0.1	0.8	0.6	0.0	0.0	0.0	0.6	0.3
Large-mouth Bass	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pumpkin-seed	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Bass	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White Sucker	6	1.7	0.5	1.0	2.1	10.6	0.6	6.0	0.0	4.9	2.0	0.0	5.7	6.5	7.3	4.3	0.0	0.4			3.2
	1	0.7	0.3	0.2	0.9	5.6	0.1	3.7	0.0	0.7	1.1	0.0	5.0	3.4	4.7	2.9	0.0	0.0	0.3	3.8	1.8
	2	0.4	0.2	0.0	0.3	3.6	0.0	3.2	0.0	0.0	0.8	0.0	4.6	1.2	3.5	2.0	0.0	0.0	0.2	3.1	1.2
	3	0.0	0.0	0.0	0.0	1.0	0.0	1.9	0.0	0.0	0.1	0.0	3.8	0.2	1.0	1.3	0.0	0.0	0.0	2.2	0.6
	4	0.0	0.0	0.0	0.0	0.8	0.0	0.5	0.0	0.0	0.0	0.0	3.8	0.0	0.5		0.0	0.0	0.0	1.7	0.4
	5	0.0	0.0	0.0	0.0	0.5	0.0	1.4	0.0	0.0	0.0	0.0	3.0	0.0	0.5	0.6	0.0	0.0	0.0	1.4	0.4
	Mean	0.5	0.2	0.2	0.6	3.7	0.1	2.8	0.0	0.9	0.7	0.0	4.3	1.9	2.9	2.2	0.0	0.1	0.1	2.4	1.2

Percent of temperature measurements that exceed the critical thermal maximum temperature (%>Ctmax)																					
		Year																			
Species	Station	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Mean
Black-nose Dace	6	0.0	0.0	0.0	0.0	1.0	0.0	0.4	0.0	0.0	0.0	0.0	1.7	0.1	0.3	0.7	0.0	0.0			0.3
	1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.1
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.2	0.0	0.0	0.0	0.1	0.1
Blunt-nose Minnow	6	0.0	0.0	0.0	0.0	1.5	0.0	0.8	0.0	0.0	0.0	0.0	2.1	0.2	0.9	0.8	0.0	0.0			0.5
	1	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.0	1.3	0.0	0.2	0.4	0.0	0.0	0.0	0.5	0.2
	2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.7	0.0	0.2	0.2	0.0	0.0	0.0	0.2	0.1
Brook Trout	6	0.2	0.0	0.0	0.0	3.2	0.0	2.0	0.0	0.0	0.4	0.0	3.3	0.4	2.3	1.3	0.0	0.0			0.8
	1	0.0	0.0	0.0	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0	2.2	0.2	0.6	0.9	0.0	0.0	0.0	1.0	0.4
	2	0.0	0.0	0.0	0.0	0.5	0.0	0.4	0.0	0.0	0.0	0.0	1.7	0.0	0.4	0.4	0.0	0.0	0.0	0.8	0.3
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0		0.0	0.0	0.0	0.1	0.1
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.8	0.0	0.5	0.0	0.0	0.1	0.0	1.6	0.1	0.6	0.5	0.0	0.0	0.0	0.4	0.3
Brown Trout	6	0.2	0.2	0.3	0.8	7.1	0.0	4.0	0.0	1.8	1.3	0.0	5.0	3.8	5.2	2.6	0.0	0.0			2.3
	1	0.0	0.0	0.0	0.3	3.4	0.0	2.5	0.0	0.0	0.6	0.0	4.4	1.2	3.1	1.8	0.0	0.0	0.0	3.1	1.3
	2	0.0	0.0	0.0	0.0	1.8	0.0	2.0	0.0	0.0	0.5	0.0	3.7	0.2	2.2	1.4	0.0	0.0	0.0	2.2	0.9
	3	0.0	0.0	0.0	0.0	0.5	0.0	1.0	0.0	0.0	0.0	0.0	2.5	0.0	0.4	0.8	0.0	0.0	0.0	1.1	0.4
	4	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.3		0.0	0.0	0.0	1.2	0.3
	5	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0	0.0	0.0	2.0	0.0	0.1	0.2	0.0	0.0	0.0	1.0	0.2

	Mean	0.0	0.0	0.1	0.2	2.2	0.0	1.7	0.0	0.3	0.4	0.0	3.3	0.9	1.9	1.4	0.0	0.0	0.0	1.7	0.9
Common Shiner	6	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Creek Chub	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Large-mouth Bass	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pumpkin-seed	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow Darter	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Bass	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White Sucker	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX H

Biological Monitoring

2024 Biological Monitoring Program
White Wolf Property Management Inc.
Aberfoyle Property

Prepared For:

White Wolf Property Management Inc.

Prepared By:

Beacon Environmental Limited

Date:	*Project:*
2025-03-20	**216114.1**

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

Table of Contents

Figures

Tables

Appendices

1. Introduction

Beacon Environmental Limited (Beacon) and C. Portt and Associates were originally retained by Blue Triton Brands to undertake terrestrial and aquatic monitoring at the company's Aberfoyle property located at 101 Brock Road South in the Township of Puslinch ("subject property"; **Figure 1**). This property was purchased by White Wolf Property Management Inc. in 2025. A Site Context Map is included as **Figure 2**. The biological monitoring program for the subject property was initiated in 2007 as a condition of a Ministry of Environment, Conservation and Parks (MECP) Permit to Take Water (PTTW) (#7043-74BL3K) for the onsite wells that service their bottling operations. Biological monitoring remains a condition of the current PTTW (#3133-C5BUH9).

Condition 4.4 of the current PTTW states:

> *The Permit Holder shall undertake wetland monitoring and redd surveys as recommended in "2010 Biological Monitoring Program Final Report" by* [Dougan & Associates and] *C. Portt and Associates dated January 28, 2011. Results from the wetland and redd surveys shall be submitted to the Director as a part of the annual monitoring report…*

Triton Water Canada Holdings Inc. are the named Permit Holder in the current PTTW.*Note: Authorship of the 2010 report should be attributed to Dougan & Associates and C. Portt and Associates[1].

The objectives of the biological monitoring program are to:

- Characterize existing aquatic, wetland and terrestrial resources; and
- Document potential long-term changes to the site's biological resources.

Existing or baseline biological conditions on the subject property were established through surveys and inventories completed between 2007 and 2009 which fulfilled the first objective. To achieve the second objective, there has been ongoing biological monitoring with annual reports submitted to the MECP as per the PTTW conditions. The type and frequency of biological monitoring is variable and based on the recommendations provided in each year's annual monitoring report.

Between 2007 and 2024, biological monitoring has included the following:

- Electrofishing surveys of Aberfoyle Creek (C. Portt & Associates);
- Salmonid spawning (redd) surveys of Aberfoyle Creek (C. Portt & Associates);
- Ecological Land Classification (ELC);
- Vascular plant surveys;
- Permanent vegetation monitoring plot surveys;
- Amphibian call surveys;
- Breeding bird surveys;
- Odonate (dragonfly/damselfly) surveys;
- Owl surveys;

[1] *Note: Authorship of the 2010 report should be attributed to Dougan & Associates and C. Portt and Associates[1].*

- Turtle surveys;
- Marsh surveys (assessment of surface hydrology); and
- Invasive species mapping - Common Reed.

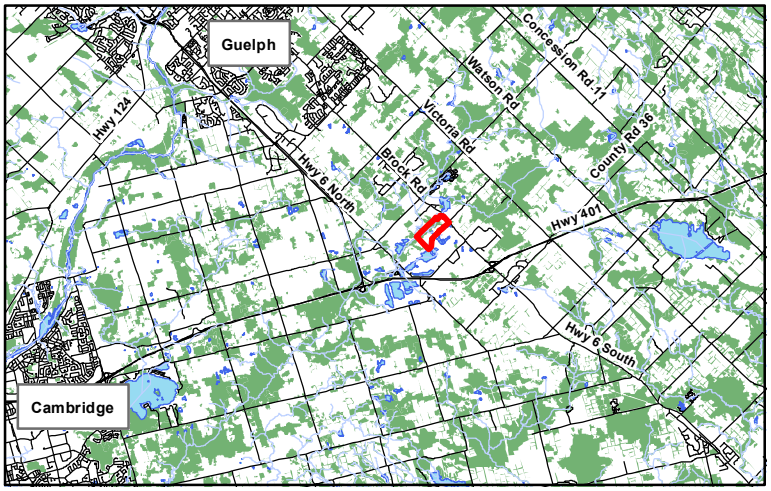
Biological monitoring completed on the subject property between 2007 and 2024 is summarized in **Table 1**.

Table 1. Summary of Biological Monitoring Program (2007-2024)

Year	Aquatic			Vegetation				Wildlife				
	Electrofishing	Habitat characterization	Spawning (*i.e.* Redd) surveys	Ecological Land Classification (ELC) mapping	Vegetation plot sampling	Marsh surveys	Invasive species mapping	Nocturnal amphibian call monitoring	Breeding bird surveys	Owl surveys	Basking Turtle surveys	Odonate surveys
2007			X	X								
2008	X		X	X	X			X	X			
2009		X	X	X		X	X	X	X			
2010			X		X	X	X	X	X	X	X	X
2011			X			X	X	X	X	X	X	X
2012			X								X	X
2013			X		X	X	X					
2014			X		X							
2015			X					X	X		X	
2016			X		X		X	X	X		X	
2017			X				X	X	X		X	
2018			X					X	X		X	
2019			X	X	X			X	X		X	
2020			X					X	X		X	
2021			X					X	X		X	
2022			X					X	X		X	
2023			X					X	X		X	
2024			X		X			X	X		X	

The 2023 Aberfoyle Biological Monitoring Program Report (Beacon 2024) recommended that core wildlife monitoring (amphibian, reptiles and birds) as well as vegetation plot sampling be completed in 2024. Additionally, the 2023 Aquatic Monitoring Report (C. Portt and Associates 2024) recommended that salmonid spawning surveys of Aberfoyle Creek be conducted in 2024. The recommended biological monitoring was completed in 2024. Beacon completed core wildlife monitoring and C. Portt and Associates completed salmonid spawning (redd) surveys of Aberfoyle Creek.

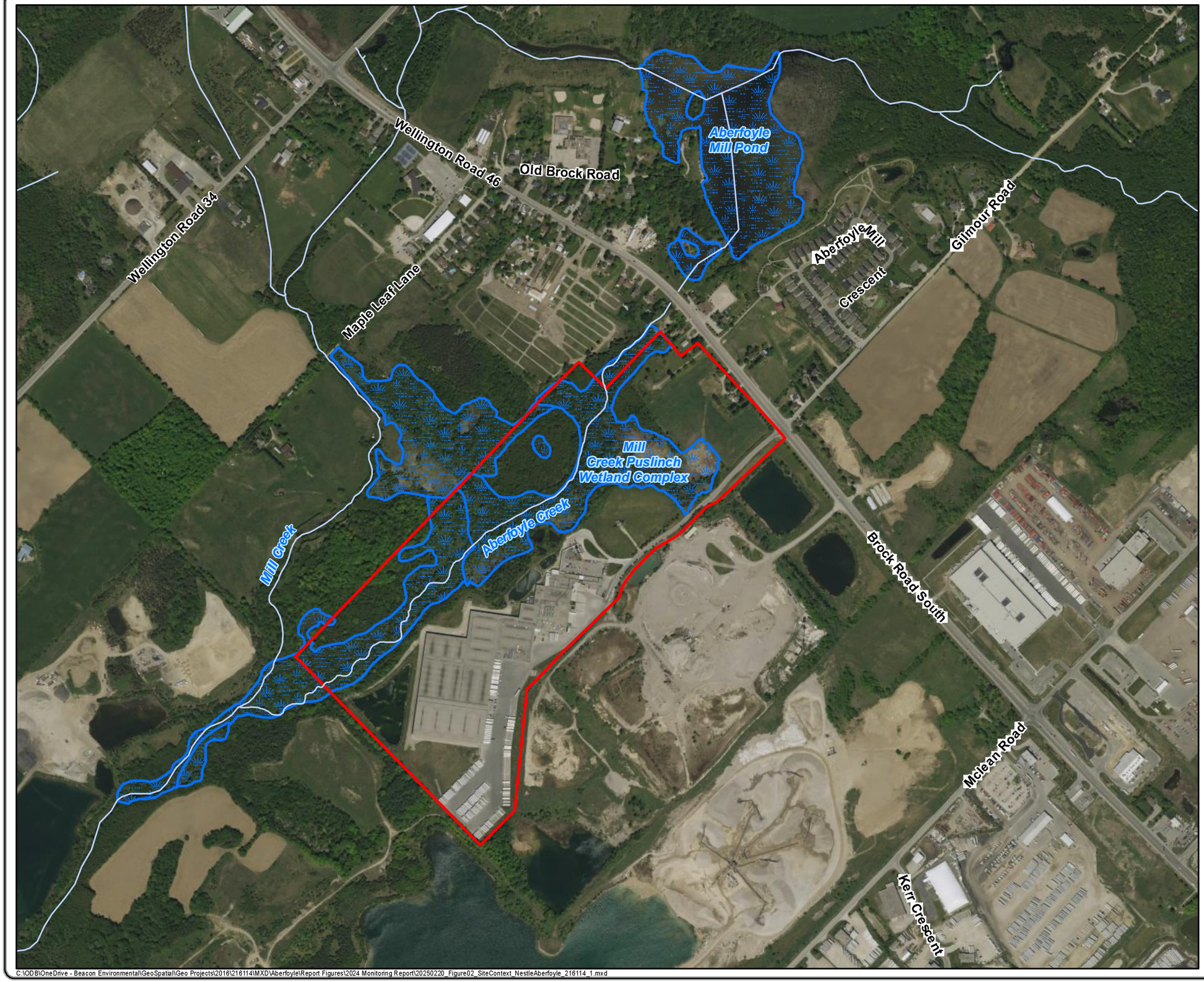
This annual report includes a comprehensive summary of all biological monitoring undertaken on the subject property between 2007 and 2024. The report describes the methods and findings of the various



Site Location	Figure 1
Aberfoyle 2024 Biological Monitoring Program	
BEACON ENVIRONMENTAL	Project: 216114.1 Last Revised: February
Client: White Wolf Property Management Inc.	Prepared by: BD Checked by: NP
N 1:40,000	Inset Map:1:250,000

Contains information licensed under the Open Government License–Ontario Orthoimagery Baselayer: FBS SWOOP (2015)

C:\ODB\OneDrive - Beacon Environmental\GeoSpatial\Geo Projects\2016\216114\MXD\Aberfoyle\Report Figures\2024 Monitoring Report\20250220_Figure01_NestleAberfoyle_SiteLocation_216114_1.mxd



Site Context	Figure 2

Aberfoyle 2024 Biological Monitoring Program

Legend

- Subject Property
- Wetlands
- Watercourse

BEACON ENVIRONMENTAL

Project: 216114.1

Last Revised: February 2025

Client: White Wolf Property Management Inc.	Prepared by: BD Checked by: NP

N | 1:8,000 | 0 — 150 — 300 m

C:\ODB\OneDrive - Beacon Environmental\GeoSpatial\Geo Projects\2016\216114\MXD\Aberfoyle\Report Figures\2024 Monitoring Report\20250220_Figure02_SiteContext_NestleAberfoyle_216114_1.mxd

monitoring activities and compares data from prior years to identify potential changes or trends in selected monitoring parameter or indicators over the long term.
In January 2025, Blue Triton Brands ceased operations and announced the sale of the subject property. A new owner, White Wolf Property Management Inc., took over the subject property and facility operations on the subject property as of January 31, 2025. This new owner will be the newly named Permit Holder in the current PTTW. This monitoring report contains recommendations for continued monitoring in 2025 under the current PTTW as part of regular facility operations. Bottling operations have ceased and it is presently unknown what the new facility operations will entail.

2. Methods

2.1 Aquatic Survey

C. Portt and Associates has surveyed Aberfoyle Creek for evidence of Brown Trout (*Salmo trutta*) or Brook Trout (*Salvelinus fontinalis*) spawning, from its confluence with Mill Creek upstream to the limit of the subject property (**Figure 2**) annually, beginning in 2007. In 2024, the surveys were conducted on October 21 and November 18. On these dates, this entire reach of the creek was walked and searched for spawning fish or areas of disturbed substrate that could be indicative of salmonid spawning.

2.2 Vegetation Surveys

2.2.1 Ecological Land Classification

Ecological communities associated with the subject property were classified and mapped in accordance with the Ecological Land Classification System for Southern Ontario (ELC) (Lee *et al*. 1998). ELC is the provincial standard for classifying and mapping ecological communities by collecting data on biophysical parameters such as vegetation composition and structure as well as physical site conditions such as topography, slope, soil, moisture and drainage. This information used to classify the individual communities in accordance with the ELC community catalogue and to map them as polygons.

Ecological communities on the subject property were initially classified and mapped by Dougan & Associates in the fall 2007 and updated by Beacon on July 23, 2019.

ELC classification and mapping is generally repeated only once a decade as the rate of vegetation change is relatively slow. For this reason it was not repeated in 2024.

2.2.2 Floristic Surveys

A floristic survey of the subject property was initially completed by Dougan & Associates in the fall of 2007 to establish baseline conditions and develop a checklist of vascular plants for the subject property. The checklist has been variably amended over the years based on data collected from the vegetation plots and incidental observations. To update this checklist, Beacon completed a floristic survey of the subject property on July 23, 2019.

Floristic surveys are generally completed every five to ten years where the rate of vegetation change is relatively slow. For this reason it was not repeated in 2024.

2.2.3 Vegetation Plot Sampling

To monitor changes to vegetation composition and structure in wetland communities on the subject property over time, six permanent vegetation sampling plots were established in 2007 in representative wetland communities. Sampling was completed in the summers of 2008, 2010, 2013, 2014, 2017, 2019, and 2024.

The six permanent vegetation sampling plots are circular and each comprises a sampling area of 100 square metres (m^2). The centroid of each plot is marked with a steel T-bar. The UTM coordinates for each plot in NAD83 are provided in **Table 2** and mapped on **Figure 3**.

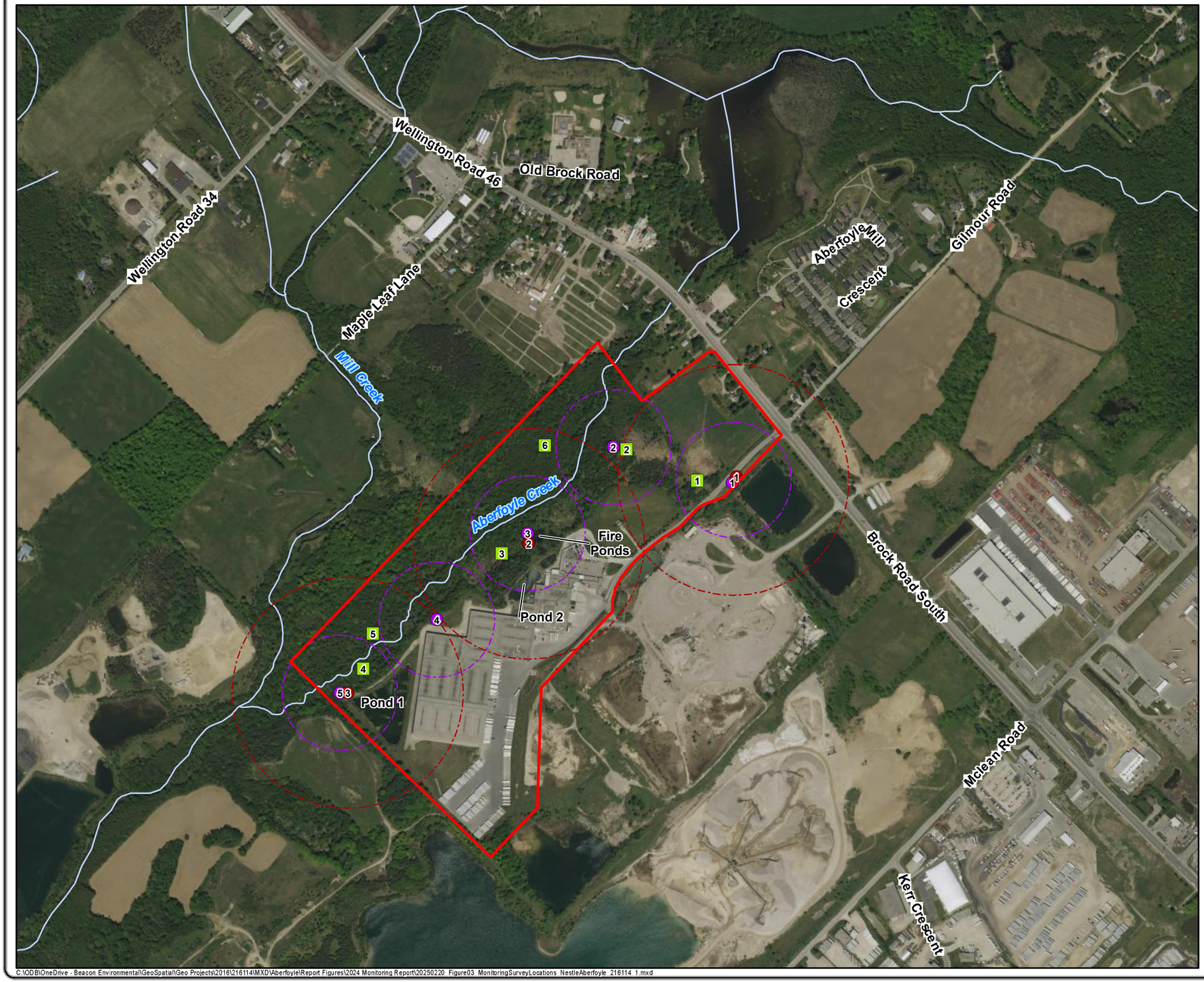
Table 2. Locations of Permanent Vegetation Monitoring Plots

Plot No.	UTM Zone	UTM Easting (m)	UTM Northing (m)
1	17T	569,227	4,812,889
2	17T	569,075	4,812,948
3	17T	568,804	4,812,731
4	17T	568,500	4,812,482
5	17T	568,500	4,812,482
6	17T	568,892	4,812,956

A handheld GPS is used to locate the plots. The outer boundaries of each sample plot were delineated by attaching a 5.64 m length of rope to the T-bar centre post and temporarily marking the plot perimeter with flagging tape Within each sampling plot, information is collected on the composition and structure of the vegetation, by estimating the cover abundance at various height classes.

Vegetation data collection methods follow the standardized vegetation sampling protocols of the Ecological Land Classification System (ELC) for Southern Ontario (Lee *et al*. 1998). Within each plot, all observed species are documented, and the percent cover estimated by assigning a cover value of 1–4 (where 1 represents a cover of <10%, 2 represents 10-25%; 3 represents 25-60%; and 4 represents >60%) to each species for each vegetation layer it occurs in. Vegetation layers corresponded with the following height classes: 1) <0.5 m; 2) 0.5–2 m; 3) 2–10 m, and 4) >10 m.

Vegetation data are subjected to a Floristic Quality Assessment (FQA) that provides a metric for monitoring changes to each sampling plot over time (Oldham *et al*. 1995). The FQA is determined from total number of species (species richness) in a given area (e.g., sampling plot) and summing their conservatism values. Species conservatism is considered a measure of "*the degree of faithfulness a plant displays to a specific habitat or set of environmental conditions*" (Oldham *et al*. 1995). More conservative species display a higher degree of fidelity to particular habitats or ecological conditions and are relatively intolerant of disturbance. Less conservative species tend to be habitat generalists and more tolerant of disturbance. In Ontario, plant species have been assigned a coefficient of conservatism value (CC) value ranging from 0–10. A description of how these values were assigned is provided below:



Monitoring Stations and Survey Locations

Figure 3

Aberfoyle 2024 Biological Monitoring Program

Legend

- Subject Property
- Watercourse
- Vegetation Monitoring Station
- Amphibian Call Monitoring Station (with 250 m radius)
- Breeding Bird Monitoring Station (with 125 m radius)

Note: Basking Turtle Surveys were conducted at Pond 1, Pond 2 and the Fire Ponds

BEACON ENVIRONMENTAL

Project: 216114.1

Last Revised: February 2025

Client: White Wolf Property Management Inc.

Prepared by: BD
Checked by: NP

N

1:8,000

0 150 300 m

C:\ODB\OneDrive - Beacon Environmental\GeoSpatial\Geo Projects\2016\216114\MXD\Aberfoyle\Report Figures\2024 Monitoring Report\20250220_Figure03_MonitoringSurveyLocations_NestleAberfoyle_216114_1.mxd

0–3: Species found in a wide variety of habitats including disturbed sites;
4–6: Species found in specific habitats, but tolerate moderate disturbance;
7–8: Species found in advanced successional communities with minor disturbance; or
9–10: Species found in high quality natural areas and/or limited to a narrow range of environmental conditions.

The FQA is used to establish a Floristic Quality Index (FQI) value. Higher FQI values generally indicate higher floristic quality and lower levels of disturbance, whereas lower FQI values indicate poorer quality and higher disturbance. FQI values were determined for each of the six monitoring plots by calculating the mean CC for each plot and multiplying it by the square root of the total number of species. FQI values were calculated using both the total number of species per plot and for native species only. The FQI values were then used to compare changes over time both within and among vegetation plots.

In addition to the FQI, a Wetness Index was also calculated for each plot and the site as a whole. Each plant species in Ontario has been assigned a Coefficient of Wetness (CW) based on their probability of occurring in wetlands. CW values range from -5 to 5. Species with negative CW values favour wetter conditions and typically occur in wetlands; species with positive CW values prefer drier conditions and tend to occur in uplands. The Wetness Index is calculated by averaging the CW values of each species observed in the plot. A Wetness Index for the site was obtained by averaging the CW of each plot. The wetness index could potentially be used as an indicator of hydrological changes.

2.2.4 Marsh Surveys

Marsh surveys were initially undertaken by Dougan & Associates in 2009, 2010, 2011 and 2013 to confirm ELC classifications of Shallow Marsh and Meadow Marsh communities. Under the ELC system (Lee *et al.* 1998), these communities are differentiated based on their hydrological conditions. Shallow Marsh communities are defined by the presence of standing water for much or all of the growing season, while Meadow Marsh communities are typically only seasonally flooded. Hydrological conditions of such communities were assessed by determining the approximate depth of standing water (if present) versus the presence of saturated soil, moist soil or dry soil. Additional surveys have not been repeated as the information previously collected was adequate for confirming the ELC classification.

2.2.5 Invasive Species Mapping

There are several colonies of Common Reed (*Phragmites australis ssp. australis*) — a reed common in the British Isles —present on the subject property. Common Reed is a highly invasive non-native plant species that is known to displace native wetland vegetation. Since 2007, the colonies on the subject property have been observed to be expanding. Colonies of Common Reed were originally mapped in several locations on the subject property in 2009, 2010, 2011, and 2013 by Dougan & Associates to track changes in the size of the colonies. The edges of the colonies were mapped using a high-resolution GPS. The Common Reed colonies were re-surveyed and mapped again by Beacon in 2016 and 2017 using a Real-Time Kinematic (RTK) GPS to facilitate comparison with prior years.

Common Reed is ubiquitous in the adjacent landscape. It is prevalent in roadside ditches next to the subject property and is also present on neighbouring properties. The species is very difficult to control.

At present the Ontario Invasive Plan Council Best Management Practices for this species is under review; however,
the previous edition suggests the most effective control method is herbicide spraying. While such treatments are considered safe and pose minimal risk to the environment when appropriately applied, Blue Triton Brands has elected not to implement a treatment program due to the proximity of the colonies to the production well (TW3-80). Common Reed colonies on the subject property will likely grow in the future; however, any management or control will remain at the discretion of White Wolf Property Management Inc.

2.3 Wildlife Surveys

2.3.1 Amphibian Surveys

Amphibian call surveys were undertaken to document the diversity of frog and toad populations associated with the subject property. Because there is variation in the breeding periods during which different frog or toad species (anurans) are calling and detectable, surveys are typically completed at three different periods between April and June to ensure coverage of the full range of early to late breeding species. These surveys were conducted by Dougan and Associates in 2008, 2009, 2010 and 2011, and then by Beacon annually between 2015 and 2024.

In 2024, Beacon conducted surveys on March 12, April 1, May 7, and June 20 using the survey protocols developed for the Marsh Monitoring Program (MMP) (Bird Studies Canada, 2009). Due to the extremely early snow melt and warming in 2024, an additional amphibian survey was conducted in March to observe potentially early breeding by species such as Wood Frogs (*Lithobates sylvaticus*). On each occasion the subject property was visited at least 0.5 hours after sunset during suitable weather conditions to listen for calling frogs and toads at three (3) permanent monitoring stations that were established in 2008. The locations of these monitoring stations are illustrated in **Figure 3**. Amphibians observed or heard calling in other locations on the subject property during these and other surveys were also recorded as incidental observations.

Surveys were conducted using the point count method whereby the surveyor stands at a set point or station for a specific period of time and records all species that can be heard calling within the sample area. A minimum of three minutes was spent listening at each station. The approximate locations of calling amphibians were noted on a standard MMP data sheet and chorus activity for each species was assigned a call code as follows:

0 — No calls;
1 — Individuals of one species can be counted, calls not simultaneous;
2 — Calls of one species simultaneous, numbers can be reliably estimated; or
3 — Full chorus, calls continuous and overlapping, individuals indistinguishable.

In addition to recording species and call levels, weather conditions (i.e., air temperature, precipitation, wind speed, and cloud cover) at the time of survey were also recorded. Weather conditions for the 2024 surveys are summarized in **Table 3**.

Table 3. Amphibian Survey Details

	Survey 1a	Survey 1b	Survey 2	Survey 3
Date:	March 12, 2024	April 1, 2024	May 7, 2024	June 20, 2024
Start time:	8:05 pm	9:03 pm	9:10 pm	9:34 pm
Temperature:	13°C	8°C	17°C	21°C
Wind speed:	0 – 1 km/h	0 – 1 km/h	12 – 19 km/h	0 - 1 km/h
Cloud cover:	0%	0%	100%	50%
Precipitation:	None	None	Light drizzle	Damp/Haze

2.3.2 Breeding Bird Surveys

Breeding bird surveys were undertaken in 2024 by Beacon to document the diversity of avian populations associated with the subject property. Previous surveys were completed in 2008, 2009, 2010 and 2011 by Dougan & Associates. Beacon completed surveys annually between 2015 and 2024.

There are five permanent point count stations that were established in 2008 that provide coverage for the majority of the subject property. Each point count station is positioned so the observer can detect calling birds up to a distance of 125 m. The locations of the point count stations are illustrated in **Figure 3**. A handheld GPS was used to locate the plots.

A modified point count methodology, based on protocols established for the Ontario Breeding Bird Atlas for point counts (Cadman *et al.* 2007), Forest Bird Monitoring Program (CWS, 2006) and a standard method recommended for monitoring songbird populations in the Great Lakes Region (Howe *et al.* 1997), was utilized to complete breeding bird surveys. The following is a detailed description of the modified approach utilized to complete these surveys:

- Surveys should be conducted a minimum of one week apart (CWS 2006);
- Point count stations will be at least 250 m apart (Howe *et al.* 1997 & CWS 2006);
- Since the subject property is relatively small, a randomized site selection approach will not be required. The majority of natural features on the site are covered by the five- point count station survey areas;
- Survey duration for each point count is 10 minutes, consistent with the Forest Bird Monitoring Program (CWS 2006) and Howe *et al.* (1997) and is not restricted to forested habitats;
- The location of each individual adult bird is recorded on a field sheet as per the layout and symbols used by the Forest Bird Mapping Protocol (CWS 2006) or Howe *et al.* (1997). Bird flying overhead (i.e., not directly associating with the survey area) or otherwise not showing any breeding evidence will be distinguished from the other breeding birds;
- Observations recorded on the field maps are transferred into a summary table. All birds observed or heard within suitable habitat are assumed to be breeding; and
- Breeding evidence is documented according to the Ontario Breeding Bird Atlas protocols (Cadman *et al.* 2007).

Birds observed between the point count surveys are noted separately on a field map to help ensure that no bird species present on the subject property are missed as the point count circles do not cover the entire property.

Weather conditions (i.e., air temperature, precipitation, wind speed, and cloud cover) at the time of survey were recorded (see **Table 4**).

Table 4. Breeding Bird Survey Details

	Survey 1	Survey 2
Date:	June 5, 2024	June 21, 2024
Start time:	6:30 am	6:00 am
End Time:	8:40 am	8:00 am
Temp:	16°C	20°C
Wind:	6 - 11 km/h	0 – 1 km/h
Cloud cover:	90%	30%
Precipitation:	None	None

2.3.3 Owl Surveys

Owl surveys were not part of the original biological monitoring program, however in August 2009, Barred Owl (*Strix varia*) was reported from the northeast portion of the subject property by Dougan & Associates. To confirm this record, two surveys were completed in 2010 and an additional survey was completed in 2011. The survey consisted of broadcasting Barred Owl calls using a portable compact disc (CD) player. In 2011, Northern Saw-whet Owl (*Aegolius acadicus*) calls were also broadcast prior to the Barred Owl calls. A period of silence was included following each series of calls to allow the surveyor to listen for a response. The surveys were completed from two stations in forested habitats in the vicinity of the original observation. No additional owl focused surveys have been undertaken since 2011.

2.3.4 Basking Turtle Survey

The ponds on the subject property are known to support populations of Midland Painted Turtle (*Chrysemys picta marginata*) and Snapping Turtle (*Chelydra serpentina*).

Midland Painted Turtle is listed federally as a Special Concern species. Snapping Turtle is listed both federally and provincially as a Special Concern species. Snapping Turtle was originally observed in the large pond near the western property boundary in 2008, which is labelled as Pond 1 on **Figure 3**.

To monitor populations of turtles, basking surveys were completed by Dougan & Associates annually between 2010 and 2012, and by Beacon annually between 2015 and 2024.

In 2024, basking turtle surveys on the subject property were primarily focused on Pond 1; brief surveys of the other ponds were also completed. The surveys consist of slowly walking along the outer edge of the ponds using binoculars to scan the perimeter and other potential basking sites within the pond. Surveys were generally completed in mid-May and mid-September between 8:00 am and 5:00 pm during sunny periods when the air temperature was greater than water temperature and after inclement weather. Due to the extremely early snow melt and warming in 2024, an additional survey was conducted in March to observe potentially early basking activity. Surveys, including weather conditions, are included in **Table 5**.

Table 5. Basking Turtle Survey Details

	Survey 1	Survey 2	Survey 3
Date:	March 13, 2024	May 16, 2024	September 17, 2024
Start time:	1:15 pm	1:30 pm	10:15 am
End time:	2:35 pm	2:45 pm	11:15 am
Temp:	16°C	21°C	18 °C
Wind Speed:	6-11 km/h	1-5 km/h	6-11 km/h
Cloud cover:	0%	50%	20%
Precipitation:	None	None	None

2.3.5 Odonate Surveys

While not included in the original monitoring program, Dougan & Associates conducted odonate (dragonflies/damselflies) surveys for select habitats on the subject property in 2010, 2011 and 2012 to supplement the baseline biological data available for the site. Surveys were informally conducted during ideal weather conditions following turtle basking surveys. Individuals caught were caught in a net and immediately examined with a 10x (power) hands lens and then released following identification. No individuals were collected, and no microscopic analysis was conducted. When needed, identifications were confirmed using Jones (2008) and Lam (2004). The surveys were brief, and the findings were not considered a comprehensive list of species potentially present. No odonate surveys have been undertaken since 2012.

2.3.6 Other Wildlife Observations

Other wildlife species observations and habitat encountered over the course of the 2024 field season were recorded as incidental observations. When encountered, the species and locations of the wildlife were noted.

3. Results

3.1 Aquatic Survey

No evidence of salmonid spawning was observed along Aberfoyle Creek on the subject property in 2024. This is consistent with the findings of previous surveys completed annually from 2007 through 2023.

3.2 Vegetation Surveys

Vegetation plot sampling was conducted in 2024. The discussion presented below also provides a summary of previous surveys.

3.2.1 Ecological Land Classification Mapping

No significant changes to any of the ecological communities were observed during the 2019 review, however minor adjustments were made to the boundaries of several communities. The changes were as follows:

- ELC unit 22 changed from Cultural Woodland (CUW1) to Fresh-Moist White Cedar Coniferous Forest (FOC 4-1) due to increased size and dominance of Eastern White Cedar; and
- ELC Unit 11 changed from Mineral Meadow Marsh (MAM2) to Cattail Mineral Shallow Marsh/Reed Canary Grass Mineral Meadow Marsh (MAS2-1/MAM2-2) due to a shift in dominance of cattails and reed canary grass.

The revised ELC mapping is presented in **Figure 4** and a table summarizing the various ecological communities is presented in **Appendix A**.

3.2.2 Flora

Floristic surveys completed between 2007 and 2019 have documented a total of 255 vascular plant species. Of these, 242 have been determined to the species level and 13 could only be determined to genus for various reasons. An updated checklist is provided in **Appendix B.** Of the species identified, 56 are considered non-native to Ontario and represents 23% of the total site flora. Native species are ranked S4 or S5 by the NHIC, indicating that they are generally common and secure in Ontario.

Two regionally rare and six regionally uncommon species have been documented on the subject property, which are summarized in **Table 6**.

Table 6. Regionally Rare and Uncommon Plants Species

Scientific Name	Common Name	Region Status[1]
Asplenium platyneuron	Ebony Spleenwort	Rare
Brachyelytrum erectum	Long-awned Wood Grass	Rare
Symphyotrichum urophyllum	Arrow-leaved Aster	Uncommon
Cardamine pensylvanica	Pennsylvania Bitter-cress	Uncommon
Equisetum sylvaticum	Woodland Horsetail	Uncommon
Cinna latifolia	Slender Wood Reedgrass	Uncommon
Ranunculus pensylvanicus	Bristly Crowfoot	Uncommon
Symphyotrichum pilosum	Frost Aster	Uncommon

[1]Draft Wellington Country Vascular Plant List (Cecile 2017)

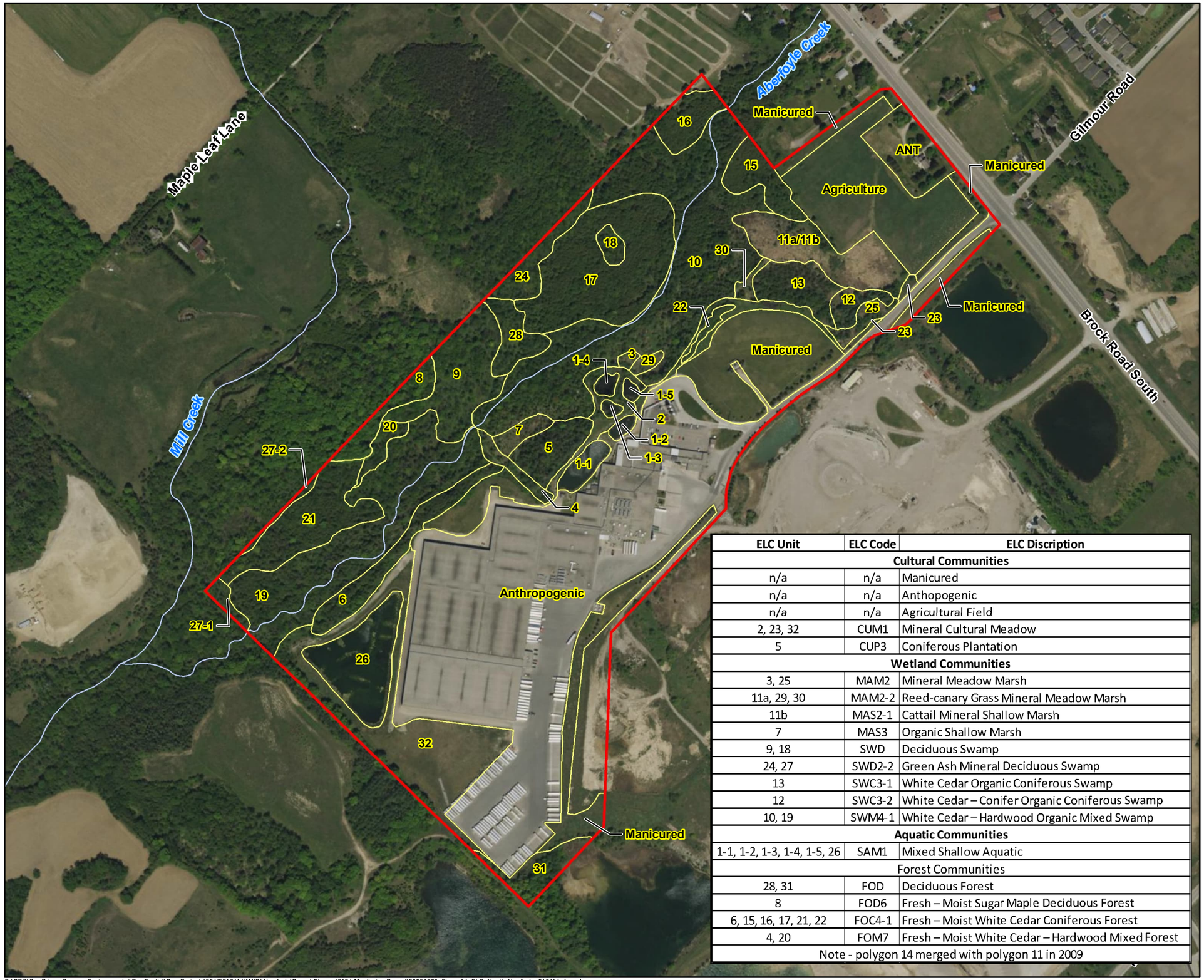
3.2.3 Vegetation Plot Sampling

A total of 104 plant species were recorded from the six vegetation plots in 2024, including nine that were identified to genus. Of the 95 species identified, 83 (87%) are native, and 12 (13%) are considered non-native in Ontario. The proportion of native/non-native species is similar to previous years with 88% native in 2008, 87% in 2010, 85% in 2013, 87% in 2014, 92% in 2016, and 85% in 2019. A photo log of the monitoring plots is included in **Appendix C**.

ELC Vegetation Communities

Figure 4

Aberfoyle 2024 Biological Monitoring Program



ELC Unit	ELC Code	ELC Discription
Cultural Communities		
n/a	n/a	Manicured
n/a	n/a	Anthopogenic
n/a	n/a	Agricultural Field
2, 23, 32	CUM1	Mineral Cultural Meadow
5	CUP3	Coniferous Plantation
Wetland Communities		
3, 25	MAM2	Mineral Meadow Marsh
11a, 29, 30	MAM2-2	Reed-canary Grass Mineral Meadow Marsh
11b	MAS2-1	Cattail Mineral Shallow Marsh
7	MAS3	Organic Shallow Marsh
9, 18	SWD	Deciduous Swamp
24, 27	SWD2-2	Green Ash Mineral Deciduous Swamp
13	SWC3-1	White Cedar Organic Coniferous Swamp
12	SWC3-2	White Cedar – Conifer Organic Coniferous Swamp
10, 19	SWM4-1	White Cedar – Hardwood Organic Mixed Swamp
Aquatic Communities		
1-1, 1-2, 1-3, 1-4, 1-5, 26	SAM1	Mixed Shallow Aquatic
Forest Communities		
28, 31	FOD	Deciduous Forest
8	FOD6	Fresh – Moist Sugar Maple Deciduous Forest
6, 15, 16, 17, 21, 22	FOC4-1	Fresh – Moist White Cedar Coniferous Forest
4, 20	FOM7	Fresh – Moist White Cedar – Hardwood Mixed Forest
Note - polygon 14 merged with polygon 11 in 2009		

Legend

- Subject Property
- ELC Communities
- Watercourse

BEACON ENVIRONMENTAL

Project: 216114.1

Last Revised: February 2025

Client: White Wolf Property Management Inc.

Prepared by: BD
Checked by: NP

N

1:5,000

0 100 200 m

C:\ODB\OneDrive - Beacon Environmental\GeoSpatial\Geo Projects\2016\216114\MXD\Aberfoyle\Report Figures\2024 Monitoring Report\20250220_Figure04_ELC_NestleAberfoyle_216114_1.mxd

The following is a brief description of the structure and composition of each monitoring plot.

Plot 1 is located at the east end of the property (**Figure 3**). This plot has an open Tamarack (*Larix laricina*). The subcanopy also consists of Tamarack with a small amount of Eastern White Cedar (*Thuja occidentalis*), Meadow Willow (*Salix petiolaris*), and Red-Osier Dogwood (*Cornus sericea*). Understory shrubs are sparse but include Tartarian Honeysuckle (*Lonicera tatarica*), Red-osier Dogwood, White Meadowsweet (*Spiraea alba*), Glossy Buckthorn (*Frangula alnus*), and Meadow Willow. A variety of wetland forbs and graminoids make up the ground layer. In 2013, the ground layer was densely covered by Woolly Sedge (*Carex pellita*); however, in 2014 only sparse amounts of this species was recorded. Woolly Sedge was not recorded since 2014. Consistent with 2019 results, the most abundant in the ground layer was Coltsfoot (*Tussilago farfara*), along with Field Horsetail (*Equisetum arvense*) and mosses.

Plot 2 has a relatively dense canopy of Eastern White Cedar (*Thuja occidentalis*). Black Ash (*Fraxinus nigra*) was previously present in the canopy (<10% cover), but was observed to be dead in 2016, likely the result of the invasive insect Emerald Ash Borer, though Black Ash seedlings were noted in the ground layer in 2024. Eastern White Cedar is also abundant in the subcanopy and understory, in association with various shrubs such as Glossy Buckthorn, Tartarian Honeysuckle, and Thicket Creeper (*Parthenocissus vitacea*). A variety of wetland forbs and graminoids make up the ground layer, the majority of which individually account for <10% cover of the plot. Mosses and Bulblet Fern (*Cystopteris bulbifera* are relatively abundant. Cover of Marsh Bedstraw (*Galium palustre*) in the ground layer was estimated between 10-25% in 2013 and less than 10%, in 2014. A small amount was observed in 2024. Common Reed (*Phragmites australis*) is beginning to encroach around the edge of the plot.

Plot 3 has a sparse subcanopy that consists predominantly of White Cedar. Yellow birch (*Betula alleghaniensis*) provides <10% canopy cover. White Birch (*Betula papyrifera*), previously reocreded in the subcanopy, was not observed in 2024. Common Reed (*Phragmites australis* ssp *australis*), an invasive grass, also extends into the subcanopy layer, which has steadily increased in cover over years. In 2013, it was recorded at >10% cover, increasing to 10-25% cover in 2014, and 25-60% cover in 2016. The percent cover of Common Reed, estimated at 25-60% in 2016, and over 60% in 2019. In 2024, the plot was completed dominated by Common Reed. The understory and ground layers are very sparse due to the density of Common Reed. Many of species observed in prior years were present in low numbers, and the diversity appears to be declining. The understory is predominantly comprised of a few tall White Cedar, Red Maple, and Green Ash saplings. In the ground layer, moss cover, estimated at >60% in previous years, was observed to be <10% in 2024. In 2016, Field Horsetail was relatively abundant in the ground layer (25-60%) along with water-pennywort (*Hydrocotyle americana*) (10-25%). Both species covered <10% in 2024. Coltsfoot cover was estimated in the range of 10-25% in 2024, while all other species in the ground layer were sparse and individually present <10% cover.

Plot 4 is dominated by White Cedar (>60% canopy cover) and <10% cover of Yellow Birch. A few Black Ash occur in the sub-canopy. The understory is sparse, consisting of Elderberry (*Sambucus canadensis*), Green Ash, Black Ash, Ostrich Fern (*Matteuccia struthiopteris*), and Common Buckthorn. Dominant groundcovers are Bulbet Fern (*Cystopteris bulbifera*) and mosses, which is consistent with previous years. Sensitive fern (*Onoclea sensibilis*) was also abundant (25-60% cover) in 2024. A diversity of other herbaceous species occur in low abundance (individual account for <10% cover).

Plot 5 has a sparse amount of American Basswood (*Tilia americana*) in the canopy. White Cedar and dominates the canopy and subcanopy, with lesser amounts of Basswood and Black Ash (<10% cover). Consistent with previous years, Ostrich Fern and Wood Nettle are abundant in the understory,

and White Cedar has increased in cover in the understory compared to previous years. It was noted that a large tree had fallen across the plot since the last survey (2019). Various other tall forbs also occur in the understory, each accounting for <10% plot coverage. In the ground layer, Sensitive Fern was estimated at 25-60% cover, while Bulbet Fern, estimated a 10-25% cover in previously years (2016, 2019) was noted to be <10% in 2024. Various other species individually contributed less than 10% cover to the ground layer.

Plot 6 is located in a deciduous swamp. A few White Cedar occur in the canopy at over 10 m in height, while in previous years White Cedar was noted below 10 m in height. Similar to other years, the subcanopy consists of Eastern White Cedar, Green Ash, Black Ash, European Buckthorn, and Glossy Buckthorn. Glossy Buckthorn was more abundant in 2024. The understory consists of Green Ash and Black Ash saplings, in association with shrubs such as Elderberry (*Sambucus racemosa ssp. pubens*), Common Buckthorn, Glossy Buckthorn, and few tall forbs. Ground covers include Dwarf Raspberry, Canada Anemone (*Anemone canadensis*), mosses, and various other forbs and small shrubs.

3.2.3.1 Floristic Quality Assessment

FQA values for each plot between 2008 and 2024 are summarized in **Table 7**. A comparison of FQA values averaged across all plots is provided in **Table 8.** Species richness is noticeably lower in 2008 compared to the following six monitoring years. The data show a spike in species richness and a corresponding increase in FQI between 2008 and 2010. After 2010, the numbers decrease somewhat and generally level off between 2013 and 2019. Between 2019 and 2024, several plots have noticeably declined in native species richness, which may be attributable to the growth of Common Reed populations (i.e. Plot 3). Average FQA values generally decreased between 2019 and 2024, with 2024 values more comparable to those observed in 2013 and 2014 (**Table 8**).

Table 7. FQA Summary by Plot for 2008–2024

Plot	Variable/ Parameter	2008	2010	2013	2014	2016	2019	2024
1	Total Species	22	52	41	44	39	35	29
	Native Species	19	43	31	36	31	30	21
	Introduced Species	3	9	10	8	8	5	8
	Wetness Index	-2.18	-2.33	-1.24	-1.93	-1.49	-2.26	-1.28
	Mean Total CC	3.32	2.98	2.20	2.65	2.59	3.17	2.45
	Mean Native CC	3.84	3.60	2.90	3.51	3.26	3.60	3.38
	Total FQI	15.56	21.49	13.86	17.55	16.17	18.76	13.18
	Native FQI	16.75	23.64	16.16	21.09	18.15	19.72	15.49
2	Total Species	30	53	40	41	41	41	34
	Native Species	27	48	34	38	34	35	28
	Introduced Species	3	5	6	5	7	6	6
	Wetness Index	-1.93	-2.52	-1.73	-1.93	-1.61	-1.78	-1.59
	Mean Total CC	3.23	3.88	3.08	3.32	3.1	3.12	3.32
	Mean Native CC	3.59	3.51	3.62	3.78	3.74	3.66	4.04
	Total FQI	17.71	25.55	18.14	21.24	19.85	19.99	19.38
	Native FQI	18.67	26.85	21.09	22.67	21.81	21.64	21.36
3	Total Species	23	62	47	50	48	47	38

Plot	Variable/ Parameter	2008	2010	2013	2014	2016	2019	2024
	Native Species	20	55	39	45	42	41	33
	Introduced Species	3	7	8	6	7	6	5
	Wetness Index	-1.09	-1.86	-1.26	-2.18	-2.10	-1.89	-1.16
	Mean Total CC	3.26	3.60	3.21	3.62	3.42	3.57	3.63
	Mean Native CC	3.75	4.05	3.97	4.11	3.90	4.10	4.18
	Total FQI	15.64	28.45	20.36	25.60	23.7	24.5	22.39
	Native FQI	16.77	30.33	24.18	27.29	27.27	26.24	24.02
4	Total Species	17	30	28	31	37	39	42
	Native Species	15	27	25	29	32	34	37
	Introduced Species	2	3	3	3	5	4	5
	Wetness Index	-0.29	-1.63	-1.61	-1.42	-1.27	-1.33	-1.29
	Mean Total CC	4.00	4.17	3.82	4.10	3.97	3.92	4.10
	Mean Native CC	4.53	4.63	4.28	4.54	4.59	4.50	4.65
	Total FQI	16.49	22.82	18.92	22.81	24.13	24.5	26.54
	Native FQI	17.56	24.06	21.4	24.00	25.98	26.24	28.28
5	Total Species	21	46	37	36	41	47	46
	Native Species	19	39	33	34	36	42	41
	Introduced Species	2	7	4	3	5	5	5
	Wetness Index	-1.19	-0.48	-0.95	-0.75	-1.15	-1.26	-1.17
	Mean Total CC	4.05	3.85	3.78	3.88	3.71	3.77	3.74
	Mean Native CC	4.47	4.54	4.24	4.33	4.27	4.21	4.20
	Total FQI	18.55	26.10	21.6	23.27	23.74	25.82	25.36
	Native FQI	19.50	28.34	24.37	24.89	25.32	27.31	26.86
6	Total Species	16	29	26	28	24	24	24
	Native Species	14	21	20	22	19	20	19
	Introduced Species	2	8	6	6	5	4	5
	Wetness Index	-1.00	0.21	-0.46	-0.32	-0.1	-0.63	-0.63
	Mean Total CC	3.06	2.45	2.62	2.86	2.92	2.71	3.13
	Mean Native CC	3.50	3.38	3.40	3.64	3.68	3.25	3.95
	Total FQI	12.25	13.18	12.85	15.12	14.31	13.27	15.31
	Native FQI	13.10	15.49	15.21	17.06	16.04	14.53	17.21

Table 8. Comparison of Floristic Quality Assessment scores averaged across all plots, 2008-2024

Parameter	2008	2010	2013	2014	2016	2019	2024
Average Total Species Richness	21.50	45.33	36.50	38.33	38.33	38.83	35.50
Average Native Species richness	19.00	38.83	30.33	34.00	32.33	33.67	29.83
Average Non-native Species Richness	2.50	6.50	6.17	5.17	6.00	5.16	5.67
Average Wetness Index	-1.28	-1.44	-1.21	-1.42	-1.29	-1.52	-1.19
Average Native CC	3.95	3.95	3.74	3.99	3.90	3.89	4.07
Average Total CC	3.49	3.49	3.12	3.41	3.28	3.38	3.40
Average Native FQI	17.06	24.79	20.40	22.83	22.1	22.61	22.20
Average Total FQI	16.03	23.04	17.62	20.93	20.31	21.14	20.36

The fluctuations in the floristic parameters could be attributed to various environmental factors such as precipitation, herbivory, competition from dominant species, and natural dieback, which can vary on a seasonal and annual basis. The introduction and spread of invasive species can also result in a decline in species richness and a reduction in cover/abundance of other species. Based on the monitoring data available, it is not possible to directly attribute the observed changes to specific environmental factors or variables. Some of the variability observed may be attributable to observer experience/effort, especially in plots where certain species occur in low numbers and can be easily overlooked or are not reliably detected.

Overall, there have been some minor shifts in species composition and abundance from year-to-year, which is to be expected. The general composition and structure of the vegetation within most plots has not changed substantially and the observed changes are within the expected range of natural variation for the wetland community types present. A notable exception is the abundance of Common Reed in Plot 3, which has increase substantially over the years. The plot is now dominated by this invasive species.

3.2.4 Marsh Surveys

As part of the ELC confirmation work of select marsh communities completed by Dougan & Associates in 2009, some communities were reclassified. These surveys were repeated by Dougan & Associates in 2010, 2011 and 2013 (not in 2012) and the resulting classifications were described in the corresponding annual monitoring reports.

In 2010, the overall conditions that had been recorded in 2009 had not changed substantially. However, ELC Unit 7 (**Figure 4**) appeared drier due to lack of deep standing water and a new moisture gradient was observed in ELC Unit 29. No changes or re-classifications to ELC communities were made in 2010.

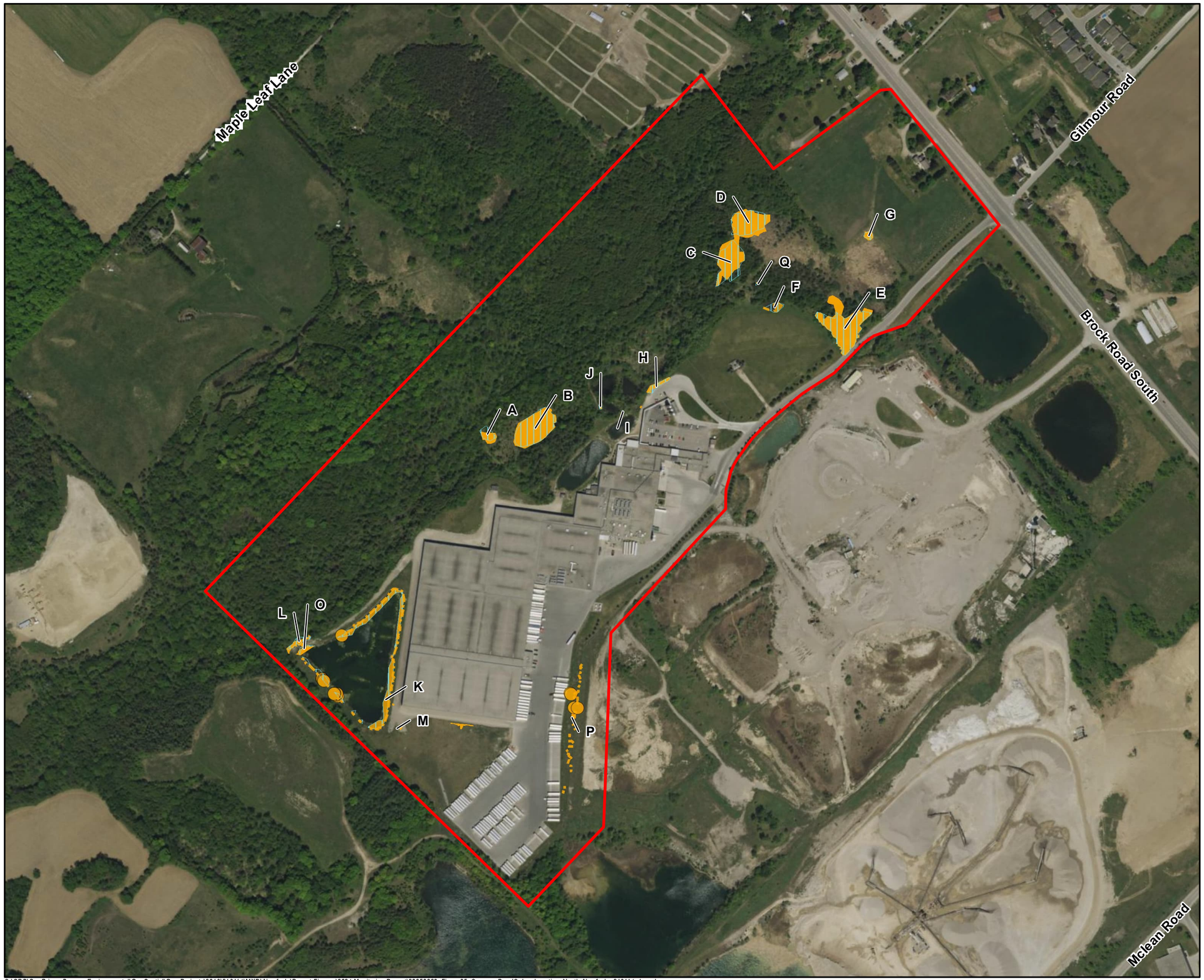
Again, the hydrologic conditions and vegetation composition observed in 2011 were not significantly different from 2010. Common Reed had spread, but the abundance of hydrophilic species (which would be indicative of changing wetland conditions) did not significantly change. No changes or re-classifications to ELC communities were made in 2010.

The conditions of the marshes observed in 2013 were slightly drier in comparison to what was noted in 2010 and 2011. Dougan & Associates attributed these changes to the much lower than average level of precipitation in 2012 and the slightly lower than average precipitation in 2013. No changes or re-classifications to ELC communities were made in 2013.

Dougan & Associates note that ELC Units 3, 29, 5 and 6 are impacted by discharge of water from the complex of small, constructed ponds west of the parking lot. The water level in these ponds is being artificially regulated, which could explain fluctuations. Dougan & Associates also noted that the variation in vegetation in marshes could also be a result of plant responses to variations in weather patterns and environmental conditions rather than permanent trends.

3.2.5 Invasive Species Mapping

Since monitoring was initiated on the subject property, colonies of Common Reed have been slowly expanding (**Figure 5**). Patch sizes were recorded in 2013, 2016 and 2017 as shown in **Table 9**.



Common Reed Colony Locations

Figure 5

Aberfoyle 2024 Biological Monitoring Program

Legend

- Subject Property
- Common Reed Colonies (December 2017)
- Common Reed Colonies (December 2017)
- Common Reed Colonies (2016)
- Common Reed Colonies (December 2017)

BEACON ENVIRONMENTAL

Project: 216114.1

Last Revised: February 2025

Client: White Wolf Property Management Inc.

Prepared by: BD
Checked by: NP

N

1:5,000

0 100 200 m

C:\ODB\OneDrive - Beacon Environmental\GeoSpatial\Geo Projects\2016\216114\MXD\Aberfoyle\Report Figures\2024 Monitoring Report\20250220_Figure05_CommonReedColonyLocation_NestleAberfoyle_216114_1.mxd

Table 9. Comparison of Common Reed Patch Size between 2013, 2016 and 2017

Colony	Size (m^2)			Difference (m^2)	Difference (%)
	2013	2016	2017		
A	172.28	254.43	255.04	0.61	0.24%
B	1,698.69	1,813.99	1,964.49	150.50	8.30%
C	1,920.17	1,401.47	2,886.44	266.24	10.16%
D	1,511.74	1,218.73	-	-	-
E	3,095.25	1,913.31	2,439.94	526.63	27.52%
F	1,061.60	202.67	123.36	-79.31	-39.13%
G	101.73	84.08	118.58	34.50	41.03%
H	-	127.31	162.44	35.13	27.59%
I	-	4.92	7.55	2.63	53.46%
J	-	25.05	18.73	-6.32	-25.23%
K	-	1,655.91	1,456.14	199.77	-12.06%
L	-	182.24	210.49	28.25	15.50%
M	-	-	16.77	-	-
N	-	-	70.55	-	-
O	-	-	132.15	-	-
P	-	-	62.52	-	-
Q	-	-	6.23	-	-
Total	**9,561.46**	**8,884.11**	**9,931.42**	**1,047.31**	**11.79%**

Monitoring of the Common Reed colonies in 2016 revealed a decrease in the rate of expansion of these colonies, but an increase in the colony size was observed in 2017. Between these two years, the following changes in Common Reed on the subject property were documented:

- Notable increases in colonies B, C (which has now joined with colony D), E and K;
- Small increases in colonies A, G, H, I and L;
- Small decreases in colonies F and J;
- Five new colonies, M through Q, were identified; and
- 32 additional points that were too small to map as polygons were also identified.

The change in cover of Common Reed on the subject property increased by 1,047.31 m^2, or 11.79% between 2016 and 2017. The Common Reed cover in 2017 was similar to that of the patch size recorded in 2013. It is anticipated that Common Reed will continue to spread throughout suitable open habitat on the subject property. An area being invaded by Common Reed is shown in **Photograph 1**.

Photograph 1. Common Reed within Colony E on December 18, 2017

3.3 Wildlife Surveys

3.3.1 Breeding Amphibians

Five anuran species were recorded from three stations on the subject property during the 2024 nocturnal amphibian call surveys. Species include American Bullfrog (*Lithobates catesbeianus*), Green Frog (*Lithobates clamitans*), Gray Treefrog (*Dryophytes versicolor*), Spring Peeper (*Pseudacris crucifer*), and Wood Frog. The findings of these amphibian breeding surveys are summarized in **Table 10**.

The primary amphibian breeding area on the subject property is the group of two to three small ponds/shallow aquatic features ("fire ponds") located just west of the parking lot. In 2024, no water was observed in the west fire pond and no amphibians were observed there.

Some indication of amphibian breeding was observed in Pond 1, Pond 2, and the pond at Brock Road South, which is just east of the subject property, in 2024.

One additional anuran species was observed incidentally during other field surveys in 2024: American Toad (*Anaxyrus americanus*). Other anurans observed incidentally in 2024 included American Bullfrog and Green Frog.

Table 10. Breeding Amphibian Survey Results (2024)

Location (Figure 3)	Round 1a (March 12, 2024)	Round 1b (April 1, 2024)	Round 2 (May 7, 2024)	Round 3 (June 20, 2024)
1	No calls	SPPE – 1(1)	No calls	BULL – 1(3) GRTR – 1(1)*
2	SPPE – 1(1)	SPPE – 1(2) WOFR – 1(1)	GRTR - 3	GRFR – 2(2)
3	No calls	No calls	No calls	GRFR – 2(9) BULL – 1(3)

* = Call recorded from outside of station area
BULL = Bullfrog, GRFR = Green Frog, SPPE = Spring Peeper, GRTR = Gray Treefrog, WOFR = Wood Frog
Code 0 — No calling
Code 1 — Individuals can be counted; calls not simultaneous. Estimated number of individuals indicated in brackets
Code 2 — Calls distinguishable; some simultaneous calling. Estimated number of individuals indicated in brackets
Code 3 — Full chorus; calls continuous and overlapping.

The 2024 amphibian breeding activity is generally comparable to previous years (2008-2011 and 2015-2023).

Results of amphibian breeding surveys from all years are shown in **Table 11**. Spring Peeper and Green Frog have been observed each year monitoring has been completed. American Toad was heard every year between 2016 and 2023 and observed incidentally in 2024. Gray Treefrog has been observed in all years except 2022. Wood Frog has been observed in 2008, in 2011, from 2015 to 2017, from 2019 to 2021, and was observed in Pond 2 in 2024. Northern Leopard Frog was incidentally observed in many years and was documented calling during the nocturnal amphibian surveys at Pond 1 in 2015, 2016, 2017 and 2019, and Pond 2 in 2023. American Bullfrog was observed incidentally in 2021 and 2022, and on Pond 1 and the off-site pond during 2023 and 2024 surveys.

Table 11. Breeding Amphibian Monitoring Results (2008–2024)

Year	SPPE	GRTR	GRFR	CHFR	WOFR	AMTO	NLFR	BULL
2008	X	X	X	X	X	-	-	-
2009	X	X	X	-	-	-	-	-
2010	X	X	X	-	-	-	X*	-
2011	X	X	X	X	X	X	-	-
2015	X	X	X	-	X	-	X*	X*
2016	X	X	X	-	X	X	X*	-
2017	X	X	X	-	X	X	X	X
2018	X	X	X	-	-	X	-	-
2019	X	X	X	-	X*	X	X	X
2020	X	X	X	-	X	X	-	X*
2021	X	X	X	-	X	X	-	X*

Year	SPPE	GRTR	GRFR	CHFR	WOFR	AMTO	NLFR	BULL
2022	X	-	X	-	-	X	X*	X*
2023	X	X	X	-	-	X	X	X
2024	X	X	X	-	X	X*	-	X

SPPE = Spring Peeper, GRTR = Gray Treefrog, GRFR = Green Frog, CHFR = Western Chorus Frog, WOFR = Wood Frog, AMTO = American Toad, NLFR = Northern Leopard Frog, BULL = American Bullfrog

* Indicates species observed incidentally and not recorded during amphibian monitoring surveys (from 2015 onward)

Overall, the results of these surveys have been relatively consistent with minor variations from year-to-year, which are to be expected based on the types of habitats present on the subject property and daily/annual species variations. Adult anurans are very mobile and often travel over upland areas to find suitable habitats.

3.3.2 Breeding Birds

A total of 43 species of birds (**Appendix D**) were documented on and directly adjacent to the subject property in 2024. Of the 43 species documented, 35 exhibited evidence of breeding and are considered to be breeding on the subject property. All species have a conservation rank of S5 (Secure) or S4 (Apparently Secure) in Ontario (NHIC 2022).

During the field surveys in 2024, species that were observed flying or foraging over the subject property, or observed during migration and not considered to be breeding on the subject property, included: Double-crested Cormorant (*Phalacrocorax auritus*), Green Heron (*Butorides virescens*), Ring-necked Duck (*Aythya collaris*), American Woodcock (*Scolopax minor*), Ring-billed Gull (*Larus delawarensis*), Belted Kingfisher (*Ceryle alcyon*), Carolina Wren (*Thryothorus ludovicianus*) and Pine Siskin (*Spinus pinus*). These species were either observed flying overhead or were using the subject property to forage (e.g., swallow species).

Of the 35 species that exhibited breeding evidence, one is a species that has conservation status. Eastern Wood-Pewee (*Contopus virens*), which is designated as Special Concern under the federal *Species at Risk Act* (2002) and provincial *Endangered Species Act* (2007), was recorded on the subject property during the 2024 breeding bird survey. This species was also recorded breeding on the subject property during the 2022 and 2023 breeding bird survey.

Eastern Wood-Pewee is a common breeding bird species for the subject property in Aberfoyle and is often associated with wooded features. In 2024 Eastern Wood-Pewee was heard singing at breeding bird monitoring station 5 as well as recorded incidentally in the deciduous forest communities immediately adjacent to the subject property boundaries to the west and to the southwest.

Six of the 35 bird species that displayed some level of breeding evidence on the subject property are considered to be “priority landbird species” in Bird Conservation Region (BCR) 13, the Lower Great Lakes – St. Lawrence Plain. Priority species are those that meet Partners in Flight criteria for Species of Continental or Regional Importance, because of high conservation concern / vulnerability and/or high stewardship responsibility scores (OPIF 2008). Species include:

- Northern Flicker (*Colaptes auratus);*
- Eastern Wood-Pewee;
- Willow Flycatcher (*Empidonax traillii*);
- Eastern Kingbird (*Tyrannus tyrannus*);
- Rose-breasted Grosbeak (*Pheucticus ludovicianus*); and
- Baltimore Oriole (*Icterus galbula*).

Northern Flicker was heard calling from breeding bird monitoring station 2, flying over breeding bird monitoring station 5, and also was recorded incidentally in the area during the September 17, 2024 basking turtle survey. Willow Flycatcher was recorded at breeding bird monitoring station 1. Eastern Kingbird was heard calling from breeding bird monitoring station 1 and was recorded incidentally in the meadow by Pond 1 during the first breeding bird survey. Rose-breasted Grosbeak was heard singing incidentally along the western property boundary in a deciduous forest community. Baltimore Oriole was recorded singing from breeding bird monitoring station 1 during the first and second breeding bird survey in 2024.

Eight of the 35 breeding bird species are considered significant in Wellington County (Dougan & Associates 2009). These species include:

- Northern Flicker;
- Eastern Wood-Pewee;
- Willow Flycatcher;
- Eastern Kingbird;
- Pine Warbler (*Setophaga pinus*);
- American Redstart (*Setophaga ruticilla*);
- Rose-breasted Grosbeak; and
- Baltimore Oriole.

One Pine Warbler was recorded incidentally during the first 2024 breeding bird survey in the White Cedar mixed swamp at the western edge of the subject property and Pine Warbler was recorded again during the second breeding bird survey at breeding bird monitoring station 5. Two American Redstart were recorded incidentally in the deciduous forest community at the western and southwestern edges of the subject property during the second 2024 breeding bird survey.

Two of the 35 breeding bird species observed in 2024 are considered area-sensitive. Area-sensitive species require larger areas of suitable habitat in order to sustain their populations (OMNR 2000) and are therefore considered more sensitive to habitat loss and fragmentation. These species include:

- Pine Warbler; and
- American Redstart.

Pine Warbler and American Redstart are associated with the forested habitats on the subject property.

The number of breeding and total birds recorded each year through the monitoring surveys is shown in **Table 12**.

Table 12. Breeding Bird Monitoring Results (2008-2024)

Monitoring Year	Number of Total Bird Species	Number of Breeding Bird Species
2008	40	34
2009	45	39
2010	48	36
2011	50	38
2015	39	33
2016	48	40
2017	51	37
2018	39	32
2019	44	34
2020	47	35
2021	44	32
2022	36	31
2023	49	35
2024	43	35

The overall results of the breeding bird surveys in 2024 are similar to the results of breeding bird surveys that were completed in previous years at the site. Differences in the results of these surveys can be attributed to daily and annual species variations.

3.3.3 Owl Surveys

During the two Barred Owl surveys conducted in 2010, Barred Owl was not recorded. However, during the second owl survey in 2010 on July 27, a Northern Saw-whet Owl was recorded calling continuously for 5 minutes in the northeast corner. The Ontario Breeding Bird Atlas states that this species breeds in a variety of forest types but is most abundant in coniferous forests (Cadman *et al*. 2007). Therefore, the subject property provides suitable habitat for this owl species. Northern Saw-whet Owl is considered locally rare in Wellington County (Dougan and Associates 2009) and ranked as “secure” (S5) by NHIC (2022).

As a result of this record, the 2011 field surveys included broadcasting calls for Northern Saw-whet Owls, as discussed in **Section 2.3.3**. However, in 2011, no owls were heard during the survey, and no formal owl surveys or incidental observations of owls have occurred since.

3.3.4 Basking Turtle Survey

The results of the basking turtle surveys are shown below in **Table 13**. Pond locations are shown on **Figure 3.**

Table 13. Basking Turtle Survey Results (2024)

	Survey 1 (March 13, 2024)			Survey 2 (May 16, 2024)			Survey 3 (September 17, 2024)		
	Pond 1	*Pond 2*	*Fire Ponds*	*Pond 1*	*Pond 2*	*Fire Ponds*	*Pond 1*	*Pond 2*	*Fire Ponds*
Midland Painted Turtle (*Chrysemys picta marginata*)	8	0	0	4	0	0	4	0	0
Snapping Turtle (*Chelydra serpentina*)	0	0	0	0	0	0	0	0	0

The only turtles that were observed on the subject property in 2024 were Midland Painted Turtle, all of which were observed in Pond 1 (**Figure 3**). This species is not considered significant at the local (Dougan & Associates 2009), regional (Plourde *et al*. 1989), or provincial (NHIC 2022) level. In April 2018, COSEWIC updated this species' status to Special Concern due to loss of wetlands in Ontario; on April 23, 2021, the *Species at Risk Act* (2002) added Midland Painted Turtle to Schedule 1 with the Special Concern status.

The number of Midland Painted Turtles seen in 2024 is lower than what has been recorded between 2011 and 2022, but higher than in 2023 (refer to **Table 14**). The lower number of turtle observations in 2023 and 2024 is likely due to the establishment of Common Reed and willow around the edge of Pond 1, as well as a higher-than-average water level in 2023 and 2024 in Pond 1, which has resulted in reduced basking opportunities..

No Snapping Turtles were observed in 2024 during the basking turtle surveys. Snapping Turtle nests were observed adjacent to Pond 1 and 2 in previous years and in 2024 during the June 2024 breeding bird surveys. One Snapping Turtle was observed by a Blue Triton employee on May 14, 2024, basking in a puddle between Pond 1 and the building on site. In 2019, Blue Triton Brands staff indicated that Snapping Turtle are frequently observed nesting in the gravel around the ponds.

A summary of the basking turtle survey results from the Blue Triton Brands monitoring program on the subject property are shown below in **Table 14**.

Table 14. Basking Turtle Monitoring Results (2008-2024)

Year	Snapping Turtle*	Midland Painted Turtle*
2008	1	0
2010	0	8 (5)
2011	1	38 (23)
2015	2 (1)	80 (36)
2016	5 (4)	42 (23)
2017	5	44 (25)
2018	1	30 (13)

Year	Snapping Turtle*	Midland Painted Turtle*
2019	4 (2)	34 (22)
2020	6	34 (17)
2021	3 (2)	34 (21)
2022	4 (1)	28 (11)
2023	0	7 (3)
2024	0	16 (8)

* Maximum number observed per survey event are noted in parentheses.

3.3.5 Odonate Surveys

Baseline odonate surveys were completed by Dougan & Associates in 2010 and 2011 in the vicinity of Pond 1. The following taxa were observed:

- Common Green Darner - *Anax junius;*
- Northern/Vernal Bluet - *Enallagma annexum/E. vernale;*
- Rainbow Bluet - *Enallagma antennatum;*
- Boreal Bluet - *Enallagma boreale;*
- Marsh Bluet - *Enallagma erbium;*
- Unidentified Bluet species - *Enallagma sp.;*
- Eastern Pondhawk - *Erythemis simplicicollis;*
- Eastern Forktail - *Ischnura verticalis;*
- Dot-tailed Whiteface - *Leucorrhinia intacta;* and
- Unidentified Spreadwing species - *Sympetrum sp.*

Additionally, Canada Darner and Eastern Pondhawk were noted incidentally in 2009.

Dougan & Associates note that this list is likely quite conservative since the survey was focussed in the Pond 1 area, and there are likely many other taxa present on the subject property. Common Green Darner, Boreal Bluet, Marsh Bluet, Eastern Pondhawk, Eastern Forktail and Dot-tailed Whiteface are ranked as “secure” (S5) while Rainbow Bluet, Northern Bluet and Vernal Bluet are ranked as “apparently secure” (S4) (NHIC 2022). Both Northern and Vernal Bluets are also considered Significant in Wellington County (Dougan & Associates 2009).

No additional odonate surveys have been conducted or are proposed.

3.3.6 Other Wildlife Species Observations

Other wildlife that were recorded on the subject property during the 2024 field season included:

- Eastern Cottontail (*Sylvilagus floridanus*);
- Muskrat (*Ondatra zibethicus*);
- Eastern Grey Squirrel (*Sciurus carolinensis*);
- Red Squirrel (*Tamiasciurus hudsonicus*);
- Groundhog (*Marmota monax*);

- Fireflies (*Lampyridae*); and
- Eastern Gartersnake (*Thamnophis sirtalis sirtalis*).

These incidental wildlife observations are similar to those noted in previous years. It is interesting to note that this is the first year that fireflies were recorded on the subject property, however it is likely that they were observed in previous years and not recorded in field notes. Similarly, it is interesting to note that 2024 is the first year since 2021 that Eastern Gartersnake was observed on the subject property. Unlike in previous years where it was recorded once per year (from 2017-2021), in 2024 it was recorded twice on two separate occasions in the meadow by Pond 1 during the second breeding bird survey and in some gravel between Pond 1 and Pond 2 during the third basking turtle survey.

4. Conclusion and Recommendations

This annual monitoring report describes the methods and findings of the 2024 biological monitoring field programs for the White Wolf Property Management Inc. Aberfoyle property. Aquatic and terrestrial monitoring completed in 2024 included:

- Salmonid spawning (redd) surveys in Aberfoyle Creek;
- Vegetation plot sampling;
- Amphibian breeding surveys;
- Breeding bird surveys; and
- Turtle basking surveys.

Consistent with the required aquatic monitoring program, salmonid spawning surveys were completed along Aberfoyle Creek in 2024 by C. Portt and Associates. No evidence of spawning was observed. These findings are consistent with those of previous years (2007-2023). The aquatic environment is strongly influenced by the thermal loading from the Aberfoyle Mill Pond upstream of the subject property, which makes downstream reaches unsuitable for sensitive cold-water fish.

Amphibian breeding surveys completed in 2024 documented five species plus an additional species incidentally observed during vegetation plot sampling. These findings are consistent with previous survey years and there are no significant changes to the resident breeding populations.

Breeding bird surveys were completed in 2024. Thirty-five (35) species were noted to be breeding on the subject property, which is consistent with numbers observed in 2008, 2010, 2019, 2020 and 2023. These numbers are average in comparison to other years and are consistent with normal year to year variation.

Turtle basking surveys of the pond habitats on site were completed in 2024 and confirmed that Painted Turtle and Snapping Turtle are actively using the subject property for basking, breeding and over-wintering. While the survey methodologies employed have been standardized, year to year variation in numbers observed remains relatively high. This is likely due to the establishment of Common Reed and willows around Pond 1, higher-than-average water levels and limited basking opportunities; therefore, it is recommended to continue to complete the first turtle basking survey of the year shortly after the first ice melt in the spring once temperatures have reached appropriate levels for basking turtles to increase detectability.

Floristic surveys of the subject property were completed in 2019 to update the overall plant species checklist which was last updated in 2011. A total of 255 species were documented. Over 77% of the species present are considered native to Ontario and reflects the quality of the ecological communities present.

In 2019, ecological communities on the subject property were verified and ELC mapping updated. The last update was in 2009. No significant changes were observed to warrant re-classification; however, the boundaries of several communities were adjusted slightly.

Monitoring of vegetation in the six permanent sampling plots located in select wetland communities was completed in 2024. The data indicate that while there have been minor shifts in species composition and abundance from year-to-year, most of this variation is attributable to natural variation and is not indicative of hydrological changes or disturbance; although there is some evidence to suggest compositional changes in some plots are related to expansion of Common Reed colonies.

In summary, the findings suggest that there have been minor changes to the various terrestrial and aquatic parameters being monitored on the subject property, though these changes are generally within the range expected and attributable to natural variation and succession. The subject property continues to support high quality terrestrial and wetland habitats that support a diverse range of native wildlife.

To maintain a complete record of the variation in the wildlife communities from year to year, it is recommended that Core wildlife monitoring (amphibian, reptiles and birds) be completed in 2025. Additionally, Salmonid spawning surveys in Aberfoyle Creek will be conducted in 2025 by C. Portt and Associates, as required by the PTTW. Recommendations for future monitoring beyond 2025 will be determined once the water taking and PTTW requirements for the new facility operations are confirmed.

Prepared by:
Beacon Environmental Ltd.

Nadine Price, M.Sc.
Ecologist

Reviewed by:
Beacon Environmental Ltd.

Dan Westerhof, B.Sc., M.E.S.
Senior Terrestrial Ecologist,
ISA Certified Arborist (ON-1536A)

5. References

Beacon Environmental. 2024.
2023 Biological Monitoring Program Blue Triton Brands Aberfoyle Property. 53 pp.

Bird Studies Canada. 2009.
Marsh Monitoring Program Participant's Handbook for Surveying Amphibians. 2009 Edition. 13 pages. Published by Bird Studies Canada in cooperation with Environment Canada and the U.S. Environment Protection Agency. February 2009.

C. Portt and Associates. 2025.
Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2024. February 2025.

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds.) 2007.
Atlas of the Breeding Birds of Ontario, 2001 – 2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologist, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto. Xxii + 706 pp.

Canadian Wildlife Services. 2006.
Forest Bird Monitoring Program: Site Set-up and Bird Survey Instructions. 6p.

Cecile, C. 2017.
DRAFT Wellington County Vascular Plant List.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2018.
Canadian Wildlife Species at Risk. Committee on the Status of Endangered Wildlife in Canada. Web Site: https://wildlife-species.canada.ca/species-risk-registry/sar/index/default_e.cfm [Accessed November 2018]

Dougan & Associates. 2007/2008.
2007/2008 Biological Monitoring Program - Final Report. Prepared for Nestlé Waters Canada, 101 Brock Road, Aberfoyle, Ontario, Canada. pp 48.

Dougan & Associates. 2009.
Guelph Natural Heritage Strategy. Phase 2: Terrestrial Inventory & Natural Heritage System Updates. Volume 2 – Appendices.

Dougan & Associates. 2010.
2009 Biological Monitoring Program - Final Report. Prepared for Nestlé Waters Canada, 101 Brock Road, Aberfoyle, Ontario, Canada. June 2, 2010. pp 43.

Dougan & Associates. 2011.
2010 Biological Monitoring Program - Final Report. Prepared for Nestlé Waters Canada, 101 Brock Road, Aberfoyle, Ontario, Canada. January 28, 2011. pp 72.

Dougan & Associates. 2012.
2011 Biological Monitoring Program - Final Report. Prepared for Nestlé Waters Canada, 101 Brock Road, Aberfoyle, Ontario, Canada. March 2012. pp 72

Dougan & Associates. 2013.
2012 Biological Monitoring Program - Final Report. Prepared for Nestlé Waters Canada, 101 Brock Road, Aberfoyle, Ontario, Canada.

Dougan & Associates. 2014.
2013 Biological Monitoring Program - Final Report. Prepared for Nestlé Waters Canada, 101 Brock Road, Aberfoyle, Ontario, Canada. March 2014. pp 25

Howe, R.W., G.J. Niemi, S.J. Lewis, and D.A. Welsh. 1997.
A standard method for monitoring songbird populations in the Great Lakes Region. The Passenger Pigeon 59(3): 189-194.

Jones, C. A., Kingsley A., Burke, P. and Holder, M. 2008.
The Dragonflies and Damselflies of Algonquin Provincial Park and Surrounding Area. Published by The Friends of Algonquin Park, Whitney, Ontario. 263 pp.

Lam, E. 2004.
Damselflies of the Northeast. A guide to the species of eastern Canada and the northeastern United States. Biodiversity Books. Forest Hills, New York. 96 pp.

NHIC. 2022.
Natural Heritage Reference Center. Available at: https://www.ontario.ca/page/get-natural-heritage-information [Accessed June 2022].

Oldham M. J., Bakowsky W. D., Sutherland D. A. 1995.
Floristic Quality Assessment System for Southern Ontario. Natural Heritage Information Center, OMNR (Ontario Ministry of Natural Resources). Peterborough, Ontario. 69 pp.

Oldham, M.J. and S.R. Brinker, S.R. 2009.
Rare Vascular Plants of Ontario. Fourth Edition. Natural Heritage information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario. 188 pages.

Ontario Ministry of Natural Resources. 2000.
Significant Wildlife Habitat Technical Guide. 151 pp.

Ontario Partners in Flight. 2008.
Ontario Land Bird Conservation Plan: Lower Great Lakes / St. Lawrence Plain, North American Bird Conservation Region 13. Ontario Ministry of Natural Resources, Bird Studies Canada, Environment Canada. Final Draft, June 2008.

Plourde, S.A., E.L. Szepesi, J.L. Riley, M.J. Oldham and C. Campbell. 1989.
Distribution and Status of the Herpetofauna of Central Region, Ontario Ministry of Natural Resources and Recreational Areas Section, OMNR, Open File Ecological Report SR8903, Central Region, Richmond Hill, Ontario. 27 pp.

Stanfield L. (editor). 2010.
Ontario Stream Assessment Protocol. Version 8.0. Fisheries Policy Section. Ontario Ministry of Natural Resources. Peterborough, Ontario. 376 pages.

Appendix A

Key Biophysical Attributes of the Vegetation Communities in the Study Area

Appendix A

Key Biophysical Attributes of the Vegetation Communities in the Study Area[2]

Unit.	1	2	3	4	5
ELC Code	**SAM1**	**CUM1**	**MAM2**	**FOM7**	**CUP3**
Vegetation Type	Mixed Shallow Aquatic Ecosite	Mineral Cultural Meadow Ecosite	Mineral Shallow Marsh Ecosite	Fresh-Moist White Cedar - Hardwood Mixed Forest Ecosite	Coniferous Plantation Ecosite
Overstorey Composition	*Salix sp*	*Thuja occidentalis, Populus tremuloides, Populus deltoides ssp. deltoides,*	*Alnus incana spp. rugosa, Thuja occidentalis, Sambucus nigra ssp. Canadensis, Fraxinus pennsylvanica, Fraxinus nigra*	*Acer rubrum, Acer negundo, Fraxinus pennsylvanica, Thuja occidentalis, Populus tremuloides, Salix amygdaloides*	*Pinus strobes, Pinus sylvestris, Thuja occidentalis, Betula papyrifera, Prunus serotina, Acer saccharum var. saccharum, Carya cordiformis, Fraxinus americana, Rhamnus cathartica, Lonicera tatarica*
Understorey Composition	*Polygonum hydropiper, Rumex crispus, Schoenoplectus tabernaemontani, Typha angustifolia, Verbena hastata*	*Salix eriocephala, Rhamnus cathartica, Lonicera tatarica, Salix purpurea, Cornus sericea ssp. sericea, Vitis riparia, Rubus idaeus ssp. Idaeus, Salix exigua*	*Ribes triste Cornus sericea ssp. sericea*	*Cornus sericea ssp. sericea, Salix sp, Rubus idaeus ssp. idaeus*	*Rubus idaeus ssp. idaeus, Prunus virginiana var. virginiana*
Groundcover Composition	*Lemna minor*	*Solidago Canadensis, Daucus carota, Aster sp, Symphyotrichum novae-angliae, Asclepias syriaca, Echium vulgare, Achillea millefolium var. millefolium, Oenothera biennis, Tussilago farfara, Verbascum Thapsus, Fragaria virginiana ssp. Virginiana, Anemone sp, Trifolium sp*	*Typha latifolia,Carex stricta,Solanum dulcamara, Phalaris arundinacea, Thalictrum dioicum, Laportea canadensis, Mentha sp, Solidago rugosa ssp. Rugosa, Onoclea sensibilis, Carex intumescens, Eupatorium maculatum var. maculatum, Eupatorium perfoliatum, Symphyotrichum puniceum var. puniceum, Impatiens capensis, Lysimachia thyrsiflora, Ranunculus hispidus var. hispidus, Glyceria striata, Leersia oryzoides, Carex sp*	*Equisetum arvense, Tussilago farfara, Phalaris arundinacea*	*Asarum canadense Solidago flexicaulis Maianthemum canadense Tussilago farfara Eurybia macrophylla Carex granularis Sanguinaria canadensis*
Diameter Range	N/A	N/A	1	1– 2	2– 3
Structural Diversity	1	1	2	2	2
Canopy Closure	N/A	1	1	2(3)	3
Relative Age	2	1	2	2	2
Soil Texture	L	L	Om 15/ L	L – rip/rap	LfS
Drainage Class	3	1	3	1	1
Slope Class	1	1	1	2	2– 3
Topographic Class	1	1	2	1	1
Botanical Quality	1	1	2	1	1

[2] *Appendix A is based off the 2011 Biological Monitoring Program - Final Report (Dougan & Associates 2012) with minor updates from work done by Beacon in 2019.*

Unit.	6	7	8	9	10
ELC Code	**FOC4-1**	**MAS3**	**FOD6**	**SWD**	**SWM4-1**
Vegetation Type	Fresh-Moist White Cedar Coniferous Forest	Organic Shallow Marsh Ecosite	Fresh-Moist Sugar Maple Deciduous Forest Ecosite	Deciduous Swamp	White Cedar - Hardwood Organic Mixed Swamp
Overstorey Composition	*Thuja occidentalis Fraxinus pennsylvanica Acer saccharum var. saccharum*	*Thuja occidentalis, Betula papyrifera, Ulmus americana, Fraxinus nigra, Betula alleghaniensis, Acer saccharum var.saccharum Fraxinus pennsylvanica, Acer rubrum, Prunus serotina, Carpinus caroliniana ssp. virginiana, Tilia americana,*	*Acer saccharum var. saccharum, Ostrya virginiana, Tilia americana, Thuja occidentalis, Betula alleghaniensis, Betula papyrifera, Tsuga canadensis, Fagus grandifolia, Fraxinus pennsylvanica, Fraxinus americana*	*Fraxinus nigra Populus tremuloides Betula alleghaniensis Acer rubrum Tilia americana Thuja occidentalis Fraxinus pennsylvanica Fagus grandifolia*	*Thuja occidentalis, Populus tremuloides, Fraxinus pennsylvanica, Ulmus americana, Fraxinus nigra, Betula papyrifera, Betula alleghaniensis, Acer rubrum,*
Understorey Composition	*Sambucus racemosa var. racemosa Cornus alternifolia Ribes sp*	*Cornus sericea ssp. sericea, Rubus pubescens, Parthenocissus vitacea, Sambucus nigra ssp. canadensis*	-	*Sambucus nigra ssp. canadensis, Cornus sericea ssp. sericea*	*Rhamnus cathartica, Rubus idaeus ssp. idaeus, Salix petiolaris, Amelanchier alnifolia, Hamamelis virginiana, Cornus sericea ssp. sericea, Sambucus nigra ssp. canadensis, Parthenocissus vitacea, Lonicera dioica, Prunus virginiana var. virginiana, Cornus alternifolia, Alnus incana spp. rugosa, Frangula alnus, Cornus racemosa, Rubus pubescens, Prunus serotina,*
Groundcover Composition	*Cystopteris bulbifera Tussilago farfara Carex communis Asarum canadense Onoclea sensibilis*	*Phragmites australis, Thelypteris palustris var. pubescens, Carex hystericina, Solanum dulcamara, Scirpus atrovirens, Epilobium hirsutum, Onoclea sensibilis, Cicuta maculata, Bidens frondosa, Typha latifolia, Sium suave, Rorippa nasturtium-aquaticum, Lycopus americanus, Agrostis stolonifera*	*Carex pensylvanica, Onoclea sensibilis, Solidago flexicaulis, Tussilago farfara, Polystichum acrostichoides, Caulophyllum thalictroides, Asarum canadense, Anemone acutiloba, Carex pedunculata*	*Phalaris arundinacea Carex sp Solidago rugosa ssp. rugosa Onoclea sensibilis, Boehmeria cylindrica Carex lupulina Euonymus obovata*	*Solanum dulcamara,Agrimonia gryposepala, Thalictrum dioicum, Onoclea sensibilis, Oxalis stricta, Carex eburnean, Cystopteris bulbifera, Pilea pumila, Viola sororia, Clematis virginiana, Echinocystis lobata, Lysimachia thyrsiflora, Circaea lutetiana ssp. canadensis,, Phalaris arundinacea, Aster puniceus var. puniceus, Anemone virginiana var. cylindroidea, Dryopteris carthusiana, Echinocystis lobata*
Diameter Range	3	1	2– 3	2– 3	2– 3
Structural Diversity	2	2	2	2	2
Canopy Closure	3	1	3	3	3
Relative Age	2	2	2	2	2
Soil Texture	LfS	Om/SiL	L	L	O/L
Drainage Class	2	3	2	3	3
Slope Class	2(3)	1	1– 2	1	1
Topographic Class	2	2	1	2	2
Botanical Quality	2	2	2	2	3

Unit.	11	12	13	14-merged with Polygon 11 in 2009	15
ELC Code	**MAS2-1/MAM2-2**	**SWC3-2**	**SWC3-1**	**SWT2**	**FOC4-1**
Vegetation Type	Cattail Mineral Shallow Marsh/Reed Canary Grass Mineral Meadow Marsh	White Cedar - Conifer Organic Coniferous Swamp	White Cedar Organic Coniferous Swamp	Mineral Thicket Swamp Ecosite	Fresh-Moist White Cedar Coniferous Forest
Overstorey Composition	*Populus tremuloides, Thuja occidentalis*	*Thuja occidentalis Larix laricina*	*Thuja occidentalis, Populus balsamifera ssp. balsamifera Larix laricina, Betula papyrifera*	*Thuja occidentalis*	*Thuja occidentalis*
Understorey Composition	*Rhamnus cathartica Salix sp Salix petiolaris Ribes sp Cornus sericea ssp. sericea*	*Lonicera tatarica*	*Parthenocissus vitacea Lonicera tatarica*	*Salix sp Parthenocissus vitacea*	-
Groundcover Composition	*Typha latifolia, Phalaris arundinacea, Solidago canadensis var. scabra Tussilago farfara, Lysimachia thyrsiflora, Solanum dulcamara, Equisetum arvense, Carex hystericina, Carex stipata Aster puniceus var. puniceus, Eupatorium maculatum var. maculatum, Caltha palustris, Onoclea sensibilis, Impatiens capensis, Poa sp, Schoenoplectus tabernaemontani, Cicuta maculate, Carex stricta*	*Carex stricta, Carex pellita Dryopteris carthusiana Thelypteris palustris var. pubescens, Osmunda cinnamomea, Galium aparine, Equisetum arvense, Aster sp, Typha latifolia, Tussilago farfara, Fragaria virginiana ssp. virginiana, Caltha palustris, Solidago canadensis var. scabra, Thalictrum pubescens, Cypripedium parviflorum, Phragmites australis, Onoclea sensibilis*	*Equisetum arvense, Tussilago farfara, Onoclea sensibilis Galium aparine, Solanum dulcamara, Carex stipata, Phalaris arundinacea, Aster puniceus var. puniceus Thalictrum pubescens Dryopteris carthusiana, Caltha palustris, Eupatorium perfoliatum, Impatiens capensis, Eupatorium maculatum var. maculatum, Carex rosea, Cypripedium parviflorum, Taraxacum officinale*	*Typha latifolia Aster puniceus var. puniceus Phalaris arundinacea Solanum dulcamara Carex stipata Cicuta maculata Impatiens capensis Lysimachia thyrsiflora Onoclea sensibilis Thalictrum pubescens Asclepias syriaca Typha angustifolia*	-
Diameter Range	N/A	1– 2	2– 3	1	3
Structural Diversity	2	2	2	2	2
Canopy Closure	N/A	2– 3	3	1	3
Relative Age	2	2	2	2	2
Soil Texture	L	Om	Om	L	LfS
Drainage Class	3	3	3	3	2
Slope Class	1	1	1	1	1
Topographic Class	2	2	2	2	2
Botanical Quality	2	2	2	2	2

Unit.	16	17	18	19	20
ELC Code	**FOC4-1**	**FOC4-1**	**SWD**	**SWM4-1**	**FOM7**
Vegetation Type	Fresh-Moist White Cedar Coniferous Forest	Fresh-Moist White Cedar Coniferous Forest	Deciduous Swamp	White Cedar - Hardwood Organic Mixed Swamp	Fresh-Moist White Cedar - Hardwood Mixed Forest Ecosite
Overstorey Composition	*Thuja occidentalis*	*Thuja occidentalis, Pinus strobus Populus tremuloides, Betula papyrifera, Prunus serotina Picea abies, Abies balsamea*	*Fraxinus nigra Rubus idaeus ssp. idaeus Rubus pubescens Parthenocissus vitacea Rhamnus cathartica Thuja occidentalis Vitis riparia Frangula alnus Populus tremuloides*	*Species composition similar to unit 10*	*Thuja occidentalis, tilia americana, Acer saccharum ssp saccharum, Ostrya virginiana, Tsuga canadensis*
Understorey Composition	-	*Prunus virginiana var. virginiana Rhamnus cathartica*	-	-	*Acer saccharum ssp saccharum*
Groundcover Composition	-	*Carex flacca, Danthonia spicata, Solidago nemoralis*	*Anemone canadensis Solanum dulcamara Geum sp Thalictrum pubescens Circaea lutetiana ssp. canadensis Arisaema triphyllum ssp. triphyllum Galium sp Solidago rugosa ssp. rugosa*	-	*Carex pensylvanica, Dryopteris carthusiana, Asarum canadense*
Diameter Range	2– 3	2– 3	1– 2	2– 3	2– 3
Structural Diversity	1	1	2	2	2
Canopy Closure	3	3	2	3	3
Relative Age	2	2	1	2	2
Soil Texture	L	L	L	O/L	L
Drainage Class	1	1	3	3	2
Slope Class	1	1	1	1	1– 2
Topographic Class	2	2	2	2	2
Botanical Quality	2	2	2	3	2

Unit.	21	22	23	24	25
ELC Code	**FOC4-1**	**FOC4-1**	**CUM1**	**SWD2-2**	**MAM2**
Vegetation Type	Fresh-Moist White Cedar Coniferous Forest	Fresh-Moist White Cedar Coniferous Forest	Mineral Cultural Meadow Ecosite	Red Ash Mineral Deciduous Swamp	Common Reed Mineral Meadow Marsh
Overstorey Composition	*Populus tremuloides Thuja occidentalis Fraxinus pennsylvanica Fraxinus americana Acer saccharum var. saccharum Betula alleghaniensis*	*Thuja occidentalis, Betula papyrifera Salix fragilis, Populus balsamifera ssp. balsamifera, Populus tremuloides,*	*Acer negundo*	-	*Populus balsamifera ssp. balsamifera Acer negundo*
Understorey Composition	-	*Salix purpurea, Cornus sericea ssp. sericea, Lonicera tatarica*	*Rhamnus cathartica, Rubus idaeus ssp. idaeus, Vitis riparia*	-	*Vitis riparia, Parthenocissus vitacea*
Groundcover Composition	*Solidago canadensis*	*Equisetum arvense, Solidago canadensis, Tussilago farfara, Taraxacum officinale*	*Solidago canadensis var. scabra, Echium vulgare, Linaria vulgaris, Thlaspi arvense, Equisetum arvense, Symphyotrichum novae-angliae, Bromus inermis ssp. pumpellianus, Leucanthemum vulgare, Solidago canadensis, Arctium minus, Lotus corniculatus, Daucus carota, Cirsium arvense, Rumex crispus, Tussilago farfara, Anemone canadensis, Asclepias syriaca, Trifolium repens*	-	*Phalaris arundinacea Rumex crispus Anemone canadensis, Ranunculus acris, Phragmites australis*
Diameter Range	2– 3	2– 3	N/A	2– 3	N/A
Structural Diversity	1	2	1	2	1
Canopy Closure	3	3	N/A	3	N/A
Relative Age	2	2	1	2	1
Soil Texture	L	L	L	L	L
Drainage Class	1	1	1	3	2
Slope Class	1	2	1– 2	1	1
Topographic Class	2	2	1	2	1
Botanical Quality	2	2	1	2	1

Unit.	26	27	28	29	30
ELC Code	**SAM1**	**SWD2-2**	**FOD**	**MAM2-2**	**MAM2-2**
Vegetation Type	Mixed Shallow Aquatic Ecosite	Green Ash Mineral Deciduous Swamp	Deciduous Forest	Reed Canary-grass Mineral Meadow Marsh	Reed Canary-grass Mineral Meadow Marsh
Overstorey Composition	*Salix exigua*	*Fraxinus pensylvanica, Fraxinus nigra, Ulmus americana, Betula allegheniensis, Tilia Americana, Populus tremuloides*	*Fraxinus pensylvanica, Populus tremuloides, Thuja occidentalis, Pinus strobus*	*Thuja occidentalis, Fraxinus nigra*	-
Understorey Composition	-	*Rubus idaeus ssp melanolasius, Rhamnus cathyartica, Sambucus canadensis, Thuja occidentalis, Viburnum trilobum (R)*	*Thuja occidentalis, Cornus sericea ssp sericea, Rhamnus frangula, abies balsamea*	*Cornus sericea ssp sericea, Rubus idaeus ssp strigosus, Thuja occidentalis*	-
Groundcover Composition	*Coronilla varia, Poa sp Achillea millefolium var. millefolium, Typha latifolia, Juncus effusus ssp. solutes, Silene vulgaris, Melilotus officinalis Rumex crispus, Schoenoplectus tabernaemontani, Ranunculus sceleratus var. sceleratus*	*Onoclea sensibilis, Solidago rugosa, Clematis virginiana, Cystopteris bulbifera*	*Carex pensylvanica, Solidago canadensis var. scabra, Pteridium aquilinum, solidago rugosa, Solanum dulcamara, Solidago rugosa*	*Phalaris arundinacea -D, Symphyotrichum lateriflorum var. angustifolium, Eupatorium maculatum, Aster puniceus, Carex sp.,*	*Phalaris arundinacea -D, Aster puniceus-A, Typha angustifolia,Typha latifolia, Symphyotrichum lanceolatum var. lanceolatum, Cyperipedium parviflorum var. makasin*
Diameter Range	N/A	2	1,2 (3)	1	1
Structural Diversity	1	2	2	1	1
Canopy Closure	N/A	3	3	1	1
Relative Age	1	2	1– 2	1	1
Soil Texture	L	L	L	L	L
Drainage Class	3	2– 3	1	2– 3	2– 3
Slope Class	1	1	1	1	1
Topographic Class	1	1	1	1	1
Botanical Quality	2	2	2	2	2

Unit.	31	32
ELC Code	**FOD**	**CUM1**
Vegetation Type	Deciduous Forest Remnant	Cultural Meadow
Overstorey Composition	*Acer saccharum ssp saccharum, Tilia americana*	-
Understorey Composition	-	-
Groundcover Composition	-	Some areas manicured turf, some areas seeded; *Medicago sativa, Melilotus sp, Daucus carota*
Diameter Range	2	1
Structural Diversity	1	1
Canopy Closure	3	1
Relative Age	2	1
Soil Texture	L	L
Drainage Class	1	1
Slope Class	1	1
Topographic Class	1	1
Botanical Quality	2	1

LEGEND

Diameter Range (1 = <15 cm dbh.; 2 = 15 – 30 cm dbh.; 3 = >30 cm dbh.)
Structural Diversity (1 = strata 1 & 2; 2 = >2 strata; 3 = > 3 strata, old growth)
Canopy Closure (1 = <25%; 2 = 25– 50%; 3 = >50%)
Relative Age (1 = immature; 2 = mature; 3 = old growth)
Soil Texture (sand/silt/clay/org)
Drainage Class (1 = well-drained; 2 = imperfectly drained (1 – 3 mottles); 3 = poorly drained (>3 mottles)
Slope Class (1 = <10%; 2 = 10– 25%; 3 = >25%)
Topographic Class (1 = uniform; 2 = uneven; 3 = high variability (hummocky)
Botanical Quality (1 = disturbed, exotics; 2 = low diversity; 3 = high diversity (sig spp. present)
Edge Abbreviations: ( ) represent localized condition; D = Dominant (51– 100%); A = Abundant (21– 50%); F = Frequent (11– 20%); O = Occasional (5– 10%); S = Scarce (<5%)

BEACON ENVIRONMENTAL

Appendix B

Flora Checklist

Appendix B

Flora Checklist

Scientific Name	Common Name (FOIBIS)	Coefficient of Conservatism	Wetness Index	S-Rank	Wellington
Alisma triviale	Northern Water-plantain	1	-5	S5	-
Sagittaria latifolia	Broadleaf Arrowhead	4	-5	S5	-
Toxicodendron rydbergii	Western Poison Ivy	0	0	S5	-
Cicuta bulbifera	Bulb-bearing Water-hemlock	5	-5	S5	-
Cicuta maculata	Spotted Water-hemlock	6	-5	S5	-
Daucus carota	Queen Anne's Lace	0	5	SNA	-
Hydrocotyle americana	American Water-pennywort	7	-5	S5	-
Sium suave	Hemlock Water-parsnip	4	-5	S5	-
Apocynum androsaemifolium ssp. *androsaemifolium*	Spreading Dogbane	3	5	S5	-
Arisaema triphyllum ssp. *triphyllum*	Jack-in-the-pulpit	5	-2	S5	-
Aralia nudicaulis	Wild Sarsaparilla	4	3	S5	-
Asarum canadense	Wild Ginger	6	5	S5	-
Asclepias incarnata ssp. *incarnata*	Swamp Milkweed	6	-5	S5	-
Asclepias syriaca	Common Milkweed	0	5	S5	-
Asplenium platyneuron	Ebony Spleenwort	6	3	S4	R
Achillea millefolium var. *occidentalis*	Wooly Yarrow	0	3	S5	-
Ambrosia trifida	Great Ragweed	0	-1	S5	-
Bidens frondosa	Devil's Beggar's Ticks	3	-3	S5	-
Cichorium intybus	Chicory	0	5	SNA	-
Cirsium vulgare	Bull Thistle	0	4	SNA	-
Erigeron philadelphicus var. *philadelphicus*	Philadelphia Fleabane	1	-3	S5	-
Eupatorium perfoliatum	Common Boneset	2	-4	S5	-
Euthamia graminifolia	Grass-leaved Goldenrod	2	-2	S5	-
Eutrochium maculatum var. *maculatum*	Spotted Joe-pye Weed	3	-5	S5	-
Hieracium sp.	Hawkweed Species	0	0	-	-
Lactuca biennis	Tall Blue Lettuce	6	0	S5	-
Lactuca sp.	Lettuce Species	0	0	-	-
Leucanthemum vulgare	Oxeye Daisy	0	5	SNA	-
Solidago altissima var. altissima	Tall Goldenrod	1	3	S5	-
Solidago canadensis	Canada Goldenrod	1	3	S5	-
Solidago flexicaulis	Broad-leaved Goldenrod	6	3	S5	-
Solidago gigantea	Smooth Goldenrod	4	-3	S5	-
Solidago nemoralis var. *nemoralis*	Field Goldenrod	2	5	S5	-
Solidago rugosa ssp. *rugosa*	Rough Goldenrod	4	-1	S5	-
Sonchus arvensis ssp. *arvensis*	Field Sowthistle	0	1	SNA	-
Sonchus asper ssp. *asper*	Spiny-leaf Sowthistle	0	0	SNA	-
Symphyotrichum lanceolatum ssp. *lanceolatum*	Panicled Aster	3	-3	S5	-
Symphyotrichum lateriflorum var. *lateriflorum*	Calico Aster	3	-2	S5	-
Symphyotrichum novae-angliae	New England Aster	2	-3	S5	-
Symphyotrichum pilosum var. *pilosum*	Hairy Aster	4	2	S5	U
Symphyotrichum puniceum var. *puniceum*	Purple-stemmed Aster	6	-5	S5	-
Symphyotrichum urophyllum	Arrow-leaved Aster	6	5	S4	U
Taraxacum officinale	Common Dandelion	0	3	SNA	-
Tussilago farfara	Colt's Foot	0	3	SNA	-
Impatiens capensis	Spotted Jewel-weed	4	-3	S5	-
Caulophyllum giganteum	Blue Cohosh	-	-	S5	-

Scientific Name	Common Name (FOIBIS)	Coefficient of Conservatism	Wetness Index	S-Rank	Wellington
Caulophyllum thalictroides	Blue Cohosh	6	5	S5	-
Alnus incana ssp. *rugosa*	Speckled Alder	6	-5	S5	-
Betula alleghaniensis	Yellow Birch	6	0	S5	-
Betula papyrifera	Paper Birch	2	2	S5	-
Carpinus caroliniana ssp. *virginiana*	American Hornbeam	6	0	S5	-
Echium vulgare	Common Viper's-bugloss	0	5	SNA	-
Hackelia virginiana	Virginia Stickseed	5	1	S5	-
Myosotis laxa	Small Forget-me-not	6	-5	S5	-
Myosotis scorpioides	True Forget-me-not	0	-5	SNA	-
Symphytum officinale ssp. *officinale*	Common Comfrey	0	5	SNA	-
Cardamine diphylla	Broad-leaved Toothwort	7	5	S5	-
Cardamine pensylvanica	Pennsylvania Bitter-cress	6	-4	S5	U
Rorippa nasturtium-aquaticum	True Watercress	0	-5	SNA	-
Thlaspi arvense	Field Penny-cress	0	5	SNA	-
Lobelia siphilitica	Great Blue Lobelia	6	-4	S5	-
Lonicera tatarica	Tartarian Honeysuckle	0	3	SNA	-
Sambucus canadensis	Common Elderberry	5	-2	S5	-
Sambucus nigra	Eupopean Elderberry	-	-	SNA	-
Viburnum opulus	Guelder-rose Viburnum	0	0	SNA	-
Silene vulgaris	Maiden's Tears	0	5	SNA	-
Euonymus obovatus	Running Strawberry-bush	6	5	S5	-
Hypericum perforatum	St. John's-wort	0	5	SNA	-
Convolvulus arvensis	Field Bindweed	0	5	SNA	-
Cornus alternifolia	Alternate-leaf Dogwood	6	5	S5	-
Cornus racemosa	Gray Dogwood	2	-2	S5	-
Cornus sericea ssp. *sericea*	Red-osier Dogwood	2	-3	S5	-
Echinocystis lobata	Wild Mock-cucumber	3	-2	S5	-
Thuja occidentalis	Northern White Cedar	4	-3	S5	-
Carex bebbii	Bebb's Sedge	3	-5	S5	-
Carex bromoides	Brome-like Sedge	7	-4	S5	-
Carex communis	Fibrous-root Sedge	6	5	S5	-
Carex flacca	Heath Sedge	0	0	SNA	-
Carex flava	Yellow Sedge	5	-5	S5	-
Carex gracillima	Graceful Sedge	4	3	S5	-
Carex granularis	Meadow Sedge	3	-4	S5	-
Carex hystericina	Porcupine Sedge	5	-5	S5	-
Carex intumescens	Bladder Sedge	6	-4	S5	-
Carex lupulina	Hop Sedge	6	-5	S5	-
Carex pedunculata	Longstalk Sedge	5	5	S5	-
Carex pellita	Woolly Sedge	4	-5	S5	-
Carex pensylvanica	Pennsylvania Sedge	5	5	S5	-
Carex radiata	Stellate Sedge	4	5	S5	-
Carex sp.	Sedge Species	0	0	-	-
Carex stipata	Stalk-grain Sedge	3	-5	S5	-
Carex stricta	Tussock Sedge	4	-5	S5	-
Carex vulpinoidea	Fox Sedge	3	-5	S5	-
Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	5	-5	S5	-
Scirpus atrovirens	Woolgrass Bulrush	3	-5	S5	-
Pteridium aquilinum var. *latiusculum*	Bracken Fern	2	3	S5	-
Athyrium filix-femina var. *angustum*	Lady-fern	4	0	S5	-
Cystopteris bulbifera	Bulblet Fern	5	-2	S5	-
Dryopteris carthusiana	Spinulose Wood Fern	5	-2	S5	-
Dryopteris cristata	Crested Wood Fern	7	-5	S5	-

Scientific Name	Common Name (FOIBIS)	Coefficient of Conservatism	Wetness Index	S-Rank	Wellington
Dryopteris intermedia	Evergreen Wood Fern	5	0	S5	-
Dryopteris marginalis	Marginal Wood Fern	5	3	S5	-
Matteuccia struthiopteris var. *pensylvanica*	Ostrich Fern	5	-3	S5	-
Onoclea sensibilis	Sensitive Fern	4	-3	S5	-
Polystichum acrostichoides	Christmas Fern	5	5	S5	-
Equisetum arvense	Field Horsetail	0	0	S5	-
Equisetum sylvaticum	Woodland Horsetail	7	-3	S5	U
Coronilla varia	Crown-vetch	0	5	SNA	-
Lotus corniculatus	Bird's-foot Trefoil	0	1	SNA	-
Medicago lupulina	Black Medic	0	1	SNA	-
Trifolium repens	White Clover	0	2	SNA	-
Trifolium sp.	Clover Species	0	0	-	-
Fagus grandifolia	American Beech	6	3	S5	-
Geranium maculatum	Wild Geranium	6	3	S5	-
Geranium robertianum	Herb-robert	0	5	S5	-
Ribes cynosbati	Prickly Gooseberry	4	5	S5	-
Ribes triste	Swamp Red Currant	6	-5	S5	-
Iris versicolor	Blueflag	5	-5	S5	-
Carya cordiformis	Bitternut Hickory	6	0	S5	-
Juglans nigra	Black Walnut	5	3	S4?	-
Juncus effusus ssp. *solutus*	Soft Rush	4	-5	S5	-
Galeopsis tetrahit	Brittle-stem Hempnettle	0	5	SNA	-
Lycopus americanus	American Bugleweed	4	-5	S5	-
Lycopus uniflorus	Northern Bugleweed	5	-5	S5	-
Mentha arvensis	Corn Mint	3	-3	S5	-
Nepeta cataria	Catnip	0	1	SNA	-
Prunella vulgaris ssp. *lanceolata*	Self-heal	5	5	S5	-
Prunella vulgaris ssp. *vulgaris*	Common Heal-all	0	0	SNA	-
Scutellaria galericulata	Hooded Skullcap	6	-5	S5	-
Scutellaria lateriflora	Mad Dog Skullcap	5	-5	S5	-
Scutellaria sp.	Skullcap Species	0	0	-	-
Lemna minor	Lesser Duckweed	2	-5	S5	-
Allium tricoccum	Wild Leek	7	2	S5	-
Maianthemum canadense	Wild-lily-of-the-valley	5	0	S5	-
Maianthemum stellatum	Starflower False Solomon's Seal	6	1	S5	-
Polygonatum pubescens	Downy Solomon's Seal	5	5	S5	-
Trillium grandiflorum	White Trillium	5	5	S5	-
Trillium sp.	Trillium Species	0	0	-	-
Lythrum salicaria	Slender-spike Loosestrife	0	-5	SNA	-
Fraxinus nigra	Black Ash	7	-4	S5	-
Fraxinus pennsylvanica	Green Ash	3	-3	S5	-
Circaea lutetiana ssp. *canadensis*	Enchanter's Nightshade	3	3	S5	-
Epilobium hirsutum	Great-hairy Willow-herb	0	-4	SNA	-
Epilobium parviflorum	Small-flower Willow-herb	0	3	SNA	-
Epilobium sp.	Willow-herb Species	0	0	-	-
Cypripedium parviflorum	Small Yellow Lady's-slipper	7	-1	S5	-
Epipactis helleborine	Eastern Helleborine	0	5	SNA	-
Osmunda cinnamomea	Cinnamon Fern	7	-3	S5	-
Oxalis stricta	Upright Yellow Wood Sorrel	0	3	S5	-
Sanguinaria canadensis	Bloodroot	5	4	S5	-
Abies balsamea	Balsam Fir	5	-3	S5	-
Larix laricina	American Larch	7	-3	S5	-
Pinus nigra	Black Pine	0	-5	SNA	-

Scientific Name	Common Name (FOIBIS)	Coefficient of Conservatism	Wetness Index	S-Rank	Wellington
Pinus strobus	Eastern White Pine	4	3	S5	-
Tsuga canadensis	Eastern Hemlock	7	3	S5	-
Plantago lanceolata	English Plantain	0	0	SNA	-
Plantago major	Nipple-seed Plantain	0	-1	SNA	-
Agrostis gigantea	Redtop	0	0	SNA	-
Brachyelytrum erectum	Long-awned Wood Grass	7	5	S4S5	R
Bromus ciliatus	Fringed Brome	6	-3	S5	-
Bromus inermis ssp. *inermis*	Smooth Brome	0	5	SNA	-
Cinna latifolia	Slender Wood Reedgrass	7	-4	S5	U
Danthonia spicata	Poverty Oat-grass	5	5	S5	-
Echinochloa crusgalli	Barnyard Grass	0	-3	SNA	-
Elymus hystrix	Bottle-brush Grass	5	5	S5	-
Elymus repens	Quack Grass	0	3	SNA	-
Elymus virginicus var. *virginicus*	Virginia Wild-rye	5	-2	S5	-
Glyceria grandis	American Manna Grass	5	-5	S4S5	-
Glyceria striata	Fowl Manna Grass	3	-5	S5	-
Leersia oryzoides	Rice Cutgrass	3	-5	S5	-
Phalaris arundinacea	Reed Canary Grass	0	-4	S5	-
Phleum pratense	Timothy	0	3	SNA	-
Phragmites australis ssp. australis	European Common Reed	0	-4	SNA	-
Poa palustris	Fowl Bluegrass	5	-4	S5	-
Poa pratensis ssp. *pratensis*	Kentucky Bluegrass	0	1	SNA	-
Schizachne purpurascens ssp. *purpurascens*	Purple Oat	6	2	S5	-
Polygonum hydropiper	Water-pepper	4	-5	SNA	-
Rumex crispus	Curly Dock	0	-1	SNA	-
Rumex orbiculatus	Water Dock	6	-5	S4S5	-
Lysimachia ciliata	Fringed Loosestrife	4	-3	S5	-
Lysimachia thyrsiflora	Water Loosestrife	7	-5	S5	-
Trientalis borealis ssp. *borealis*	Northern Starflower	6	-1	S5	-
Adiantum pedatum	Northern Maidenhair-fern	7	1	S5	-
Actaea pachypoda	White Baneberry	6	5	S5	-
Anemone acutiloba	Sharp-lobed Hepatica	6	5	S5	-
Anemone canadensis	Canada Anemone	3	-3	S5	-
Anemone virginiana var. *virginiana*	Virginia Anemone	4	5	S5	-
Aquilegia canadensis	Wild Columbine	5	1	S5	-
Caltha palustris	Marsh Marigold	5	-5	S5	-
Clematis virginiana	Virginia Virgin-bower	3	0	S5	-
Ranunculus abortivus	Kidney-leaved Buttercup	2	-2	S5	-
Ranunculus acris	Tall Buttercup	0	-2	SNA	-
Ranunculus hispidus var. *caricetorum*	Swamp Buttercup	5	-5	S5	-
Ranunculus pensylvanicus	Bristly Crowfoot	3	-5	S5	U
Ranunculus recurvatus var. *recurvatus*	Hooked Crowfoot	4	-3	S5	-
Ranunculus sp.	Buttercup Species	0	0	-	-
Thalictrum dioicum	Early Meadowrue	5	2	S5	-
Thalictrum pubescens	Tall Meadowrue	5	-2	S5	-
Frangula alnus	Glossy Buckthorn	0	-1	SNA	-
Rhamnus cathartica	Buckthorn	0	0	SNA	-
Agrimonia gryposepala	Tall Hairy Agrimony	2	2	S5	-
Fragaria virginiana	Wild Stawberry	2	1	S5	-
Geum canadense	White Avens	3	0	S5	-
Geum laciniatum	Rough Avens	4	-3	S4	-
Geum sp.	Avens Species	0	0	-	-
Geum urbanum	Clover-root	0	5	SNA	-

Scientific Name	Common Name (FOIBIS)	Coefficient of Conservatism	Wetness Index	S-Rank	Wellington
Malus sp.	Apple Species	0	0	-	-
Prunus serotina	Wild Black Cherry	3	3	S5	-
Rubus idaeus ssp. *strigosus*	Wild Red Raspberry	0	-2	S5	-
Rubus pubescens	Dwarf Raspberry	4	-4	S5	-
Spiraea alba	Narrow-leaved Meadow-sweet	3	-4	S5	-
Galium aparine	Cleavers	4	3	S5	-
Galium asprellum	Rough Bedstraw	6	-5	S5	-
Galium palustre	Marsh Bedstraw	5	-5	S5	-
Galium sp.	Bedstraw Species	0	0	-	-
Populus balsamifera ssp. *balsamifera*	Balsam Poplar	4	-3	S5	-
Populus deltoides ssp. *deltoides*	Eastern Cottonwood	-	-	S5	-
Populus tremuloides	Quaking Aspen	2	0	S5	-
Salix alba	White Willow	0	-3	SNA	-
Salix bebbiana	Bebb's Willow	4	-4	S5	-
Salix discolor	Pussy Willow	3	-3	S5	-
Salix eriocephala	Heart-leaved Willow	4	-3	S5	-
Salix exigua	Sandbar Willow	3	-5	S5	-
Salix fragilis	Crack Willow	0	-1	SNA	-
Salix petiolaris	Meadow Willow	3	-4	S5	-
Salix purpurea	Basket Willow	0	-3	SNA	-
Salix sp.	Willow Species	0	0	-	-
Acer negundo	Manitoba Maple	0	-2	S5	-
Acer platanoides	Norway Maple	0	5	SNA	-
Acer rubrum	Red Maple	4	0	S5	-
Acer saccharinum	Silver Maple	5	-3	S5	-
Acer saccharum var. *saccharum*	Sugar Maple	4	3	S5	-
Acer x *freemanii*	Freeman's Maple	-	0	S5	-
Mitella nuda	Naked Bishop's-cap	6	-3	S5	-
Tiarella cordifolia	Heart-leaved Foam-flower	6	1	S5	-
Chelone glabra	Turtlehead	7	-5	S5	-
Verbascum thapsus	Common Mullein	0	5	SNA	-
Veronica anagallis-aquatica	Brook-pimpernell	0	-5	SNA	-
Veronica officinalis	Common Speedwell	0	5	SNA	-
Smilax herbacea	Smooth Herbaceous Greenbrier	5	0	S4	-
Solanum dulcamara	Climbing Nightshade	0	0	SNA	-
Thelypteris palustris var. *pubescens*	Marsh Fern	5	-4	S5	-
Tilia americana	American Basswood	4	3	S5	-
Typha angustifolia	Narrow-leaved Cattail	3	-5	S5	-
Typha latifolia	Broad-leaf Cattail	3	-5	S5	-
Ulmus americana	American Elm	3	-2	S5	-
Ulmus pumila	Siberian Elm	0	5	SNA	-
Boehmeria cylindrica	False Nettle	4	-5	S5	-
Laportea canadensis	Wood Nettle	6	-3	S5	-
Pilea pumila	Canada Clearweed	5	-3	S5	-
Urtica dioica ssp. *gracilis*	Slender Stinging Nettle	2	-1	S5	-
Verbena hastata	Blue Vervain	4	-4	S5	-
Viola sororia	Woolly Blue Violet	4	1	S5	-
Viola sp.	Violet Species	0	0	-	-
Parthenocissus vitacea	Thicket Creeper	3	3	S5	-
Vitis riparia	Riverbank Grape	0	-2	S5	-

a - COSEWIC = Committee on the Status of Endangered Wildlife in Canada: END = Endangered, THR = Threatened, SC = Special Concern

b - Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario): END = Endangered, THR = Threatened, SC = Special Concern

c - SRANK (from Natural Heritage Information Centre) for breeding status if: S1 (Critically Imperiled), S2 (Imperiled),S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure) SNA (Not applicable…'because the species is not a suitable target for conservation activities'; includes non-native species); last updated approximately 2019

d - Draft Wellington County Vascular Plant List (Cecile 2017). Status only shown if: R = Rare, U = Uncommon

Appendix C

Vegetation Monitoring Plots Photo Log

Photograph 1. Plot 1 (looking west), July 26, 2024

Photograph 2. Plot 1 (looking east), July 26, 2024

Photograph 3. Plot 2 (looking north), July 26, 2024

Photograph 4. Plot 2 (looking west), July 26, 2024

Photograph 5. Plot 3 (looking east), July 26, 2024

Photograph 6. Plot 3 (looking south), July 26, 2024

Photograph 7. Plot 4 (looking east), July 2024

Photograph 8. Plot 4 (looking west), July, 2024

Photograph 9. Plot 5 (looking east), July 26, 2024

Photograph 10. Plot 5 (looking west), July 26, 2024

Photograph 11. Plot 6 (looking south), July 26, 2024

Photograph 12. Plot 6 (looking north), July 26, 2024

Appendix D

Breeding Bird Checklist (2024)

Appendix D

Breeding Bird Checklist (2024)

Common Name	Scientific Name	Status					2024-03-12 Incidentals	2024-03-13Incidentals	2024-04-01 Incidentals	2024-05-16 Incidentals	2024-09-17 Incidentals	June 5, 2024						June 21, 2024					
		National Species at Risk COSEWIC [a]	Species at Risk in Ontario Listing [b]	Provincial breeding season SRANK [c]	Wellington Regional Status [d]	Area-sensitive (OMNR) [e]						PCS #1	PCS #2	PCS #3	PCS #4	PCS #5	Incidentals	PCS #1	PCS #2	PCS #3	PCS #4	PCS #5	Incidentals
Double-crested Cormorant	*Phalacrocorax auritus*			S5							F												
Green Heron	*Butorides virescens*			S4							F												
Canada Goose	*Branta canadensis*			S5				F		1							F						2
Mallard	*Anas platyrhynchos*			S5												1							1
Ring-necked Duck	*Aythya collaris*			S5	S,R			F															
Killdeer	*Charadrius vociferus*			S5			X		X						1		1						1
Spotted Sandpiper	*Actitis macularia*			S5						F			1				F						
American Woodcock	*Scolopax minor*			S4			X																
Ring-billed Gull	*Larus delawarensis*			S5	S,R									F									
Belted Kingfisher	*Ceryle alcyon*			S4	S					F													
Downy Woodpecker	*Picoides pubescens*			S5									1							1			
Northern Flicker	*Colaptes auratus*			S4	S						F					F			1				
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4	S											1	1						1
Willow Flycatcher	*Empidonax traillii*			S5	S													1					
Great Crested Flycatcher	*Myiarchus crinitus*			S4										2					1	1	1		
Eastern Kingbird	*Tyrannus tyrannus*			S4	S							2					1	F					
N. Rough-winged Swallow	*Stelgidopteryx serripennis*			S4													1						F
Blue Jay	*Cyanocitta cristata*			S5										2		1		1		1			
American Crow	*Corvus brachyrhynchos*			S5									F	F	1					2			2
Black-capped Chickadee	*Poecile atricapillus*			S5							F		1				2		2	1		1	
Carolina Wren	*Thryothorus ludovicianus*			S4							F												
American Robin	*Turdus migratorius*			S5								2	1		2	1	1				2	2	2
Gray Catbird	*Dumetella carolinensis*			S4																1			2
Cedar Waxwing	*Bombycilla cedrorum*			S5											F		F	2					1
European Starling	*Sturnus vulgaris*			SE								F					1						F
Warbling Vireo	*Vireo gilvus*			S5								1						1					1
Red-eyed Vireo	*Vireo olivaceus*			S5													1						1
Yellow Warbler	*Setophaga petechia*			S5								2					2	2					
Pine Warbler	*Setophaga pinus*			S5	S	A											1					1	
American Redstart	*Setophaga ruticilla*			S5	S	A																	2
Northern Waterthrush	*Parkesia noveboracensis*			S5											1							1	
Common Yellowthroat	*Geothlyphis trichas*			S5								1		1		1	1	1	1	2		1	
Northern Cardinal	*Cardinalis cardinalis*			S5							F		2		1	1			1		1		2
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4	S																		1
Chipping Sparrow	*Spizella passerina*			S5																			1
Song Sparrow	*Melospiza melodia*			S5								2	2	1	1	1	5	2		2		3	5
Red-winged Blackbird	*Agelaius phoeniceus*			S4								4	2	2	1	2	2	2			2	3	6
Common Grackle	*Quiscalus quiscula*			S5								1									F		1
Brown-headed Cowbird	*Molothrus ater*			S4									1				1				F		
Baltimore Oriole	*Icterus galbula*			S4	S							1						1					
House Finch	*Haemorhous mexicanus*			SNA													1						

Common Name	Scientific Name	Status					2024-03-12 Incidentals	2024-03-13Incidentals	2024-04-01 Incidentals	2024-05-16 Incidentals	2024-09-17 Incidentals	June 5, 2024						June 21, 2024					
		National Species at Risk COSEWIC [a]	Species at Risk in Ontario Listing [b]	Provincial breeding season SRANK [c]	Wellington Regional Status [d]	Area-sensitive (OMNR) [e]						PCS #1	PCS #2	PCS #3	PCS #4	PCS #5	Incidentals	PCS #1	PCS #2	PCS #3	PCS #4	PCS #5	Incidentals
Pine Siskin	*Spinus pinus*			S4				F															
American Goldfinch	*Spinus tristis*			S5								F	F	F	F	F	2	1	1				1

KEY

a - COSEWIC = Committee on the Status of Endangered Wildlife in Canada: END = Endangered, THR = Threatened, SC = Special Concern

b - Species at Risk in Ontario List (as applies to ESA) as designated by COSSARO (Committee on the Status of Species at Risk in Ontario): END = Endangered, THR = Threatened, SC = Special Concern

c - SRANK (from Natural Heritage Information Centre) for breeding status if: S1 (Critically Imperiled), S2 (Imperiled),S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure) SNA (Not applicable…'because the species is not a suitable target for conservation activities'; includes non-native species); last updated approximately 2022

d - Significant Wildlife List for Wellington County from the City of Guelph Natural Heritage Strategy, Volume 2 (Dougan & Associates with Snell and Cecile 2009), last updated by the City of Guelph 2012. Status only shown if: S = Significant, R = Rare
Note that the following designations were excluded from this list:
** = Only habitats that support or have recently supported active nests should be considered significant;
† = Bank Swallow: Significant only when found nesting in colonies equal to or greater than 100. However, recent OBBA data for Wellington County should be reviewed to see if this is appropriate.
† = Cliff Swallow: Significant only when found nesting in colonies equal to or greater than 8. However, recent OBBA data for Wellington County should be reviewed to see if this is appropriate.
‡ = Being small and secretive, these species are often overlooked. When more information is collected, it is possible that they may not merit significant species status in the future.
o= Habitat protection should be considered only when larval habitat is present at or in close proximity to where adults were documented.
Δ = Considered significant at present, but may prove to be too common to be so regarded in the future.

e - Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide (Appendix G). 151 p plus appendices.

Beacon Breeding Status classifications:
- breeding pair
F- foraging/flyover
x- Species observed not breeding

wsp.com