HYDROGEOLOGICAL REPORT

LINKSVIEW DEVELOPMENT

TOWN OF COLLINGWOOD
SIMCOE COUNTY

PREPARED FOR:

WYVIEW GROUP

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
1 FIRST STREET, SUITE 200
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MARCH 2022

CFCA FILE NO. 1462-4989

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev. 0	August 18, 2020	Issued for 1st Submission.
Rev. 1	October 14, 2020	Issued for 2nd Submission.
Rev. 2	March 3, 2022	Issued for Draft Redline Submission.
Rev. 3	March 30, 2022	Issued for Redline Submission.

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1.0 Background

C.F. Crozier & Associates Inc. (Crozier) was retained by Wyview Group (Wyview) to prepare a Hydrogeologic Report in support of the Linksview Development located at 780 and 788 Tenth Line in the Town of Collingwood, in Simcoe County. The Linksview Development will henceforth be referred to as the subject lands. A site location plan is included as Figure 1.

Previous hydrogeological investigations have been undertaken on the subject lands. This hydrogeological report stands as a supplemental update in which more information has been collected surrounding the proposed stormwater management facility block as well as Phase 1 of the development which is to be located within the western third of the property. The extended coverage of monitoring wells has also aided in the development of site wide design constraints related to the seasonal high groundwater elevation.

Original Draft Plan Approval (DPA) for the Linksview Development was granted by the Town of Collingwood on June 27th, 2016. This supplemental update has been prepared to support the Redline Revision to the Draft Plan for the subject lands.

The majority of the property is currently vacant. There is a derelict house located on a small parcel of land at 788 Tenth Line which will be removed. The site currently has two access points to Tenth Line; one at each of 780 and 788 Tenth Line.

The elements envisioned for this development include:

- Single Detached – 309 lots
- Townhouses – 187 lots
- Apartments – 190 units
- School – 2.14 ha
- Stormwater Management Facility
- One Site Access to Tenth Line
- Secondary Emergency Access
- Internal Roads

Our review and work plan for this Hydrogeological Report was developed based on the Concept Plan dated December 2021 prepared by MHBC Planning Ltd.

We have also reviewed the pertinent background information associated with the Site, including:

- Memo – Testpit Observations (C.F. Crozier & Associates Inc., September 14, 2014)
- Geotechnical Investigation (Peto MacCallum Limited, October 2014)
- Preliminary Hydrogeological Assessment (SPL Consultants Limited, December 8, 2014)
- Hydrogeologic Report (C.F. Crozier & Associates Inc., October 2020)

2.0 Existing Conditions

2.1 Land Use

The subject lands are located on the west side of Tenth Line, approximately 320 m north of Sixth Line. The property is bounded on the north by Blue Mountain Golf & Country Club, on the south by municipal sports fields (Fisher Fields) and a Heritage Museum and open space to the west. On the east side of the property east of Tenth Line there is a residential development (Georgian Meadows).

Land uses in the area are largely Recreation (REC) coincidental with the golf course and sports fields, Rural (RU) to the south and west and Residential Third Density (R3) to the east per the Collingwood Zoning By-law April 12, 2010.

The subject lands are currently designated in the Town Collingwood Official Plan as Residential and the Zoning By-law as Residential (R3-40), Environmental Protection, Recreational and Community Services (CS-2).

2.2 Topography & Drainage

Regionally, topography and drainage are generally trending to the northeast towards the shore of Georgian Bay. The entirety of the subject lands are located within the tertiary South Georgian Bay Shoreline watershed. Locally, topography gradually slopes from the southwest corner of the site to the northeast with a relief change of approximately 21 m over a distance of about 1.5 km. The 1.4% gradient across the entire site appears to be uniform. Surface water drainage also appears to follow the same gradient with a few ephemeral streams being evident. On the adjacent property to the north, a tributary of Black Ash Creek follows the same trajectory and flows to the northeast.

2.3 Physiography

The site is located within the physiographic region known as the Simcoe Lowlands which Chapman and Putnam (1984) describe the "the lowlands bordering Georgian Bay and Lake Simcoe" and fall within two major divisions: the Simcoe basin to the east draining to Lake Simcoe, and the Nottawasaga basin draining into Nottawasaga Bay mostly via the Nottawasaga River. The site lies near the western terminus of the Simcoe Lowlands and is therefore within the Nottawasaga basin. To the west is the Beaver Valley Region and to the south is the Horseshoe Moraine Region.

The Nottawasaga basin was once part of the floor of Lake Algonquin so the materials at surface are generally deltaic and lacustrine type deposits and not glacial outwash. The site lies in the Stayner clay plain which is described as a considerably complex plain of low relief, partially beveled with pebbly till appearing at or near surface in some locations, other areas are solely comprised of calcareous clays (known as clay plains), and in some locations the clays are overlain with several feet of sand (known as sand plains).

There is a boundary between the two physiographic landforms known as plains on the property, the eastern portion of the site is located within the sand plains and the western portion is located within the clay plains (Figure 2).

2.4 Source Water Protection

The subject lands lie within the Nottawasaga Valley Source Protection Area and are governed by the Source Protection Plan's guiding policies which took effect in July 2015. According to index mapping, a Significant Groundwater Recharge Area (SGRA) with a Vulnerability Index Score of 4 (moderate) occupies approximately 90% of the site with the southeast and southwest corners being

the only coverage exception. However, no significant threats are associated with an SGRA index score of 4 and thus, for the subject property there are no legally mandated Source Protection policies that exist under Section 31 of the Clean Water Act.

While no significant threats to the SGRA exist, there are numerous activities identified in the Source Protection Plan that pose low to moderate threats to drinking water. The low to moderate threat activities have been identified below to ensure a best practices approach to development is adhered to:

- The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.
- The establishment, operation, or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act.
- The handling and storage of a dense non-aqueous phase liquid.
- The storage or application of agricultural source material to land.
- The handling, storage or application of commercial fertilizer to land.
- The handling, storage or application of non-agricultural source material to land
- The handling, storage or application of pesticide to land.
- The handling, storage or application of road salt.
- The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.
- The handling and storage of an organic solvent.
- The handling and storage of fuel.
- The management of runoff that contains chemicals used in the de-icing of aircraft.
- The storage of snow.
- The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard (O. Reg. 385/08, s. 3.).
- The establishment and operation of a liquid hydrocarbon pipeline.

No other threats to local drinking water are identified in the South Georgian Bay Lake Simcoe Source Protection Plan.

3.0 Geology

3.1 MECP Well Records

A review of provincial well records within a 500 m radius of the site was completed to support background research and confirm the findings of previous studies conducted in the study area. The review showed that 15 of the 27 wells were domestic and installed beyond a depth of 7 m into varying overburden and shale bedrock aquifer units. Domestic wells installed beyond approximately 12 m generally relied on the shale bedrock as its productive aquifer unit.

The average static water level was found to be 4.71 m. However, there were several (3) wells that demonstrated static water levels within 1 m of the ground surface including one directly to the south of the property that was installed in 2017.

Stratigraphy described within the MECP well records was in agreeance with previous studies. A summary table of the MECP wells can be viewed in Appendix B. Refer to Figure 3 for the MECP well location plan and the spatial distribution of historical wells around the site.

3.2 Regional

Geological mapping indicates that the surficial geology in the area includes the following types of materials:

- Coarse-textured glaciolacustrine deposits (sand, gravel, minor silt and clay)
- Ice-contact stratified deposits (sand and gravel, minor silt, clay and till)
- Fine-textured glaciolacustrine deposits (silt and clay, minor sand and gravel)
- Till (stone-poor, sandy silt to silty sand-textured till)

Refer to Figure 4 for the surficial geology in the study area.

3.3 Local

Previous investigations at the site concluded that the soils encountered at the site include the following formations (Peto MacCallum, 2014 & SPL, 2014):

- Stratified fine sand and silt at surface in the middle to mid-west portion of the site with varying amounts of sand and silt.
- Sand, fine to medium grained, some silt, encountered at surface in the western and eastern portions of the site and underlying the stratified sand and silt in the middle to mid-west portion of the of the site.
- Silt, with trace to some fine sand, encountered underlying the sand formation in the eastern portion of the site.
- Sandy silt to silty sand till encountered at depth in most locations throughout the site.

Crozier supervised the installation of fifteen total additional monitoring wells between 2020 and 2021 and the results are consistent with the summary above. Fine grained materials (brown), described by field staff as clayey sand or silty sand, were encountered at surface and silty sands to clayey silts (grey) were found at depth in all monitoring wells.

4.0 Field Work

4.1 Previous Investigations

The Geotechnical Investigation (Peto MacCallum Ltd., 2014) and the Preliminary Hydrogeological Assessment (SPL, 2014) identified the area around BH11 as having the potential for artesian conditions. Therefore, this region was selected for additional wells to further delineate the locally

isolated hydrogeologic feature. The Preliminary Hydrogeological Assessment completed by SPL was a desktop review of exiting information and no additional wells were installed as part of their work.

Figure 5 is a well location plan showing all wells, boreholes and testpits at the site including wells previously installed as part of the Peto MacCallum Geotechnical Investigation.

4.2 2020 Monitoring Well Construction

Crozier supervised the installation of seven monitoring wells complete with 50 mm diameter standpipes and well screens on the site on April 22 – April 24, 2020 at locations selected to fill existing gaps in information from the previous studies and to augment information around existing BH11.

Table 1 is a summary of the seven wells constructed as part of the 2020 investigation.

Table 1: 2020 Monitoring Well Details

Monitoring Well	Total Depth (m)	Screened Interval (m)	Material
MW1-20	6.10	3.05 – 6.10	Grey Silty Clay with Trace Gravel
MW2-20	6.10	3.05 – 6.10	Grey Clayey Silt with Trace Gravel
MW3-20	6.10	3.05 – 6.10	Brown Sand Till with Trace Gravel
MW4-20	6.10	3.05 – 6.10	Grey Silt Sand Till with Trace Gravel, Dense
MW5-20	6.10	3.05 – 6.10	Grey Silty Sand, Saturated
MW6-20	6.10	4.57 – 6.10	Grey Silty Sand, Saturated
MW7-20	5.18	3.05 – 4.57	Grey Silty Sand, Saturated

Most of the monitoring wells were completed to a depth of 6.10 m below grade with 3.05 m long #10 slot well screens with the exception to MW6-20 and MW7-20. Monitoring wells MW5-20 through MW7-20 were targeting a grey saturated silty sand layer located beneath a dense dry layer that acts as a confining layer to the underlying aquifer. MW6-20 and MW7-20 were constructed with shorter screens because the thickness of the aquifer until at these locations would not support the installation of a longer well screen.

Table 2 shows the top and bottom depths of the aquifer units at MW5-20 through MW7-20 as well as BH11 installed by Peto MacCallum Ltd. and the test pits installed under the supervision of Crozier.

Table 2: Aquifer Details

Identification	Depth to Top of Aquifer Unit (m)	Depth to Bottom of Aquifer Unit (m)	Notes
MW5-20	2.29	6.10	Bottom of unit not located.
MW6-20	3.20	6.10	Bottom of unit not located.
MW7-20	3.20	5.03	
BH11	2.90	6.60	Bottom of unit not located.
Test Pit #1	1.00	3.00	Bottom of unit not located.
Test Pit #2	1.80	5.20	
Test Pit #3	2.90	3.00	Bottom of unit not located.

4.3 2021 Monitoring Well Construction

Crozier supervised the installation of eight monitoring wells complete with 50 mm diameter standpipes and well screens on the site on May 25 – May 27, 2021 at locations selected to extend the coverage of monitoring well data to all areas intended for development.

Table 3 is a summary of the eight wells constructed as part of the 2021 investigation.

Table 3: 2021 Monitoring Well Details

Monitoring Well	Total Depth (m)	Screened Interval (m)	Material
MW1-21	6.38	3.33 – 6.38	Grey Sandy Silt with Trace Gravel, Dense
MW2-21	7.05	4.00 – 7.05	Grey Sand Silt Till with Trace Gravel, Dense
MW3-21	6.14	3.09 – 6.14	Brown Silty Sand with Trave Gravel, Wet
MW4-21	6.88	3.83 – 6.88	Grey Sand Silt Till with Trace Gravel, Dense
MW5-21	5.40	2.35 – 5.40	Grey Silty Sand with Trace Gravel, Wet
MW6-21	5.67	2.62 – 5.67	Grey Clay Silt Till with Trace Gravel, Wet
MW7-21	5.92	2.87 – 5.92	Grey Clay Silt Till with Trace Gravel, Moist
MW8-21	3.86	2.34 – 3.86	Grey Sand Silt Till with Trace Gravel, Dense

Most of the monitoring wells were completed to a depth of approximately 6.00 m below grade with 3.05 m long #10 slot well screens with the exception of MW8-21 which included a 1.53 m long #10 slot well screen.

Monitoring wells MW3-21 through MW7-21 encountered a grey saturated silty sand layer located beneath a dense dry layer similar to the wells installed in 2020. The dense till layer acts as a confining layer to the underlying aquifer unit. MW8-21 was constructed with a shorter screen due to borehole refusal.

4.4 Groundwater Monitoring

Following the installation and development of the 2020 wells, Crozier staff measured water levels in the seven monitoring wells to assess the seasonally high groundwater level. Water level monitoring was completed throughout the summer and fall months for a one-year period.

Following the installation and development of the 2021 wells, Crozier staff measured water levels in the eight monitoring wells to assess the seasonally high groundwater level and eight (8) automatic water level recording devices were deployed in the wells to record continuous water levels. Water level monitoring is ongoing and will continue through Spring 2022.

4.5 Hydraulic Conductivity Testing

Crozier completed hydraulic conductivity testing at all seven of the 2020 monitoring well locations. A slug of known volume was quickly lowered into the well to displace water and the resulting water level response was measured. Data loggers programmed to collect water levels at 1-minute intervals were installed prior to insertion of the slug and remained within the wells for the duration of testing. Manual water level readings were recorded during the testing to validate and confirm the accuracy of data logger values.

5.0 Results

5.1 2020 Groundwater Levels

Crozier staff manually measured water levels on May 4th, 2020 following construction and development of the monitoring wells as well as July 22, 2020. The water level monitoring results are included in Table 4.

Table 4: 2020 Groundwater Levels

	May 4, 2020		July 22, 2020	
Monitoring Well	**Water Level** (m bg)	**Water Level** (m asl)	**Water Level** (m bg)	**Water Level** (m asl)
MW1-20	2.55	197.88	2.79	197.64
MW2-20	3.17	197.60	3.38	197.39
MW3-20	3.98	197.78	3.97	197.79
MW4-20	3.26	199.45	1.26[2]	201.45
MW5-20	-0.24[1]	203.68	-0.02[1]	203.46
MW6-20	-0.85[1]	204.99	-0.07[1]	204.21
MW7-20	-0.62[1]	204.60	-0.31[1]	204.29

Notes: 1. Water level above grade.
2. MW4-20 was open and potentially filled with foreign material. Will be investigated further.

The water levels ranged from approximately 4.0 m below grade to 0.85 m above grade in 2020. The artesian conditions were encountered within the three wells installed around BH11 which was the only well that previously exhibited potentially artesian conditions.

Given that the water levels were measured in the spring conditions, it can be reasonably concluded that the water levels represent seasonally high groundwater levels at all locations.

The water levels observed within MW5-20, MW6-20 and MW7-20 indicate the potential for artesian conditions. It should be noted that the drilling logs completed by Crozier staff and attached in Appendix A indicate that the wells are constructed within confined aquifers overlain by dense fine-grained dry materials to depths of 2.28 m – 3.05 m. Therefore, it is anticipated that water would only be encountered when and if construction pierced the confining layer at a depth of 2.28 m to 3.05 m. This was previously confirmed by Crozier staff via test pit installation (September 2014) around BH11 which indicated that the material was dense and dry above the aquifer unit.

Previous monitoring completed by SPL from February 2014 through January 2015 showed that the water levels in BH11 fluctuated significantly throughout the spring, summer and fall months and artesian conditions were not observed at that time. It is assumed that the water levels measured by Crozier staff are seasonally high levels related to spring weather events and that the artesian conditions are not encountered year-round.

5.2 2021 & 2022 Groundwater Levels

Crozier staff manually measured water levels on March 27, 2021 following construction and development of the monitoring wells and have completed an additional four (4) rounds of groundwater monitoring in 2021 and 2022. The groundwater monitoring results are included in Table 5.

Table 5: 2021 & 2022 Groundwater Levels

	Mar. 27, 2021		Jun. 24, 2021		Aug. 4, 2021		Sept. 17, 2021		Feb. 10, 2022	
Monitoring Well	**Water Level** (m bg)	**Water Level** (m asl)	**Water Level** (m bg)	**Water Level** (m asl)	**Water Level** (m bg)	**Water Level** (m asl)	**Water Level** (m bg)	**Water Level** (m asl)	**Water Level** (m bg)	**Water Level** (m asl)
MW1-21	3.54	192.65	1.72	194.47	0.89	195.30	1.20	194.99	0.57	195.62
MW2-21	1.27	195.58	2.13	194.72	1.67	195.18	2.90	193.95	0.48	196.37
MW3-21	1.00	204.83	1.17	204.66	0.75	205.08	1.10	204.73	0.33	205.50
MW4-21	2.81	208.79	1.95	209.65	0.65	210.95	1.03	210.57	-0.21[1]	211.81
MW5-21	0.43	206.48	0.79	206.12	1.27	205.64	1.58	205.33	0.73	206.18
MW6-21	0.39	204.43	1.10	203.72	1.69	203.13	1.93	202.89	0.99	203.83
MW7-21	1.39	212.50	1.81	212.08	1.81	212.08	2.13	211.76	0.71	213.18
MW8-21	1.15	211.67	1.58	211.24	1.19	211.63	1.41	211.41	0.69	212.13

Notes: 1. Water level above grade.

As illustrated in Table 5, the water levels fluctuated seasonally and ranged from 3.54 m below grade in March 2021 to 0.21 m above grade in February 2022.

Eight continuous data loggers set to record on one-hour intervals were installed within the 2021 monitoring wells. Hydrographs for each well have been prepared using the data from the loggers and are included in Appendix C.

From the hydrographs, it is noted that water levels within all wells decreased gradually from late July 2021 to September 2021. A large spike in September corresponds with a large precipitation event (>90 mm) that was recorded on September 22, 2021 at the Collingwood Climate Station (Environment Canada, September 2021). Additional spikes in the hydrographs are attributed to other precipitation events based on Collingwood Climate Station Data.

It is anticipated that the water levels will continue to increase into Spring 2022 and the seasonally high groundwater elevations will trend similarly as those of Spring 2020 and 2021. Crozier will continue monitoring water levels though Spring 2022.

5.3 Groundwater Contour Mapping

Groundwater contour mapping (Figure 6) was created with the water level data from previous monitoring along with the additional water level data obtained as part of the 2020 and 2021 investigations. Given the presence of potential artesian conditions around BH11, the data was adjusted to respect the elevation of the confining layer and present a surface representative of actual groundwater elevations. This information indicates that groundwater flows from west to east at the site.

Figure 6 also shows an area around BH11 where the potential would exist for artesian conditions. If excavation during construction were to extend below the confining layer, there is the potential for artesian conditions to occur during seasonally high groundwater periods.

5.4 Hydraulic Conductivity Testing

SPL completed hydraulic conductivity testing in 2014 and found:

- K of the silt formation was approximately 1 x 10^{-6} cm/s (at BH1)
- K of the sand formation was approximately 5 x 10^{-4} cm/s (at BH11)
- K of the sandy till formation was approximately 1 x 10^{-7} cm/s (at BH13)

Testing was conducted at all seven of the monitoring wells by Crozier to determine an approximate value for hydraulic conductivity (k) of the native soils. Data loggers were installed to measure water levels at 5-second intervals during the testing. The results of the 2020 hydraulic conductivity testing are summarized in Table 6.

Table 6: Hydraulic Conductivity Values

Monitoring Well	Aquifer Material	Hydraulic Conductivity (cm/s)
MW1-20	Silty Clay	8.5 x 10^{-5}
MW2-20	Clayey Silt	1.0 x 10^{-4}
MW3-20	Sandy Till	3.9 x 10^{-5}
MW4-20	Silty Sand Dense Till	3.6 x 10^{-7}
MW5-20	Silty Sand	1.0 x 10^{-5}
MW6-20	Silty Sand	4.6 x 10^{-5}
MW7-20	Silty Sand	2.5 x 10^{-5}
BH1	Silt	1.0 x 10^{-6}
BH11	Sand	5.0 x 10^{-4}
BH13	Sandy Till	1.0 x 10^{-7}

The results of the testing were consistent with previous testing completed by SPL in 2014 which resulted in the hydraulic conductivities ranging from 1 x 10^{-7} cm/s to 1 x 10^{-6} cm/s at most of the site. The differences between the values observed at MW1-20 through MW3-20 and BH1 which are all in silty materials are relatively minor and considered to be a result of heterogenous conditions across the site. The calculated values for sandy till material at MW4-20 and BH13 are consistent

SPL determined a k value at BH11 of 5 x 10^{-4} cm/s at BH11 whereas the k value calculated in 2020 for monitoring wells MW5-20 through MW7-20, installed around BH11, ranged from 1.0 x 10^{-5} cm/s to 4.6 x 10^{-5} cm/s. The difference between SPL and Crozier hydraulic conductivity values are considered to be relatively minor and could be attributed to differences in testing and analysis methodologies and heterogeneity across the site. BH11 was considered to be within a sand aquifer whereas Crozier's interpretation of the materials encountered at MW4-20 through MW7-20 indicated that the material was a silty sand. The presence of silt at MW4-20 through MW7-20 could also explain the slightly lower hydraulic conductivity.

6.0 Conclusions and Recommendations

Based on the field work and analysis completed, we are prepared to make the following conclusions:

- The seasonally high ground water elevation at the site is expected to be below 1.50 m throughout most of the site.
- The seasonally high groundwater level in a small area located around BH11 may be artesian during the spring months but below grade for most of a typical year.
- Water would not be encountered in the area around BH11 unless excavation were to extend below to dry confining layer as evidenced by test pit construction previously completed by Crozier.
- Large scale dewatering during construction will likely not be required. Low rate sump pumping from open excavations to remove accumulated rainfall following rain events may be required.
- The hydraulic conductivity of the native soils is consistent with that of sandy silt and sandy clay materials.

Respectfully submitted,

Sincerely,

C.F. CROZIER & ASSOCIATES INC.

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CG/EF

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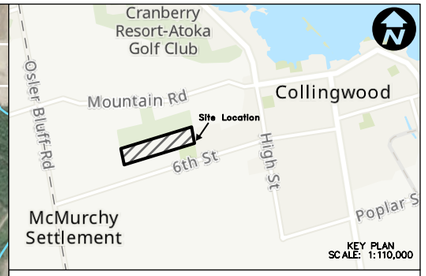
FIGURES



LEGEND

- Property Limits
- Road
- Watercourse
- Waterbody
- Street Name
- Watercourse Label

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Project

LINKSVIEW SUBDIVISION
TOWN OF COLLINGWOOD

Drawing

SITE LOCATION PLAN

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.
E.F./C.M.	C.G.	1462-4989
Date	Projection	Scale / Dwg.
2022-03-28	EPSG:26917	1:10,000 / FIG. 1

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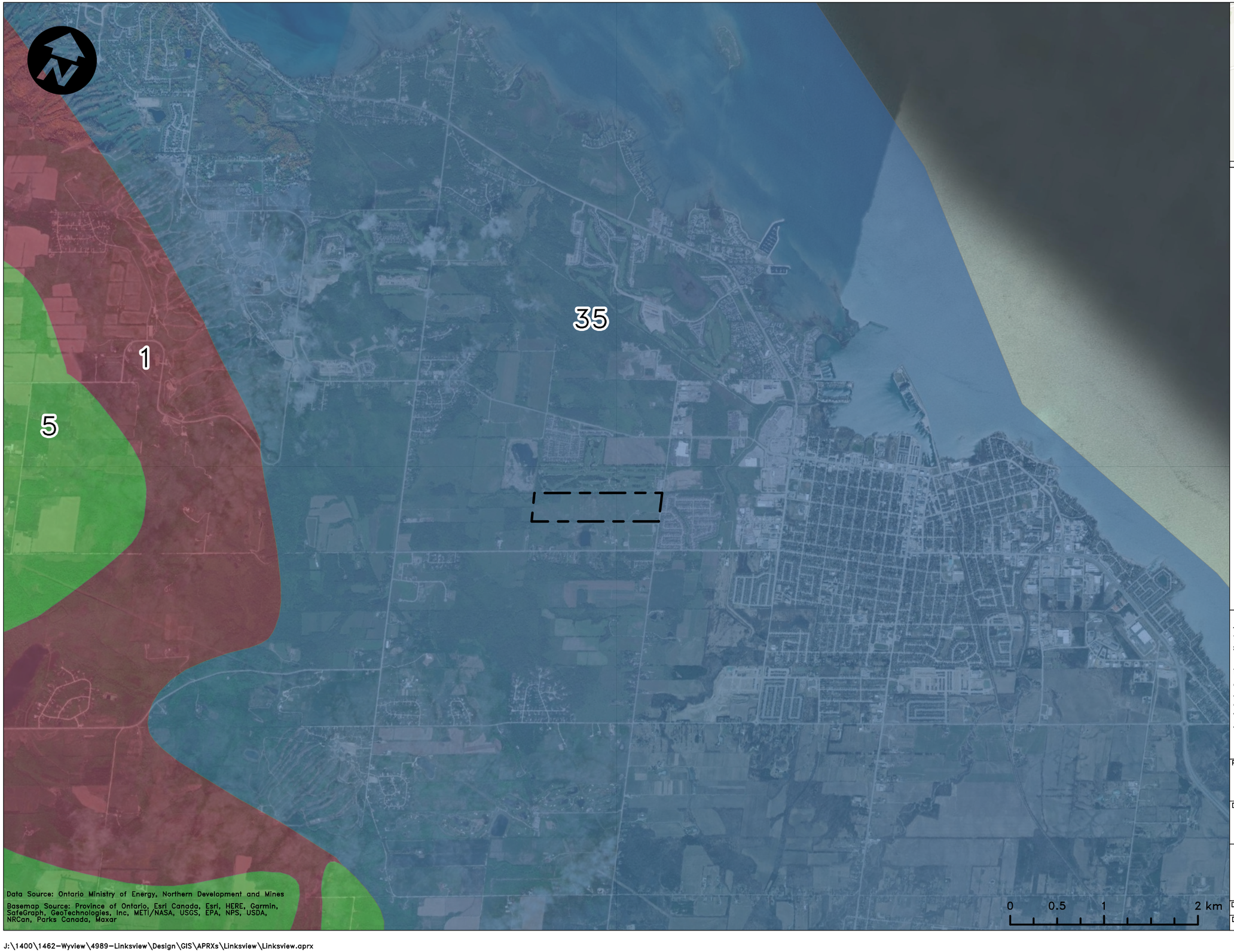

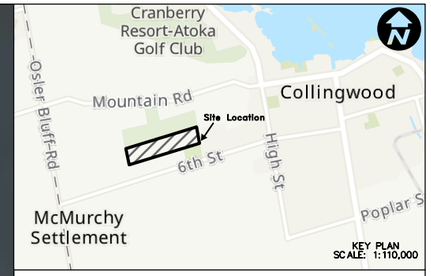

LEGEND

Property Limits

PHYSIOGRAPHIC REGION

- 1: Niagara Escarpment
- 5: Horseshoe Moraines
- 35: Simcoe Lowlands

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Drawing

PHYSIOGRAPHY

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E.F./C.M.	C.G.	1462-4989	
Date	Projection	Scale	Dwg.
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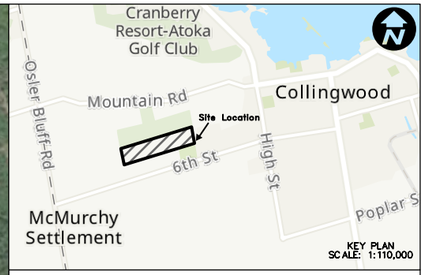

LEGEND

- Property Limits
- MECP Wells
- 12 Key Number - See Appendix B

Data Source: Ontario Ministry of Energy, Northern Development and Mines

Basemap Source: Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada, Maxar

DRAWING NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.

ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project

LINKSVIEW SUBDIVISION
TOWN OF COLLINGWOOD

Drawing

MECP WELL LOCATION PLAN

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.
E.F./C.M.	C.G.	1462-4989
Date	Projection	Scale / Dwg.
2022-03-28	EPSG:26917	1:7,000 / FIG. 3

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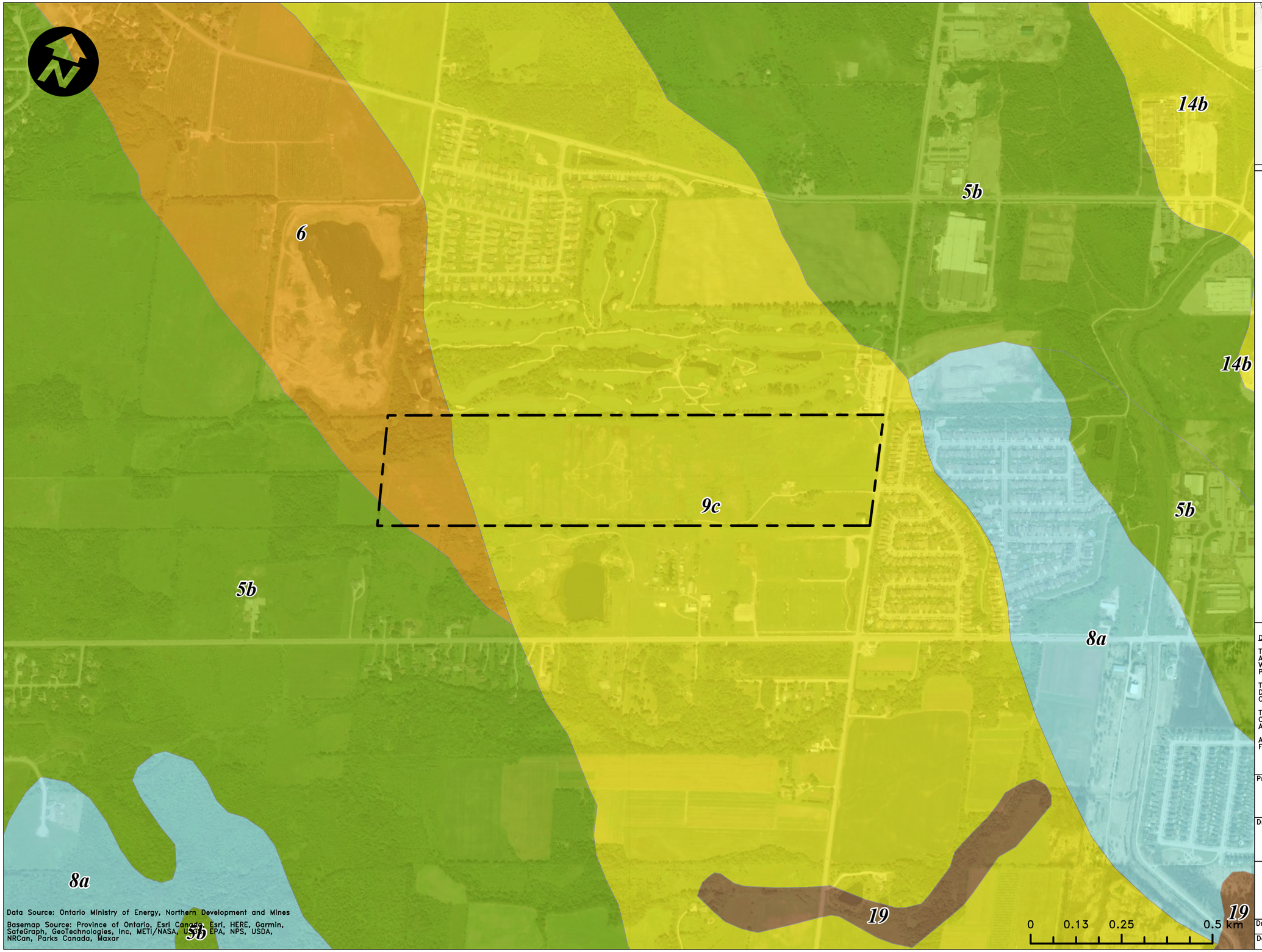

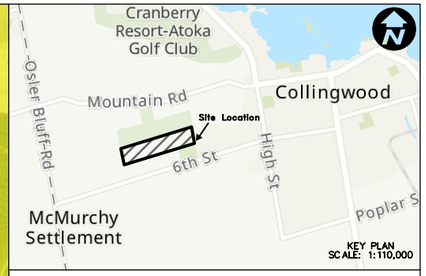

LEGEND

- Property Limits

Surficial Geology

- 19: modern alluvial sand and silt
- 14b: lacustrine sand, minor fine gravel
- 9b: glaciolacustrine sandy gravel
- 9c: glaciolacustrine sand, minor fine gravel
- 8a: glaciolacustrine silt, minor clay and sand
- 6: glaciofluvial sand and gravel
- 5b: sandy silt to silty sand glacial till
- 5d: clayey silt to silty clay glacial till
- 3: paleozoic bedrock

DRAWING NOTES:

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Project

LINKSVIEW SUBDIVISION
TOWN OF COLLINGWOOD

Drawing

SURFICIAL GEOLOGY

CROZIER
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Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.
E.F./C.M.	C.G.	1462-4989
Date	Projection	Scale / Dwg.
2022-03-28	EPSG:26917	1:10,000 / FIG. 4

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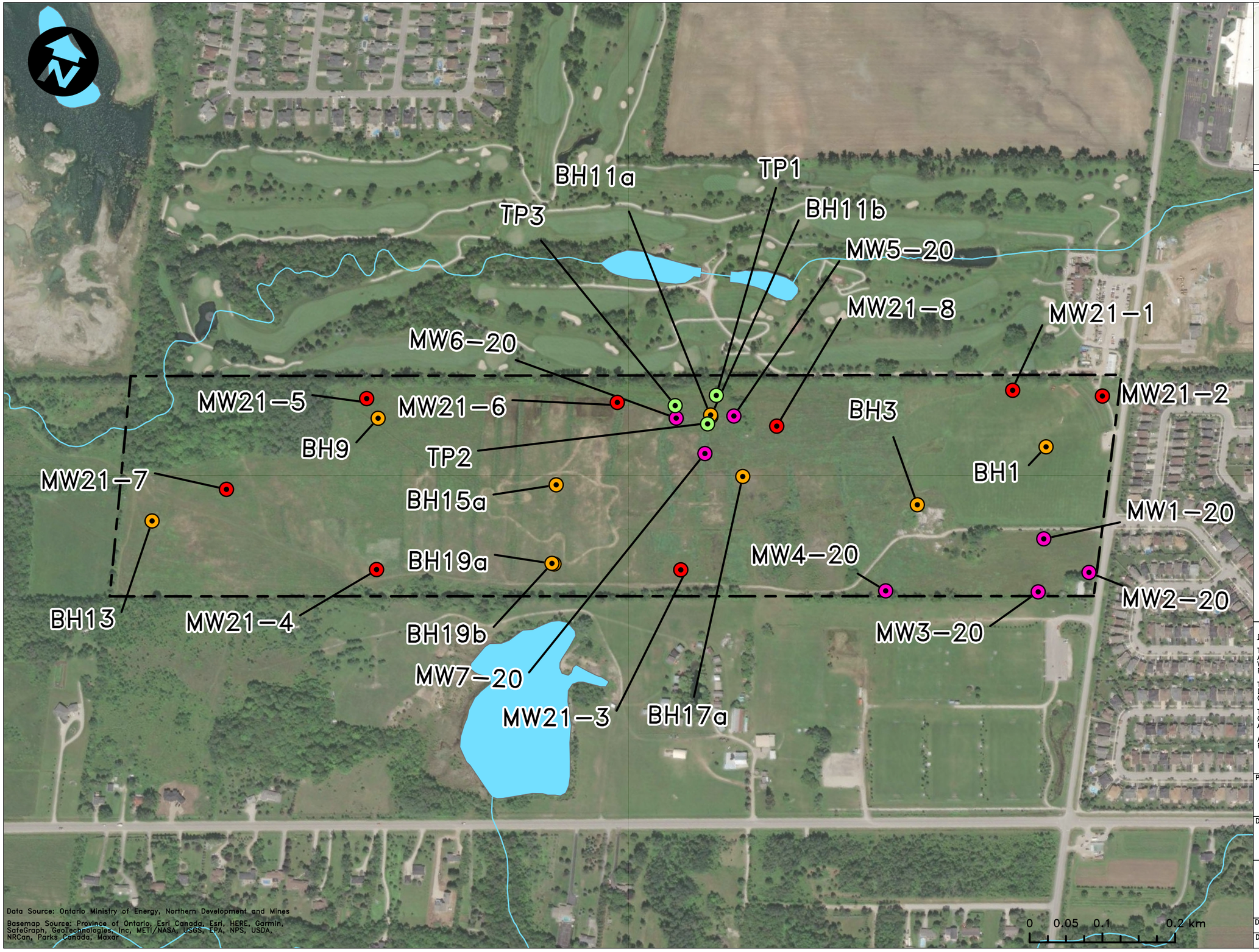

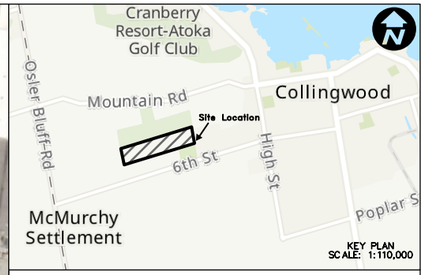

LEGEND

- Property Limits
- Watercourse
- Waterbody

Monitoring Locations

- 2020 Monitoring Well
- 2020 Borehole
- 2020 Test Pit
- 2021 Monitoring Well
- MW1-20 Well Label

Project

LINKSVIEW SUBDIVISION
TOWN OF COLLINGWOOD

Drawing

WELL LOCATION PLAN

CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.
E.F./C.M.	C.G.	1462-4989
Date	Projection	Scale / Dwg.
2022-03-28	EPSG:26917	1:5,000 / FIG. 5

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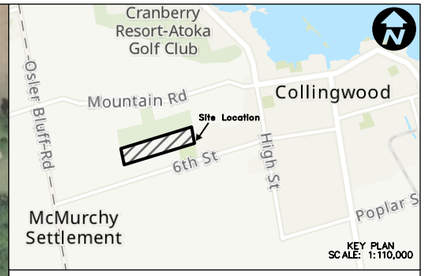

LEGEND

- Property Limits
- Top Unit Groundwater Contour (0.5m)
- Groundwater Contour (0.5m)
- Area of Potential Artesian Conditions
- 200 Top Unit Interpreted Groundwater Elevation (masl)
- 200 Interpreted Groundwater Elevation (masl)
- Interpreted Groundwater Flow Direction

DRAWING NOTES:

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Project

LINKSVIEW SUBDIVISION
TOWN OF COLLINGWOOD

Drawing

INTREPRETED GROUNDWATER CONTOUR MAPPING

CROZIER
CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

Drawn E.F./C.M.	Design C.G.	Project No. 1462-4989	
Date 2022-03-28	Projection EPSG:26917	Scale 1:4,100	Dwg. FIG. 6

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APPENDIX A

Monitoring Well Logs

CROZIER
CONSULTING ENGINEERS

WELL CONSTRUCTION REPORT

REPORT NO.: 1

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 0°C, Windy

DATE: 22-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:30am | OFF SITE: 5:00 pm

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 9:26am | END: 11:30am

SITE VISITORS: Chris Gerrits (C.F Crozier & Associates Inc.)

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.5	1 - Operator	8.5
Drill Rig	8.5	1 - Labourer	8.5

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #1	Just south of old residence Laneway approximately 100 meters west of Tenth Line.	County Road 9 and County Road 10 intersection

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (10ft)	1	2" Coupling	0
Riser (10ft)	1.2	Well Sand (50lbs Bag)	4
Steal Well Head	1	Hole Plug (50lbs Bag)	3

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:
0 - 1ft	Topsoil
1 – 7 ft	Brown sandy clay
7 – 18 ft	Grey Silty Clay with Trace Gravel
18– 20ft	Brown Clay

REMARKS:

Hole filled to 8 feet below surface with well sand. Eight feet to surface filled with hole plug. Hole was drilled twice as drill hit a rock.

CROZIER
CONSULTING ENGINEERS

WELL CONSTRUCTION REPORT

REPORT NO.: 2

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 0°C, Windy

DATE: 22-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:30am | OFF SITE: 5:00 pm

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 12:00pm | END: 1:36pm

SITE VISITORS: Chris Gerrits (C.F. Crozier & Associates Inc.)

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.5	1 - Operator	8.5
Drill Rig	8.5	1 - Labourer	8.5

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #2	South East Corner of Property	Adjacent to Tenth Line

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (10ft)	1	2" Coupling	0
Riser (10ft)	1.2	Well Sand (50lbs Bag)	8
Steal Well Head	1	Hole Plug (50lbs Bag)	3

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:
0 - 1ft	Topsoil
1 – 5 ft	Brown clayey sand
5 – 10 ft	Brown sand gravel mix (sand till)
10– 20ft	Grey Clayey silt with trace gravel

REMARKS:

Hole filled to 8 feet below surface with well sand. Eight feet to surface filled with hole plug.

WELL CONSTRUCTION REPORT

REPORT NO.: 3

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 0°C, Windy

DATE: 22-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:30am | OFF SITE: 5:00 pm

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 2:10pm | END: 2:55pm

SITE VISITORS: Chris Gerrits (C.F Crozier & Associates Inc.)

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.5	1 - Operator	8.5
Drill Rig	8.5	1 - Labourer	8.5

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #3	Adjacent to Well #1 at south property limit	100 meters west of Tenth Line at the south property limit.

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (10ft)	1	2" Coupling	1
Riser (10ft)	1.2	Well Sand (50lbs Bag)	8
Steal Well Head	1	Hole Plug (50lbs Bag)	4

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:
0 – 0.5ft	Topsoil
0.5 – 7 ft	Brown sand
7 – 13 ft	Grey Sandy Clay
13 – 20ft	Brown sand till with trace gravel

REMARKS:

Hole filled to 8 feet below surface with well sand. Eight feet to surface filled with hole plug.

WELL CONSTRUCTION REPORT

REPORT NO.: 4

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 0°C, Windy

DATE: 22-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:30am | OFF SITE: 5:00 pm

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 3:45pm | END: 4:45pm

SITE VISITORS: Chris Gerrits (C.F. Crozier & Associates Inc.)

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.5	1 - Operator	8.5
Drill Rig	8.5	1 - Labourer	8.5

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #4	Adjacent to south property line east of where the trail starts running along the south property line.	Adjacent to the south property line ¼ of the property length to the west of Tenth Line.

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (10ft)	1	2" Coupling	1
Riser (10ft)	1.2	Well Sand (50lbs Bag)	8
Steal Well Head	1	Hole Plug (50lbs Bag)	4

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:
0 – 1.5ft	Topsoil
1.5 – 5 ft	Brown silty sand
5 – 20 ft	Grey silt sand till with trace gravel (very dense and dry)

REMARKS:

Hole filled to 8 feet below surface with well sand. Eight feet to surface filled with hole plug.

WELL CONSTRUCTION REPORT

REPORT NO.: 5

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 3°C, Windy

DATE: 23-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:00am | OFF SITE: 6:30 pm

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 9:00am | END: 2:25pm

SITE VISITORS: Material Truck and Driver

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.5	1 - Operator	8.5
Drill Rig	8.5	1 - Labourer	8.5

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #5	20m east of existing well#11	Adjacent to the north property line 1/3 of the property length to the west of Tenth Line.

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (10ft)	1	2" Coupling	0
Riser (10ft)	1.2	Well Sand (50lbs Bag)	8
Steal Well Head	1	Hole Plug (50lbs Bag)	4

REMARKS:

Split spoons used on this hole to determine geology.

Hole was dug by 10:30am however did not start well construction till 1:15pm because Walker was waiting on supplies this time was deducted from the day.

Hole filled to 8 feet below surface with well sand. Eight feet to surface filled with hole plug.

Went from dry to saturated at 7.5' below surface.

CROZIER
CONSULTING ENGINEERS

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:	Split Spoons:
0 – 0.5 ft	Topsoil	1-3-3-10 **0 - 2ft**
0.5 – 5.5 ft	Brown wet silty sand	3-13-34-47 **2 – 4ft**
5.5 – 7.5 ft	Grey silt sand till with trace gravel (very dense and dry)	26-34-46-50 **5 - 7ft**
7.5 – 20 ft	Grey saturated silty sand	7-11-15-16 **7.5 – 9.5ft**
		8-9-11-15 **10 – 12ft**
		13-18-23-25 **15 – 17ft**

CROZIER
CONSULTING ENGINEERS

WELL CONSTRUCTION REPORT

REPORT NO.: 6

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 3°C, Windy

DATE: 23-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:00am | OFF SITE: 6:30pm

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 2:45pm | END: 5:30pm

SITE VISITORS: Material Truck and Driver

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.5	1 - Operator	8.5
Drill Rig	8.5	1 - Labourer	8.5

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #6	20m West of existing well#11	Adjacent to the north property line 1/3 of the property length to the west of Tenth Line.

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (5ft)	1	2" Coupling	0
Riser (10ft)	1.7	Well Sand (50lbs Bag)	3
Steal Above Ground Well Head	1	Hole Plug (50lbs Bag)	3

REMARKS:

Split spoons used on this hole to determine geology.

Hole was left without hole plug overnight and caved in from 13 feet to 6 feet by the morning.

Hole filled to 13 feet below surface with well sand. Six feet to surface filled with hole plug.

Went from dense dry layer to saturated sand layer at 10.5 ft.

CROZIER
CONSULTING ENGINEERS

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:	Split Spoons:
0 – 1 ft	Topsoil	1-2-2-4 **0 - 2ft**
1 - 2.5 ft	Damp Brown Silty Sand	8-20-24-38 **2 – 4ft**
2.5 – 5.5 ft	Dense Dry Brown Sandy Silt	
		16-28-30-31 **5 - 7ft**
5.5 – 10.5 ft	Dense Dry Grey Fine Sand Silt	13-29-37-33 **7.5 – 9.5ft**
		6-12-9-8 **10 – 12ft**
10.5 – 20 ft	Grey Saturated Silty Sand	5-8-10-11 **15 – 17ft**

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WELL CONSTRUCTION REPORT

REPORT NO.: 7

PROJECT #: 1462-4989 | PROJECT NAME: Linksview | WEATHER: 3°C, Windy

DATE: 24-April-2020 | CONTRACTOR: Walker Drilling LTD. | PHOTOS: No

LOCATION: Tenth Line - Collingwood | ON SITE: 8:00am | OFF SITE: 11:00am

CFCA REPRESENTATIVE: Justin L'Abbe | WELL SPECIFIC START: 8:30am | END: 10:24am

SITE VISITORS:

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	3	1 - Operator	3
Drill Rig	3	1 - Labourer	3

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #7	20m South of existing well#11	Adjacent to the north property line 1/3 of the property length to the west of Tenth Line.

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Slot – Screen (5ft)	1	2" Coupling	0
Riser (10ft)	1.2	Well Sand (50lbs Bag)	4
Steal Above Ground Well Head	1	Hole Plug (50lbs Bag)	2

REMARKS:

Split spoons used on this hole to determine geology.

Hole only dug to 15 ft and a 5-foot screen used.

Hole filled to 8 feet below surface with well sand. 8 feet to surface filled with hole plug.

Transitioned from dry grey fine sand to saturated silty sand at 10.5 ft.

CROZIER
CONSULTING ENGINEERS

GEOLOGY:

DEPTH:	SOIL CLASSIFICATION:	Split Spoons:
0 – 1 ft	Topsoil	2-1-3-5 **0 - 2ft**
1 - 2ft	Damp Brown Silty Sand	
2 – 3.5 ft	Dense Brown Sandy Silt	8-20-24-38 **2 – 4ft**
3.5 – 5.5 ft	Dense Dry Brown Silty Sand	
5.5 – 10.5 ft	Dense Dry Grey Fine Sand Silt with Trace Gravel	17-32-50-(50x4") **5 - 7ft** 19-(50x5.5") **7.5 – 8.5ft**
10.5 – 16.5 ft	Grey Saturated Silty Sand	14-29-34-34 **10 – 12ft** Weight of Hammer -2-17-15 **15 – 17ft**
16.5 – 17 ft	Dense Dry Grey Fine Silty Sand	

WELL CONSTRUCTION REPORT (WELL #21-1)

REPORT NO.: 1 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 10°C, Cloudy

DATE: May 25, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:00 AM

OFF SITE: 4:00 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 8:45 AM

WELL SPECIFIC END: 11:00 AM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.00	Operator (1)	8.00
Drill Rig	8.00	Assistant (1)	8.00

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-1	North East Corner of Site	~560 m N of Sixth St. C/L, ~32 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	1.2	Well Sand (50lbs Bag)	2.5
Well Cover	1	Bentonite (50lbs Bag)	2

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (8"). SAND: Brown, low moisture, consolidated W/ trace silt, gravel, and organics.
2-4 ft.	SILTY-SAND: Brown, moist, dense W/ some grey clayey-silt pockets.
6-8 ft.	SILTY-SAND: Grey, low moisture, very dense W/ some gravel and trace clay (6'). SILTY-SAND: Brown, low moisture, very dense W/ some gravel (8').
8-10 ft.	SILTY-SAND TILL: Grey, low moisture, very dense W/ some gravel.
10-12 ft.	SILTY-SAND TILL: Grey, low moisture, very dense W/ some gravel.
14-16 ft.	SILTY-SAND TILL: Grey, low moisture, very dense W/ some gravel.
18 ft.	SILTY-SAND TILL: Grey, low moisture, very dense W/ some gravel.
REFUSAL	

REMARKS:

- Sand pack at 8 ft.
- No water noted in bottom of borehole upon completion at 18 ft.
- Screen (10 ft.) installed at 18 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.25 Well Construction Log 21-1.docx

WELL CONSTRUCTION REPORT (WELL #21-2)

REPORT NO.: 2 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 10°C, Cloudy

DATE: May 25, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:00 AM

OFF SITE: 4:00 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 12:00 PM

WELL SPECIFIC END: 1:45 PM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.00	Operator (1)	8.00
Drill Rig	8.00	Assistant (1)	8.00

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-2	North-Central Side	~560 m N of Sixth St. C/L, ~155 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	1.2	Well Sand (50lbs Bag)	3.0
Well Cover	1	Bentonite (50lbs Bag)	2

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (10"). SAND: Medium, brown, moist, loose W/ trace silt, and organics.
2-4 ft.	SAND: Medium, brown, moist, dense. SILTY-SAND: Brown, low moisture, loose W/ trace silt and oxidative staining.
6-8 ft.	SANDY-SILT TILL: Brown-grey, moist, very dense, pliable W/ trace gravel. GRAVELLY-SILTY-SAND: Coarse, grey, moist, dense.
8-10 ft.	SANDY-SILT TILL: Grey, low moisture, very dense W/ trace gravel.
10-12 ft.	SANDY-SILT TILL: Grey, low moisture, very dense, pliable W/ trace gravel and clay.
14-16 ft.	SANDY-SILT TILL: Grey, low moisture, very dense, pliable W/ trace gravel and clay
18-20 ft.	CLAYEY-SILT TILL: Grey, low moisture, very dense, pliable W/ trace gravel and sand.
END	

REMARKS:

- Sand pack at 8 ft.
- No water noted in bottom of borehole upon completion at 20 ft.
- Screen (10 ft.) installed at 20 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.25 Well Construction Log 21-2.docx

WELL CONSTRUCTION REPORT (WELL #21-6)

REPORT NO.: 3 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 10°C, Cloudy

DATE: May 25, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:00 AM

OFF SITE: 4:00 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 2:00 PM

WELL SPECIFIC END: 4:00 PM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.00	Operator (1)	8.00
Drill Rig	8.00	Assistant (1)	8.00

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-6	North-Central Side	~560 m N of Sixth St. C/L, ~700 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	1.2	Well Sand (50lbs Bag)	3.0
Well Cover	1	Bentonite (50lbs Bag)	2

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (10"). SAND: Medium, brown, moist, loose W/ trace silt, gravel, and organics.
2-4 ft.	SAND: Medium, brown, moist, consolidated. SILTY-SAND: Medium, brown, moist, dense W/ some grey clayey-silt pockets.
6-8 ft.	SILTY-SAND: Brown-grey, low moisture, dense W/ some gravel.
8-10 ft.	SAND: Brown, wet, compact W/ some silt.
10-12 ft.	SAND: Brown, wet, compact W/ some silt.
14-16 ft.	SILTY-SAND TILL: Grey, low moisture, very dense W/ some gravel. SAND SEAM: Medium, grey, wet W/ some silt. SANDY-SILT TILL: Grey, moist, very dense, pliable W/ some clay.
18-20 ft.	SAND: Coarse, grey, wet W/ trace gravel and cobbles.
END	

REMARKS:

- Sand pack at 8 ft.
- Water noted in bottom of borehole upon completion at 20 ft.
- Water level rising at time of borehole completion, potentially artesian.
- Screen (10 ft.) installed at 20 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.25 Well Construction Log 21-6.docx

WELL CONSTRUCTION REPORT (WELL #21-5)

REPORT NO.: 4 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 8°C, Cloudy

DATE: May 26, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:00 AM

OFF SITE: 5:00 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 10:00 AM

WELL SPECIFIC END: 11:30 PM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.25	Operator (1)	8.25
Drill Rig	8.25	Assistant (1)	8.25

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-5	North-Central	~560 m N of Sixth St. C/L, ~1036 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	0.6	Well Sand (50lbs Bag)	2.0
Well Cover	1	Bentonite (50lbs Bag)	1.5

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (8"). SAND: Medium, brown, moist, loose W/ trace silt, gravel, and organics. SILTY-SAND: Brown-grey, moist, consolidated W/ trace clay.
2-4 ft.	SILTY-SAND: Brown-grey, moist, consolidated W/ trace clay.
6-8 ft.	SILTY-CLAY: Brown-grey, moist, dense, ductile W/ trace sand. SILTY-SAND: Medium-coarse, grey, moist, loose.
8-10 ft.	GRAVELLY-SAND: Grey, wet, loose.
10-12 ft.	SAND: Grey, wet, dense W/ trace silt.
14-16 ft.	GRAVELLY-SAND: Grey, wet, consolidated. SAND: Grey, wet, dense.
END	

REMARKS:

- Sand pack at 4 ft. Clay plug above.
- Water noted in bottom of borehole upon completion at 16 ft.
- Screen (10 ft.) installed at 14 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.26 Well Construction Log 21-5.docx

WELL CONSTRUCTION REPORT (WELL #21-7)

REPORT NO.: 5 of 8

PROJECT #: 1462-4989 | PROJECT NAME: Linksview Development | WEATHER: 8°C, Cloudy

DATE: May 26, 2021 | CONTRACTOR: Walker Drilling Ltd. | PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario | ON SITE: 8:00 AM | OFF SITE: 5:00 PM

CFCA REPRESENTATIVE: Evan Finbow | WELL SPECIFIC START: | END:

SITE VISITORS: None | 3:00 AM | 5:00 PM

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.25	Operator (1)	8.25
Drill Rig	8.25	Assistant (1)	8.25

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-7	South-West Corner	~317 m N of Sixth St. C/L, ~1237 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	0.6	Well Sand (50lbs Bag)	2.0
Well Cover	1	Bentonite (50lbs Bag)	1.5

CROZIER
CONSULTING ENGINEERS

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (2"). SAND: Medium, dark-brown, low moisture, compact W/ trace gravel, and organics. SILTY-SAND: Brown, low-moisture, compact W/ trace gravel.
2-4 ft.	SANDY-SILT: Brown-grey, moist, dense, pliable W/ trace clay. SAND: Medium-coarse, brown, low moisture, compact.
6-8 ft.	SAND: Medium-coarse, brown, moist, loose. SANDY-SILT: Brown, moist, dense, pliable W/ trace clay.
8-10 ft.	SANDY-SILT: Grey, moist, dense, pliable W/ trace clay. SAND: Medium-coarse, grey, moist, loose W/ trace gravel.
10-12 ft.	SAND: Medium-coarse, grey, moist, loose W/ trace gravel.
14-16 ft.	SAND: Medium-coarse, grey, moist, loose W/ trace gravel.
REFUSAL	

REMARKS:

- Sand pack at 6 ft. Clay plug above.
- No water noted in bottom of borehole upon completion at 16 ft.
- Screen (10 ft.) installed at 15 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.26 Well Construction Log 21-7.docx

WELL CONSTRUCTION REPORT (WELL #21-8)

REPORT NO.: 6 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 8°C, Cloudy

DATE: May 26, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:00 AM

OFF SITE: 5:00 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 12:00 PM

WELL SPECIFIC END: 2:30 PM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	8.25	Operator (1)	8.25
Drill Rig	8.25	Assistant (1)	8.25

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-8	South-West Corner	~480 m N of Sixth St. C/L, ~1280 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	1.2	Well Sand (50lbs Bag)	2.5
Well Cover	1	Bentonite (50lbs Bag)	2.0

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (8"). SAND: Medium, dark-brown, moist, loose W/ trace silt, gravel, and organics. SILTY-SAND: Brown-grey, moist, consolidated W/ trace clay.
2-4 ft.	SILTY-SAND: Brown-grey, moist, consolidated, pliable W/ trace clay.
6-8 ft.	SILT: Brown-grey, moist, consolidated, pliable W/ some clay and trace sand. SAND: Medium-coarse, wet, moist, loose, dilatant.
8-10 ft.	SANDY-SILT TILL: Grey, dry, very dense W/ some gravel.
END	

REMARKS:

- Sand pack at 6 ft. Clay plug above.
- Water noted in bottom of borehole upon completion at 10 ft.
- Screen (5 ft.) installed at 10 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.26 Well Construction Log 21-8.docx

WELL CONSTRUCTION REPORT (WELL #21-4)

REPORT NO.: 7 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 8°C, Cloudy

DATE: May 27, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:30 AM

OFF SITE: 1:30 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 9:45 AM

WELL SPECIFIC END: 11:30 AM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	5.00	Operator (1)	5.00
Drill Rig	5.00	Assistant (1)	5.00

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-4	South-West Mid Point	~337 m N of Sixth St. C/L, ~990 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	0.6	Well Sand (50lbs Bag)	2.0
Well Cover	1	Bentonite (50lbs Bag)	1.5

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	TOPSOIL (6"). SAND: Medium, dark-brown, dry, loose W/ trace gravel, and organics.
2-4 ft.	SAND: Medium, dark-brown, dry, loose W/ trace gravel, and organics. GRAVELLY-SAND: Grey, moist, compact W/ trace cobbles and oxidated layer.
6-8 ft.	SANDY-SILT: Grey-brown, wet, loose W/ some gravel and trace clay.
8-10 ft.	SANDY-SILT TILL: Grey, dry, very dense W/ some gravel and trace clay.
10-12 ft.	SANDY-SILT TILL: Grey, dry, very dense W/ some gravel and trace clay.
14-16 ft.	SANDY-SILT TILL: Grey, dry, very dense W/ some gravel and trace clay.
18-20 ft.	SANDY-SILT TILL: Grey, dry, very dense W/ some gravel and trace clay.
END	

REMARKS:

- Sand pack at 10 ft. Clay plug above.
- No water noted in bottom of borehole upon completion at 20 ft.
- Screen (10 ft.) installed at 20 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.27 Well Construction Log 21-4.docx

WELL CONSTRUCTION REPORT (WELL #21-3)

REPORT NO.: 8 of 8

PROJECT #: 1462-4989

PROJECT NAME: Linksview Development

WEATHER: 8°C, Cloudy

DATE: May 27, 2021

CONTRACTOR: Walker Drilling Ltd.

PHOTOS: No

LOCATION: 10th Line, Collingwood, Ontario

ON SITE: 8:30 AM

OFF SITE: 1:30 PM

CFCA REPRESENTATIVE: Evan Finbow

WELL SPECIFIC START: 9:45 AM

WELL SPECIFIC END: 11:30 AM

SITE VISITORS: None

EQUIPMENT & LABOUR ON SITE:	HOURS	EQUIPMENT & LABOUR ON SITE:	HOURS
Service Truck	5.00	Operator (1)	5.00
Drill Rig	5.00	Assistant (1)	5.00

WORK COMPLETED:

ITEM :	DESCRIPTION:	LOCATION:
Well #21-3	South-East Mid Point	~339 m N of Sixth St. C/L, ~562 m W of 10th Line C/L

MATERIAL USED:

ITEM:	QUANTITY:	ITEM:	QUANTITY:
Cone	1	J Plug	1
10 Foot Screen	1	Cement (Bag)	1
Riser (10ft)	0.6	Well Sand (50lbs Bag)	2.0
Well Cover	1	Bentonite (50lbs Bag)	1.5

CROZIER
CONSULTING ENGINEERS

GEOLOGY:

DEPTH:	SOIL CLASIFICATION:
0-2 ft.	GRAVELLY-SAND: Medium-coarse, grey-brown, dry, loose W/ trace silt, and organics.
2-4 ft.	SAND: Medium, grey-brown, moist, loose W/ trace silt, gravel, and organics.
6-8 ft.	SAND: Medium-coarse, brown, moist, loose W/ some gravel and trace silt.
8-10 ft.	SAND: Medium-coarse, brown, moist, loose W/ some gravel and trace silt.
10-12 ft.	SAND: Medium-coarse, brown, moist, loose W/ some gravel and trace silt.
14-16 ft.	SAND: Medium-coarse, brown, moist, loose W/ some gravel and trace silt.
18-20 ft.	SAND: Medium-coarse, brown, moist, loose W/ some gravel and trace silt.
END	

REMARKS:

- Sand pack at 10 ft. Clay plug above.
- No water noted in bottom of borehole upon completion at 20 ft.
- Screen (10 ft.) installed at 20 ft.

https://cfcrozier-my.sharepoint.com/personal/efinbow_cfcrozier_ca/Documents/Documents/Project Files/Hydrogeology/1462-4989 Greenwood Meadows/Well Construction Logs/2021.05.27 Well Construction Log 21-3.docx

APPENDIX B

MECP Well Records

MECP WATER WELL RECORDS

Project Number: 1462-4989
Address: 708 and 700 Tenth Line, Collingwood

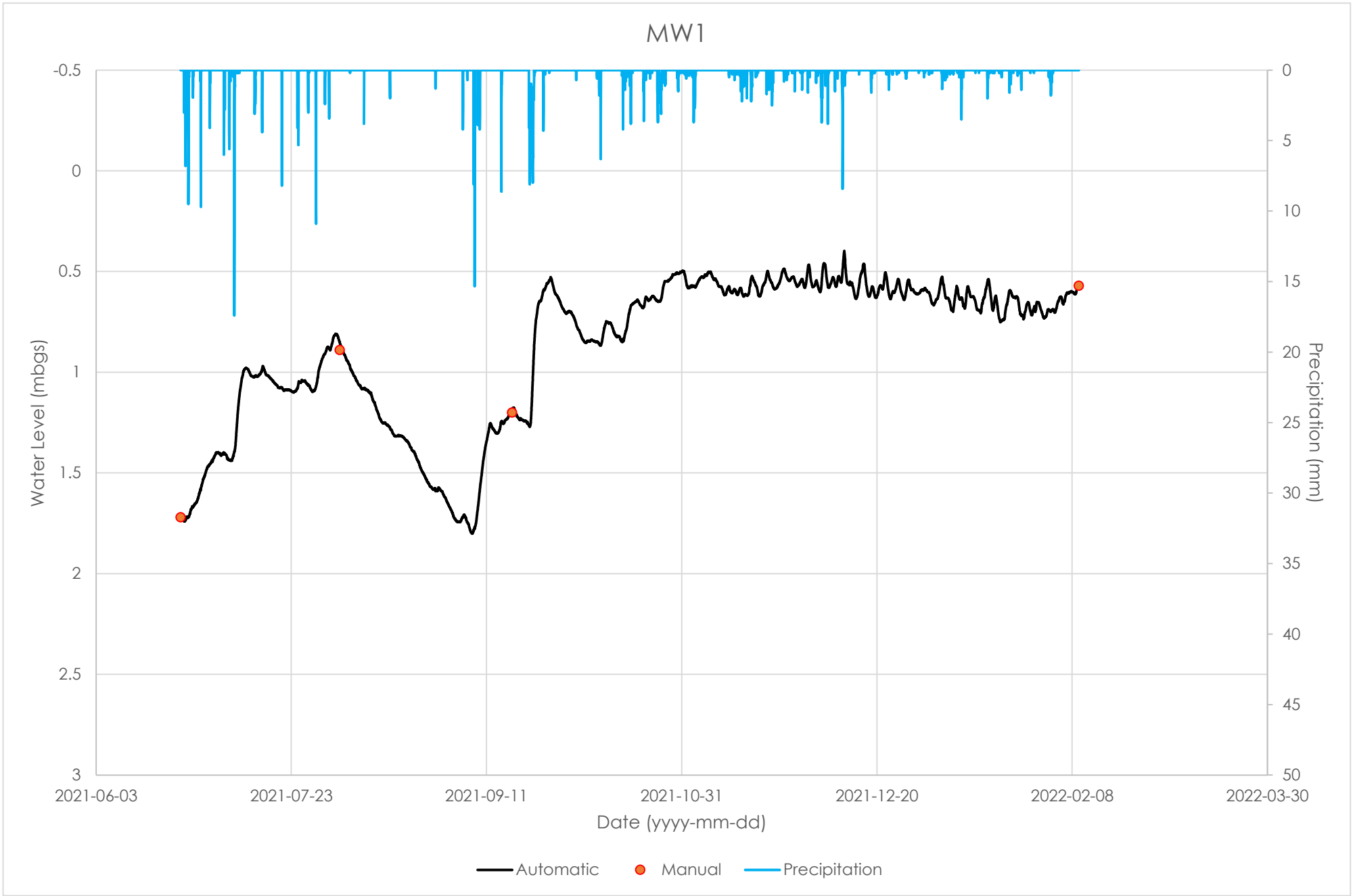
Prepared by: MD
Date completed: 2022-03-03

Well ID	Diameter (cm)	Depth (m)	Static Level (m)	Quantity (lpm)	Quality	Material / Notes	Aquifer[1]	Use	Date Completed
5702583	15.2	14.6	8.23	90.9	fresh, clear	sandy clay, gravel, limestone (29')	BR	industrial	04/11/1966
5702584	76.2	9.1	7.62	13.6	fresh, clear	sandy silt, sand	OB	domestic	09/05/1966
5702585	76.2	9.1	6.10	22.7	fresh, clear	sand, sandy gravel	OB	domestic	01/02/1967
5702586	10.2	17.4	-	-	-	sandy clay, till, clay	OB	abandoned	05/23/1960
5705505	76.2	9.4	3.05	9.1	fresh	gravel, sand	OB	domestic	06/03/1968
5705809	76.2	9.4	6.40	9.1	fresh,clear	stony clay	OB	domestic	07/16/1968
5705810	76.2	7.0	3.66	9.1	fresh, clear	sand, stony clay	OB	domestic	07/18/1968
5706248	76.2	9.4	6.10	9.1	fresh, clear	stony clay, sand	OB	domestic	04/24/1969
5708435	76.2	11.6	7.92	9.1	fresh, clear	clay, sand	OB	domestic	10/21/1971
5708890	12.7	30.8	-	-	-	clay, gravel, black shale (75')	BR	abandoned	06/03/1972
5708891	12.7	19.8	5.49	18.2	fresh, cloudy	clay, gravel, silt	OB	domestic	06/08/1972
5712648	15.2	14.9	0.91	36.4	fresh, clear	clay, sand, silt	OB	domestic	10/08/1975
5716117	15.2	17.7	4.88	22.7	fresh	sand, clay, gravel	OB	domestic	05/31/1979
5716118	15.2	21.9	-	-	-	gravel, clay, silt, shale (71')	BR	abandoned	06/18/1979
5716119	15.2	25.9	-	-	-	gravel, silt, clay, shale (70')	BR	abandoned	06/14/1979
5716120	15.2	23.2	-	-	-	clay, gravel, clay till, shale (74')	BR	abandoned	07/05/1979
5720404	15.2	7.0	0.61	27.3	fresh, clear	clay, gravel	OB	domestic	11/22/1985
5729499	15.2	14.6	7.32	9.1	fresh, clear	clay, gravel, shale (31')	BR	domestic	08/28/1992
7169657	15.2	23.2	1.22	18.2	fresh, clear	clay, gravel, shale (74')	BR	domestic	09/21/2011
7171429	15.2	39.6	-	-	-	clay, gravel, shale (75')	BR	abandoned	07/15/2011
7171430	15.2	29.0	-	-	-	clay, shale (69')	BR	abandoned	07/27/2011
7229665	-	-	-	-	-	-	-	-	06/30/2014
7269627	15.2	38.1	-	-	-	sand, clay, stones, limestone (20.1	BR	abandoned	-
7269628	15.2	68.6	-	-	-	sand, clay, gravel, limestone (19.5 m)	BR	abandoned	-
7271956	91.4	9.1	5.00	13.6	-	sand, clay	OB	domestic	08/13/2016
7289121	15.2	13.1	0.91	45.5	-	sand, clay, gravel	OB	domestic	02/08/2017
7370919	5.0	6.1	-	-	-	gravel, sand	OB	monitoring	09/22/2020

Data Source: Ministry of the Environment, Conservation, and Parks, retrieved March 3rd, 2022.
1. OB = Overburden Aquifer, BR = Bedrock Aquifer

APPENDIX C

Hydrographs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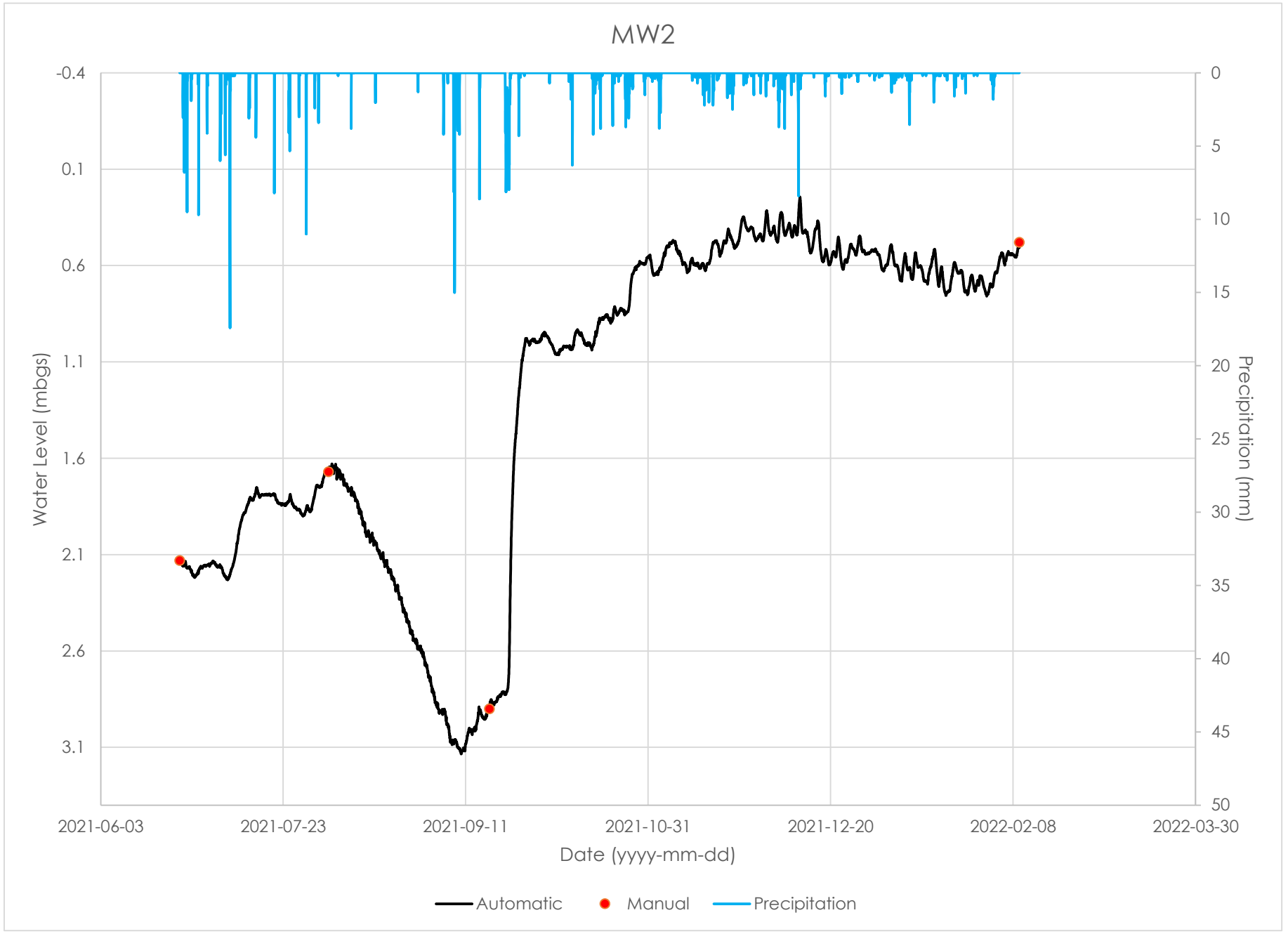
0.5
1
1.5
2
2.5
3
Water Level (mbgs)
0
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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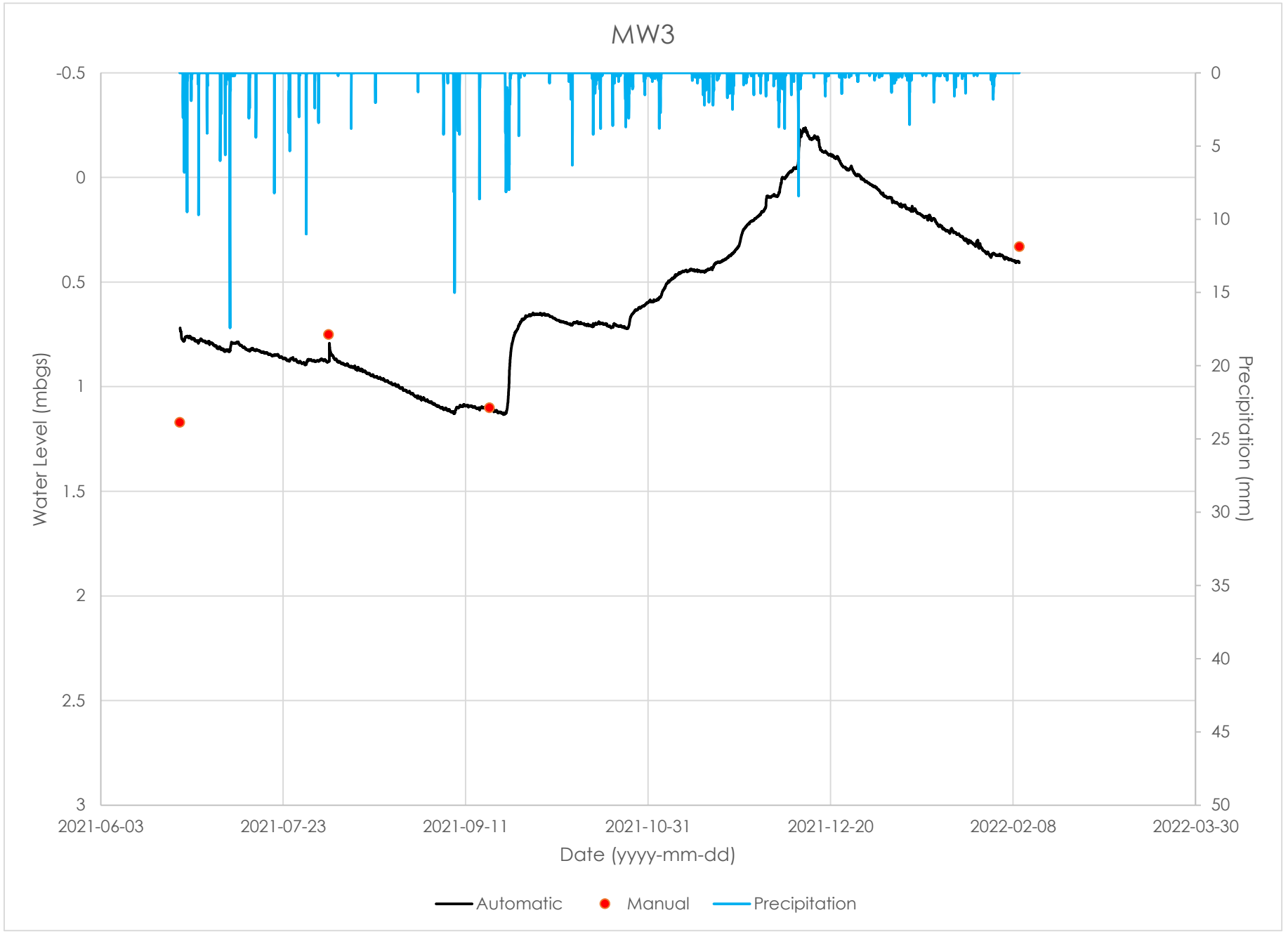
0.1
0.6
1.1
1.6
2.1
2.6
3.1
Water Level (mbgs)
0
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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0.5
1
1.5
2
2.5
3
Water Level (mbgs)
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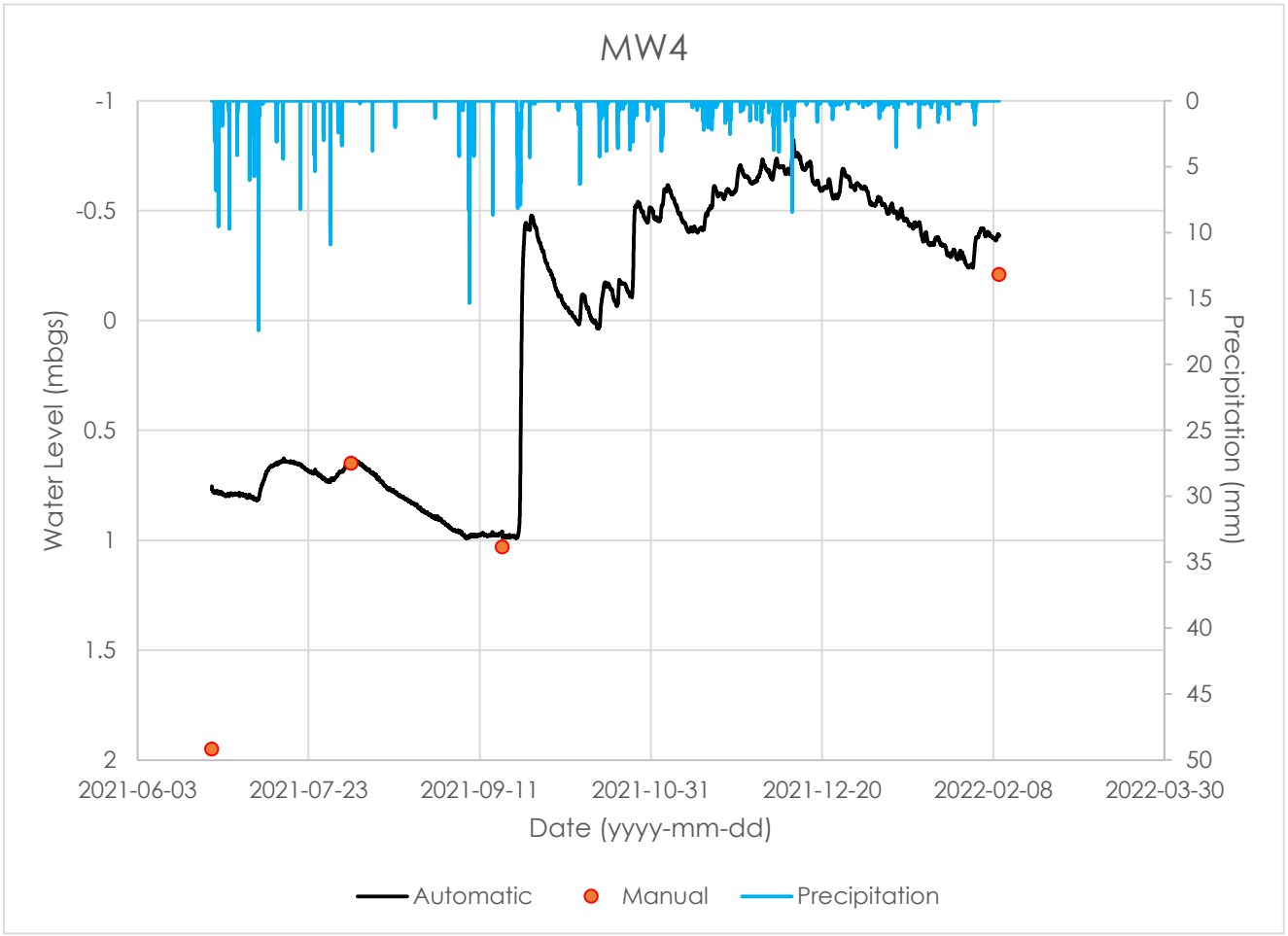
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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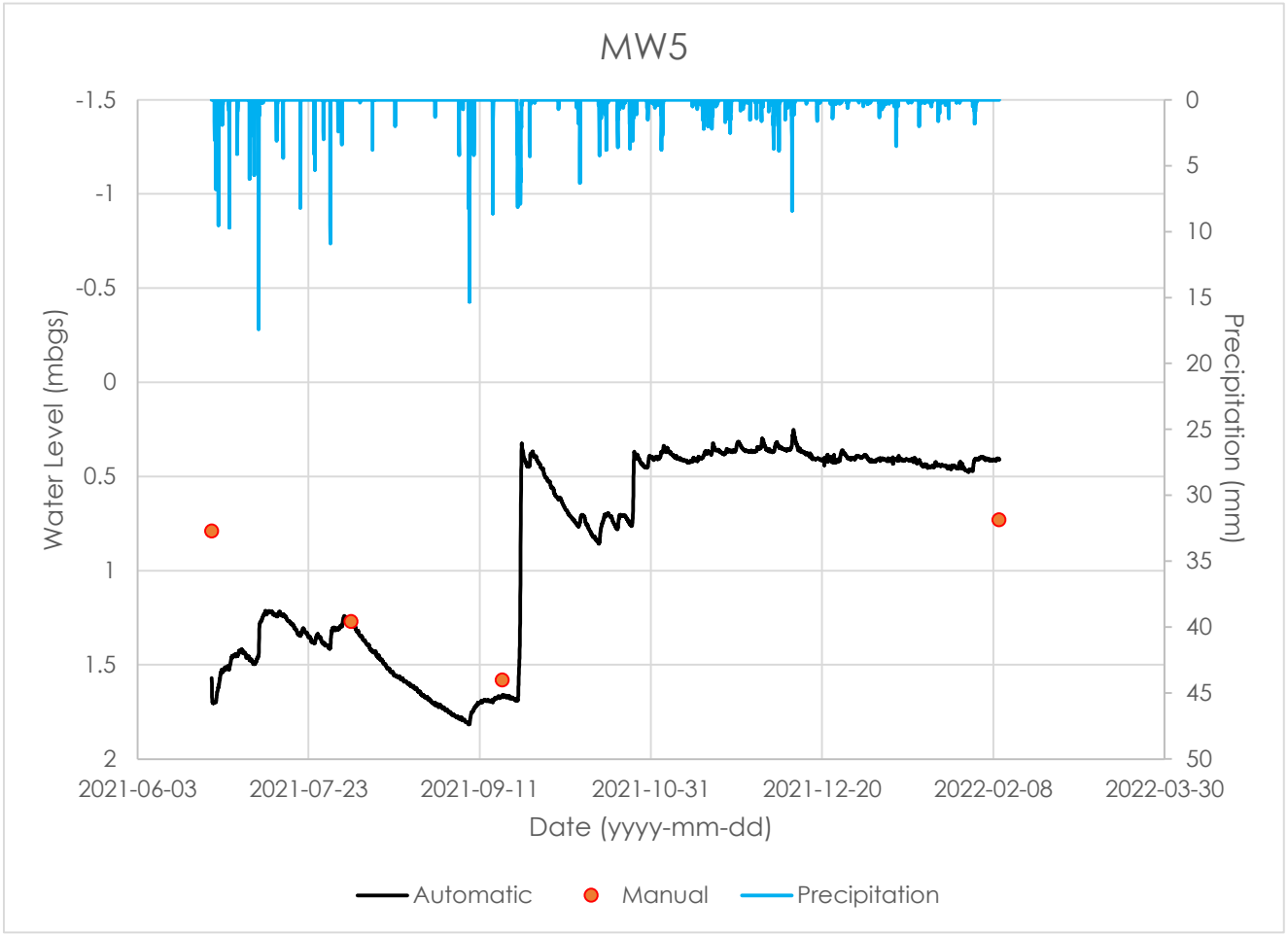
-0.5
0
0.5
1
1.5
2
Water Level (mbgs)
0
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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-0.5
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0.5
1
1.5
2
Water Level (mbgs)
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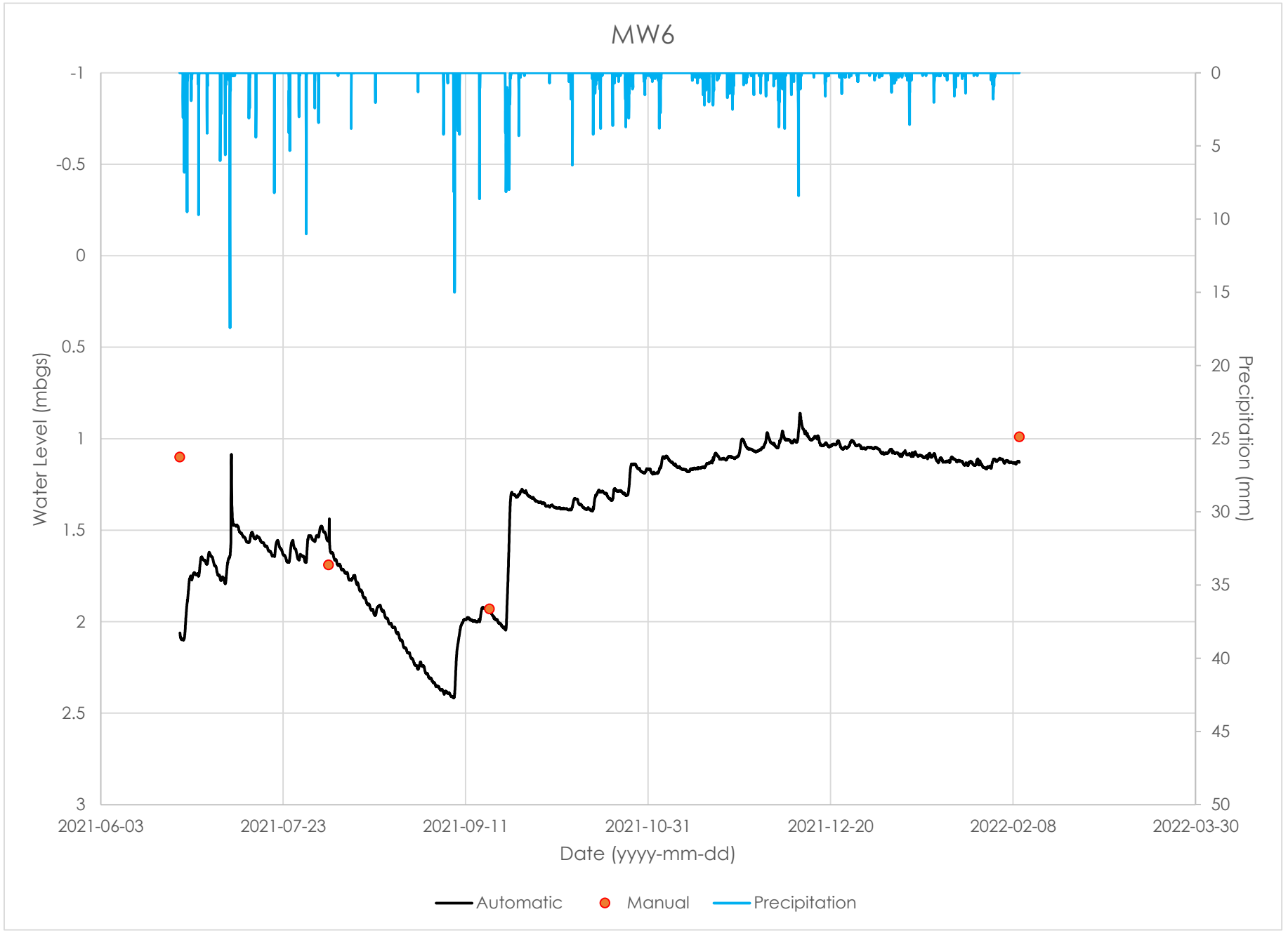
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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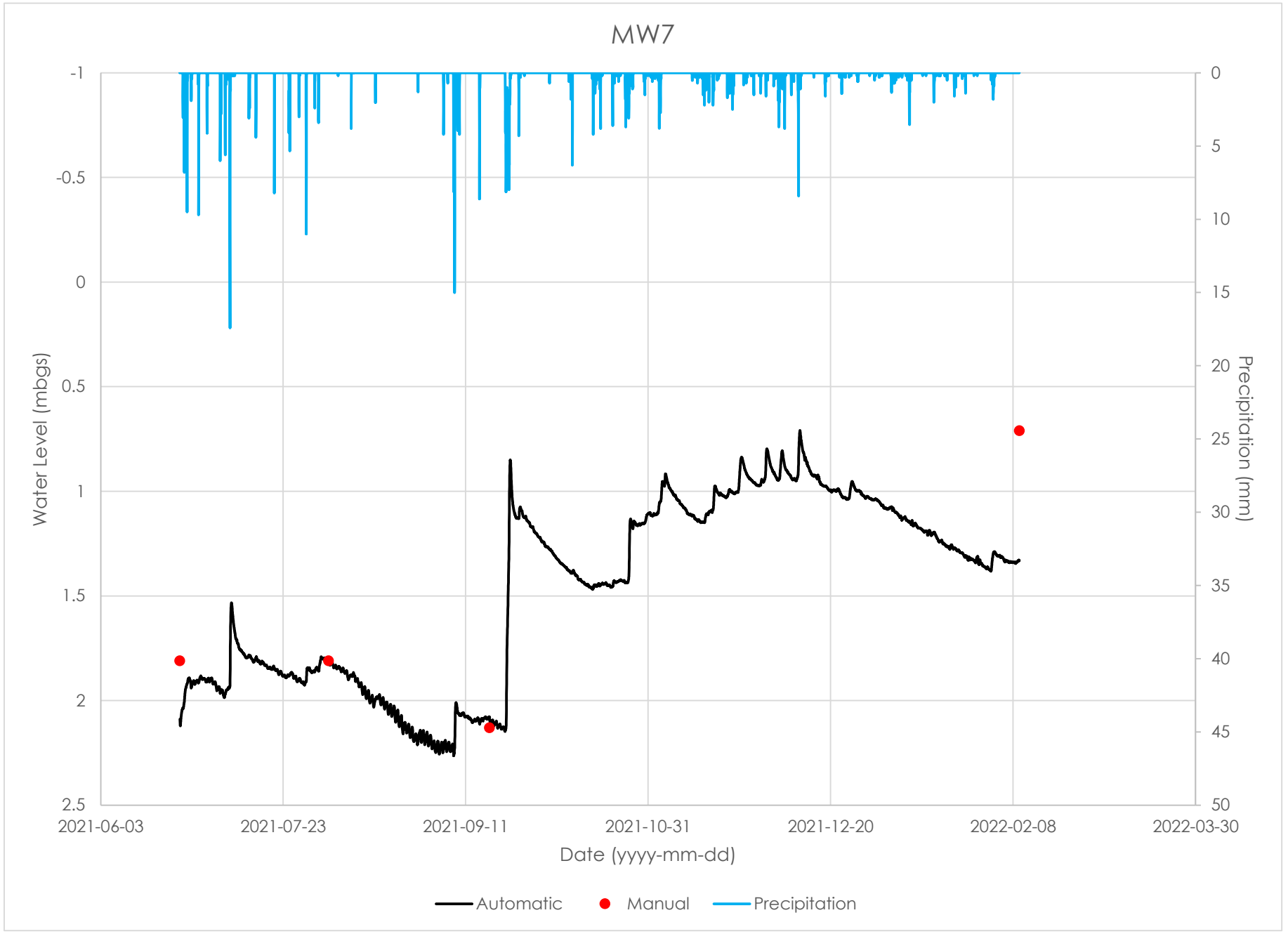
0
0.5
1
1.5
2
2.5
3
Water Level (mbgs)
0
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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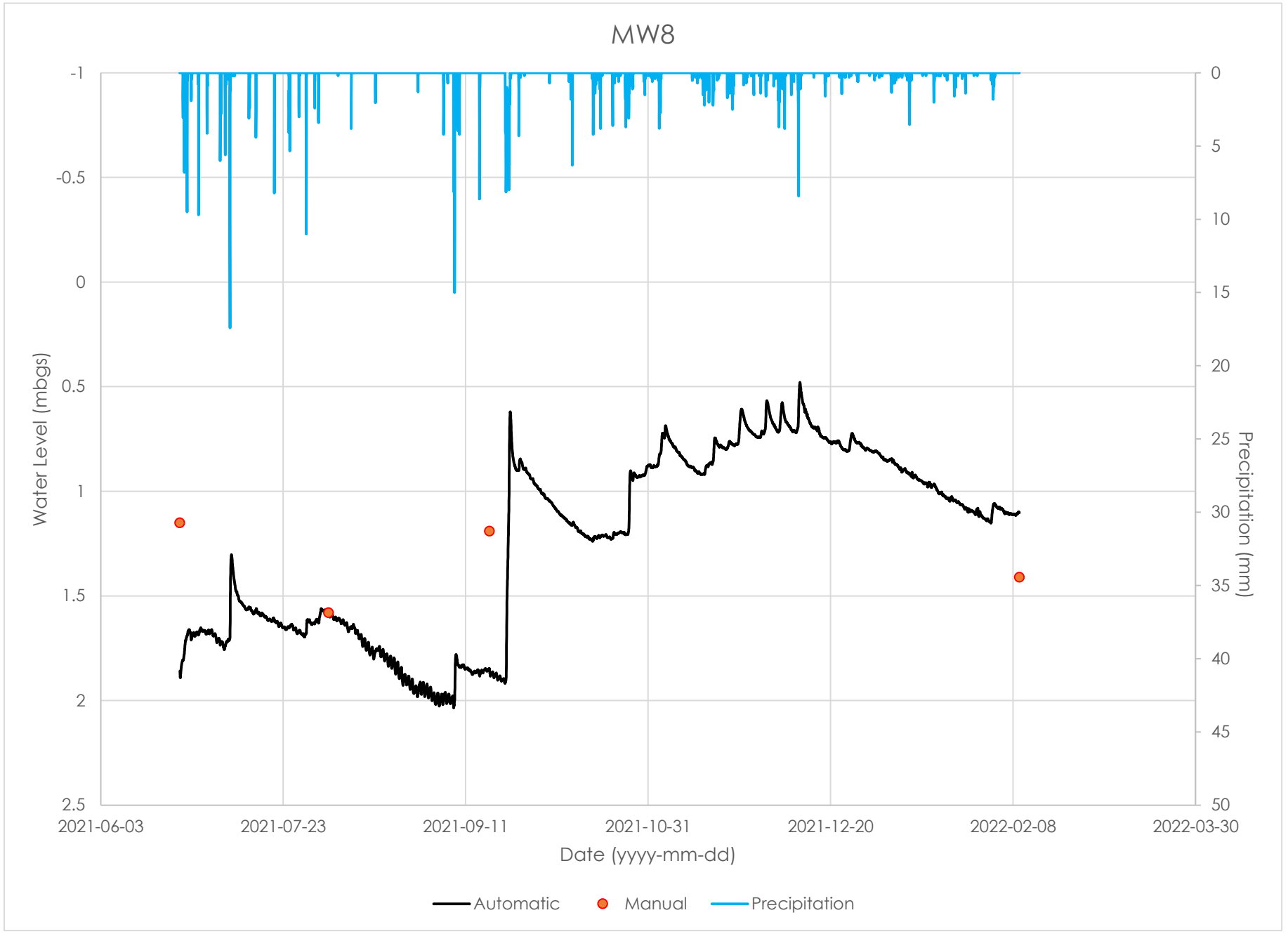
0
0.5
1
1.5
2
2.5
Water Level (mbgs)
0
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation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0.5
1
1.5
2
2.5
Water Level (mbgs)
0
5
10
15
20
25
30
35
40
45
50
Precipitation (mm)
2021-06-03
2021-07-23
2021-09-11
2021-10-31
2021-12-20
2022-02-08
2022-03-30
Date (yyyy-mm-dd)
Automatic
Manual
Precipitation