

August 7, 2024
Project No. 2401738

ATTN: Carley Dixon
R.J. Burnside & Associates Limited
15 Townline
Orangeville, ON L9W 3R4

**Re: Draft Plan of Subdivision Application S1-14 and Zoning By-Law Amendment Z5-14
Groundwater Level Monitoring Report
Marsville North Subdivision, Township of East Garafraxa**

Dear Ms. Dixon,

In response to the comments received on September 30, 2022, which requested groundwater level monitoring data be provided in the form of hydrographs, we offer the following to satisfy this request.

Background

GEI Consultants Canada Ltd. (formerly GM BluePlan Engineering Limited) was retained by Thomasfield Homes to provide hydrogeological services in regards to the proposed development of lands into a residential subdivision (referred to as the Marsville North Subdivision). The proposed subdivision is anticipated to consist of 30 single-detached units, park space, a stormwater management block, and associated roadways.

The subject Site is located within the Township of East Garafraxa with the civic address 191384 13th Line Road and is further described as Part of lot 6, Concession 13 of the Geographic Township of East Garafraxa. The Site occupies an area of approximately 9.73 hectares (approximately 24 acres) and is currently undeveloped agricultural lands. The reader is referred to other reports prepared by GM BluePlan and other consultants for further details regarding existing site conditions and the hydrogeological characterization of the Site.

This letter provides groundwater level monitoring data as requested by reviewers R.J. Burnside & Associates Limited (2022) in Comment #7 of their letter dated September 30, 2022:

An updated hydrogeology tech memo should be submitted documenting the groundwater hydrographs measured between Feb. 2020 and Dec. 2021. The levels noted in the table included in the JLP Consultants letter dated April 4, 2022 have not been documented and reviewed.

Groundwater Monitoring

On January 10, 2020, JLP Services Inc (formerly VA Wood Inc.) advanced 6 boreholes as part of the Geotechnical Investigation to support the development of the proposed residential subdivision. Each borehole was equipped with a 2" Ø monitoring well (MW-01 to MW-06). The locations of these monitoring wells and the associated borehole logs are provided in Appendix A.

For the purposes of supporting the development and approvals process, GEI Consultants conducted continuous groundwater level monitoring at these JLP monitoring wells. On February 11, 2020, GEI visited the Site to collect water levels and install dedicated dataloggers manufactured by Solinst Canada in each of the six (6) monitoring wells. The dataloggers are described as self-contained pressure transducers which have been set to record the pressure of the water column above the unit at a frequency of once every four hours. The dataloggers were set to begin recording on the day of installation (i.e., February 11, 2020). The data was collected through to May 30th, 2024. It is noted the data record for MW-01 does not extend past November 11, 2023, which is the second most recent monitoring event. This is because on the April 9, 2024 visit the data for logger MW-01 was irretrievable.

The groundwater level data has been presented in the form of hydrographs enclosed within Appendix B.

Discussion

From the data collected, the following observations have been made regarding the trends in the groundwater level:

- During the late winter months and into the spring, the groundwater level at monitoring well MW-03 was observed to be at ground surface. This is not considered to be indicative of groundwater discharge but rather due the presence of water (e.g., precipitation, snowmelt, ponding in microtopography) in excess of the capacity of the soil to permit infiltration, resulting in groundwater levels rising to ground surface. A similar phenomenon is observed at MW-06, though the high groundwater levels are less persistent at that location compared to MW-03.
- Monitoring wells MW-01 and MW-04 exhibited considerably lower groundwater levels than the other monitoring wells on site. This is inferred to be due to the proximity of the bottom of these wells to the underlying sand aquifer, which provides drainage to the overlying silt aquitard. This is evidence that the Site exhibits recharge (rather than discharge) conditions.
- The contrast in groundwater levels between the two sets of wells described above (i.e., MW-03 and MW-06 versus MW-01 and MW-04) indicate that the predominantly-silt soils of the shallow overburden are of relatively low hydraulic conductivity compared to the underlying sand and allow the development of a perched water table.
- The groundwater was generally observed to be at higher elevations along the south property boundary (i.e. MW-05 and MW-06) and slightly lower at the north property boundary (i.e. MW-02 and MW-03).
- Throughout the monitoring period, the maximum groundwater level observed was approximately 487.7 metres above sea level (masl); observed at monitoring well MW-05 located near the midpoint of the southern boundary of the Site.

- In terms of seasonal trends from year-to-year, the groundwater level was generally highest across the Site during the winter and spring months, and gradually declined during the summer months. The groundwater level in the aquitard was observed to fluctuate 3.5 to 4.5 m vertically between high and low periods.

Closing


We trust this letter provides the information that has been requested by the reviewer. Should further information be needed, please do not hesitate to contact the undersigned.

Sincerely,

GEI CONSULTANTS CANADA LTD.



Matthew Long, M.Eng., P.Eng.
Senior Project Engineer



Abdirahman Faarah, P.Geo.
Project Geoscientist

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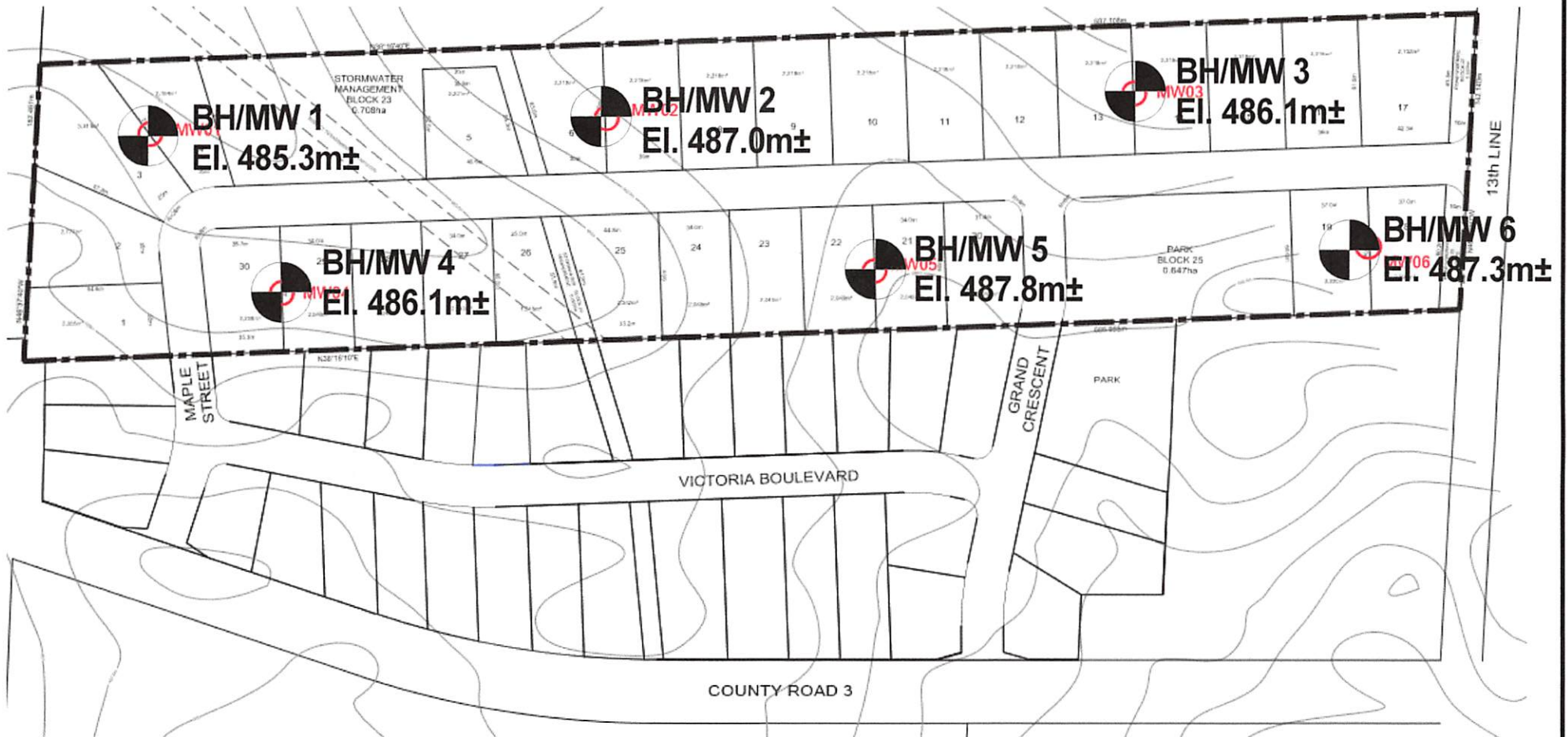
Appendices

- Appendix A JLP Services Monitoring Well Plan Figure and Borehole Logs
- Appendix B Hydrographs (MW-01 to MW-06)

REFERENCES


R.J. Burnside & Associates Limited. 2022. Letter re: Marsville North, Owner Thomasfield Homes Limited, Application for Draft Plan of Subdivision 22T-141585 & Zoning By-Law Amendment, 2nd Submission, Project No.: MSO020868.0000. Dated September 30, 2022. Addressed to Sue Stone, Township of East Garafraxa.

Appendix A JLP Services Monitoring Well Plan Figure and Borehole Logs



Notes:

1. Borehole Ground Elevations provided by GM BluePlan Engineering Ltd.
2. The stratigraphy referred to in the report is based on the data from the boreholes supplemented by geological data where available. The actual stratigraphy between and beyond the boreholes may vary. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.

 <p>V.A. WOOD (GUELPH) INC. Consulting Geotechnical Engineers</p> <p>405 York Road, Guelph, Ontario N1E 3H3 Ph. (519) 763-3101 Fax. (519) 763-5912</p>	<p>Borehole/Monitoring Well Location Plan Marsville-Thunderbird Subdivision Part of Lot 5, Concession 3 Township of East Garafraxa (Marsville), ON</p>	
	<p>Scale: NTS</p> <p>Date: February 6, 2020</p>	<p>Ref. No. G4223-20-2</p> <p>Enclosure 1</p>

REFERENCE No: G4223-20-1

MONITORING WELL No: 1

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 2

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE				WATER CONTENT %					UNIT WEIGHT	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	20	40	60	80	5	10	15	20	25		
0.0	Ground Surface	485.3																
0.5	500mm Topsoil	484.8			1	SS	6											
	brown, loose to compact SILT AND SAND trace gravel, wet saturated @ 4.6m				2	SS	4											
3.0		482.3			3	SS	19											
	grey, hard SILT AND CLAY TILL trace sand, saturated				4	SS	42											
6.1		479.2			5	SS	30											
6.6	brown, dense SAND some silt, saturated	478.7		6	SS	35												
	End of Borehole																	

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 2

CLIENT: Thomasfield Homes Ltd.

V.A. WOOD (GUELPH) INC.
 CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 3

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
 PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE				WATER CONTENT %					UNIT WEIGHT	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	20	40	60	80	5	10	15	20	25		
0.0	Ground Surface	487.0																
0.3	300mm Topsoil	486.7			1	SS	5											
4.6	brown, loose to compact SILT AND SAND trace gravel, wet	482.4			2	SS	7											
					3	SS	8											
					4	SS	16											
6.6	brown, compact SILT AND SAND TILL trace clay, occassional cobbles, moist to wet	480.4			5	SS	16											
				6	SS	50												
	End of Borehole																	

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 3

CLIENT: Thomasfield Homes Ltd.

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 4

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE				
0.0	Ground Surface	486.1									
0.3	300mm Topsoil	485.8									
1.2	brown, loose SILT AND SAND (Re-worked) trace organics, wet	484.9			1	SS	6				
4.9	brown, very loose to compact SILT AND SAND trace gravel, wet to saturated	481.2			2	SS	3				
					3	SS	11				
					4	SS	10				
					5	SS	20				
6.6	brown to grey, compact SILT AND SAND TILL trace clay, saturated	479.5		6	SS	15					
	End of Borehole										

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 4

CLIENT: Thomasfield Homes Ltd.

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 5

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE			
0.0	Ground Surface	486.1								
0.3	300mm Topsoil	485.8								
1.2	brown, compact SILT AND SAND (Re-worked) trace organic, trace gravel, moist	484.9			1	SS	19			
	brown, compact SILT AND SAND trace gravel, wet				2	SS	14			
3.0		483.1			3	SS	15			
	brown, very stiff SILT AND CLAY TILL wet				4	SS	23			
6.1		480.0								
	brown, dense SAND some silt, saturated	479.5		5	SS	26				
6.6				6	SS	30				
	End of Borehole									

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 5

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

CLIENT: Thomasfield Homes Ltd.

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 6

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE	WATER CONTENT %	UNIT WEIGHT	
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE				
0.0	Ground Surface	487.8									
0.3	300mm Topsoil	487.5			1	SS	4				
2.3	brown, very loose SILT AND SAND trace gravel, wet	485.5			2	SS	3				
	grey, loose to dense SILT AND SAND TILL some clay, wet to saturated				3	SS	6				
6.1		481.7			4	SS	7				
6.6	grey, very stiff SILT AND CLAY wet	481.2			5	SS	39				
	End of Borehole			6	SS	22					

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

REFERENCE No: G4223-20-1

MONITORING WELL No: 6

CLIENT: Thomasfield Homes Ltd.

V.A. WOOD (GUELPH) INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Marsville North (Marsville Thunderbird)

ENCLOSURE No: 7

405 YORK ROAD, GUELPH, ONTARIO N1E 3H3
PH. (519) 763-3101 FAX (519) 763-5912

LOCATION: Maple Street, Marsville, ON

SUPERVISOR: BI

SUBSURFACE PROFILE					SAMPLE			PENETRATION RESISTANCE				WATER CONTENT %					UNIT WEIGHT		
DEPTH (m)	DESCRIPTION	ELEVATION	SYMBOL	MONITORING WELL	NUMBER	TYPE	N-VALUE	20	40	60	80	5	10	15	20	25			
0.0	Ground Surface	487.3																	
0.3	300mm Topsoil	487.0			1	SS	8												
	brown, loose to compact SILT AND SAND trace gravel, trace clay, wet saturated @ 3.0m				2	SS	7												
					3	SS	11												
					4	SS	10												
					5	SS	12												
6.1		481.2																	
6.6	End of Borehole	480.7		6	SS	15													

DRILLED BY: LST

HOLE DIAMETER: 210mm

DRILL METHOD: Hollow Stem Auger

DATUM: Geodetic

DRILL DATE: January 10, 2020

SHEET: 1 of 1

Appendix B Hydrographs (MW-01 to MW-06)

Chart 1: Hydrograph of MW-01

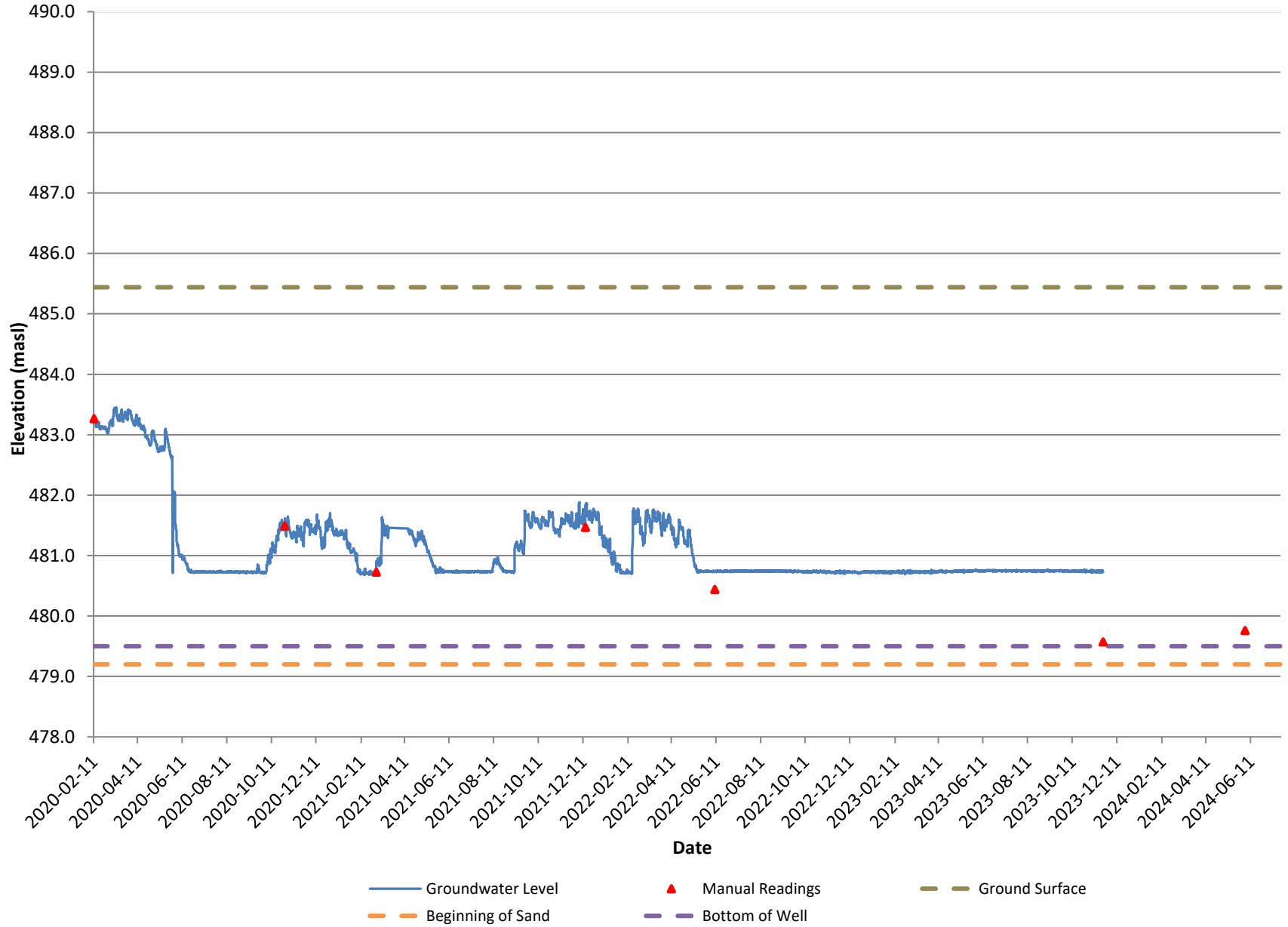
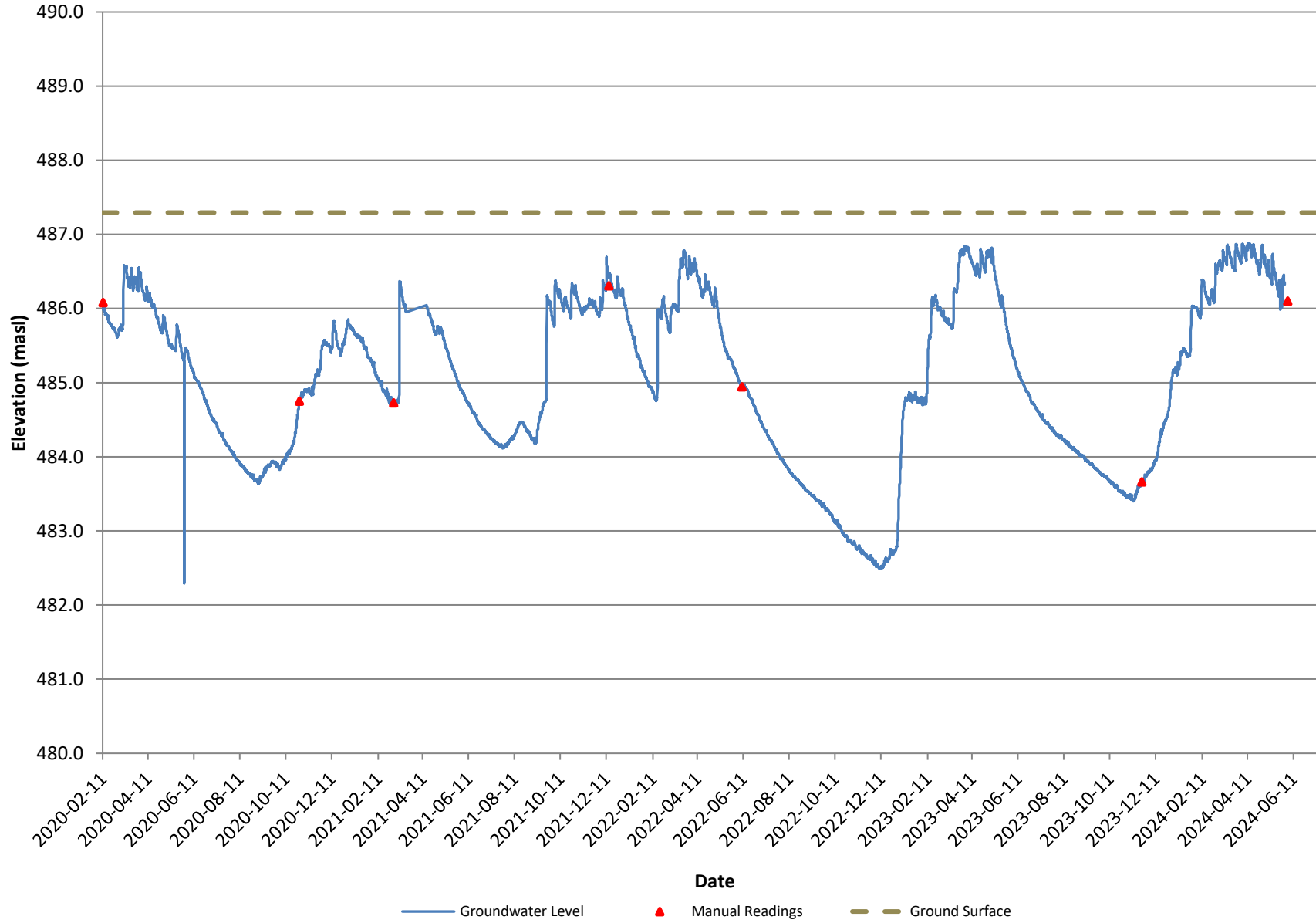
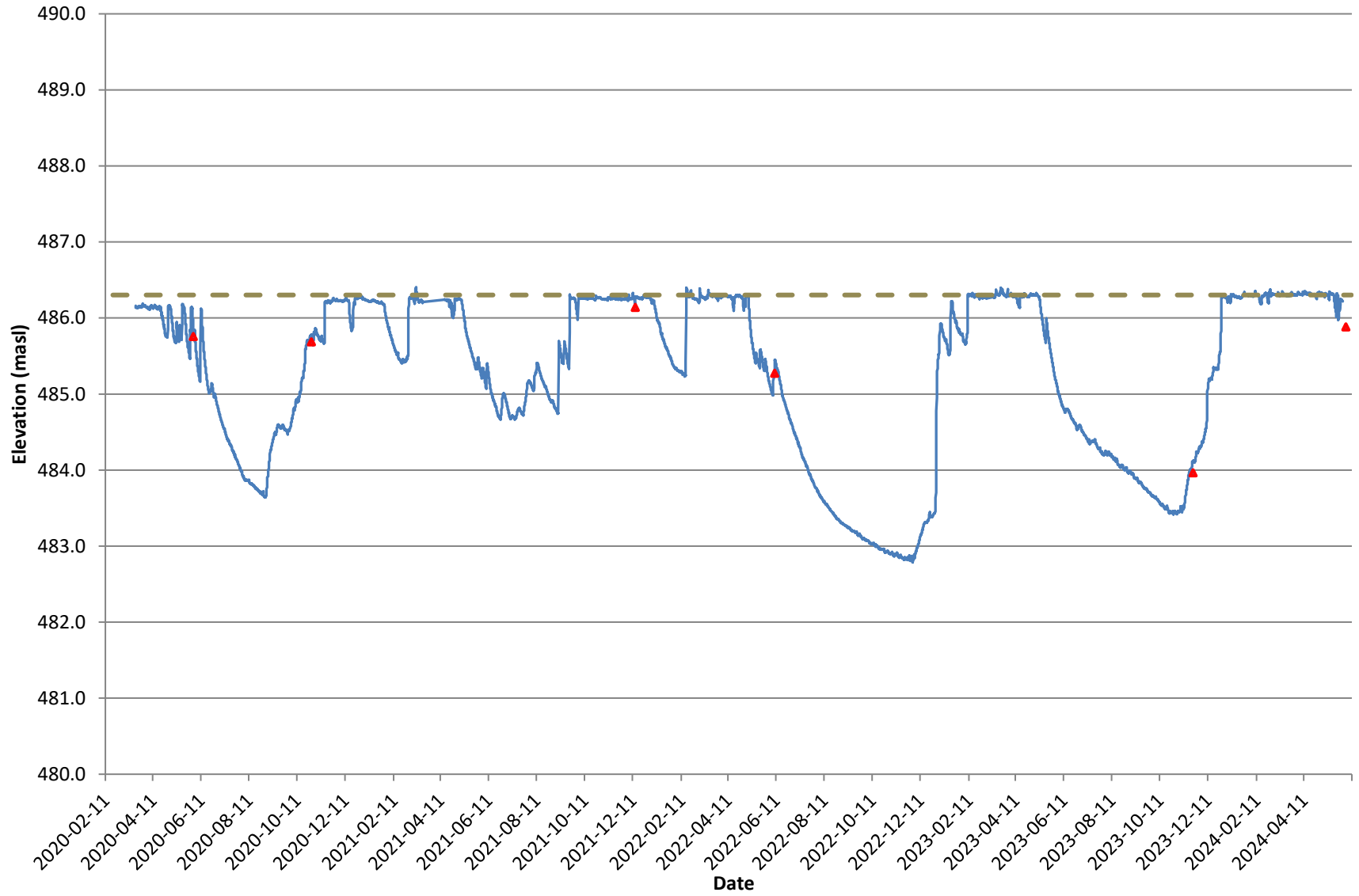


Chart 2: Hydrograph of MW-02



Hydrograph: MW-03



— Groundwater Level ▲ Manual Readings - - - Ground Surface

Chart 4: Hydrograph of MW-04

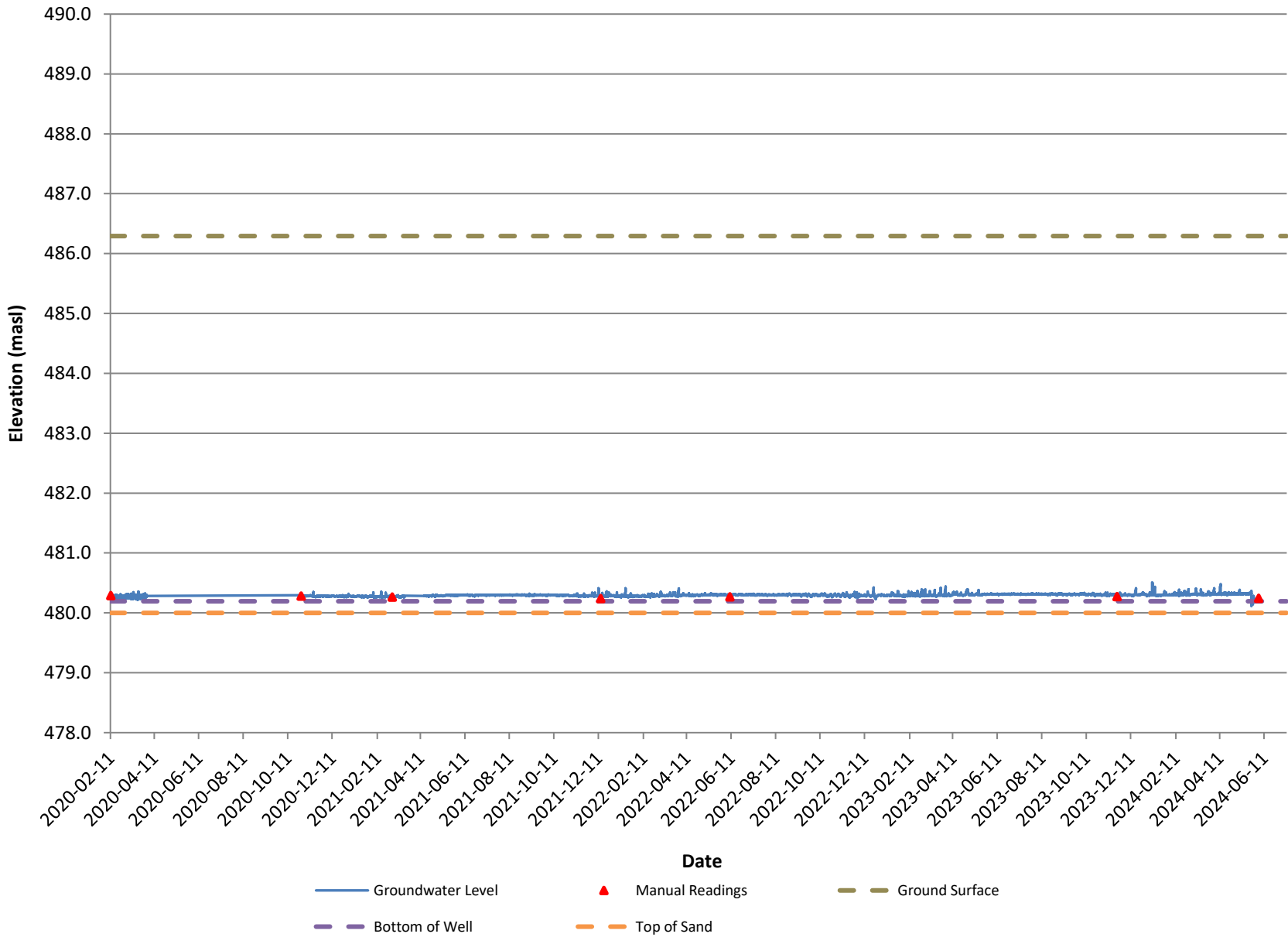


Chart 5: Hydrograph of MW-05

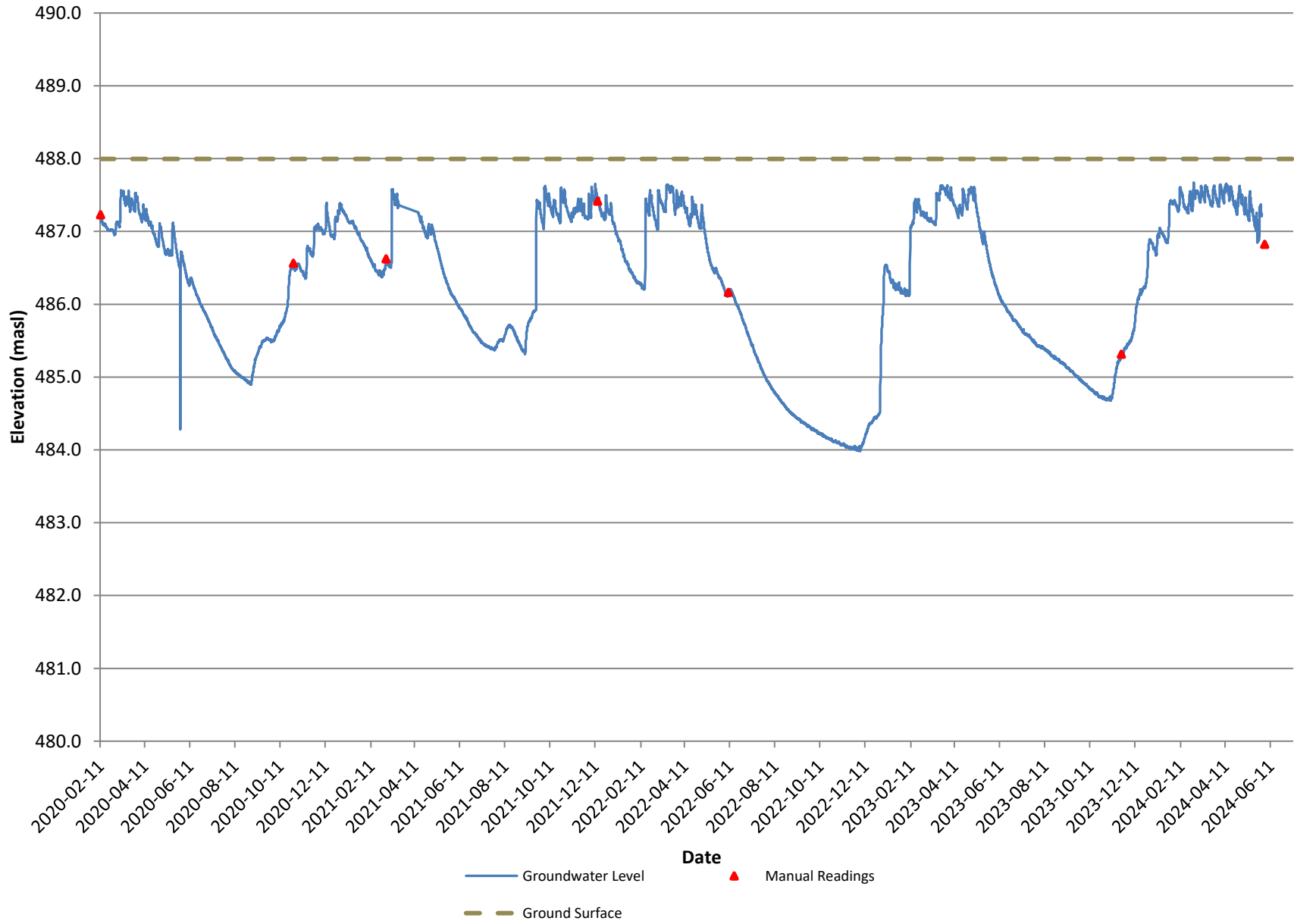


Chart 6: Hydrograph of MW-06

