



November 8, 2023

File No.: 32121

Alberta Transportation and Economic Corridors
Provincial Building
9621-96 Avenue
Peace River, Alberta
T8S 1T4

Attention: Mr. Max Shannon

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022164)
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING RESULTS – FALL 2023**

SECTION C

SITE PH080: HWY 688:02 McKINNEY CREEK SLIDE (KM 15.4) - BF72477

Dear Mr. Shannon:

This report provides the results of the bi-annual geotechnical instrumentation monitoring for the above-mentioned site as part of Alberta Transportation and Economic Corridors' Geohazard Risk Management Program for Peace Region – Peace River District (CON0022164).

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

1. FIELD PROGRAM AND INSTRUMENTATION STATUS

From July 2018 to October 2019, a 3.99 m diameter bridge culvert was installed at the Hwy 688:02 McKinney Creek culvert site (km 15.4) to replace an existing bridge culvert at that location. During construction, three vibrating wire piezometers (VW18-1, VW18-2, and VW18-3) were installed beneath the culvert bed subgrade to monitor changes in pore pressure during placement of the new embankment fill. The piezometers were monitored during construction with dataloggers during periods of fill placement, and the dataloggers were subsequently removed at the end of construction.

The three vibrating wire piezometers were monitored on October 10, 2023 by Mr. Niraj Regmi, G.I.T. and Mr. Nixson Mationg, both of Thurber Engineering Ltd.

The vibrating wire piezometers were read using an Geokon GK404 vibrating wire readout.



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2. DATA PRESENTATION

2.1 General

Vibrating wire piezometer reading summary PH080-1 table is provided below. A site plan showing the approximate vibrating wire piezometer locations is included in Appendix A. Plots of the vibrating wire piezometer results are included in Appendix A.



Table PH080-1: Fall 2023 – HWY 688:02 McKinney Creek Culvert (Km 15.4) - Bf72477 Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: October 10, 2023

INSTRUMENT	DATE INITIALIZED	TIP Elevation (m)	CURRENT STATUS	MAXIMUM GROUNDWATER ELEVATION (M)	CURRENT GROUNDWATER ELEVATION (m)	PREVIOUS GROUNDWATER ELEVATION (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW18-1 (VW47342)	July 26, 2018	545.59	Operational	551.90 on October 30, 2018	547.56	547.87	-0.31
VW18-2 (VW47343)	July 26, 2018	545.82	Operational	560.50 on August 16, 2019	549.29	549.44	-0.15
VW18-3 (VW45176)	August 8, 2018	559.84	Operational	554.93 on July 24, 2019	549.08	549.04	0.04

Drawing 32121-PH080 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.



3. INTERPRETATION OF MONITORING RESULTS

Vibrating wire piezometers VW18-1 and VW18-2 showed decreases in groundwater level of 0.31 m and 0.15 m, respectively, since the spring of 2023 readings. VW18-3 showed an increase in groundwater level of 0.04 m since the spring of 2023 readings. VW18-1 and VW18-3 showed a prior trend of diminishing groundwater levels since the completion of construction and the groundwater levels at these instrument locations appear to have levelled out. The piezometers had all previously shown their highest groundwater levels during construction as fill was placed at their respective locations.

Figures PH080-1, PH080-2 and PH080-3 show the response of each of the piezometers relative to fill height during construction, as well as the subsequent decrease in pore water pressure. Figure PH080-4 shows a combined plot of the groundwater elevations of all three vibrating wire piezometers.

4. RECOMMENDATIONS

4.1 Future Work

The instruments should be read again in the spring of 2024.

4.2 Instrumentation Repairs

No instrumentation repairs are required at this time.



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5. CLOSURE

We trust this report meets your requirements at present. If you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Tarek Abdelaziz, Ph.D., P. Eng.
Partner | Senior Geotechnical Engineer

Niels Rasmussen, P.Geo.
Geologist
/ak

Attachments:

- Statement of Limitations and Conditions
- Appendix A
 - Field Inspector's report
 - Site Plan Showing Approximate Instrument Locations (Drawing No. 32121-PH080)
 - Figure PH080-1 (VW18-1 Readings)
 - Figure PH080-2 (VW18-2 Readings)
 - Figure PH080-3 (VW18-3 Readings)
 - Figure PH080-4 (Combined VW Piezometer Readings)



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



THURBER ENGINEERING LTD.

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022164)
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING RESULTS**

FALL 2023

**APPENDIX A
DATA PRESENTATION**

SITE PH80: HWY 688:02 MCKINNEY CREEK SLIDE (KM 15.4) - BF72477

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (PH080)
FALL 2023**

Location: McKinney Creek Slide (Hwy 688:02 C1 15.422) - BF72477 File Number: 32121	Readout: GK404 SN 364 Temp: 10 Read by: NKR/NRM
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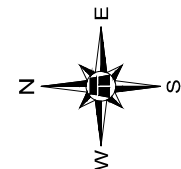
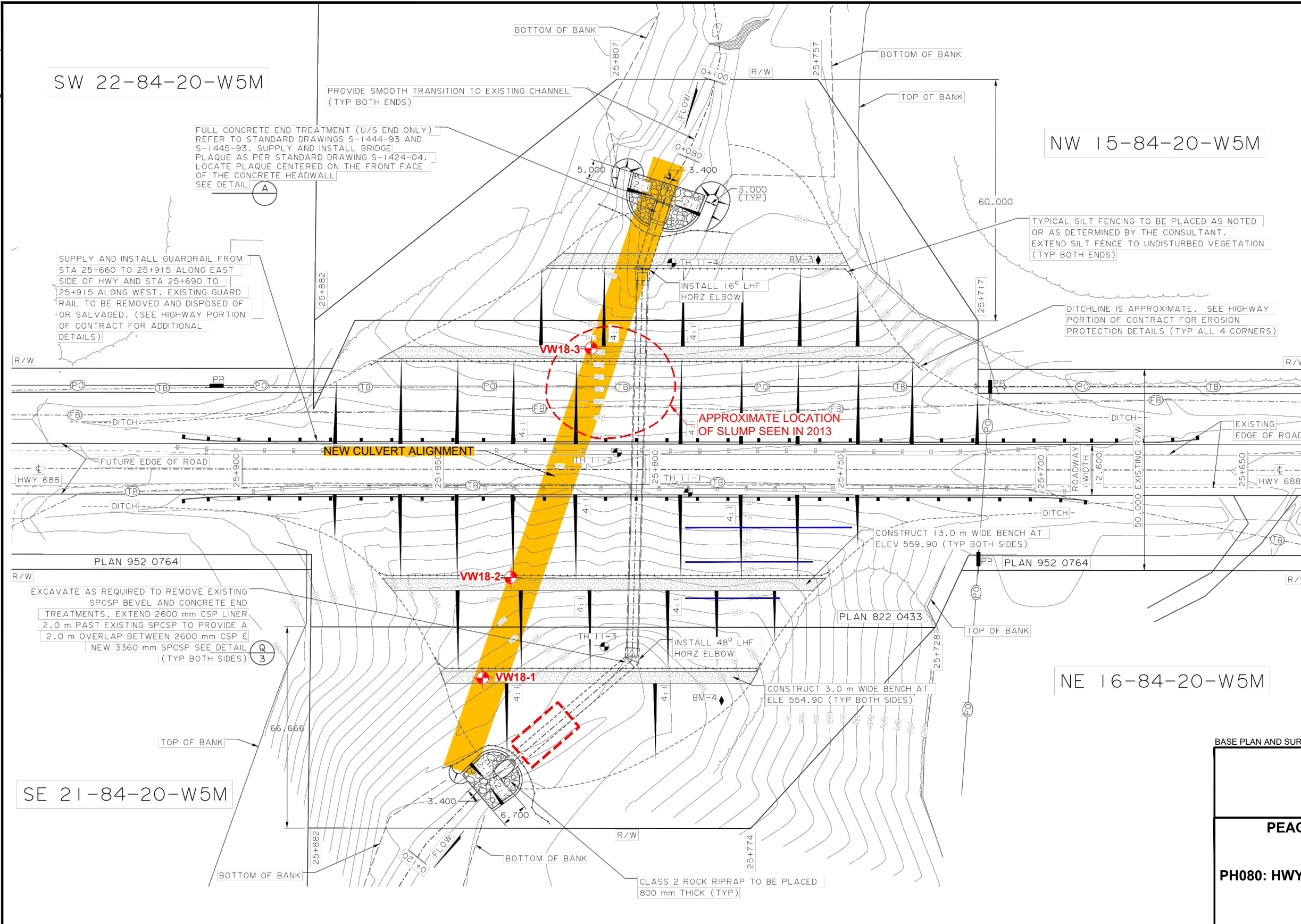
VIBRATING WIRE PIEZOMETER (VW) READINGS

VW #	Serial Number	GPS Location (UTM 11)		Date	Reading Dg	Temperature (deg C)
		Easting (m)	Northing (m)			
VW18-1	VW47342	494733	6238402	10-Oct-23	8686.5	6
VW18-2	VW47343	494733	6238402	10-Oct-23	8615.9	5.1
VW18-3	VW45176	494859	6238380	10-Oct-23	8533.5	5.4

INSPECTOR REPORT

VW18-1 and VW18-2 cables are west of the highway, north of the culvert outlet near the bush line. VW18-3 cable is east of the highway, north of the creek near the crest of the hill
VW 18-1,18-2 and 18-3 needs stickup protector or enclosure box. Currently the wires are lying on ground. See photographs

H:\32000\32121 AT GRMP Peace River District 2021-2025\CAD\2021 INSTRUMENT\32121-PH080.dwg - 1N - Sep. 21, 2021



SW 22-84-20-W5M

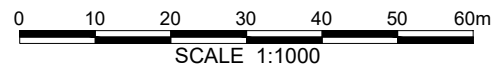
NW 15-84-20-W5M

NE 16-84-20-W5M

SE 21-84-20-W5M

- LEGEND**
- APPROXIMATE INSTRUMENT LOCATION
 - VW** VIBRATING WIRE PIEZOMETER

NOTE:
1. BASE PLAN FROM DRAWING 36131-P, DATED OCTOBER 13, 2015



BASE PLAN AND SURVEY PROVIDED BY WSP



PEACE REGION (PEACE RIVER DISTRICT)

PH080: HWY 688:02 MCKINNEY CREEK CULVERT SLIDE INSTRUMENT LOCATIONS

DWG No. 32121-PH080

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	1:1000
DATE	SEPTEMBER 2021
FILE No.	32121



FIGURE PH080-1
HWY 688:02 MCKINNEY CREEK CULVERT SLIDE - VW18-1
(WEST SIDE OF CULVERT)

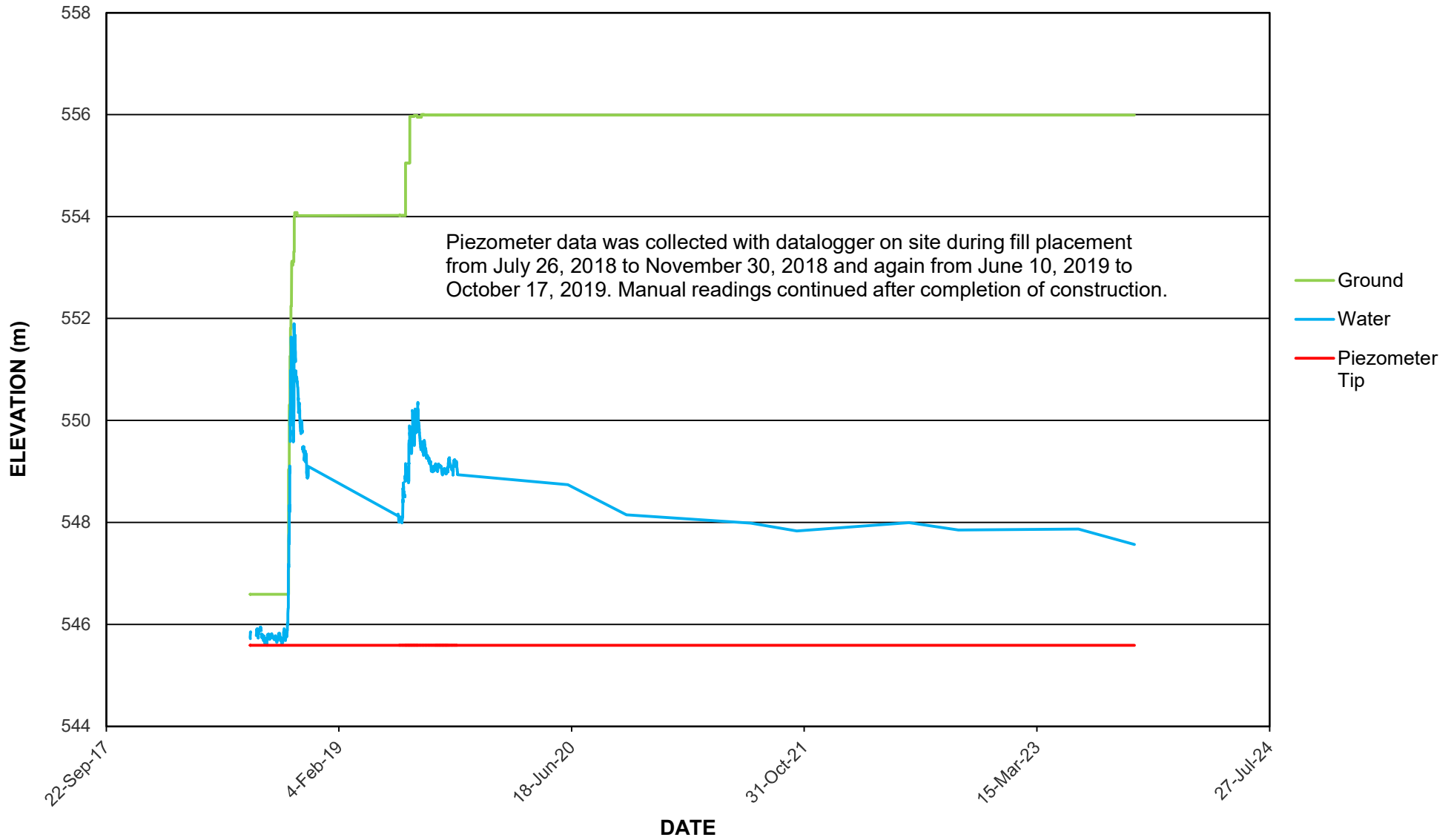


FIGURE PH080-2
HWY 688:02 MCKINNEY CREEK CULVERT SLIDE - VW18-2
(CENTER OF CULVERT)

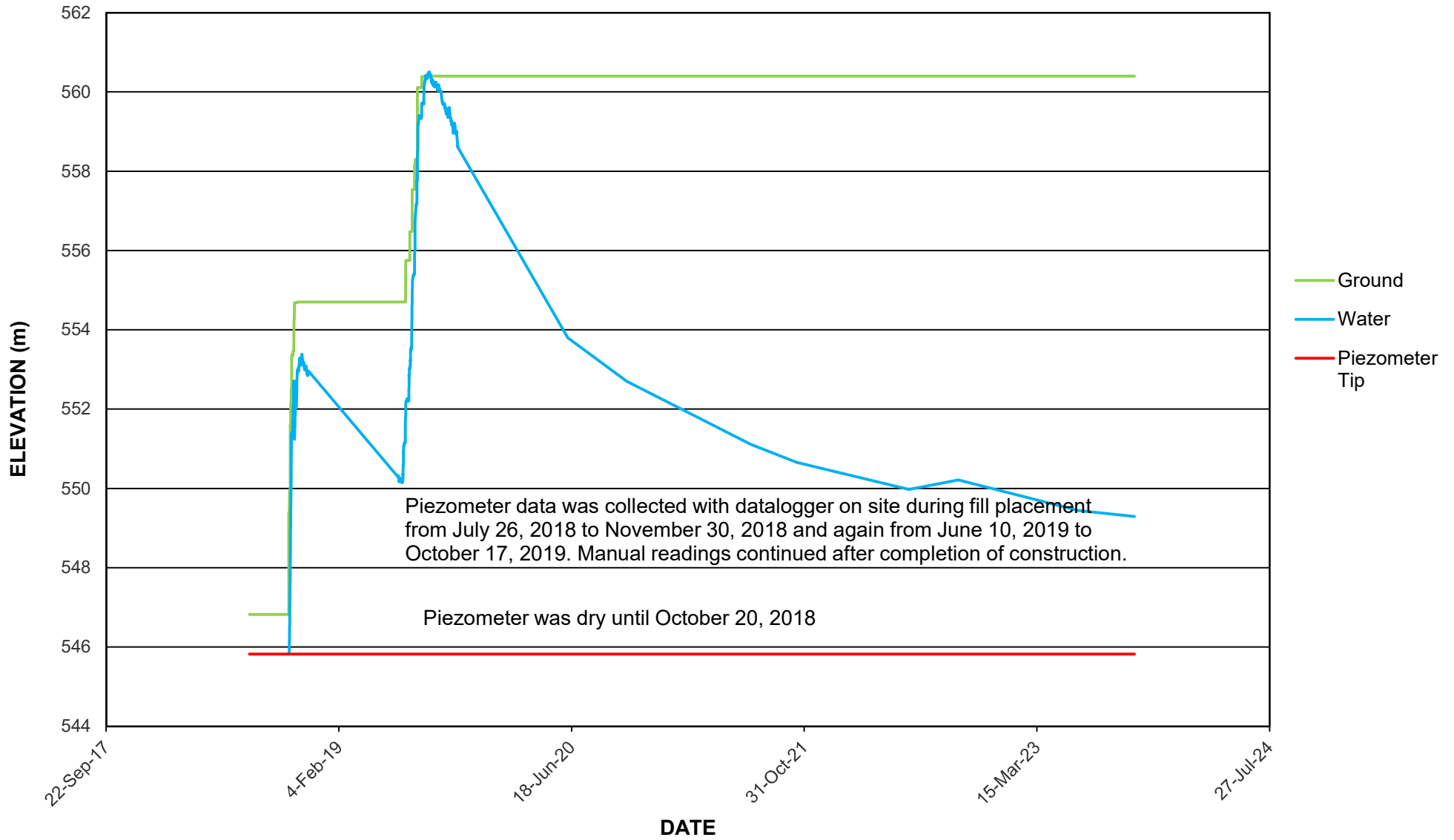


FIGURE PH080-3
HWY 688:02 MCKINNEY CREEK CULVERT SLIDE - VW18-3
(EAST SIDE OF CULVERT)

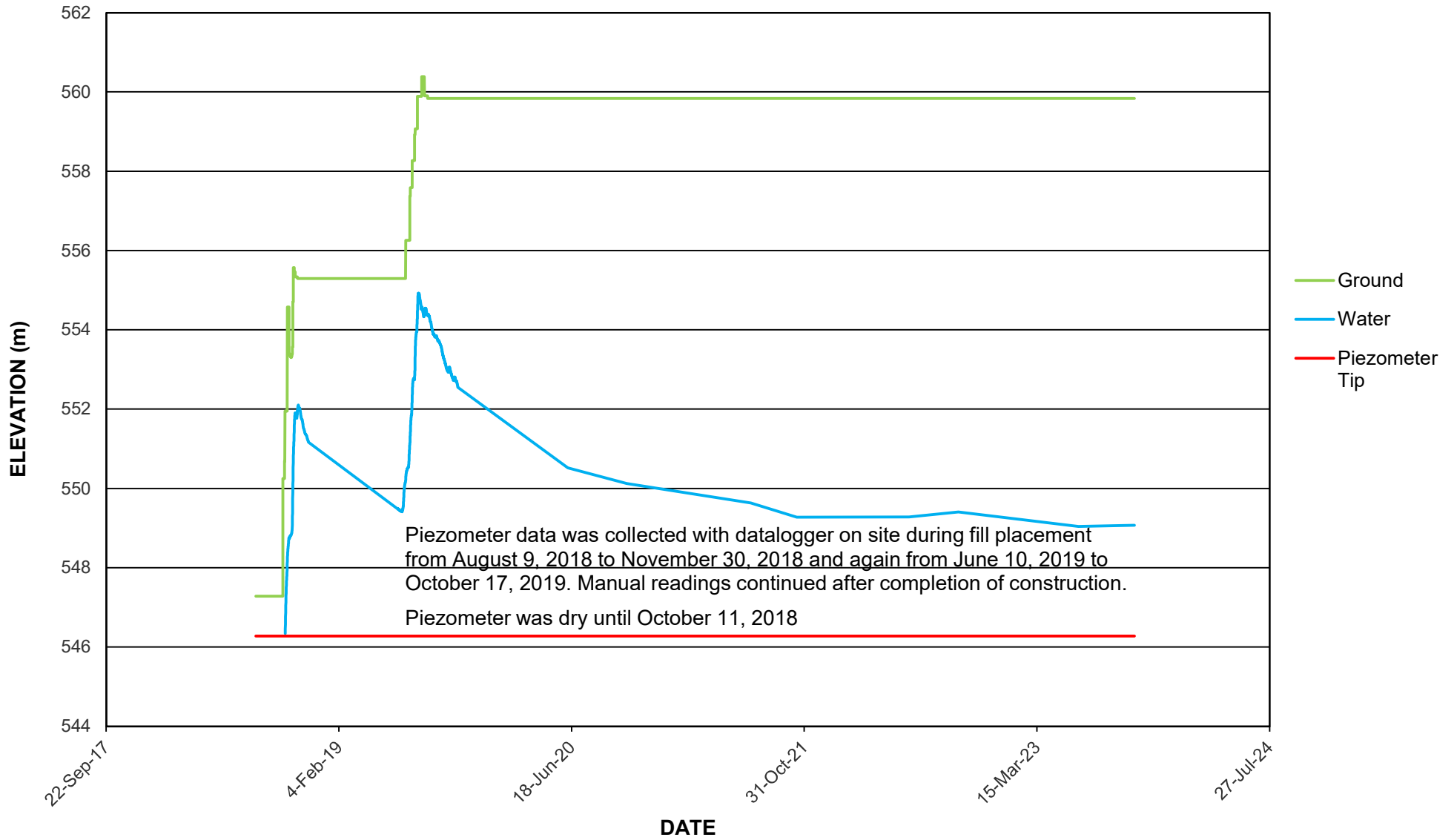


FIGURE PH080-4
HWY 688:02 MCKINNEY CREEK CULVERT SLIDE
(COMBINED PIEZOMETER READINGS)

