

ALBERTA TRANSPORTATION AND  
ECONOMIC CORRIDORS GRMP  
NORTH CENTRAL (ATHABASCA AND FORT  
McMURRAY DISTRICTS)  
INSTRUMENTATION MONITORING- SPRING 2024



Site Number	Location	Name	Hwy	km
NC091	HWY 63:02	Backslope Slumps	63:02	Km 39.4 and Km 40.4
<b>Legal Description:</b> 7-13-71-17 W4		<b>UTM Co-ordinates</b>		
		12U E 405719	N	6112165

<b>Current Monitoring:</b>	08-June-2024	<b>Previous Monitoring</b>	27-May-2023
<b>Instruments Read By:</b>	Mr. Niraj Regmi, G.I.T and Mr. Nixson Matong, of Thurber		

Instruments Read During This Site Visit			
<b>Slope Inclinometers (SIs):</b> SI18-1	<b>Pneumatic Piezometers (PN):</b> PN18 1, PN18-2B, PN18-4A, and PN18-4B	<b>Vibration Wire Piezometers (VW):</b> N/A	<b>Standpipe Piezometers (SP):</b> N/A
<b>Load Cell (LC):</b> N/A	<b>Strain Gauges:</b> N/A	<b>SAs:</b> N/A	<b>Others:</b>

Readout Equipment Used			
<b>Slope Inclinometers:</b> RST Digital Inclinator probe with a 2 ft wheelbase and an RST Pocket PC readout	<b>Pneumatic Piezometers:</b> RST C108 pneumatic piezometer reader	<b>Vibration Wire Piezometers:</b>	<b>Standpipe Piezometers:</b>
<b>Load Cell:</b>	<b>Strain Gauges:</b>	<b>SAs:</b>	<b>Others:</b>
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>- Site plans showing instrument locations are included in Appendix A.</li> <li>- Historical SIs plots movements are summarized in Table NC091-1, attached.</li> <li>- The pneumatic piezometer plot is included in Appendix A.</li> <li>- Pneumatic piezometer readings are summarized in Table NC091-2, attached.</li> </ul>			

Discussion	
<b>Zones of New Movement:</b>	None
<b>Interpretation of Monitoring Results:</b>	<p><b>NC091-1 (km 39.35)</b></p> <p>Slope inclinometer SI18-1 was sheared off at 1.2 m below the top of the inclinometer casing.</p> <p>The groundwater level in PN18-1 and PN18-2B decreased by 0.03 m and 0.64 m, respectively since the spring of 2023 readings.</p>
	<p><b>NC091-2 (km 40.37)</b></p> <p>The groundwater level increased in PN18-4A by 0.46 m and decreased in PN18-4B by 0.06 m since the spring of 2023 readings. The groundwater level in PN18-4A is at the highest level ever recorded in this instrument since initialization.</p>
<b>Future Work:</b>	The operational instruments at this site should be read again in the spring of 2025.
<b>Instrumentation Repairs:</b>	SI18-3 is broken at 0.8 m below ground. The repair will require a mechanical excavator or a hydrovac unit, and hence it is anticipated

	to be a costly repair. This is not a critical instrument to repair and hence it is suggested to delete this instrument from the monitoring program.
<b>Additional Comments:</b>	

<b>Attachments:</b>	<ul style="list-style-type: none"> <li>• Table NC091-1 Spring 2024 – HWY 63:02 Backslope Slumps (km 39.35 and 40.37), Slope Inclinometer Instrumentation Reading Summary</li> <li>• Table NC091-2 Spring 2024 – HWY 63:02 Backslope Slumps (km 39.35 and 40.37), Pneumatic Piezometer Instrumentation Reading Summary</li> <li>• Statement of Limitations and Conditions</li> <li>• APPENDIX A – NC091-1 SPRING 2024 <ul style="list-style-type: none"> <li>○ Field Inspector's report</li> <li>○ Site Plans Showing Approximate Instrument Locations (Drawings Nos. 32122-NC091-1 and 32122-NC091-2)</li> <li>○ SI Reading Plots</li> <li>○ Figure NC091-1 (Piezometric Depths)</li> </ul> </li> </ul>
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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

Lucas Green, P.Eng.  
Geotechnical Engineer



**Table NC091-1: Spring 2024 – Hwy 63:02 Backslope Slumps (Km 39.35 And 40.37) Slope Inclinator Instrumentation Reading Summary**

Date Monitored: June 8, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
<b>NC091-1 (km 39.35)</b>								
SI18-1	February 20, 2018	12.2 mm over 0.1 to 1.4 m depth in 108° direction	50.0 on March 28, 2018	Sheared at 1.2 m below top of casing	May 27, 2023	N/A	N/A	N/A
SI18-2	February 20, 2018	18.2 mm over 1.0 to 2.9 m depth in 289° direction	28.5 on September 10, 2018	Sheared at 3.7 m below top of casing	May 27, 2019	N/A	N/A	N/A
<b>NC091-2 (km 40.37)</b>								
SI18-3	February 20, 2018	11.6 mm over 0.1 to 2.0 m depth in 134° direction	65.8 on March 28, 2018	Damaged	May 27, 2019	N/A	N/A	N/A
SI18-4	February 20, 2018	11.8 mm over 1.0 to 3.5 m depth in 319° direction	28.1 on March 28, 2018	Sheared at 3.4 m below top of casing	May 27, 2019	N/A	N/A	N/A

Figures 32122-NC091-1 and 32122-NC091-2 in Appendix A show the approximate location of the monitoring instrumentation at this site.



**Table NC091-2: Spring 2024 – Hwy 63:02 Backslope Slumps (Km 39.35 And 40.37) Pneumatic Piezometer Instrumentation Reading Summary**

Date Monitored: June 8, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER DEPTH (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER DEPTH (m)	PREVIOUS GROUNDWATER DEPTH (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
<b>NC091-1 (km 39.35)</b>								
PN18-1 (37784)	February 20, 2018	9.0	Operational	7.37 on May 27, 2019	0.3	8.96	8.93	-0.03
PN18-2A (37782)	February 20, 2018	3.9	Damaged	1.09 on May 26, 2018	N/A	N/A	2.47 (June 25, 2021)	N/A
PN18-2B (37781)	February 20, 2018	8.5	Operational	7.61 on May 27, 2023	2.2	8.25	7.61	-0.64
<b>NC091-2 (km 40.37)</b>								
PN18-3 (37783)	February 20, 2018	5.5	Damaged	5.07 on September 10, 2018	N/A	N/A	5.35 (May 27, 2019)	N/A
PN18-4A (37785)	February 20, 2018	2.4	Operational	1.23 on June 8, 2024	11.9	1.23	1.69	0.46
PN18-4B (37780)	February 20, 2018	13.0	Operational	12.53 on September 10, 2018	1.6	12.79	12.73	-0.06

Figures 32122-NC091-1 and 32122-NC091-2 in Appendix A show the approximate location of the monitoring instrumentation at this site.



## 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.

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- 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

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**THURBER** ENGINEERING LTD.

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022163)  
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)  
INSTRUMENTATION MONITORING RESULTS**

**SPRING 2024**

**APPENDIX A  
DATA PRESENTATION AND SITE PLANS**

**SITE NC091: HWY 63:02 BACKSLOPE SLUMPS (km 39.35 and 40.37)**

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS  
 NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS  
 INSTRUMENTATION MONITORING FIELD SUMMARY (NC091)  
 SPRING 2024

<b>Location:</b> HWY 63:02 km 39.35 and km 40.37 Backslope Slumps <b>File Number:</b> 32122 <b>Probe:</b> RST Set 8R <b>Cable:</b> RST Set 8R	<b>Readout:</b> RST PN C108 Unit 4 <b>Casing Diameter:</b> 2.75" <b>Temp (deg C):</b> 9 <b>Read by:</b> NKR/NRM
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**SLOPE INCLINOMETER (SI) READINGS**

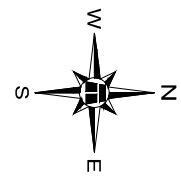
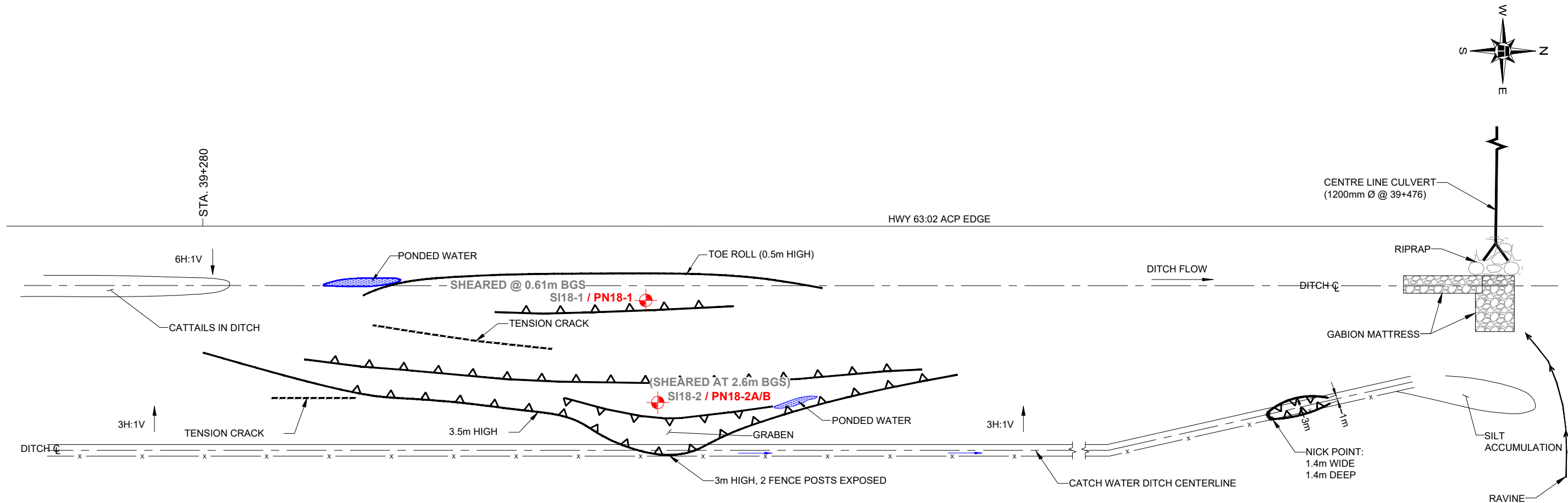
SI#	GPS Location (UTM 12)		Date	Stickup (m)	Readings Depth from top of casing (ft)	Azimuth of A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Northing	Easting					A+	A-	B+	B-			
<b>NC091-1</b>													
SI18-1	6112165	405719	08-Jun-24	0.78	32 to 2	278	-1209	1219	-360	372	8R/8R	2.75	

**PNEUMATIC PIEZOMETER (PN) READINGS**



PN #	Serial	GPS Location (UTM 12)		Location	Date	Reading kPa	Comments
		Northing	Easting				
<b>NC091-1</b>							
PN18-1	37784	6112165	405719	Attached to SI18-1	08-Jun-24	0.3	When bypass open pressure went up to 350 kpa and dropped down water return
PN18-2B	37781	6112165	405732	Attached to SI18-2	08-Jun-24	2.2	
<b>NC091-2</b>							
PN18-4A	37785	6113174	405764	Attached to SI18-4	08-Jun-24	11.9	
PN18-4B	37780	6113174	405764	Attached to SI18-5	08-Jun-24	1.6	

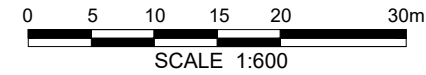
**INSPECTOR REPORT**


SI18-3 broken at surface at 2ft 9" below ground. Need mechanical excavator or hydrovac to repair. Not repairable by hand.
SI18-1 Sheared off at 4 ft from top, and 2 ft below ground



**LEGEND**

-  APPROXIMATE INSTRUMENT LOCATION
- SI SLOPE INCLINOMETER
- PN PNEUMATIC PIEZOMETER
-  SCARP CRACK (APPROXIMATE)






**NORTH CENTRAL  
(ATHABASCA AND FORT MCMURRAY DISTRICTS)  
NC091: HWY 63:02 km 39.35 - BACKSLOPE SLUMP  
SITE PLAN SHOWING APPROXIMATE  
INSTRUMENT LOCATIONS**

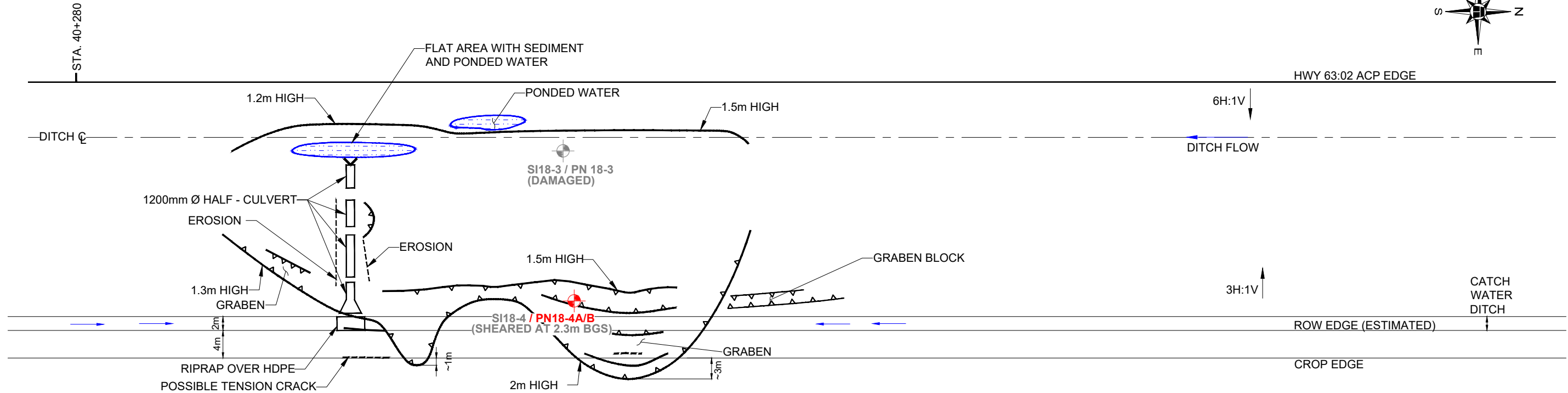
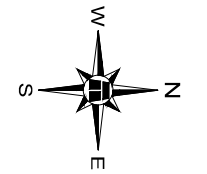
**DWG No. 32122-NC091-1**

DRAWN BY	ML
DESIGNED BY	LRG
APPROVED BY	TSA
SCALE	1:600
DATE	JUNE 2024
FILE No.	32122







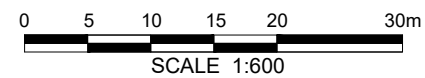
**THURBER ENGINEERING LTD.**





**LEGEND**

-  APPROXIMATE INSTRUMENT LOCATION
-  SLOPE INCLINOMETER
-  PNEUMATIC PIEZOMETER
-  SCARP CRACK (APPROXIMATE)



**NORTH CENTRAL  
(ATHABASCA AND FORT MCMURRAY DISTRICTS)  
NC091: HWY 63:02 km 40.37 - BACKSLOPE SLUMP  
SITE PLAN SHOWING APPROXIMATE  
INSTRUMENT LOCATIONS**

**DWG No. 13357-NC091-2**

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	AS SHOWN
DATE	JULY 2021
FILE No.	32122



**FIGURE NC091-1  
PIEZOMETER DATA FOR HWY 63:02 BACKSLOPE SLUMPS**

