

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – SWAN HILLS
2022 INSPECTION**



Site Number	Location	Name	Hwy	km
SH023-10	Little Smoky River	Little Smoky River Valley, North Hill – Site #10	744:02	20.20-20.40
Legal Description		UTM Co-ordinates		
NE21-76-22-W5M		11U E 478,074	N	6,161,918

	Date	PF	CF	Total
Previous Inspection:	2-Jun-2020	7	3	21
Current Inspection:	1-Jun-2022	10	3	30
Road AADT:	230		Year:	2021
Inspected By:	Rishi Adhikari, TRANS Max Shannon, TRANS		Ken Froese, Thurber Mark Gallego, Thurber	
Report Attachments:	<input checked="" type="checkbox"/> Photographs <input checked="" type="checkbox"/> Plans <input type="checkbox"/> Maintenance Items			

Primary Site Issue:	Highway traverses deep-seated, retrogressive landslides with ongoing creep movements due partly to erosion at toe by the Little Smoky River and Peavine Creek resulting in cracking and sagging of the pavement surface at numerous locations. Approx. 4 km of the highway crosses this unstable north valley slope. Site #10 is 55 m above and 480 m away from the Peavine Creek.	
Dimensions:	135 m length of highway affected by cracking and distortion	
Date of Remediation:	2000: Subdrain pipe from Site #11 installed in downslope ditch. 2006: Both ditches regraded and lined with riprap.	
Maintenance:	Routine ACP crack sealing, milling, and patching, when required. 2013: ACP patch placed. 2019: Patch over south portion 2020: Line painting 2021: Highway overlay (50 mm)	
Observations:	Description	Worsened?
<input checked="" type="checkbox"/> Pavement Distress	Site was recently overlaid. Some of the previous longitudinal and traverse cracks have reflected through.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	Site is located on an active deep-seated landslide moving toward the Peavine Creek. This site crosses over and along a main scarp.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Gully below riprap ditch outlet at south end of site extends south into a sag pond located about 110 m from the highway. Erosion gullies have started to form at the culvert outlet and at end of riprap. Slight erosion forming at inlet of culvert.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Upslope ditch at northeast end of site has been historically wet and poorly drained.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert Distress	New SWSP culverts installed at km 20.22 and at km 20.38. Outlet of culvert at km 20.38 is 50 percent full and ponded water was observed at the outlet.	<input checked="" type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>

Instrumentation: None.

Assessment:

The overall valley slope is moving as several separate slide blocks in response to the toe erosion and downcutting of two different rivers resulting in numerous scarps, sag ponds, and differential movement zones going in slightly different directions. The highway intersects the scarps of these blocks at several locations resulting in an uneven highway surface and cracking.

Although this Site #10 is located on the unstable valley slope with a significant sag pond located below the site, landslide movements have not been consistently observable at this site with most cracking being transverse or longitudinal. There is a noticeable dip in the highway profile which could also be related to soft subgrade soils given the historically wet upslope ditch. Previously observed vertical distortions and angled cracks were not present during the 2022 inspection since the highway was overlaid in 2021. However, a few longitudinal and transverse cracks have started to reflect.

Historically, there has also been problems with erosion of the ditches following high precipitation events. The erosion gully forming away from the highway below the riprap apron had noticeably deteriorated since 2018. New SWSP culverts were installed at km 20.22 and at km 20.38. Culvert at km 20.38 is 50 percent full and ponded water was observed at the outlet. Standing water was observed in the east ditch which is an indication of poor drainage at the site.

Recommendations:

Short-Term:

- Road maintenance should continue as necessary to maintain a safe roadway surface and may consist of ACP milling, patching, and crack sealing.

Medium-Term:

- Minor regrading could be carried out to allow drainage of the ponded water at the north culvert and standing water observed in the east ditch.

Long-Term:

It is understood that, at this time, the only long-term remediation option under consideration is realignment of the entire north hill section of Highway 744. However, given the high cost of this option and as it is a low volume highway, it is unlikely that realignment will be undertaken in the near future. Consideration is also being given to a shorter realignment which would include both of the SH023 sites as they currently require frequent maintenance.

Ongoing Investigation:

- It is recommended that the annual Geohazard inspection should continue as scheduled.

Closure:

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.

Don Proudfoot, P.Eng.
Principal | Senior Geotechnical Engineer

Mark Gallego, P.Eng.
Geotechnical Engineer



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

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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.

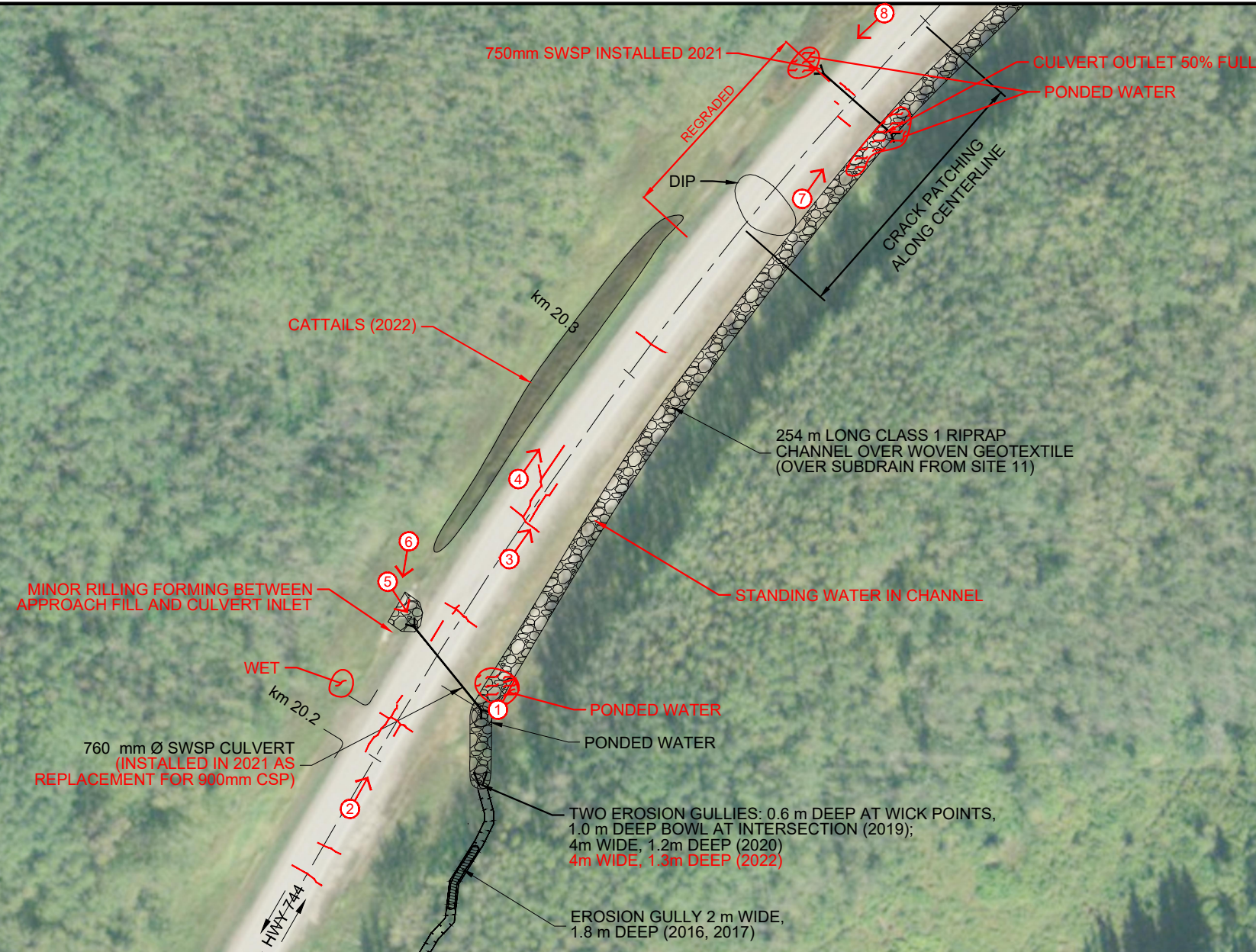
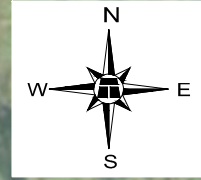
6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

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

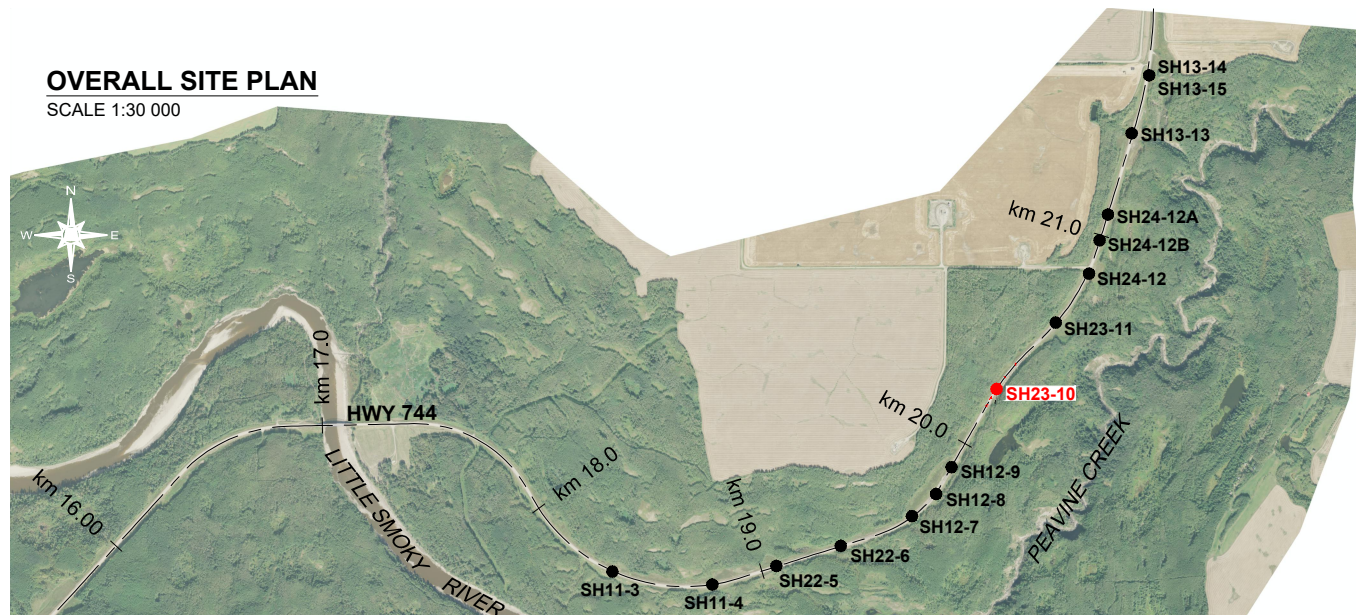
The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or 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.

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DETAILED SITE PLAN
SCALE 1:1250

OVERALL SITE PLAN
SCALE 1:30 000

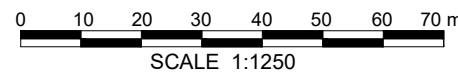


LEGEND

- CULVERT
- DIRECTION AND NUMBER OF PHOTO

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. JUNE 2022 OBSERVATIONS SHOWN IN RED.
3. CRACK AND PATCH PATTERNS RESET AS HWY 744 WAS OVERLAID IN SUMMER 2021.
4. CULVERT LOCATIONS TAKEN FROM MCINTOSH PERRY AS-BUILT DRONE SURVEY (JULY 2021).



SATELLITE IMAGE FROM VALTUS IMAGERY (DATED 2014)



PEACE REGION (SWAN HILLS)

**SH023-10: HWY 744:02 LITTLE SMOKY RIVER VALLEY
2022 SITE INSPECTION PLAN**

DWG No. 32121-SH023-10

DRAWN BY	ML
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	AS SHOWN
DATE	OCTOBER 2022
FILE No.	32121





Photo 1 – Looking northeast along downslope ditch.



Photo 2 – Looking northeast from southwest end of Site.



Photo 3 – Looking northeast at cracking that is starting to surface around km 20.26 (just northeast of the culvert).



Photo 4 – Looking northeast at potential scarp crack northeast of Photo 3.



Photo 5 – Looking at inlet of new culvert at km 20.22. Note minor rill forming on the right-hand side of the photo.



Photo 6: Erosion adjacent to km 20.22 culvert inlet (right side of Photo 5).



Photo 7: Ponding water in reggraded downslope ditch at the km 20.38 culvert outlet.



Photo 8: Poor drainage and ponding water at the km 20.38 culvert inlet.