PEACE REGION
(GRANDE PRAIRIE DISTRICT – SOUTH) GRMP
SITE INSPECTION FORM

SITE NUMBER AND NAME: **GP007 Wanyandie Road Slide**	HIGHWAY & KM: 40:36, 29.339	PREVIOUS INSPECTION DATE: June 10, 2024	INSPECTION DATE: **June 3, 2025**
LEGAL DESCRIPTION: NW 02-59-07-W6M NE 02-59-07-W6M	NAD 83 COORDINATES: UTM 11 Northing 5993890 Easting 372875	RISK ASSESSMENT: PF: 11 CF: 8 TOTAL: 88	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 401 (north) & 408 (south) (Reference No. 60403650, 2024)		CONTRACT MAINTENANCE AREA (CMA): 504	

SUMMARY OF SITE INSTRUMENTATION:	INSPECTED BY:
Operable: Nine slope inclinometer (SIs), ten pneumatic piezometers (PNs), nineteen vibrating wire piezometers (VWPs), and three standpipe piezometers (SPs) installed between 1998 and 2022. All VWPs and two SPs connected to data loggers. Inoperable: Nine SIs and two PNs installed between 1998 and 2022. LAST READING DATE: June 4, 2025	Chris Gräpel (KCB) Courtney Mulhall (KCB) Babatunde Awokunle (TEC) Rocky Wang (TEC)

PRIMARY SITE ISSUE: Deep-seated landslide (or nested slides) along north valley slope of the Smoky River. Hwy 40:36 fill placed in a cut and side-hill arrangement across slide area. Slide movement affecting both lanes of highway.

APPROXIMATE DIMENSIONS: Entire site is approximately 600 m long. An approximate 200 m and 150 m length of highway primarily being affected at west and east ends of site, respectively.

DATE OF ANY REMEDIAL ACTION: 2018 and 2019 – Asphalt overlay. Summer/Fall/Winter 2020 and 2021 – Highway surface returned to gravel in summer/fall then paved for winter. Fall 2023 – North highway ditch regraded at west end of site. Ongoing pavement patching, and sub-excavation and backfilling of voids with granular fill.

ITEM	**CONDITION EXISTS**		**DESCRIPTION AND LOCATION**	**NOTICABLE CHANGE FROM LAST INSPECTION**	
	YES	NO		YES	NO
Pavement Distress	X		Cracking and settlement in pavement surface, including recent pavement patches.	X	
Slope Movement	X		Cracking and settlement in recent pavement patches and SI data indicate ongoing slide movements. Pavement distress indicates increased movement near middle and east end of site since 2024 inspection.	X	
Erosion		X	None observed at time of 2025 inspection.		X
Seepage	X		At west side of site: Area downslope/south of Hwy 40:36 not visited during 2025 inspection, but ponded water and seepage previously observed in 2022. At east side of site: none observed during 2025 inspection.		X
Culvert Distress		X	Rock in culvert at west end of site. Bridge-sized culvert (BF80699) at east end of site not visited during 2025 inspection.		X

COMMENTS
Slope upslope and downslope of highway is landslide terrain.
Highway crosses deep gully/ravine and bridge-sized culvert (BF80699) at east end of site.
High fills located at western and eastern flanks of slide with lower side-hill fills in middle of slide area.

Cracking observed in pavement surface at west and east ends of site as follows:
• At west end of site (Photo 2): Cracking and settlement (up to approximately 10 m)) across both lanes through recent pavement patch to north shoulder, which was more noticeable than previous inspection.. Some skid marks observed in both lanes.
• At middle of site (Photo 5): Cracking and settlement (up to approximately 25 mm) in south (eastbound) lane, which was more noticeable than previous inspection.
• At east end of site (Photos 7 and 9): Cracking and settlement (up to approximately 100 mm) across both lanes through recent pavement patch, which was more noticeable than previous inspection. Some skid marks observed in westbound lane.
  ○ It is noted that a call-out inspection was completed in August 2024 due to increased pavement distress at the east end of the site, including a circular depression or sinkhole along the highway centerline.
  ○ Ongoing movement at the east end of the site could eventually impact the bridge-size culvert (BF80699).
Despite this increased movement observed at pavement surface, indications of increased movement were not observed on the south side of the highway at the time of the 2025 inspection (Photos 1, 6, and 10).

Portions of landslide that appear most active have generally coincided with areas of high fill (below/adjacent to Wanyandie Road intersection and deep gully at eastern site limit). Slide has been relatively inactive near middle of site, except for the past year, and above the highway.
Less active portions of slide north of highway may not be as influenced by fill placement or water infiltration into slide scarps at highway level. However, without any changes to the slide or highway geometry, continued movement of the lower portions of the slide or prolonged periods of wet weather causing groundwater levels to rise could eventually result in movements further upslope.
Vegetation beginning to re-establish in the north highway ditch where it was re-graded in 2023 near the west end of the site. It is noted that some water still ponds in the ditch (approximate 3-m diameter area) (Photo 3).
Sinkholes observed along north highway ditch, which appear to correspond with the location of a fiber optics line.
During the 2025 inspection, a very deep and steep-sided graben feature was observed while walking between Wanyandie Road and SI-06.
The area downslope/south of Wanyandie Road was not visited during the 2025 inspection, but the following was previously observed by KCB in 2022: • A series of ridges and troughs on the slope, which are visible in historic air photos and the bare-earth light detection and ranging (LiDAR) data. It was discussed that the ridges and troughs could be the result of blocks sliding and eroding overtime becoming more dome shaped. Generally, no pattern to ridges and troughs. • A pond of water located on the mid-slope. As well as other wet spots on the slope, and ponded and flowing water in two locations on former Wanyandie Road. Note pore pressures/water levels recorded in PN-3, located along former Wanyandie Road, were above ground surface before the instrument became inoperable in 2011.
Several geotechnical site investigations completed by others between 1998 and 2020, which included installing 14 SIs and 21 piezometers.

- Several of these piezometers have been dry or near dry (i.e., recording water levels below or near their tip elevations) since installation with a water level/porewater pressure above tip elevation only being recorded in the spring of 2020 and/or 2021. A sustained water level/porewater pressure has only been recorded in PN98-1, PN98-3, and the piezometers at the east end of the site (VW20 02A/B, -03A/B, and 06A/B, and SP20-4).
- Several of these SIs were either not installed deep enough (e.g., SI98-4 and -6, SI02-11 and -12, and TH20-2, -3, and -6) or did not record clear movement patterns before they became inoperable (e.g., SI98-1).

KCB subsequently completed a geotechnical site investigation in May 2022, which included installing 4 deep SIs and 13 deep VWPs.

To record year-round groundwater-fluctuations and improve our understanding of groundwater conditions below Hwy 40:36, KCB:

- installed data loggers on all 19 VWPs in the spring of 2022; and
- installed small-diameter VWPs connected to data loggers in 2 SPs in the spring of 2023.

Highway re-alignment to north/upslope previously studied and designed by others. The re-alignment design involved:

- large excavations of the mountain slope and high backslopes above/north of Hwy 40:36, which was judged by KCB and TEC to have a high risk of exacerbating existing movements or triggering other movements further upslope above/north of Hwy 40:36; and
- extension of the existing 1980's bridge-sized culvert at the eastern site limit.

Subsequent discussions with TEC indicated that they would like to see additional preliminary engineering assessments from KCB for re-alignment/lowering downslope/south and drainage/dewatering.

KCB presented our preliminary engineering work to TEC on March 18 and April 21, 2022. The main conclusions of the April 21, 2022, meeting were that:

- TEC will no longer be considering realignment and lowering/unloading of Hwy 40:36 to address slides movements; and
- there was insufficient piezometric and groundwater level data to full assess the feasibility of a dewatering solution.

A subsequent drilling investigation completed in May 2022 (see above) indicated dewatering would be challenging due to the fine-grained materials (soils and bedrock) present and the depth to bedrock (30 m to 40 m versus the 10 m to 20 m expected based on previous geotechnical site investigations).

Preliminary engineering report to be issued in late 2025.

<u>Maintenance/Repair/Monitoring Recommendations:</u>

- Pavement surface should be patched again.
- Remove rock from culvert at west end of site (Photo 4).
- Guardrail on the south side of the highway at the east end of the site is low (approximately 0.5 m above pavement surface) and located too far from the highway (approximately 0.6 m from edge of pavement) and may not redirect motorist back onto the highway (Photo 8). There is also an approximate 0.9 m drop below the guardrail that could trap a tire and some guardrail rail posts that are unsupported. Guardrail should be moved closer to pavement surface. Estimated cost: $20,000 to $40,000 depending on the length.

- As discussed in the Spring 2025 Section C instrumentation report, the existing information for the site is not providing TEC with much information on groundwater levels and the movements recorded in the SIs are difficult to relate to the amount of highway distress (e.g., cracking, settlement, and deflection) that is occurring. TEC could consider installing additional deeper piezometers and SIs at the site, but could also consider Interferometric Synthetic Aperture Radar (InSAR) monitoring to further study the slide and assess how the slope is moving and over what extent, particularly in difficult to assess areas with no instrumentation (e.g., above the highway where landslide terrain is visible on the surface expression of the 2005 bare-earth light detection and ranging (LiDAR) data). Estimated cost: approximately $40,000 to $75,000 per year for InSAR.

2025 Oct. 15
ID#153449

Courtney Mulhall, M.Sc., P.Eng.
Geotechnical Engineer

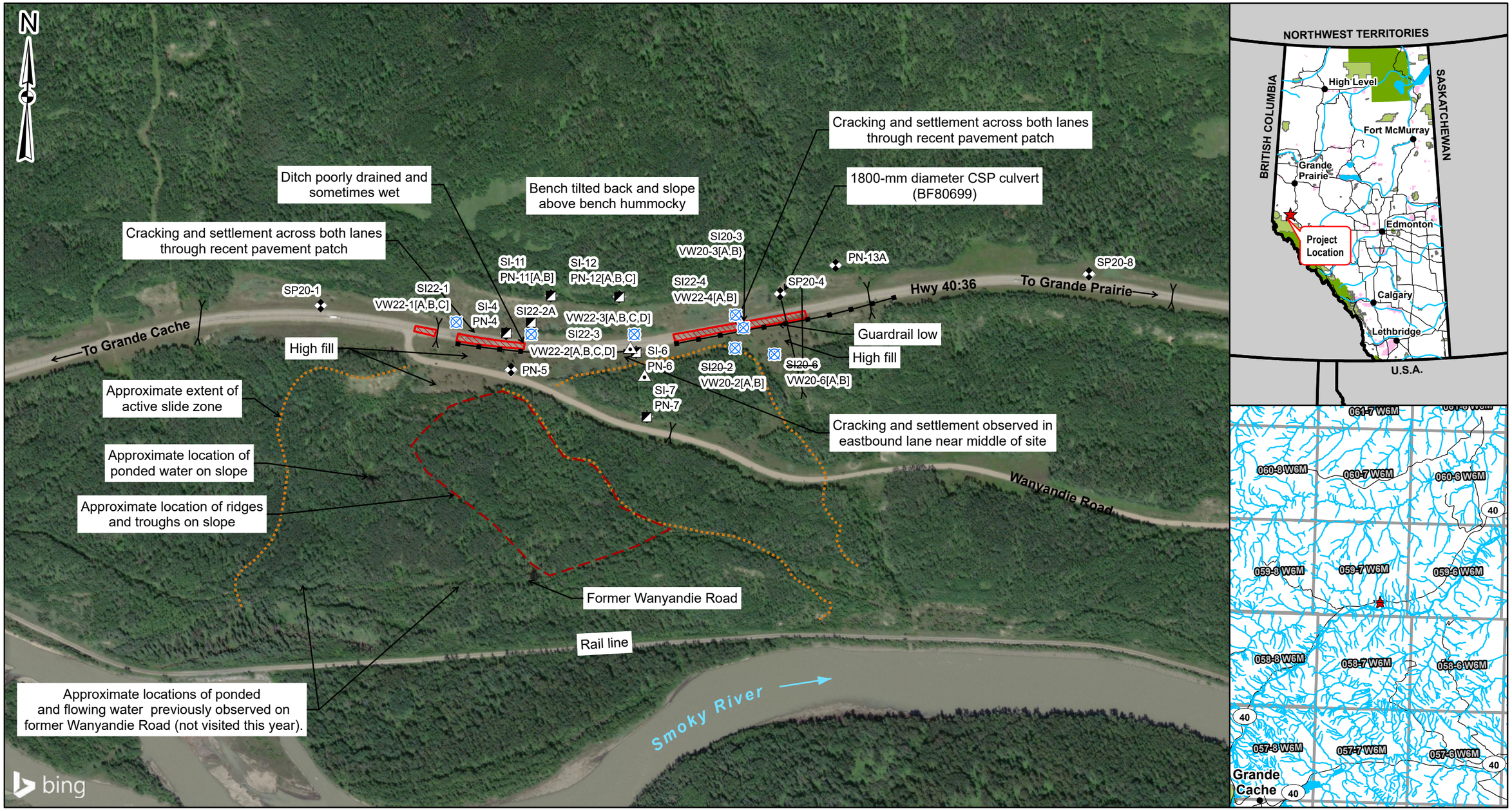
PERMIT TO PRACTICE
KLOHN CRIPPEN BERGER LTD.

RM SIGNATURE: _____

RM APEGA ID #: 187607

DATE: 15 Oct. 2025

PERMIT NUMBER: P009196
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)



Legend

- GPS Waypoint (June 03, 2025)
- Pneumatic Piezometer (PN)
- Slope Inclinometer (SI)
- Vibrating Wire Piezometer (VW)
- Flow Direction
- Culvert
- Guardrail
- Active Slide Zone
- Ridges and Troughs
- Pavement Patch

0 200 Metres

NOTES:
1. HORIZONTAL DATUM: NAD83
2. GRID ZONE: UTM ZONE 11N
3. IMAGE SOURCE: 2025 MICROSOFT CORPORATION, 2025 MAXAR CNES, DISTRIBUTION AIRBUS DS
4. STRIKETHROUGH INDICATES INSTRUMENT IS INOPERABLE. INSTRUMENT LOCATIONS APPROXIMATE. INSTRUMENTS INOPERABLE PRIOR TO 2021 MAY NOT BE SHOWN.

CLIENT: Alberta

Klohn Crippen Berger

PROJECT: PEACE REGION (GRANDE PRAIRIE DISTRICT-SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM

TITLE: Site Plan
GP007 - Wanyandie Road Slide
Hwy 40:36, km 29.339

SCALE	PROJECT No.	FIG No.
1:6,000	A05116A01	1

File: Z:\AEDM\A05116A01 ABT Grande Prairie South GRMP\400 Drawings\GIS\MXD\2025\Section B\GIS\1ABT_GPSouth_SectionB_250703.aprx Date: Time: Creator: : HManandyan

Inspection Photographs

Photo 1 **South (downslope) side of Hwy 40:36 near west end of GP007 site. Photo taken June 2, 2025, facing southeast.**

Photo 2 **Cracking and settlement across pavement surface of Hwy 40:36 near west end of GP007 site. Photos taken June 2, 2025, facing southwest and east, respectively.**

Photo 3 **Ditch on north (upslope) side of Hwy 40:36. Note vegetation becoming established in ditch and ponded water in ditch. Photo taken June 2, 2025, facing west.**

Photo 4 **Inlet of culvert at west end of GP007 site. Photo taken June 2, 2025, facing south.**

Photo 5 **Cracking and settlement across pavement surface of Hwy 40:36 near middle of GP007 site. Photo taken June 2, 2025, facing northwest and northeast, respectively.**

Photo 6 **South (downslope) side of Hwy 40:36 near middle of GP007 site. Photo taken June 2, 2025, facing east.**

Photo 7 **Cracking and settlement across pavement surface of Hwy 40:36 near east end of GP007 site. Photo taken June 2, 2025, facing southeast and southwest, respectively.**

Photo 8 **Guardrail on south side of Hwy 40:36 at east end of GP007 site is low and located far from highway. Photo taken June 2, 2025, facing east.**

Photo 9 **Undulating pavement surface of Hwy 40:36. Photo taken June 2, 2025, facing northwest.**

Photo 10 **South (downslope) side of Hwy 40:36 near middle of GP007 site. Photo taken June 2, 2025, facing west.**