

SITE NUMBER AND NAME: S057 Exshaw Rockfall, Sites A & B		HIGHWAY & KM: 1A:02 km 12.034	PREVIOUS INSPECTION DATE: May 17, 2022	INSPECTION DATE: May 27, 2024
LEGAL DESCRIPTION: 13-22-24-09 W5M	NAD 83 COORDINATES: UTM Northing Easting 11 5658509 627178		RISK ASSESMENT: Site A: PF: 11 CF: 3 TOTAL: 33 Site B: PF: 12 CF: 3 TOTAL: 36	
AVERAGE ANNUAL DAILY TRAFFIC: 1006 (west) & 931 (east) (Reference No. 50100258)			CONTRACTOR MAINTENANCE AREA (CMA): 27	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the S057 site. LAST READING DATE: N/A	INSPECTED BY: Chris Grapel (KCB) Peter Roy (KCB) Renato Macciotta (U of A) Kristen Tappenden (TEC) Alex Frotten (TEC) Syed Siddique (TEC)
PRIMARY SITE ISSUE: Two rock cut slopes with bedding planes dipping towards the highway. The sites have shallow to non-existent catchment ditches and rockfalls can reach the highway.	
APPROXIMATE DIMENSIONS: Site A – approximately 210 m long and up to 15 m high; Site B – approximately 300 m long and up to 12 m high.	
DATE OF ANY REMEDIAL ACTION: N/A	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress		X	N/A – none observed		X
Slope Movement		X	N/A – none observed		X
Erosion		X	N/A – none observed		X
Seepage		X	N/A – none observed		X
Culvert Distress		X	N/A – none observed		X
Rockfall	X		Recent rockfalls up to 3.5 m3 contained within the ditch. Bedrock slopes with ongoing rockfall into the existing shallow catchment ditches.		X

COMMENTS
<u>General:</u> <ul style="list-style-type: none"> The existing shallow ditches at both sites appear to be effective but should be cleaned out regularly. A utility box was noted on the north side of the road, with utility cables running along the ditch.

Site A (km 12.52 to km 12.34):

- The bedrock is sedimentary (limestone or siltstone) with open joints and visible bedding planes (dipping towards the highway at approximately 40°). There is the potential for sliding failure but unlikely to rebound onto the road.
- The ditch is relatively flat and rockfall debris (up to boulders in size) were observed in the ditch. The larger debris (boulders) were observed during the 2020 inspection.
- Fresh (i.e., unweathered) rockfall debris (up to 1 m³) were noted in the ditch, suggesting rockfalls are ongoing. Multiple rocks with open fractures were noted at the brow of the rock slope.
- No significant changes were observed at the site during the 2024 inspection.

Site B (km 12.26 to km 11.91):

- Bedrock is sedimentary and similar to Site A (limestone or siltstone) with open joints and visible bedding planes (dipping towards the highway at approximately 50°), mid-sized blocks visible with potential to roll onto the road. The bedrock at the northwest end of Site B is highly fractured and has irregular bedding. At the east end the bedrock is massive and less fractured. Subrounded rocks were observed to be weathering out of the soil mantle at the brow of the slope during the inspection. Root jacking due to the presence of trees and shrubs may be contributing to additional rockfalls.
- Ditch is relatively flat and contained multiple gravel and cobble sized debris.
- Rockfalls are active and fresh rockfall debris (up to 1 m³) was noted in the ditch bottom, with smaller debris on the highway surface. Rockfall observed was primarily subangular to angular. Multiple potential loose blocks were visible in the rock mass.
- Site B appears to be more active than Site A.

Maintenance/Repair/Monitoring Recommendations:

- The site should be inspected regularly by TEC's MCI and rockfall debris in the ditch should be regularly removed.
- The site should continue to be inspected as part of the Southern Region GRMP Section B inspections.
- Excavation of rockfall catchment ditches adjacent to the highway and spot bolting of blocks which appear unstable or pose a wedge failure risk. A wildlife and road safety assessment would need to be completed to assess the impact of the installation of jersey barriers at the site.
- This site was included in the K-Country Rockfall Hazard Assessment completed by KCB in 2023. A draft report was submitted on September 18, 2023. One of the recommendations in the report included that jersey barriers should be installed at the edge of the pavement to reduce the percentage of rockfall that is entering the highway. At the S057 site, it is noted that jersey barriers are not enough to decrease the catchment requirement to 95% (91 % with jersey barrier at the edge of pavement). Other mitigation measures should be considered such as higher lock block walls or rock fall barriers installed on jersey barriers.

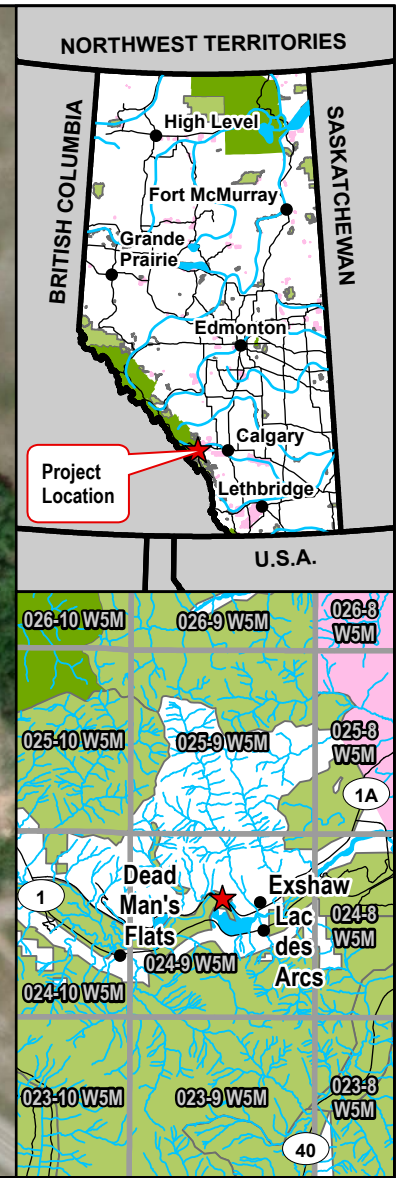
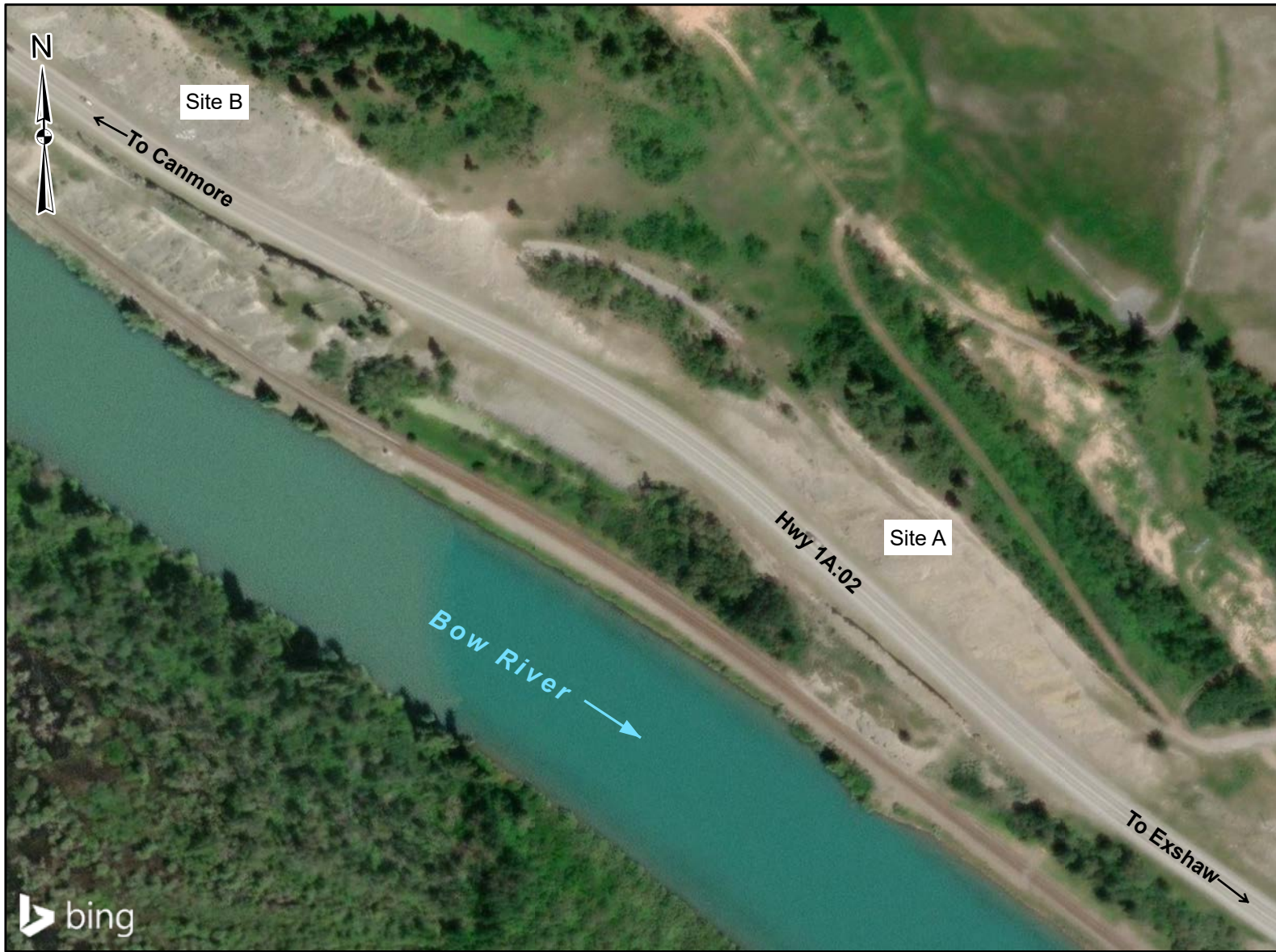
This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Alberta Transportation and Economic Corridors (Client) for the specific application to the Southern Region Geohazard Risk Management Program (Contract No. CON0022161) and it may not be relied upon by any other party without KCB's written consent.

KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

Use of or reliance upon this instrument of service by the Client is subject to the following conditions:

- (i) The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report.
- (ii) The observations, findings and conclusions in this report are based on observed factual data and conditions that existed at the time of the work and should not be relied upon to precisely represent conditions at any other time.
- (iii) The report is based on information provided to KCB by the Client or by other parties on behalf of the client (Client-supplied information). KCB has not verified the correctness or accuracy of such information and makes no representations regarding its correctness or accuracy. KCB shall not be responsible to the Client for the consequences of any error or omission contained in Client-supplied information.
- (iv) KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.
- (v) This report is electronically signed and sealed and its electronic form is considered the original. A printed version of the original can be relied upon as a true copy when supplied by the author or when printed from its original electronic file.

Peter Roy, P.Eng.
Civil Engineer



Legend
 Flow Direction



NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM ZONE 11N
 3. IMAGE SOURCE: MAXAR 2024

CLIENT

PROJECT SOUTHERN REGION GEOHAZARD RISK MANAGEMENT PROGRAM		
TITLE Site Plan S057 - Exshaw Rockfall Hwy 1A:02, km 12.034		
SCALE 1:2,500	PROJECT No. A05116A03	FIG No. 1

Photo 1 The bedrock at Sites A and B is dipping at approximately 40° and 50°, respectively, towards the highway. Photo taken on May 27, 2024, facing northwest.



Photo 2 The north (westbound) ditch at Site A, recent rockfall debris in ditch at the south end of the site. Photo taken on May 27, 2024, facing southeast.



Photo 3 The north (westbound) ditch at Site A. Recent rock fall from area noted with red circle. Photo taken on May 27, 2024, facing northeast.



Photo 4 Northwest end of Site A. Photo taken on May 27, 2024, facing north.



Photo 5 Northwest end of Site A, recent rockfalls and debris fan. Photo taken on May 27, 2024, facing northwest.



Photo 6 South end of Site B. Loose rock with the potential to fall into the ditch. Photo taken on May 27, 2024 facing northwest.



Photo 6 South end of Site B. Rockfall debris in ditch. Photo taken on May 27, 2024 facing northwest.



Photo 7 North end of Site B. Rockfall debris in ditch (unchanged from 2022). Photo taken on May 27, 2024 facing northwest.

