

SITE INSPECTION FORM

SITE NUMBER AND NAME: GP053 Rock Slope North of McIntyre Mine		HIGHWAY & KM: 40:36, 16.295 to 17.161	PREVIOUS INSPECTION DATE: July 21, 2021	INSPECTION DATE: June 14, 2022
LEGAL DESCRIPTION: West SE 15-58-08-W6M East NW-14-58-08-W6M	NAD 83 COORDINATES: UTM Northing Easting 11 5986971 362772 11 5987248 363835		RISK ASSESSMENT: PF: 12 CF: 5 TOTAL: 60	
AVERAGE ANNUAL DAILY TRAFFIC (AADT): 820 (north) & 820 (south) (Reference No. 70000788, 2021)			CONTRACT MAINTENANCE AREA (CMA): 504	

SUMMARY OF SITE INSTRUMENTATION: There is no instrumentation at the GP053 site, but instruments are installed at the GP008A slide site within the limits of the rockfall corridor. LAST READING DATE: N/A	INSPECTED BY: Chris Gräpel (KCB) Courtney Mulhall (KCB) Ed Szmata (AT) Kristen Tappenden (AT) Max Shannon (AT) Mike Schiffer (Ledcor HMC)
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PRIMARY SITE ISSUE: Series of rockfall hazards from rock cut slope along west side of Hwy 40:36. Talus deposits and rockfall particles from rock cut slope constrict upslope/north highway ditch and falling rocks are a traffic hazard. The site is located along the west valley slope of the Smoky River. This site is the rockfall component of the former GP008A site that has been made into a separate site in 2022 for rockfalls only. GP008 site is now for road surface slumping and slides only.

APPROXIMATE DIMENSIONS: Corridor is approximately 1.0 km long.

At south/western site limit: Rock cut slope is near vertical with a mid-slope bench, and approximately 20 m high above pavement surface.

At north/eastern site limit: Rock cut slope is near vertical and approximately 5 m to 10 m above pavement surface.

DATE OF ANY REMEDIAL ACTION: Ongoing ditch cleaning and removal of rockfall particles from pavement surface. As well as patching and paving (more so due to GP008A slides along the same section of highway).

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Majority of pavement distress along corridor due to GP008A slide movements. No change in pavement distress from rockfall hazards observed.		X
Slope Movement	X		Previously fallen rockfall particles (up to 1.0 m x 1.0 m x 1.0 m) and talus materials between toe of slope and pavement edge.	X	
Erosion	X		Differential weathering, freeze thaw, ice jacking, and seepage eroding rock mass.		X
Seepage		X	None observed at time of 2022 inspection.		X
Culvert Distress		X	Culverts not inspected, but no previous distress observed by KCB.		X

COMMENTS
Brow of rock slope has minimal to no overburden and some trees.
Rock mass consists of relatively good quality sedimentary rocks, except the coal seams (and other less competent materials) which are weathering faster. Between WP190 and WP191 beds are near vertical, between WP191 and WP193 beds are gently inclined from horizontal (fault/fold at WP191), and between WP192 and WP197 beds are sub-vertical and inclined to the west. Faster weathering of the coal results in the undermining of more competent rocks, which results in overhanging blocks and particles with little support that eventually fall, and the deposition of talus cones/slopes at the toe of the coal seams with occasional adjacent lateral rock block piles/cones. Cubical shaped rockfall particles appear to be rolling and bouncing down the talus cones bringing them closer to the highway (i.e., the talus cones act like chutes for rockfall particles). Whereas flat platy shaped rockfall particles appear to get hung up in the talus.
Several hanging rock blocks close to falling.
At the south/western site limit between WP190 and WP191, there is a mid-slope bench that has talus cones/slopes, which could potentially bounce/launch/roll rockfall particles out onto highway.
AT says that some rock particles make it to the highway, and some are large enough to require a front-end loader to remove.
At south/western site limit between 190 and 191 rockfall particle approximately 0.5 m x 0.5 m x 0.5 m observed approximately 0.5 m from pavement edge. At north/eastern site limit between WP195 and WP196 rockfall particle approximately 1.0 m x 1.0 m x 1.0 m observed approximately 3 m to 4 m from pavement edge.
Approximate ditch geometry: <ul style="list-style-type: none"> • East of WP192: 1.0 m to 1.5 m wide, up to 1.5 m deep with a 2H:1V side slope. • Near middle of site at WP194: 2.0 m wide, up to 1.0 m deep with a 3H:1V side slope. • North/eastern site limit at WP196: v-notched, up to 1.0 m high with a 3H:1V side slope.
AT reported that there has been more rockfall from the rock cut slope in recent years. Powerlines at crest of rock slope indicate mine site development that could be influencing the performance of the slope. KCB to check air photos for evidence of mining activity above slope and for history of road construction.
<u>Maintenance/Repair/Monitoring Recommendations:</u> <ul style="list-style-type: none"> • Call out completed at the GP036, GP049, and GP053 sites on July 14, 2022 after increased rockfall activity was triggered by wet weather. As part of the call out a review will be completed to determine where scaling and an attenuating mesh is needed. <ul style="list-style-type: none"> ○ Short term – Rock slope should be scaled by a high-angle specialty contractor. Scaled materials and other rockfall materials should be cleaned out of the ditch. Estimated cost: \$150,000 to \$200,000 if entire rock face scaled. ○ Long term – Rock slope should be draped in an attenuating mesh that reduces the energy of falling rocks and limits their potential to reach the highway. Estimated cost: \$330,000 to \$450,000 if half the rock face is draped in mesh. • “Watch for fallen rock” signs on either side of site, on east shoulder before site for northbound traffic and on west shoulder before site for southbound traffic. Additional signage (e.g., “watch for fallen rock, no parking) should be installed along site to further warn motorists of rockfall hazard. • Upslope/north ditch narrow (up to 2.0 m wide at base) and shallow (up to 1.0 m deep) with a 2H:1V to 3H:1V side slopes. MC reported ditch has not been cleaned in approximately 3 years. Rockfall particles and talus materials starting to impede ditch drainage. Continue to clean ditch to maintain rockfall storage volume (i.e., keep ditch as wide and deep as possible to retain material within the ditch) and reduce the potential for material reaching the highway. AT reported that there are no utilities below the ditch at this site, but AbaData indicates there may be a pipeline (depth unknown) that crosses the highway from south to north near SI-1.

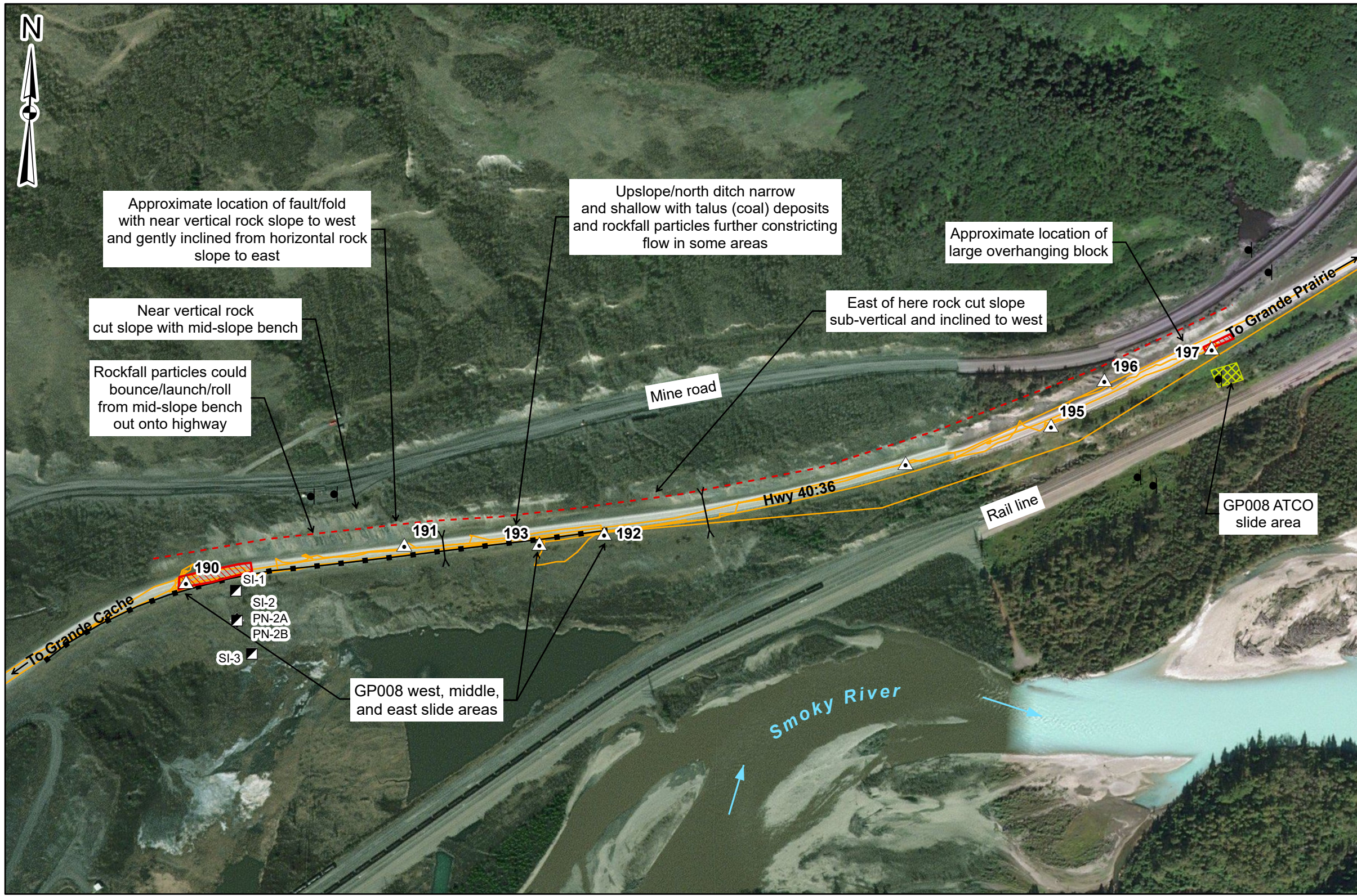
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Chris Gräpel, M.Eng., P.Eng.
Senior Civil Engineer, Associate



Approximate location of fault/fold with near vertical rock slope to west and gently inclined from horizontal rock slope to east

Upslope/north ditch narrow and shallow with talus (coal) deposits and rockfall particles further constricting flow in some areas

Approximate location of large overhanging block

Near vertical rock cut slope with mid-slope bench

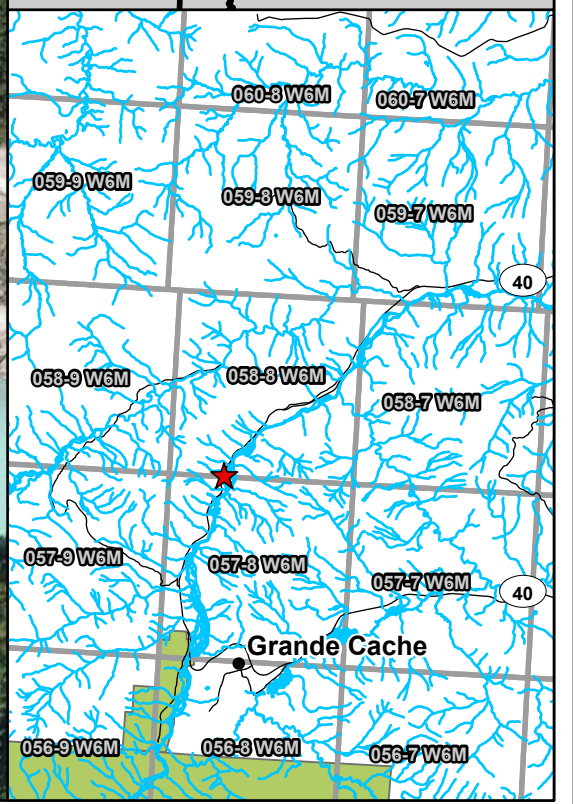
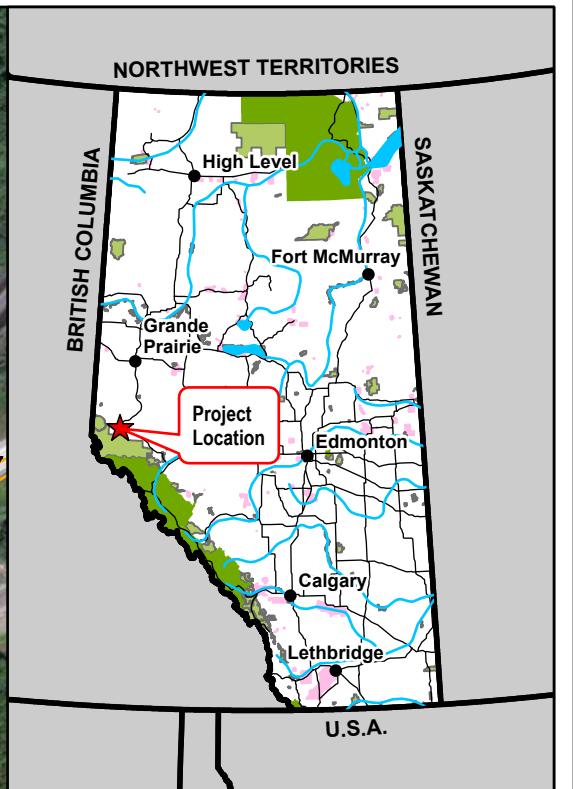
East of here rock cut slope sub-vertical and inclined to west

Rockfall particles could bounce/launch/roll from mid-slope bench out onto highway

Mine road

GP008 ATCO slide area

GP008 west, middle, and east slide areas



Legend

- Powerpole
- ◆ Approximate Pneumatic Piezometer Location
- Approximate Slope Inclinometer Location
- △ GPS Waypoint (June 14, 2022)
- GPS Track (June 14, 2022)
- Flow Direction
- > Culvert
- - - Rockfall Corridor
- Guardrail
- ▨ ATCO Excavation
- ▨ Pavement Patch



NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM ZONE 11N
 3. IMAGE SOURCE: 2022 MICROSOFT CORPORATION, 2022 MAXAR CNES, DISTRIBUTION AIRBUS DS
 4. INSTRUMENTS BEING MONITORED AS PART OF GP008A SITE.

CLIENT

PROJECT	PEACE REGION (GRANDE PRAIRIE DISTRICT-SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM	
TITLE	Site Plan GP053 - Rock Slope North of McIntyre Mine Hwy 40:36, km 16.295 to 17.161	
SCALE	PROJECT No. A05116A01	FIG No. 1

File: Z:\A\EDM\A05116A01\ABT Grande Prairie South GRMP\400 Drawings\GIS\MXD\2022\2022 GRMP Figures_2024\25.aprx Date: Time: Creator: aharrison

Inspection Photographs

Photo 1 Overview of rockfall corridor along west side of Hwy 40:36 north of McIntyre Mine. Photo taken June 14, 2022, with unmanned aerial vehicle (UAV) facing northeast.



Photo 2 Rock cut slope along west side of Hwy 40:36 between WP190 and WP191 at south/western site limit. Note talus (coal) deposits and rockfall particles in upslope/north highway ditch. As well as change in orientation of bedrock discontinuities mid-photo (near vertical bedding to left/south transitioning at a fault/fold to gently inclined from horizontal on right/north). Photo taken June 14, 2022, with UAV facing northwest.



Photo 3 Rock cut slope along west side of Hwy 40:36 at WP 197 at north/eastern site limit. Note talus (coal) deposits and rockfall particles in upslope/north highway ditch. Photo taken June 14, 2022, with UAV facing north.



Photo 4 Toe of rock cut slope between WP190 and WP191 at south/western site limit. Note talus (coal) deposits and rockfall particles in upslope/north highway ditch. Photo taken June 14, 2022, facing west.



Photo 5 Toe of rock cut slope between WP190 and WP191 at south/western site limit. Note rockfall particles in upslope/north highway ditch. Photo taken June 14, 2022, facing east.



Photo 6 Near vertical bedding of rock cut slope between WP190 and WP191 at south/western site limit. Note hanging rock blocks. Photo taken June 14, 2022, facing north.



Photo 7 Talus material from coal seam in rock cut slope between WP190 and WP191 at south/western site limit. Photo taken June 14, 2022, facing north.



Photo 8 Rock cut slope east of WP192 near middle of site. Photo taken June 14, 2022, facing east.



Photo 9 Rock cut slope near WP195 and middle of site. Note talus (coal) materials and rockfall particles in upslope/north highway ditch, which is narrow and shallow, and hanging rock blocks. Photo taken June 14, 2022, facing north.



Photo 10 Rock cut slope near WP195 and middle of site. Note talus (coal) materials in upslope/north highway ditch, which is narrow and shallow. Photo taken June 14, 2022, facing north.



Photo 11 Rock cut slope near WP195 and middle of site. Note rockfall particles in upslope/north highway ditch, which is narrow and shallow. Photo taken June 14, 2022, facing northeast.



Photo 12 Rock cut slope at WP197 at north/eastern site limit. Note rockfall particles in upslope/north highway ditch, which is narrow and shallow, and hanging rock blocks (see large one circled in white). Photo taken June 14, 2022, facing southwest.



Photo 13 Large rockfall particle in upslope/west ditch between WP195 and WP196 near northern site limit. Photo taken June 14, 2022, facing east.

