

Project: EP-24-0086 Crystal Park Site S-166 (Burroughs Residence)

El Paso File Number: CP252

**Location: SW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 17, T14S, R67W, 6th Meridian
38.8333, -104.9140**

Submitted 5/21/2025 by Amy Crandall, Engineering Geologist, Colorado Geological Survey (303-384-2632 or acrandall@mines.edu)

The applicant proposes a single-family residence at 5105 Neeper Valley Road in the Crystal Park development. With this resubmittal, we received the Site Plan (TDG Arch, dated April 7, 2025) and the Geologic Hazards Report (Rocky Mountain Group (RMG), dated May 17, 2024). RMG references a soils report prepared by A Better Soil Solution (dated May 24, 2023). However, this report was not provided in Appendix A of RMG's report.

The available LiDAR and the Geologic Hazard Report indicate slopes ranging from 70 to 80 percent upslope from the proposed residence. As noted by RMG in the Geologic Hazards Study, geologic hazards that may pose constraints to construction include potentially unstable slopes, downslope creep, erosion, seismic activity, and radon gas. Debris flow hazards are also a hazard/constraint associated with the site (Debris Flow Susceptibility, El Paso County, 2018, CGS No. OF-18-11). CGS offers the following comments and recommendations during the planning and development of this site.

Site Geology

The site is underlain at variable depths by relatively loose material (commonly known as "Grus" or "Colluvium") weathered from the underlying Pikes Peak Granite. Pikes Peak Granite is typically not problematic from a geotechnical or foundation performance perspective. However, the rock is fractured and weathered, sometimes extensively. Both of these rock quality characteristics can impact slope stability and erosion potential. Additionally, Grus is weaker than the bedrock and can be highly variable in depth.

Steep Slopes and Construction-Related Slope Instability

There are risks associated with construction on steep slopes, such as those present at this site. Although mapped landslides are not present and no evidence of existing slope instability was observed, construction on these steep slopes poses risks, as erosion is also a significant constraint. Presently stable slopes may become unstable as a result of reduced soil strengths if,

- 1) Modifications are made through the excavation of cuts, the addition of fills, and loading due to structures,
- 2) Significant moisture is added to the slope through residential irrigation (including infiltration from septic fields) and ample precipitation or snowmelt,
- 3) The existing drainage pattern is altered through grading, introducing water to previously drier areas.

CGS recommends the following be implemented in the design and construction:

- **All planned cuts exceeding four feet in height should be evaluated for slope stability** using proposed slope geometry and considering all foundation and proposed cuts that will affect the slope. The geotechnical engineer should be provided with the construction plans and grading information to verify proposed slopes.

- Retaining walls, building foundations, and upslope foundation walls that will function as retaining walls must be designed by a qualified geotechnical, structural, or civil engineer and must include adequate behind-wall drainage.
- RMG states (page 8), “Surface runoff could also be rapid and the potential for rapid erosion of unvegetated slopes is considered to be high. Long-term slopes should not be steeper than 3:1 (horizontal: vertical) in cut or fill areas.” According to the site plan, proposed slopes of 2:1 (horizontal: vertical) are planned downslope and east of the residence. **Slope stability analysis should be performed on slopes steeper than 3:1.**
- Block slope failures in the bedrock can occur along concealed fractures and weathered zones anywhere beneath the planned building site. The foundation excavation should be carefully inspected for evidence of fractures, discontinuities, and weathered zones.

The site plan indicates that a leach field (septic location) is planned to the northeast of the proposed residence. Engineered septic systems are commonly used in the Crystal Park area due to the steep slopes and geology. CGS recommends that a septic system investigation be performed during the design phase.

Debris Fans/Debris Flow Susceptibility

RMG states (page 7), “Terrain features consistent with the formation of debris flows and debris fans are not present in the vicinity of the property.” However, based on debris flow susceptibility mapping (CGS, OF-18-11, 2018), the project site is within a small drainage designated as a debris flow hazard. Although the site is not within a defined floodplain, the small drainages that discharge into Sutherland Creek may be affected by erosion, flooding, sediment-laden flows, and erosion following heavy precipitation.

RMG also states that this drainageway has reportedly been redirected away from the street above and rerouted, and “If this drainageway shows indications of water seeping from above, the water will need to be redirected away from the residence.” CGS agrees with RMG that “care should be taken (both during construction and in the final grading of the lot) in redirecting surface drainage (and any resulting debris) around the structure. The new drainage flow path should maintain a minimum 10-foot separation from the structure.” Erosional setbacks from any drainage or channel within the site should be established, along with site grading that provides positive surface drainage and Best Management Practices (BMPs) for stormwater. **CGS recommends that erosion setbacks from the previous and redirected drainageways be established and noted on the site plan.**

Surface Drainage and Erosion

The onsite soil and colluvium (“Grus”) are highly susceptible to erosion. Concentrated, developed flows can cause severe and damaging erosion, rapidly eroding the surface material down to hard rock. Site drainage should be designed and constructed to prevent concentrated flows from being developed within the site. Proper maintenance and erosion protection of the slope face within the subject property is critical to the long-term structural integrity of the proposed structure.

Geologic Hazard Disclosure Statement

CGS recommends adding a statement to the site plan that references RMG’s report and lists all geologic hazards and constraints affecting the site.