WWE

MEMORANDUM

To: Michelle Metteer, Town Manager
Scot Hunn, Planning Director

From: Wright Water Engineers, Inc.
Scott Schreiber, P.E., CFM

Date: August 21, 2023

Re: Minturn North PUD: Cursory Mudflow Evaluation

This memorandum is to document a cursory mudflow evaluation completed by Wright Water Engineers, Inc (WWE) as it relates to the proposed Minturn North PUD and associated mudflows from the Game Creek drainage. WWE has not completed a detailed quantitative modeling analysis of mudflow concerns for the proposed development, rather this evaluation is based on experience, background data review and site visits. The Minturn North PUD is located on the north side of Minturn between Taylor Street and Minturn Road. WWE was retained by Rick Hermes of Minturn Crossing, LLC (Developer), to complete this mudflow evaluation.

In review of United States Geological Survey Minturn Quadrangle Geological map, the proposed development resides in an area of Stream Alluvium (Qa, Holocene) and Fan Deposits (Qf, Holocene to Middle Pleistocene). These deposits are synonymous with an alluvial fan and deposited from historical events. The conical shape of the existing ground topography on site is also synonymous with an alluvial fan.

While the geologic mapping and existing topography indicate that the development site has historically seen active mudflows, there is no evidence of recent mudflow events in the area. A berm, designed by others, has been designed along the northern side of the development. This berm will help to reduce the risk of a mudflow from Game Creek impacting the development from the north. The berm will only affect mudflow events in vicinity of the development. It should be noted though that due to the development upstream of the PUD, mudflow events could spill out of Game Creek and impact Taylor Street and the PUD from the west, where the berm is not planned. While the planned berm could reduce risk, it does not eliminate the mud and debris flow hazard on site.

There is a high level of uncertainty in mudflow dynamics due to the complexity of factors dictating flow behavior.. Factors which were beyond the scope of this analysis, such as potential future wildfire impacts, man-made modifications to the upstream flow path, avulsion of the existing active channel, debris damming and/or breaching could dramatically change the behavior of the mudflow and potentially increase the risk to any structure situated within the PUD and surrounding areas. The existing topographic data of the PUD and upgradient drainage could change dramatically with each mudflow event due to the highly dynamic nature of the system. Upstream avulsions or man-made alterations to the watercourse could also significantly impact the hydraulics of a mudflow event as it approaches the PUD, potentially increasing risk. Maintenance of the mitigation measures that will be designed will be required to maintain the design level of mitigation. Consecutive events could have additional impacts if the mitigation measures are not maintained.

Memo

To: Scott Hunn, Planning Director, Town of Minturn

From: Phil Harris

Date: August 23, 2023

Re: Minturn North PUD, Deflection Berm Lots 1-5.

The purpose of this memo is to follow up to an August 17, 2023 memorandum by Wright Water Engineers Inc. (WWE) regarding their Cursory Mudflow Evaluation relating to the Minturn North PUD.

There are many factors which can impact debris flow patterns and depths. These factors are largely unpredictable because they involve scenarios which include a variety of theoretical off-site catastrophic events such as wildfires, avalanches, and other dynamics which may impact groundcover above the site. Debris flow is also impacted by obstructions such as existing manmade structures and homes, vegetation, drainage structure blockages, and even parked vehicles.

The civil engineering drawings prepared for the Minturn North PUD include the recommendations from the drainage study prepared by WWE, and also include a deflection berm along the northern edge of Lots 1-5 within the 30' Game Creek setback with the specific design intent of reasonably containing flow in the Game Creek drainage corridor. The deflection berm was placed in this location based on a preliminary mud flow analysis map provided by WWE which identified this area as having the potential for debris flow. No depth of debris flow was identified on the WWE mapping. The base of the berm is located on the fringe of the 100 year floodplain for Game Creek. Absolute debris flow protection can never be feasibly achieved due to the unpredictability of hazardous events in any mountain valley. Nonetheless, a 2 ft. minimum height deflection berm is to be constructed as shown on the civil engineering drawings on sheet C.6 as an improvement to existing conditions.