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**ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED**

Job No. 162062

January 18, 2021

Windsor Ridge Homes
4164 Austin Bluffs Parkway, #361
Colorado Springs, CO 80918

Re: Response to CGS Comments
Windermere Subdivision
N Carefree Cr
El Paso County, Colorado

Dear Mr. Stephens:

RMG – Rocky Mountain Group (RMG) prepared the Soils and Geology Report (RMG Job No. 162062, last dated October 26, 2020) for the proposed development, consisting of 203 single-family residences. The report was reviewed by personnel of the Colorado Geological Survey (CGS), and comments were posted on the El Paso County website, EDARP, and forwarded to RMG by personnel of Drexel Barrell & Co. on December 2, 2020.

This letter provides RMG's response to CGS' comments. For clarity and ease of review we have "snipped" the relevant comments and pasted them below, each followed by our response to that comment.

CGS Comment:

Persistent shallow groundwater occurs at this site and within this region. This is reflected in part where RMG has mapped areas as "seasonally wet" (sw). Within this area they state, "basement construction should be avoided on the proposed lots 72-74 and lots 169-173." This is not all the lots within the "seasonally wet" map unit. No technical basis has been provided why some lots within this mapped designation should avoid basement construction and not others.

RMG Response:

As noted in our report, *"Additionally, areas of seasonal and potentially seasonal shallow groundwater were observed on the site. In these areas, the potential for periodically high subsurface moisture conditions may be encountered. These areas currently lie within the low-lying areas in the northeastern corner of the site and the existing detention area. Water has been observed in these areas during seasonally high moisture periods."* Where the proposed lots encroach within these low-lying areas in the northeastern corner of the site, personnel of RMG have reviewed the available groundwater data available to date (compiled from nearly 60 test borings, only 5 of which contained any groundwater at all) and the conditions observed in our site reconnaissance visits to determine which lots are anticipated to encounter groundwater conditions

shallow enough to impact basement construction. We recommended that basement construction be avoided on these lots.

Regarding the remaining areas identified as "seasonally wet" (sw) in our report, these lots are in an area we designated the "central drainageway". As noted in section 6.5 of our report, *"It is our understanding that the central drainageway is to be infilled as part of the overlot grading process. Based on our investigation, the central drainageway does not appear to be related to a shallow groundwater condition. Rather, it is a relatively low-lying pathway for surface runoff. Provided that the site drainage and grading plan provides for adequate surface runoff in this area, it is our opinion that no further mitigation measures are required. Site grading should be configured to avoid ponding of water around the structures."*

For clarification, the "seasonally wet" designation in our report does not necessarily indicate the presence of a subsurface water condition. Intermittent (or "seasonally wet") drainages such as those identified on the site are typically incised by surficial runoff during periods of high precipitation or snowmelt, not by subsurface groundwater conditions (whether a permanent water table, or a localized "perched" water condition). The pathway that these surface water conditions follow (and thus, the drainage channels that they incise) are based on surface topography, not on groundwater conditions occurring below the ground surface. Surficial drainage channels, such as the ones identified on this site, can and do occur in areas with no subsurface groundwater conditions. Likewise, areas containing high groundwater conditions (either permanent or "perched") can and do occur in areas with no incised drainages on the ground surface. The two conditions, while both relating to the presence or movement of water, can and do occur independently of each other and the presence of one is not a reliable indication of the presence of the other. There are no indications of a persistent subsurface groundwater condition within the central drainageway and thus, it is our opinion that there is insufficient justification to prohibit basement construction in this area.

CGS Comment:

Seasonal groundwater monitoring has not been conducted at this site as recommended by the Engineering Criteria Manual (ECM) and extent of seasonal fluctuation is unknown. Without monitoring, potential impacts from groundwater are indeterminate. RMG states, p. 8, "If shallow groundwater conditions are found to exist on additional lots at the time of site-specific subsurface soil investigations, the feasibility of basement construction and/or any recommended mitigation measures are to be addressed at that time."

RMG Response:

Seasonal groundwater monitoring is recommended by the El Paso County Engineering Criteria Manual (ECM) in cases where groundwater has been encountered within 5 feet of the original ground surface (as part of a Subsurface Water Investigation Report). Groundwater was not encountered within 5 feet of the original ground surface in any of the test borings performed at this site by RMG. Furthermore, the stated purpose of this report is to *"ensure mitigation of high groundwater effects upon public improvements within the right-of-way."* The ECM does not indicate any correlation between the Subsurface Water Investigation Report (or the associated groundwater monitoring) and a determination of basement feasibility. Nor does the ECM require seasonal groundwater monitoring as part of the geologic hazard evaluation. At most, the ECM lists "monitoring programs" as one of many available site evaluation techniques. However, it also

states that "*The most appropriate site evaluation techniques shall be determined by the geologist/geotechnical engineer based on site conditions and the activities being proposed for the site.*" Based on the locations and depths of groundwater encountered in our investigation, a review of the proposed development, and a review of the ECM requirements regarding groundwater, it is our opinion that a seasonal groundwater monitoring program is not required at this site.

CGS Comment:

ECM is clear that discussion of seasonal variations in groundwater levels based on groundwater monitoring are the responsibility of the applicant at the time of initial planning.

RMG Response:

As noted above, the ECM states that it is up to the geologist/geotechnical engineer to determine which investigation methods are appropriate for the site. The ECM does designate one specific condition when groundwater monitoring would be required but that condition does not relate to basement feasibility (or any other construction within the proposed lots), and this site does not meet that criteria.

CGS Comment:

This subdivision includes areas of both shallow groundwater and potentially shallow groundwater. CGS recommends the applicant follow ECM recommendations and perform a groundwater monitoring program to determine groundwater depths and extent of seasonal fluctuation. In the absence of such a program and prior to approval of the development plan we recommend it be demonstrated where mitigation of persistent groundwater is taking place from:

- Raising site grades;
- Garden-level basement construction; and/or,
- An underdrain system.

RMG Response:

RMG has identified one area on the site where shallow groundwater is anticipated to exist within the proposed lots. We have recommended that basement construction be avoided on these lots. It is our opinion that further investigation or mitigation is not required at this time.

CGS Comment:

It is the applicant's responsibility to demonstrate that groundwater levels will be maintained 3 to 5 feet below base of foundation year-round and how this is achieved should be clearly shown and stated on the plans. Areas where basements are not feasible, areas where specific mitigation allows basements, and areas of high ground above any seasonal groundwater levels should be clearly depicted on the plans and individual lot numbers listed for each area. All areas where basements are considered feasible should clearly state how it was determined that groundwater levels will be maintained 3 to 5 feet below base of foundation.

RMG Response:

The ECM has no such requirement. The ECM does not stipulate a minimum separation between groundwater and the base of the proposed foundations. Nor does it provide any specific criteria for determining basement feasibility with respect to groundwater, or for determination of mitigation measures necessary to promote basement feasibility. These determinations are the responsibility of the geologist/geotechnical engineer preparing the report. We have made these determinations, and provided our recommendations accordingly.

It is our opinion that the report referenced above (and the recommendations provided therein) are in compliance with the ECM, and that no additional investigations or revisions to the referenced report are required at this time.

I hope this provides the information you have requested. Should you have questions, please feel free to contact our office.

Cordially,

RMG – Rocky Mountain Group



Kelli Zigler
Project Geologist



Tony Munger, P.E.
Geotechnical Project Manager