

COLORADO GEOLOGICAL SURVEY

1801 19th Street
Golden, Colorado 80401



Karen Berry
State Geologist

December 1, 2016

Kari Parsons
El Paso County
Development Services Department
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Location:

SW¹/₄ Section 13, SE¹/₄ Section 14,
NE¹/₄ Section 23, and NW¹/₄ Section 24,
T15S, R65W of the 6th P.M.
38.7378, -104.6261

Subject: Lorson Ranch East – PUD/Preliminary Plan
File number PUDSP-16-003; El Paso County, CO; CGS Unique No. EP-17-0020

Dear Ms. Parsons:

Colorado Geological Survey has reviewed the Lorson Ranch East PUD/preliminary plan referral. I understand the applicant proposes a PUD development plan for 838 single family lots on 225.76 acres located east of the Jimmy Camp Creek East Tributary. With this referral, we received: a Review Agency Comment Sheet requesting CGS's review (October 17, 2016), a copy of the Petition/Application Form (signed October 4, 2016), a Lorson Ranch East PUD Development, Preliminary Plan and Early Grading Request (Thomas Thomas, October 10, 2016), a Geology and Soils Report (RMG, October 5, 2016), a Letter of Map Revision Determination Document (14-08-0534P, effective January 29, 2015), a set of 25 Preliminary Site Grading Construction Plans for Lorson Ranch East (Core Engineering Group, October 2016), a Preliminary Drainage Plan and a Master Development Drainage Plan (Core Engineering Group, September 2016), and a Stormwater Management Plan for Lorson Ranch East Phase I (undated).

CGS has several concerns regarding the proposed development:

Soil and bedrock engineering properties and foundation design recommendations. RMG describes loose, low density soils at depths of ten to greater than 25 feet in five of their 18 borings. Swell potential values corresponding to a moderate to high risk of poor slab performance were observed in six of the seven laboratory swell-consolidation tests in which swell was observed. RMG states (page 16) that floor slab movements on the order of one to three inches are possible after mitigation. It is not clear whether RMG is describing total or differential settlement, or heave, but **three inches of movement is considered excessive**. The county should require the applicant to describe how foundations, floor systems, and utility connections will be designed to accommodate that much settlement without sustaining damage.

Alternatively, RMG should develop a mitigation strategy that reduces potential heave and settlement to less than one inch. Low strength soils at depths greater than typical overexcavation depths indicate that deep foundation systems with structurally supported floors may be necessary. If overexcavation is proposed, what depth of overexcavation will be necessary to reduce differential settlement to less than one inch, and is overexcavation to this depth feasible on an individual lot basis? In CGS's experience, it is difficult to achieve adequate compaction within the footprint of an individual home, especially at the proposed density.

Perched water, shallow groundwater and feasibility of below-grade construction. RMG conducted post-drilling water level observations in only two of their borings, TB-1 and TB-12. Groundwater was observed at 25 feet below the ground surface in TB-1 nine days after drilling. The grading plans indicate that only minimal

grade changes are planned in this area. Groundwater was observed at 15.5 feet below the ground surface in TB-12 one day after drilling. In clayey, low permeability soils such as those described in the TB-12 boring log, it is not clear that one day is sufficient for water levels to equilibrate. Detention pond D2 is proposed immediately west of this location, so water levels should be expected to rise. Groundwater levels fluctuate seasonally and always rise, post-development, due to factors such as stormwater detention, construction of impermeable slabs and pavements, and landscape irrigation.

Post-drilling water level observations were not conducted in any of RMG's other borings. Colorado Association of Geotechnical Engineers (CAGE) Guideline for Slab Performance Risk Evaluation and Residential Basement Floor System Recommendations states (page 2) "Ground water can affect foundation installation and performance of residences. Ground water levels should be checked and reported at the time of drilling and one day or more after drilling."

RMG provides insufficient water level information to determine whether full-depth basements will be feasible on the Lorson Ranch East property. As noted by RMG (page 21), the proposed detention pond and the Jimmy Camp Creek East Tributary may be located at higher elevations than the proposed foundations.

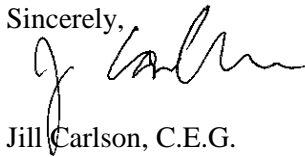
Full-depth basements should not be considered feasible unless: (1) a systematic groundwater level monitoring program consisting of monthly water level observations spanning at least one complete spring-summer-fall cycle is conducted to determine maximum anticipated water levels across the site, and to determine whether the required separation distance between lowermost floor levels and shallowest anticipated groundwater levels can be maintained year-round, or (2) a properly designed, constructed and maintained area underdrain system is installed in areas where groundwater is anticipated within three feet of planned basement floor elevations, with individual foundation drains discharging to a pumped interior sump or gravity outlet, provided as a backup. An underdrain system should be considered only if the site geometry permits a permanent gravity outfall that discharges to the stormwater collection system, or away from structures.

Regardless of whether basements are determined to be feasible, I agree with RMG's recommendation (page 21) for individual foundation perimeter drain systems to control perched water. Individual foundation perimeter drains are intended to handle small amounts of intermittent, perched water, and are *not* to be used to mitigate a persistent shallow groundwater condition. The perimeter drains must be sloped to discharge to an interior pumped sump or a gravity outlet that discharges water as far as possible away from all structures, or they may discharge to an area underdrain system, if one is constructed.

Incorrect map reference. RMG references (page 24) Carroll and Crawford, 2000, Geologic Map of the Fountain Quadrangle, CGS Open File Report 00-3. This is incorrect. Open File Report 00-3 is the Colorado Springs quadrangle. Mapping of the Fountain quadrangle is currently in progress.

Thank you for the continued opportunity to review and comment on this project. If you have questions or require additional review, please call me at (303) 384-2643, or e-mail carlson@mines.edu.

Sincerely,



Jill Carlson, C.E.G.
Engineering Geologist