

COLORADO GEOLOGICAL SURVEY

1801 19th Street
Golden, Colorado 80401



Karen Berry
State Geologist

October 24, 2017

Raimere Fitzpatrick
El Paso County Development Services
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Location:
W½ Section 28 and E½ Section 29,
T12S, R64W, 6th P.M.
38.9763, -104.564

Subject: Waterbury Phase 2 Preliminary Plan
File Number SP-17-008; El Paso County, CO; CGS Unique No. EP-18-0007

Dear Mr. Fitzpatrick:

Colorado Geological Survey has reviewed the Waterbury Phase 2 preliminary plan referral. I understand the applicant proposes 235 single family residential lots on 80 acres within the 322-acre Waterbury PUD, located northeast of Eastonville Road and Stapleton Drive, Falcon. The available referral documents include a Letter of Intent (William Guman & Associates, Ltd., April 30, 2017), a set of Waterbury Phase 2 preliminary plans (Guman, July 20 and July 31, 2017), a Soil, Geology, and Geologic Hazard Study, Waterbury, Phase 2 (Entech Engineering, August 30, 2017), and a Preliminary Drainage Report (Terra Nova Engineering, July 2017).

Entech's report contains a valid description of subsurface conditions, and makes appropriate *preliminary* recommendations to address the site's geologic and geotechnical constraints, which include very shallow groundwater, drainages, areas of artificial fill, expansive and collapsible soils, and hard, shallow bedrock. Specific concerns include:

Very shallow groundwater. Groundwater was observed in seven of Entech's soil and percolation test borings within or near the Waterbury Phase 2 area at very shallow depths of 4.5 to 10 feet below the ground surface. **Full-depth basements should not be considered feasible within the Waterbury Phase 2 area unless mitigation measures are implemented to ensure that a *minimum* separation distance of three feet between shallowest seasonal water levels and lowermost floor and crawlspace elevations can be maintained year-round.** Mitigation strategies could include placing fill to raise site grades and planned basement floor levels, limiting basement floor depths through the use of walk-out or garden-level basement construction, and/or constructing an area underdrain system if site geometry permits a permanent gravity outfall. CGS agrees with Entech that subsurface perimeter drains must be constructed around any below-grade space determined to be feasible, but such drains are intended to handle small amounts of intermittent, perched water, and are *not* to be used to mitigate a persistent shallow groundwater condition.

If site grades or basement floor levels cannot be raised to maintain a separation distance of at least three feet between lowermost floor elevations and shallowest anticipated groundwater elevations, and an area groundwater collection system (underdrain) is determined to be unworkable, then full-depth basements should not be allowed. It is outside the scope of CGS review to verify that site grades will be sufficiently raised to allow three feet of separation between lowermost floor levels and shallowest anticipated water levels.

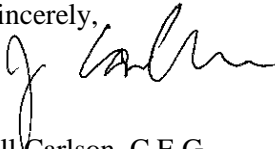
If an underdrain system is proposed, a maintenance plan must be developed and recorded to ensure that thorough, accurate information is available to the entity responsible for maintaining the groundwater

collection/underdrain system, in perpetuity. The same entity responsible for the stormwater collection or sanitary sewer system should be responsible for the underdrain system, and *preferably not the HOA*. The expertise required to oversee proper inspection, maintenance and repair of an underdrain system, especially a pumped (non-gravity outfall) system, exceeds the capabilities of the typical HOA board and HOA management company. A groundwater collection system operations manual should include, at a minimum:

- a description of why the system was constructed, and how it works,
- an as-built map of the system, clearly indicating the location, *relative to surface features*, of every inlet, conduit, collection and discharge point, well or sump pit, pump, and all other components of the system,
- details regarding what type & capacity of pump(s) is/are installed, wherever the system discharges to anything other than a gravity outfall,
- clear instructions on how (and whom to call) to inspect, maintain and repair the system,
- clear instructions on how to identify malfunctions, and whom to call in the event of malfunction or failure,
- an inventory of all system components and a description of how to estimate (and therefore levy assessments and budget for) expenses associated with inspection, maintenance and repairs of the system.

Thank you for the 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