COLORADO GEOLOGICAL SURVEY

1801 19th Street
Golden, Colorado 80401

Karen Berry
State Geologist

August 14, 2017

Katie Carleo
Land Use Review Division
Colorado Springs Planning & Comm Dev
30 S. Nevada Ave., Suite 105
Colorado Springs, CO 80901

Location:
W½ Section 33,
T13S, R65W of the 6th PM
38.8741, -104.6811

Subject: **The Sands**
Annexation (CPC A 17-00004, CPC A 17-00005, CPC A 17-00006, CPC A 17-00007)
Zone Change (CPC ZC 17-00081, CPC ZC 17-00082 CPC ZC 17-00083)
Master Plan (CPC MP 17-00080)
Concept Plan (CPC CP 17-00084)
City of Colorado Springs, El Paso County, CO; CGS Unique No. EP-16-0020_3

Dear Ms. Carleo:

Colorado Geological Survey has reviewed the above-referenced referrals for annexation of approximately 137 acres located northeast of Marksheffel Road and Constitution Avenue, master plan, concept plan, and zone change of approximately 114 acres from I-3 to M1/AO, R1-6000 and PBC. CGS previously reviewed The Sands for El Paso County on April 26, 2016 at map amendment (rezoning) application. The applicant proposed to rezone approximately 85.9 acres from I-3 to RS-5000 to allow 343-515 dwelling units. No geologic or geotechnical information was included with the current or previous referral documents. The currently available referral documents include a Land Suitability Analysis (Thomas Thomas Planning, July 31, 2017).

The applicant's response to comments letter (July 31, 2017) states "A Geo Hazard Report should not be needed as the current 100 yr floodplain limits will be revised via the CLOMR/ LOMR process. With future development plan submittals, no lots will be shown or platted within the floodplain limits. Notes have been added to the plan regarding the CLOMR/ LOMR and lot restrictions." **CGS disagrees.** Potential development constraints that need to be addressed include:

East Fork Sand Creek tributary flood zone erosion setback. The site is gently to moderately sloping and lies within the Sand Creek drainage basin. According to FEMA Flood Insurance Rate Map panels 08041C0756F and 08014C0543F (March 17, 1997), some of the area proposed for residential zoning is located within the 100-year flood hazard zone of a tributary of the East Fork of Sand Creek.

- Development plans should provide adequate setbacks from flood-prone areas to reduce hazards associated not only with rising floodwaters but also sediment deposition, erosion, scour, and undercutting of foundations and pavements. The setbacks should be determined based on site-specific analysis of topography and soil erosion properties, and should be specifically identified on the plat as non-buildable.

Shallow groundwater and subsurface drainage. Shallow groundwater and seasonally shallow groundwater have been encountered in nearby developments. Based on this, and the presence of an active drainage (Sand Creek tributary) through the site, shallow groundwater may impact the feasibility of full-depth basements in at

FIGURE 18

least some areas of the site. Frost impact depth should be expected to be deeper than typical in this area. A subsurface investigation should be conducted to determine the presence, depth, and extent of shallow groundwater and seasonally shallow groundwater, and to provide mitigation recommendations if necessary.

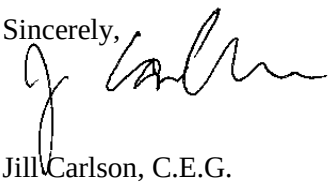
- The applicant's geotechnical consultant should make lot-specific basement feasibility determinations based on the results of a systematic groundwater level monitoring program, consisting of monthly water level observations over at least one complete spring-summer-fall cycle, to determine maximum anticipated water levels across the site. Basements should be allowed only if these observations indicate that a *minimum* three foot (preferably five foot) separation distance between maximum seasonal water levels and lowermost floor elevations can be maintained year-round.
- CGS would like to review the results of the water level monitoring program and grading plans when available. Where below-grade (basement) construction is proposed, the grading plans should show proposed lowermost floor elevations for comparison to observed water levels. If interceptor drain(s), underdrain(s), sub-excavation fill subdrain(s), or any other groundwater collection system is proposed, the plans should show drain and discharge locations, and invert elevations.
- Individual perimeter drain systems should be constructed on all lots to help prevent infiltration of perched water (on lots where basements are determined to be feasible), and to help control wetting of potentially expansive and compressible soils in the immediate vicinity of foundation elements. 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.

<u>Soil and bedrock engineering properties.</u>
The site is underlain by river-deposited loose sands and clays. Clay layers and lenses within the alluvium are typically expansive, and low density, low strength, alluvial soils in this area often exhibit collapse under loading and wetting. The surficial soils are underlain at unknown depth by the Dawson Formation, consisting of interbedded clayey sandstone and claystone. Claystone layers and lenses within the Dawson can exhibit very high swell when wetted and, if present at or near foundation depths, can cause significant damage to foundations and improvements if not properly identified and mitigated.

- A geotechnical investigation consisting of drilling, sampling, lab testing and analysis will be needed prior to preliminary plat application to characterize soil and bedrock engineering properties such as density, strength, water content, and swell/consolidation potential; identify unstable and potentially moisture-sensitive (expansive and collapsible) soils and expansive claystone bedrock; determine depths to groundwater and bedrock; evaluate the feasibility of full-depth basements, if planned; identify overexcavation areas, if stabilization is determined to be necesssary; and provide earthwork, foundation, floor system, surface and subsurface drainage, and pavement recommendations for design purposes.

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

Sincerely,



Jill Carlson, C.E.G.
Engineering Geologist

EP-16-0020_1 The Sands Rezoning
2:35 PM, 08/14/2017

FIGURE 18

COLORADO GEOLOGICAL SURVEY

1801 19th Street
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303.384.2655

Karen Berry
State Geologist

November 16, 2017

Ms. Katie Carleo
Principal Planner
Planning and Development Department
PO Box 1575, Mail Code 155
Colorado Springs, CO 80901-1575

Location:
W½ Section 33
T13S, R65W of the 6th PM
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Dear Katie:

Colorado Geological Survey has reviewed the above-referenced referrals for annexation of approximately 137 acres located northeast of Marksheffel Road and Constitution Avenue, master plan, concept plan, and zone change of approximately 114 acres from I-3 to M1/AO, R1-6000 and PBC. CGS previously reviewed The Sands for El Paso County on April 26, 2016 at map amendment (rezoning) application. The applicant proposed to rezone approximately 85.9 acres from I-3 to RS-5000 to allow 343-515 dwelling units. Following the response to comments letter dated July 31, 2017 CGS again reviewed the project on August 14, 2017. At that time the potential development constraints had not been addressed in a geologic hazard study. Referral documents now include a Geologic Hazard Study (RMG, 10.26.17) with an Appendix containing a Preliminary Subsurface Soil Investigation (RMG, 7.24.15) and the design of channel improvements (Western Environment and Ecology, 8.24.17).

These additional documents adequately address some of the concerns previously expressed by CGS. The Geologic Hazard Report and Preliminary Subsurface Soil Investigation by RMG provide preliminary recommendations for the geologic hazards and engineering constraints identified at the property. We concur with RMG's recommendation that additional lot-specific investigations be conducted for all proposed structures.

- The site specific foundation investigations, including drilling, sampling, lab testing and analysis will be needed, prior to preliminary plat application to characterize soil and bedrock engineering properties such as density, strength, water content, and swell and consolidation potential; identify unstable and potentially moisture-sensitive (expansive and collapsible) soils and expansive claystone bedrock; determine depths to groundwater and bedrock; evaluate the feasibility of full-depth basements, if planned; identify overexcavation areas, if stabilization (of loose soils) is determined to be necessary; and provide earthwork, foundation, floor system, surface and subsurface drainage, and pavement recommendations for design purposes.

We understand that a LOMR ruling on the location of the 100-year flood plain for the project is pending. Site plans and grading plans will be developed after the finalized ruling. CGS would like to review these plans prior to preliminary plat approval

Our previous letters discussed systematic groundwater monitoring at the site. This monitoring program was recommended due to shallow groundwater conditions anticipated at the site (confirmed by RMG's subsurface investigation) and the likelihood that the groundwater levels will fluctuate throughout the year. RMG states that their Investigation in July of 2015 reflects:

"…"abnormally" high amount of rainfall during this period, the groundwater conditions presented in that report are anticipated to reflect a "worst case scenario". As such, a prolonged groundwater monitoring program would not be anticipated to provide substantial benefit at this time. Lot-specific Subsurface Soil Investigations performed prior to construction should consider water level reading at that time and the water levels reported in the PSSI report referenced herein when determining the feasibility of basement construction on that lot."

If this approach is adhered to in lieu of a monitoring program, than the reported water levels of the PSSI (Preliminary Subsurface Soil Investigation) by RMG should be the water levels used to determine basement feasibility on the development plan. Determining the feasibility of a basement at a lot near time of construction rather than with a systematic monitoring program may miss the extent of shallow groundwater problems, especially if the drilling takes place in drier times of the year. Depth to groundwater measured during site specific investigations should only be used if higher than that reported by RMG. Depth to groundwater data will be the basis for specific types of surface and subsurface drainage systems and the possibility that an active (pumped) underdrain system may be necessary.

Where below-grade (basement) construction is proposed, the grading plans should show proposed lowermost floor elevations for comparison to observed water levels. If interceptor drain(s), underdrain(s), sub-excavation fill subdrain(s), or any other groundwater collection systems is proposed, the plans should show drain and discharge locations, and invert elevations. Lot-specific basement feasibility determinations should be part of the development plan.

Disclosure statement: Per City of Colorado Springs ordinance, the disclosure statement on the Plans is required to not only list the Geologic Hazard Report of record (as is done on the Land Suitability Analysis plans revised 11.2.17) but must also record the identified geologic hazards at the site. RMG identified geologic hazards that may affect the site. In addition to the ones listed by RMG, erosion is also a geologic hazard at this site. Significant erosion from both water and wind can occur from uncontrolled surface runoff and lack of vegetation. The geologic hazards that must be included in the disclosure statement on the Plans include; expansive soils and expansive bedrock, collapsible soil, shallow groundwater, erosion, radon, and uncontrolled fill.

Thank you for the opportunity to review and comment on this project. If you have questions or require further review, please call me at 303-384-2654, or e-mail jlovekin@mines.edu .

Sincerely,

Jonathan R. Lovekin
Senior Engineering Geologist

Carleo, Katie

From: Jonathan Lovekin <jlovekin@mines.edu>
Sent: Friday, December 22, 2017 4:04 PM
To: Carleo, Katie
Subject: The Sands resubmittal - Comment

Follow Up Flag: Follow up
Flag Status: Flagged

Katie,

I have reviewed the materials received for The Sands resubmittal. The only comment I have (and it is the same as in my last review letter) may be more relevant at the development plan submittal stage:

Disclosure statement: Per City of Colorado Springs ordinance, the disclosure statement on the Plans is required to not only list the Geologic Hazard Report of record (as is done on the Land Suitability Analysis plans revised 11.2.17) but must also record the identified geologic hazards at the site. RMG identified geologic hazards that may affect the site. In addition to the ones listed by RMG, erosion is also a geologic hazard at this site. Significant erosion from both water and wind can occur from uncontrolled surface runoff and lack of vegetation. The geologic hazards that must be included in the disclosure statement on the Plans include; expansive soils and expansive bedrock, collapsible soil, shallow groundwater, erosion, radon, and uncontrolled fill.

The note on the land-suitability analysis by Thomas and Thomas has not been changed to meet City ordinance. However, as already stated this must be done at the development plan level so can probably be disregarded for now.

Please let me know if you have any questions (I am out of town until January 2, 2018)

Regards,

Jonathan R. Lovekin, P.G.
Senior Engineering Geologist
Colorado Geological Survey at the Colorado School of Mines
1801 19th Street
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303.384.2654

FIGURE 18