



April 2, 2021

Ms. Shireen Ambush
Abaris Realty, Inc.
7811 Montrose Road, Suite 110
Potomac, MD 20854

**Re: Tanyard Springs HOA, Glen Burnie, Maryland
Preliminary Site-Wide Sinkhole Survey
CSG Project # 20-063**

Dear Ms. Ambush,

Pursuant to our proposal dated September 11, 2020, this office has undertaken a preliminary site-wide sinkhole survey at the above-mentioned property. The scope of this work included the following:

- Obtain copies of the original civil drawings and site plan for the subdivision from Anne Arundel County.
- Review available file documentation relating to sinkholes, including records relating to previous repairs by either the HOA or the original developer.
- Prepare a questionnaire for distribution to the HOA membership inquiring about the presence of sinkholes on HOA and privately owned property.
- Prepare a map of the community for use as a site plan.
- Walk the community with the On-site Property Manager, Mr. Mark Moorman, to document instances of suspected sinkhole formation.
- Mark each location on the site plan.
- Analyze the compiled data to identify trends and data gaps.
- Prepared this letter report summarizing the conclusions drawn and recommending subsequent steps. The report is supplemented with a summary table outlining documented defects, a site map depicting locations of defects, and photographic documentation.

I. Document Review

As-Built civil drawings for the subdivision obtained from Anne Arundel County indicate that unsuitable soils were cut and fill in locations where public roads and storm drains were built on

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the property. Acceptable compacted fill was placed in 6-in loose lifts and compacted to at least ninety-eight percent (98%) of the maximum dry density. A California Bearing Ratio (CBR) test needed to be performed for all soil types encountered at the sub-grade for the areas to receive paving sections. The CBR test is a penetration test used to evaluate the sub-grade strength of road and pavement. The drawings indicate that typical cut-and-fill have an average depth of 5-ft. No geotechnical report was available at Anne Arundel County to confirm whether the fill was compacted to suitable maximum dry density, or whether the fill was suitable (i.e., free from debris).

A Sinkhole & Drainage Correction Survey (questionnaire) prepared by this office was distributed to the residents by Management. The survey information revealed that sinkhole formation and water ponding are widespread throughout the property.

II. Findings:

On February 9 and 17 and March 8, 2021 this office performed a visual survey of common area elements at roads and around homes, as directed by the On-site Property Manager, Mr. Mark Moorman. The purpose of our visual survey was to document ground deficiencies throughout the property. The deficiencies have been rated with the following severity scoring system: 1–Minor, 2–Moderate, 3–Serious, 4–Severe, and 5–Critical. The following table summarizes our observations while on-site.

Identifier	Type	Location	Severity	Description
1	Sinkhole	1003 Sithean Way	Fixed	Two sinkholes on the asphalt road directly adjacent to two manholes. Investigation revealed no apparent leaks or underground springs. Sinkhole formation is presumed due to poor compaction and drainage. Remediation included the installation of a French drain and CR6 backfill.
2	Sinkhole	7740 Timbercross Ln	3	5'x5'x1', BGE box and Verizon box is sinking into the ground.
3	Sinkhole	1002 Sithean Way	2	2'x2'x6", Sinkhole forming directly next to the fire hydrant.
4	Sinkhole	1002 Sithean Way	1	4'x4'x4", sinkhole forming at transformer box.
5	Sinkhole	7612 Timbercross Ln	5	3'x3'x4', sinkhole is formed directly adjacent to the light post, beginning to undermine the sidewalk; sinkhole gets refilled with dirt on a regular basis.
6	Sinkhole	7612 Timbercross Ln	2	1'x1'x1', soil around the Verizon box; beginning to sink.
7	Sinkhole	7607 Timbercross Ln	5	4'x4'x3', big sinkhole forming directly adjacent to a drain, drainage issues all around it.
8	Sinkhole	7615 Timbercross Ln	2	1'x1'x1', sinkhole forming directly adjacent to a drain; drainage issues all around it.

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Identifier	Type	Location	Severity	Description
9	Sinkhole	716 Hidden Oak Ln	2	2'x2'x6", sinkhole forming in asphalt in the middle of a parking space; appears to have previous openings adjacent to the sinkhole.
10	Sinkhole	716 Hidden Oak Ln	1	Small area of saturated ground, settled ground forming sinkhole; near road between houses.
11	Sinkhole	7503 Briargrove Ln	2	3'x1'x1', sinkhole forming directly adjacent to drain, downspout runoff in close proximity; ponding at flat ground 15' away from drain.
12	Sinkhole	7503 Briargrove Ln-to-7521 Briargrove Ln	4	Sinkholes forming at drains, entire backyard area is saturated with standing water; downspouts do not have extensions.
13	Sinkhole	7422 Macon Dr	2	2'x2'x6", BGE box and Verizon box sinking into ground; tripping hazard at sidewalk adjacent to sinkhole.
14	Sinkhole	7421 Macon Dr	2	BGE box is beginning to sink into ground and box is broken; potential additional sinkhole at adjacent transformer box.
15	Sinkhole	Playground	5	4'x2'x1', sinkhole adjacent to the playground, drain, and swimming pool; poor drainage around sinkhole; drainage issues from tennis court and pool area; mulch flushed onto sidewalk; grass elevation higher than sidewalks.
16	Sinkhole	1005 Sithean Way	4	4'x4'x1', sinkhole forming at waterline access; beginning to undermine the sidewalk.
17	Sinkhole	923 Boatwright Dr	4	4'x4'x2' and 4'x4'x6", sinkhole at drain; two separate formations.
18	Sinkhole	1011 Meherrin Ct	2	1'x1'x1', sinkhole forming at drain.
19	Sinkhole	1011 Meherrin Ct	5	Sinkhole forming underneath backyard patio adjacent to the downspout and window well.
20	Sinkhole	1017 Meherrin Ct	5	8'x8'x2', massive sinkhole forming directly in the middle of drainage issue 032 behind houses.
21	Sinkhole	1010 Meherrin Ct	5	6'x6'x2', sinkhole is forming at the end of drainage issue 037, adjacent to the clogged drain.
22	Sinkhole	6818 Warfield St-to-6822 Warfield St	4	4 sinkholes forming in front yards, one is undermining the driveway, all approximately 1-foot deep.

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Identifier	Type	Location	Severity	Description
23	Sinkhole	6823 Warfield St	2	3'x3'x6", sinkhole forming at BGE box.
24	Sinkhole	6840 Warfield St	1	1'x1'x1', sinkhole forming in front yard.
25	Sinkhole	818 Croggan Cres	1	1'x1'x1', sinkhole forming in backyard.
26	Sinkhole	Warfeild St-to-Archibald	4	Saturated ground and pooling water behind houses; sinkhole forming at low drain (1'x1'x2', adjacent to 709 Margaret Pl).
27	Sinkhole	6829 Archibald Dr	1	Sinkhole in asphalt roadway appears to have a recent repair attempt.
28	Sinkhole	Heritage Crossing adjacent to Pavilion	3	4'x4'x6", sinkhole in asphalt roadway near a manhole.
29	Sinkhole	7262 Stallings Dr	3	Previous site visits this office observed 3 large sinkholes on the side of house; sinkholes appeared to have been filled with soil recently; residents stated they fill the sinkholes on a regular basis.
30	Sinkhole	6935 Heritage Crossing	1	On previous site visits this office observed a sinkhole undermining the sidewalk; the sinkhole was filled months ago and still appears stable, this office will monitor.
31	Sinkhole	6933 Heritage Crossing	1	2'x1'x6", sinkhole forming in front yard.
32	Sinkhole	5948 Heritage Crossing	3	4'x4'x6", sinkhole forming adjacent to drain.
33	Sinkhole	6942 Heritage Crossing	1	1'x1'x1', sinkhole forming adjacent to drain.
34	Sinkhole	1151 Coulbourn Cr	3	3'x3'x1', sinkhole forming in backyard.
35	Sinkhole	7272 Stallings Dr	2	3'x1'x4", sinkhole forming at transformer box.
36	Sinkhole	7249 Stallings Dr	4	8'x9'x1', sinkhole forming in asphalt roadway.
37	Sinkhole	7223 Stallings Dr	3	1'x1'x1', sinkhole forming adjacent to light post.
38	Sinkhole	7206 Stallings Dr	1	1'x1'x1', sinkhole forming at the side of house next to a downspout.
39	Sinkhole	7209 Stallings Dr	1	1'x1'x1', sinkhole forming adjacent to the electric box.
40	Sinkhole	7223 Stallings Dr	1	1'x1'x1', sinkhole forming in front yard.
41	Sinkhole	7262 Stallings Dr	2	3'x1'x1', sinkhole forming in grass median between sidewalk and roadway.
42	Drainage	7740 Timbercross Ln	1	Leaves clogging drain behind the house.

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Identifier	Type	Location	Severity	Description
43	Drainage	7740 Timbercross Ln-to-7632 Timbercross Ln	4	Drainage issues behind houses along Timbercross Ln; ground is saturated and has standing water.
44	Drainage	7607 Timbercross Ln-to- 7502 Briargrove Ln	3	Drainage issues behind houses, ground is saturated and has standing water; location doesn't appear to get much sun, tree cover seems to contribute.
45	Miscellaneous	718 Hidden Oak Ln	1	Downspouts and condensate lines do not have extensions.
46	Drainage	716 Hidden Oak Ln	1	Small area of saturated ground, settled ground forming sinkhole; near road between houses.
47	Drainage	7503 Briargrove Ln-to-7521 Briargrove Ln	4	Sinkholes forming at drains, entire backyard area is saturated with standing water; downspouts do not have extensions.
48	Drainage	803 Glenside Way	4	Saturated ground and ponding water start at the side of the house and wraps around to backyard; apparent hump on the ground where it turns 90 degrees, preventing water from flowing to drain.
49	Drainage	Playground	5	Drainage issues at playground behind the clubhouse; pooling water on the sidewalks, tripping hazard on sidewalk, ground is completely saturated.
50	Drainage	Basketball Court	3	Ponding water and saturated ground between basketball court and tennis courts; water is ponding on sidewalks, standing water at all sides of basketball court.
51	Drainage	Corner of Sithean Way and Skipwith Dr	4	Severe ponding water at the corner of Sithean Way and Skipwith Dr.; 15'x15' area and water is 8" deep. Mark stated water never drains at this location, stop sign may be sinking into ground (unusually short stop sign).
52	Drainage	Dog Park and Garden	5	Issues begin between Stonebriar and dog park; extend all the way past the community garden; pooling water on walking path; previous French drain was installed (appears non-functional); resident stated issues have been there for at least 5 years, trees died from over saturation, swampy in wooded area, SWM pond from adjacent property drains on to Tanyard Springs property.
53	Drainage	7714 Hollins Chapel Ct-to- 7726 Hollins Chapel Ct	5	Ground is saturated behind houses, water is pooling at low points, water exits into forest retention area, highpoint located at 7720 Hollins Chapel Ct.

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Identifier	Type	Location	Severity	Description
54	Miscellaneous	912 Boatwright Dr	1	Erosion issue at the exits of the downspouts.
55	Drainage	7717 Hollins Chapel Ct	2	Downspout extension in back causing saturated ground and pooling water; extends into neighbor's yard as well.
56	Drainage	7725 Hollins Chapel Ct to 7730 Hollins Chapel Ct	4	Underground downspout extension has pooling water and starts the drainage issues; resident installed a trench that leads to forest retention area behind 7730 Hollins Chapel Ct; trench appears to help but not solve the problem; erosion present on adjacent hill.
57	Drainage	7838 Stonebriar Dr to 7824 Stonebriar Dr	4	Saturated ground behind houses; appears that water cannot make it to existing drain.
58	Drainage	1009 Meherrin Ct to 1031 Meherrin Ct	5	Saturated ground and ponding water start between 1009 and 1011 Meherrin Ct; flowing water behind houses.
59	Drainage	1034 Meherrin Ct	2	Saturated ground and ponding water start at the side of house and wrap around to the backyard; survey response stated a French drain was installed and fixed 90% of the problem (survey photos showed severe ponding water); water appears to be originating at small, wooded area between houses and roadway.
60	Drainage	1030 Meherrin Ct to 1012 Meherrin Ct	5	Saturated ground and pooling water behind houses, downspout extensions appear to exacerbate the issue; water is coming from forest retention area, appears to have some kind of drainage system installed; drainage system has PVC cleanouts every 50-60 yards (cleanouts don't appear to be at the low points), inspected cleanouts and observed flowing water (underground pipe appears to be approximately 4-6 inches in diameter, cannot tell if pipe is perforated), the pipe appears to be undersized and is not handling the extent of the drainage issues, drainage system leads to a clogged drain.
61	Drainage	801 Croggan Cres to 6891 Archibald Dr	5	Saturated ground with pooling water behind houses, soil erosion issues at the drain, tripping hazard at 835 Croggan Cres.
62	Drainage	Elias Way to Croggan Cres	2	Saturated ground behind houses.

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Identifier	Type	Location	Severity	Description
63	Drainage	Warfield St to Archibald	4	Saturated ground and pooling water behind houses; sinkhole forming at low drain (1'x1'x2') adjacent to 709 Margaret Pl.
64	Miscellaneous	7262 Stallings Dr	1	Concrete spalling at sidewalk in front of house; tripping hazard at 7325 Stallings Dr.
65	Drainage	6951 Heritage Crossing	2	Saturated ground and pooling water between 6951 and 6952; resident installed a trench drain that doesn't appear to be working.
66	Drainage	5950 Heritage Crossing to 6942 Heritage Crossing to 7289 Stallings Dr	4	Saturated ground and pooling water behind houses, water appears to be coming from forest retention area.
67	Drainage	Coulbourn Cor	4	Saturated ground and pooling water behind houses starting at 1113 Coulbourn Cor, appears to have grass mesh behind houses; clogged drain at end of issue.
68	Drainage	7223 Stallings Dr	3	Ponding water next to fire hydrant, water is approximately 6-inches deep; adjacent to storm water management drain.
69	Drainage	7233 Stallings Dr	2	Saturated ground in between 7233 and 7231, resident put drain in backyard (doesn't appear to function); main area is hidden by fencing, (survey submitted on this).
70	Drainage	SWM Pond by Mockingbird Circle	5	The walking trail between the pedestrian bridge and the riprap at the base of the SWM pond has pooling water over the trail. The riprap at the base of the trail does not appear to be working and existing drainage system at the riprap appears non-functional.
71	Drainage	524 Kinglets Roost Ln to 526 Kinglets Roost Ln	3	Drainage issues at the side yards between 524 and 526. The water rises on to the asphalt pavement and drains very slowly. Previous fix was installed but does not appear to be working.
72	Drainage	Willow View Ln	3	Drainage issues behind houses along Willow View Lane. Dry at the time of our visit but the survey shows excessive standing water. Big and small trees along the entire backyard area.
73	Drainage	515 Bluffton Dr	1	Survey stated drainage issues in the backyard of 515 Bluffton Dr. Area was dry during the site visit. Area is sloped to a wooded area.
74	Drainage	7605 Gunmill Ln to 641 Bracey Dr	4	Water is exiting out of the joint between the concrete curb and gutter and the asphalt pavement creating staining on the pavement.
75	Drainage	Mockingbird Circle to Tanyard Knoll Lane	3	Poor drainage and standing water behind houses in back yards.

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III. Conclusion and Recommendations:

Southern portions of the State of Maryland, such as Anne Arundel County, are known for the presence of underground springs, which typically have a negative impact on terrain that has been treated with cut and fill. Due to the geographical location of the property and the surface water documented while onsite, it is our opinion that the sinkhole deficiencies are potentially the result of improperly compacted fill soil disturbed by ground water. As a result, we recommend that an additional evaluation of the ground sites in the form of a geotechnical study be performed. The geotechnical study should include the following:

- Standard penetration testing (SPT) to determine the condition and strength of the existing fill below the soil and paved areas;
- Soil infiltration test to determine the permeability of the existing soil and explore the subsurface conditions underneath the soil and pavement areas; and,
- Soil profile to determine the depth of groundwater.

The geotechnical study will provide soil data necessary to design suitable repairs throughout the property. Due to the property size and topography, we recommend that the above-mentioned geotechnical study be performed at four (4) different sections (sampling locations) of the property.

Based on our experience with similar projects, it is anticipated that the geotechnical study will cost between \$20,000 and \$25,000.00. CSG should assist the Association with the coordination and monitoring of the study and afterwards provide interpretation of the results and development of conceptual design recommendations to address the deficiencies outlined in this letter. We recommend a budget of \$40,000 to \$45,000.00.

If you have any questions or comments, please do not hesitate to contact the writer.

RESPECTFULLY SUBMITTED;
CONSTRUCTION SYSTEMS GROUP, INC.

Lorena Michel

Lorena Michel
Project Engineer

Wayne F. Hosking

Wayne F. Hosking
Vice President

Cc: File 20-133

Attachments: Identifier Photographs
Site Map

 4/15/21

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6493