MBA ENGINEERS, INC.
STRUCTURAL CIVIL GEOTECHNICAL

October 11, 2022

Brett Tucker, P.E.
City Engineer
City of Alabaster, AL

Re: Lacey's Grove Subdivision Phase III
No Adverse Effects Letter

Mr. Tucker:

Development Summary: The project consists of a new sector (phase) to the Lacey's Grove subdivision including the construction of new streets, lots, mass grading, utility extensions, drainage network construction, and ultimately new residences. This project has been designed with multiple detention ponds that have the ability to control the release of storm runoff.

Existing Conditions
The Phase III sector generally slopes from west to east / southeast with moderate to flat slopes, with the slopes generally decreasing as it approaches Phase II and Lacey's Lake. The Phase III site has been cleared of large trees recently as well as previously during Phase I and II construction (approximately 10-17 years ago). Much of the Phase III sector was not properly stabilized in the past, leading to major erosion issues throughout the years. Unfortunately or fortunately, Lacey's Lake was the recipient of much of the transported sediment.

Offsite Drainage - A 343 acre +- off site drainage basin feeds the existing Lacey's Lake, which is routed through Phase II of the subdivision. The outfall of Lacey's Lake and unnamed tributary to Beaverdam Creek continues under a phase II street (Lacey Avenue) and northward between Lacey's Grove Phase II and Creekview Elementary School, traveling offsite in an area that has been shown to pond and have standing water, before re-entering the Lacey's Grove Subdivision Property again, where the tributary crosses under the construction entrance road for Phase II known as Crider Road (which is to be improved in another project to serve this subdivision). This tributary then flows northward off the subdivision property prior to joining Beaverdam Creek.

Outfalls
#1 - The Phase III sector generally has two stormwater outfalls. The first outfall is to southeast of Phase III, to the existing Lacey's Lake. The outfall of Lacey's Lake is routed under Lacey's Avenue (phase 2 street), offsite, and back onsite and under Crider Road, and then continues to Beaverdam Creek, north of the Lacey's Grove Subdivision.

#2 - The second outfall is to the Phase II sector of Lacey's Grove Subdivision via an existing 48" RCP, which is routed east through Phase II subdivision (upsized to a 54" RCP), to existing ponds installed in Phase II for this purpose (named Pond #1 and Pond #2 in this project). Pond #1 outfall is split, sending some runoff to the un-named tributary to Beaverdam Creek described above, and some runoff to Pond #2. Outfall for both ponds continues to Beaverdam Creek, north of the Lacey's Grove Subdivision.

Total Outfall - The point where runoff from outfall #1 and outfall #2 meet up is located approximately 400 feet south of where the unnamed tributary to Beaverdam Creek leaves the Lacey's Grove Property. This point is referenced as the total outfall point.

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Proposed Improvements
The stormwater runoff for Phase III is collected and routed via open ditches, stormwater structures, and underground piping. A majority of runoff (about two thirds of runoff) is sent to outfall #1, Lacey's Lake after routing through Pond "A". Approximately 1/3 of runoff is sent north from Phase III into an area of future development for the subdivision. This runoff is routed through Pond "B", which will serve as a detention pond for Phase III and is sized to serve as a detention pond for the Future remaining acres that currently drain to it. Pond "B" outfall is routed to the Phase II underground piping, which is routed to two existing downstream ponds (referred to as Pond #1 and Pond #2).

Design Intent
Drainage calculations and modeling have also been provided for Ponds #1 and #2, which although technically are not included in this project, we realize that this analysis is vital to the complete City review, and understand that the City would not allow Phase III to be completed without the improvements to Crider Road (and a connection to Hwy 17) being made, Since Pond #1 and #2 drainage areas are located in Phases II, III, and future phases, we believe there inclusion in this report makes the most sense.

Method
We used the SCS method with Type III, 24-hour storms in our drainage calculations. Unique curve numbers (CN), time of concentrations (tc), and areas (D.A.) were input for all drainage areas.
Drainage area maps (attached) were created to show actual areas used in the design calculations.

Result/Findings

Pre-Dev vs. Post-Dev Flow Summary Tables

Outfall #1 Summary (At Lacey's Lake)

2-YEAR STORM	PRE-DEV	POST-DEV
Q2 (Outfall #1)	= 64.53 cfs	63.67 cfs
10-YEAR STORM		
Q10 (Outfall #1)	= 167.80 cfs	165.11 cfs
25-YEAR STORM		
Q25 (Outfall #1)	= 264.88 cfs	259.35 cfs
50-YEAR STORM		
Q50 (Outfall #1)	= 357.79 cfs	350.09 cfs
100-YEAR STORM		
Q100 (Outfall #1)	= 465.08 cfs	455.44 cfs

Outfall #2 Summary (At Ex. 48" Pipe)

2-YEAR STORM	PRE-DEV	POST-DEV
Q2 (Outfall #2)	= 64.78 cfs	51.12 cfs
10-YEAR STORM		
Q10 (Outfall #2)	= 116.59 cfs	94.06 cfs
25-YEAR STORM		
Q25 (Outfall #2)	= 158.13 cfs	127.24 cfs
50-YEAR STORM		
Q50 (Outfall #2)	= 194.82 cfs	162.70 cfs

100-YEAR STORM		
Q100 (Outfall #2)	= 235.08 cfs	197.53 cfs

Total Outfall Summary

2-YEAR STORM	PRE-DEV	POST-DEV
Q2 (Total Outfall)	= 74.76 cfs	70.48 cfs
10-YEAR STORM		
Q10 (Total Outfall)	= 185.68 cfs	161.33 cfs
25-YEAR STORM		
Q25 (Total Outfall)	= 276.61 cfs	238.71 cfs
50-YEAR STORM		
Q50 (Total Outfall)	= 399.74 cfs	368.02 cfs
100-YEAR STORM		
Q100 (Total Outfall)	= 532.42 cfs	525.37 cfs

Water Quality Summary

Water Quality requirement of 1.1" rainfall volume is being met by providing automated outlet control structure devices with a stone filter to provide controlled release from detention ponds. These outlet control devices are provided by Flood-Con LLC and designed by Jon Rasmussen, P.E.. We have included detail sheets AOS 1 and AOS 2 from Flood-Con in our plan set to show construction details for these devices. There is also a supplemental stormwater management report and post-development hydrocad report included with our electronic drainage submittal detailing water quality calculations from Flood-Con.

Lacey's Lake Improvements Summary

Analysis of the Existing Lacey's Lake (pre-development conditions) showed that the lake was not capable of passing much more than a 10-year storm without overtopping the earth spillway. Even though the Phase III Development lessens the peak flow to Lacey's Lake, we have included minor improvements to the Lacey's Lake spillway and outlet. This included raising the earth spillway, adding concrete sidewalks atop, and adding three 12" discharge pipes. Our analysis shows that this helps to contain the lake water, prevents overtopping, and further reduces peak flows. See summary of existing and proposed Lacey's Lake outfall below:

Ex. Lacey's Lake Outfall

Normal Water Elevation = 460.00 (Summer 2020 = 459.65')
8" Pipe - Inv = 460.00
Natural Spillway- Broad C Wier = crest length 8', breadth 10'
30'x19' Concrete Spillway - Elev = 461.03;
Crest length = 24'; Breadth = 18'
Earth Dam – EL = 462.00; 60'Length; 15' Breadth

Proposed Lacey's Lake Outfall

8" Pipe -Inv = 460.00 (retain)
Triple 12" Pipe – Inv. 460.00 **(proposed)**
Natural Spillway- Broad C Wier - crest length 8'; breadth 10'(retain)
30'x19' Concrete Spillway - Elev = 461.03;
Crest length = 24'; Breadth = 18'(retain)
Earth Dam w Sidewalk – EL = 462.90; 55' Length; 6' Breadth **(proposed)**
Earth Dam w Sidewalk – EL = 463.28; 165' Length; 6' Breadth **(proposed)**

Lacey's Lake Inflow Check using Rational Method

Q=CiA, C=0.3, A=381.6, tc=120
i2=1.14, i10=1.59, i25=1.91, i50=2.09 i100=2.43
Q2=(0.3)(1.14)(381.6)= 130.51cfs
Q10=(0.3)(1.59)(381.6)= 182.02cfs
Q25=(0.3)(1.91)(381.6)= 218.66cfs
Q50=(0.3)(2.09)(381.6)= 239.26cfs
Q100=(0.3)(2.43)(381.6)= 278.19cfs

Summary

Our calculations show that peak flows have been reduced for all storms ranging from a 2-year storm to a 100-year storm for Outfall #1, Outfall #2, and the point of Total Outfall. If built according to plans there should be no adverse effects on adjacent or downstream property owners. Supporting stormwater reports and drainage area maps are provided in our electronic drainage submittal.

Please let me know if you have any questions or would like to discuss.

Sincerely,

MBA Engineers, Inc.
Thomas F. Callison, P.E.