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LAKE PETIT DAM

State ID No. 112-009-00462

NID No. GA00685

Summary of Visual Assessment

Prepared for:

Big Canoe® Property Owners Association, Inc.
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Jasper, GA 30143

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1. INTRODUCTION

This Summary of Visual Assessment (Report) was prepared by Geosyntec Consultants, Inc. (Geosyntec) of Chattanooga, Tennessee under the direction of Wesley MacDonald, P.E. on behalf of the Big Canoe® Property Owners Association, Inc. (POA or Owner), Jasper, Georgia.

On 09 March 2020, representatives from Geosyntec, including Ms. Michelle Lisi, E.I., Mr. Max Cange, P.G., Mr. Edisson Avila, E.I., and Mr. Wesley MacDonald, P.E., performed a engineer-led visual assessment (i.e., inspection) of the Lake Petit Dam (Dam) State Identification (ID) Number (No.) 112-009-00462 and National Inventory of Dams (NID) No. GA00685. Geosyntec walked the upstream face and crest of the Dam, the downstream face and each bench on the downstream face of the Dam, the toe and outfall of the downstream slope, and the spillway during the inspection. In addition to a visual inspection of the Dam, Geosyntec personnel collected readings on the conventional standpipe piezometers (PZs) and the vibrating wire piezometers (VWPs).

General observations were noted in the Georgia Environmental Protection Division's (GA EPD) Safe Dams Program Embankment (Earth) Dam Inspection Form (Inspection Form), included as Appendix A. The remainder of this Report provides additional details of the Dam inspection, including: (i) site observations; (ii) an annotated site plan and photograph log; (iii) summary and review of historical and new piezometer data; and (iv) recommendations for ongoing maintenance.

1.1 Background

Lake Petit Dam is located within the Big Canoe development on Petit Creek, approximately 5.8 miles upstream of Marble Hill, Georgia. The reservoir formed by the Dam has a surface area of approximately 105 acres at a normal pool elevation of 1,635 feet (ft) mean sea level (MSL). According to 2016 data from the NID, the normal storage for the reservoir is approximately 4,600 acre-ft.

Lake Petit Dam was constructed in 1972 as a zoned earth embankment consisting of a central clayey silt core and predominantly silty sand embankment shells. According to the NID, the Dam has a maximum height of 126 ft measured as the vertical difference from crest to the current streambed, a crest length of approximately 908 ft, and a crest width of approximately 35 ft. The upstream slope of the Dam is inclined at 3.5 horizontal to 1.0 vertical (3.5H:1V). The downstream shell is inclined at 2.5H:1V with 10 ft wide benches at approximate 20 ft vertical intervals. Design drawings for the Dam were prepared by Baldwin and Cranston Associates in 1971. The Dam is permitted as a Category I Dam under Chapter 391-3-8 of the Georgia State Code "Rules for Dam Safety".

The remainder of this Report is organized as follows:

- Section 2 presents a summary of our findings relative to the observations made on 09 March 2020.
- Section 3 presents a summary of our recommended actions.
- Appendix A presents a copy of the 2020 GA EPD Safe Dams Inspection Form completed by Geosyntec and other quarterly Inspection Forms completed by the Owner;

- Appendix B presents a photograph log.
- Appendix C presents a letter detailing the upstream erosion mitigation measures proposed by Geosyntec.

2. OBSERVATIONS

2.1 Overview

Visual observations of the downstream face of the Dam and the overflow spillway were made on 09 March 2020. The visible portion of the upstream face was also observed; the low-level drain piping and valves were not observed as these are located below normal pool elevation. In addition, Geosyntec collected a round of measurements from piezometers located on the downstream face of the Dam. A graphical layout of the Dam including identified areas of interest and piezometer locations is presented in Figure 2-1. This section of the Report presents the findings of our observations together with a summary of the piezometer data.

2.2 Upstream Face

The upstream face of the Dam was observed by walking the upstream slope. Photographs were also taken to record the general condition of the Dam. Representative photographs are presented as Appendix B of this Report. Areas of minor shoreline erosion and "beaching" were observed on portions of the upstream face of the Dam, which was consistent with observations first noted in the 2008 Geosyntec Summary of Visual Assessment. The beaching observed did not appear to have worsened from the previous inspection. Lowered lake levels associated with the 2007 drought combined with wave action within the reservoir likely resulted in erosion and displacement of rip rap along portions of the shoreline. At the time of this inspection, the lake level was near the top of this erosion feature. Representative photographs are presented as Appendix B of this Report, and attempts were made to compare the most recent photograph to those taken in 2013.

To rectify the observed erosion, additional rip rap should be placed in the affected areas and vegetation re-established as necessary. Further details to address and mitigate the upstream erosion were previously provided to GA EPD in a letter dated 05 March 2013, included here as Appendix C.

In previous inspections it was noted that there was increased surface erosion near the valve box at the center of the Dam. Geosyntec recommended this area be monitored visually and the erosion immediately around the valve box to be repaired by placing and compacting clayey soils in the areas of erosion and establishing vegetation (turf grass) to reduce future erosion. Following the 2013 inspection, it has been observed that vegetation was progressively establishing well. During the October 2015 inspection, several small and isolated areas of erosion were noted along the crest of the upstream face and thought to be the result of animal burrowing. During the 2018 and the 2020 inspections, animal burrows were not discovered, and vegetation continued to be establishing well.

Two patches of surface erosion were observed at the groin of both abutments on the upstream face. This appears to be due to foot traffic and surface water runoff. To protect the Dam from further erosion and soil loss, additional seeding and topsoil should be placed in an attempt to reestablish vegetation in these areas.

2.3 Downstream Face

The downstream face and benches of the Dam were observed by walking each slope and bench. Photographs were also taken to record the general condition of the Dam. Representative photographs are presented as Appendix B of this Report. No significant changes were observed based on a comparison of current photographs to previous photographs taken of comparable areas. However, a wet area along the slope above the first bench from the toe was observed to have increased in size from previous inspections. This area was encountered non-continuously along the length of the bench, from the bench drain to approximately halfway up the slope. The inspection was performed following a relatively wet winter period (approximately 21 inches [in.] of precipitation year to date), however, this area should be closely monitored for changes. The slope interceptor drains that drain this area were generally observed to be flowing and had clear flow. One drain was clogged with vegetation and was unclogged during this inspection. The drains should be maintained, and vegetation and growth should be routinely removed from these drains to ensure performance of these features that are intended to lower the phreatic surface and prevent seepage on the face of the Dam.

In general, other than the area of wetness, the downstream face of the Dam was found to be in good condition, needing only minor maintenance items. Identified areas that should be monitored or repaired as part of routine operations include the following:

- Several minor erosion features were identified along the groin areas between the abutments and main portion of the Dam. The eroded areas were previously repaired with compacted earth, seeding, and erosion nets, but vegetation did not appear to be growing. The areas need reseeding and monitoring to ensure vegetation is fully established and erosion is not generated around repairs prior to vegetation establishing. The erosion appears to be due to surface water flow overtopping the benches, or the benches not providing full containment for surface water. The benches, especially near the groins should be maintained to contain surface water flow, and regraded and reseeded if necessary. Additional debris and vegetation should continue to be removed from the benches and abutments to prevent surface water flow backup.
- The lower two benches of the Dam are partially paved with concrete channels that are intended to collect and convey both surface water and shallow interceptor drain seepage off the face of the Dam. The lower concrete channel was observed to be wet with low flow at the time of inspection while the upper concrete channel was observed to be dry. Surface spalling was observed in some areas of the paved channels, likely as a result of normal aging and weathering. The spalled areas of concrete should be monitored and repaired or replaced if the spalling leads to cracks through the entire thickness of concrete. The lower concrete channel was generally clear of debris. The channels should continue to be cleaned out as needed, to include areas underneath moveable bridges/crossovers for mowing equipment.
- A total of 13 slope interceptor drains were located during the 2020 inspection. The drains have been numbered for identification and their approximate locations are shown on Figure 2-1. Every drain was observed to have light flow, except Drain 1 which is located closest to the right abutment. Drain 12 was unplugged during the 2020

inspection. The increase of the areas of wetness may have occurred as a result of a blocked or partially collapsed shallow interceptor drains and should continue to be monitored and investigated further during subsequent inspections. Hydrophilic vegetation was observed above Bench 1 as well, and particularly near both the right and left abutments. This vegetation indicates these areas routinely retain moisture, instead of draining to the downstream channel. At a minimum, Drains 8 and 9 should be replaced, and future maintenance should be conducted on the remaining drains. Otherwise replacement of all drains should be considered. Damaged drains and drains downstream of wet areas should be carefully removed and replaced per the initial design. The wet areas should be re-inspected following the completion of these routine maintenance activities.

- The upper concrete channel on the left abutment of the Dam was observed to have been undermined and eroded, likely from upstream flow. It is likely that the drainage bench upstream from this point was previously clogged with vegetation, which may have resulted in surface water being directed downslope to the upper concrete channel. The influx of surface water likely overtopped the upper concrete channel and initiated the observed undermining and erosion. The eroded areas should be repaired by placing and compacting clayey soils in the undermined area and establishing vegetation to the extent possible. Debris should be removed from channels on the left abutment above the affected area and all channels on the Dam and abutments should continue to be kept clean of loose debris and vegetation to ensure free flow of water.
- Numerous ant hills and possible animal burrows were observed across the downstream face. Any holes that remain after removal of ant hills or animal burrows must be filled and compacted, and the area should be seeded with turf grass. It is recommended that the mowing frequency be increased to prevent the establishment of unwanted vegetation and animal homes, allow ease of Dam visual inspections, and allow establishment of turf grass.
- Small trees that otherwise would have been mowed were observed to have sprouted in areas that were blocked by downed tree limbs. Debris should be removed from groins and abutments to allow mowing access to at least 50 ft off the Dam. Vegetation will need to be cut and the debris will need to be removed to allow this.

In addition to the site observations made on 09 March 2020, Geosyntec also reviewed water level readings that are taken periodically in the piezometers installed on the downstream face of the Dam. Two types of piezometers have been installed on the Dam: (i) conventional PZs that consist of PVC casings with screened sections strategically located to facilitate direct measurement of water levels within the shell of the Dam; and (ii) VWPs that consist of electrical pressure transducers that provide a means of measuring water pressures at discrete locations within the shell. Both types of instrumentation provide an excellent means of monitoring the level of water at discrete points through a Dam. In addition, changes in water levels and pressures provide useful information regarding the effectiveness of the Dam's internal drainage system. In general, consistent water level and pressure data indicates that internal conditions have likely not changed significantly, whereas sustained changes may be indicative of potential issues.

Geosyntec collected a round of measurements from the PZs and VWPs on 09 March 2020. Additionally, the Owner collected periodic VWP readings between the last engineer-led inspection on 26 January 2018 and this one. The PZs have not been monitored on a regular basis (other than at periodic inspections) since their installation in 1998. PZ measurements taken on 09 March 2020 were compared to measurements taken in 1998, 2007, 2008, and 2013 through 2019. VWP and PZ data are summarized in Tables 2-1 and 2-2, respectively, and are presented graphically on Figures 2-2 through 2-6. Over the period from October 2015 through March 2020, VWP and PZ readings indicate a general increase in water elevations. The largest apparent water elevation increase was observed to be approximately 8.2 ft at PZ G-2 Shallow between the March 2020 readings and the previous reading completed in January 2018. The largest apparent water elevation increases in VWPs was observed to be approximately 7.9 ft at VWP P-4A between the March 2020 readings and the previous reading completed in July 2019.

While these increases are larger than previously recorded fluctuations, it should be noted that the months of January and February 2020 were both significantly wetter than average. The precipitation totals for January and February 2020 at the Big Canoe development were approximately 6.5 and 11.9 in. respectively, which is more than double the average for each month as reported by the National Weather Service. This abundance of precipitation is believed to possibly be related to the observed increases in water elevations from piezometer data.

In summary, the VWPs and PZs appear to indicate a general increase in water elevations at the Dam. The observed increases are larger than previously recorded seasonal fluctuations, but continued and additional monitoring and instrument readings can help with evaluation of whether or not this could be due to a change in internal drainage conditions within the Dam. Subsequent piezometer readings in 2020 should be collected during dry periods to gauge whether water levels have receded back towards historic steady-state conditions.

2.4 Spillway

The spillway that conveys water from the lake around the Dam and discharges to the creek at the toe of the Dam was also observed. Photographs of the spillway are included in Appendix B. In general, the spillway was found to be in good condition. It is noted that the spillway was re-faced with gunite (i.e., sprayed concrete) around September 2009. The spillway was observed to be conveying a higher than normal flow at the time of inspection and appeared to be in good condition. A few tree limbs and minor organic debris were observed within the spillway, and those should be removed when able. There were a few locations where water was flowing through the cracks in the steps in addition to the normal flow over the weir. Additionally, tree roots on the sides of the spillway appeared to be encroaching on the spillway structure and starting to form cracks in the sides of the spillway. There was no evidence of discoloration or other suggestion of undermining and the cracks do not appear to be detrimental at this point. These features should continue to be monitored and should be sealed or otherwise repaired, when practical, as part of routine maintenance activities.

2.5 Low Level Drain

The low level drain is located at the bottom of the upstream pool. It was not possible to check the condition of the low level drain during the inspection. Geosyntec understands that this drain is not

utilized during normal operations. An inspection of the low level drain and the associated spillway pipe should be planned to take place within the next few years

2.6 Drainage Discharge Pipes

Several pipes discharge both surface water and internal drainage to the tailwater creek located at the toe of the Dam. This general area was noted to be difficult to access due to vegetation and waterlogged conditions. In 2008, Geosyntec recommended that this area be cleaned out and the pipes in this area be evaluated, and the area was cleaned out, however heavy and woody vegetation has re-established.

The two pipes (8-inch diameter) that outlet into the concrete impact-style stilling basin were observed to be flowing but appeared to have accumulated buildup at the pipe outlet. This material should be removed, and the pipe monitored for additional buildup. Water draining to the creek was observed to be minimally flowing, and reestablished vegetation was observed as well. The vegetation in this area is due for mowing or cutting once more to allow for inspection, as some other pipes were not visible.

3. SUMMARY OF RECOMMENDED ACTIONS

In general, the Dam and associated structures appear to be in a good state of repair, however continued maintenance, as well as inspections and monitoring of the instruments, should be performed to ensure piezometers and wet areas do not continue to increase. In the short-term, Geosyntec recommends repairs to the following items as part of ongoing maintenance:

- Tree sprouts and debris near the abutment areas should be removed from the face of the Dam. All tree sprouts should be cut or removed by the root. Holes that remain after removal should be filled and compacted, and the area seeded with turf grass.
- Erosion features on the downstream face of the Dam should be repaired and vegetated with turf grass, including erosion beneath the upper concrete channel on the left abutment. Repairs that have been previously made to eroded areas which were observed to not have vegetation growing should be reseeded and monitored to ensure vegetation growth and additional erosion does not occur. The surface water benches should have debris removed and be regraded to promote positive drainage and to ensure stormwater is contained.
- Cleaning of debris and vegetation of the concrete channels should be continued as routine maintenance, and should extend to the sections of channel on each abutment of the Dam as well.
- The undermined portion of the upper concrete channel on the left abutment should be repaired by placing and compacting clayey soils in the undermined area and establishing vegetation to the extent possible.
- Increase mowing activities to reduce growth of tree sprouts, ant hills/animal burrows, and excessive vegetation.
- Remove debris from spillway, remove large trees growing immediately adjacent to spillway, and monitor and repair cracks in steps when feasible (i.e., during low flow conditions).
- Remove accumulated iron deposits in drainage pipes in the concrete impact-style stilling basin at the tailwater to ensure water is able to continue to discharge.

We further recommend that the following items should be addressed:

- Complete quarterly piezometer readings in 2020, preferably during dry conditions to gauge whether water levels have receded back towards historic steady-state conditions.
- Investigate, and if necessary, repair or replace the shallow interceptor drains, which discharge to the lowest concrete channel. The drains should be monitored and maintained to prevent plugging and ensure continued flow. Monitor soft and wet areas following maintenance activities.
- Repair cracks in spillway and steps when feasible (i.e., during low flow conditions).
- Additional rip rap should be placed along the upstream face of the Dam to address erosion referenced in Comment No. 2 of the 2008 GA EPD inspection report; shoreline

erosion on the upstream face of the Dam should be repaired as recommended in Appendix C - Upstream Erosion Mitigation Measures.

- Prior to implementation of the previous item, GA EPD Safe Dams Program should be contacted to assure consensus with the proposed course of action and repairs.

TABLES

Table 2-1
Vibrating Wire Piezometer Data

	2/6/2004	2/13/2004	2/15/2004	2/20/2004	2/27/2004	3/12/2004	3/19/2004	3/27/2004	3/30/2004	4/7/2004	4/16/2004	4/22/2004	4/30/2004	5/7/2004	5/13/2004	5/21/2004	6/2/2004	6/18/2004	6/29/2004	7/6/2004
	Water Elevation (ft MSL)																			
P-2A	1623.01	1623.15	1623.35	1623.21	1623.35	1623.41	1623.41	1623.35	1623.28	1623.15	1622.94	1622.88	1622.81	1622.74	1622.74	1622.74	1622.67	1622.61	1622.67	1622.74
P-2B	1609.30	1609.42	1609.59	1609.48	1609.42	1609.59	1609.59	1609.71	1609.71	1609.59	1609.42	1609.48	1609.42	1609.42	1609.36	1609.36	1609.19	1609.13	1609.13	1609.07
P-2C	1594.74	1594.61	1594.80	1594.74	1594.74	1594.87	1594.93	1594.93	1595.00	1595.00	1594.93	1594.87	1594.87	1594.87	1594.87	1594.87	1594.80	1594.68	1594.61	1594.55
P-4A	1586.49	1587.00	1588.22	1587.64	1588.09	1588.47	1588.47	1588.41	1587.96	1587.45	1587.19	1587.00	1587.00	1586.81	1586.74	1586.62	1586.17	1585.85	1585.59	1585.53
P-4B	1572.34	1572.67	1573.59	1573.13	1573.26	1573.66	1573.66	1573.66	1573.46	1573.06	1572.73	1572.73	1572.60	1572.54	1572.47	1572.47	1572.01	1571.81	1571.81	1572.01
P-4C	1571.00	1571.18	1571.66	1571.36	1571.54	1571.78	1571.78	1571.84	1571.84	1571.60	1571.36	1571.36	1571.30	1571.24	1571.24	1571.18	1571.00	1570.82	1570.76	1570.88
P-6A	1557.35	1557.56	1557.62	1557.40	1557.40	1557.46	1557.35	1557.40	1557.19	1556.77	1557.19	1556.82	1557.03	1556.98	1556.98	1556.98	1556.66	1556.87	1557.03	1557.03
P-6B	1539.65	1539.98	1540.47	1540.09	1540.14	1540.63	1540.69	1540.74	1540.63	1540.25	1540.03	1557.38	1540.30	1540.36	1540.36	1540.47	1539.87	1557.38	1557.60	1540.09
P-6C	1556.19	1556.49	1556.64	1556.39	1556.39	1556.44	1556.24	1556.39	1556.14	1555.74	1556.09	1539.99	1555.99	1555.89	1555.89	1555.89	1555.59	1539.59	1539.74	1555.99
P-7A	1536.90	1537.17	1537.17	1537.06	1536.74	1536.90	1536.63	1536.68	1536.47	1536.25	1536.63	1536.47	1536.68	1536.74	1536.58	1536.85	1536.47	1536.90	1537.22	1537.33
P-7B	1523.23	1523.28	1523.50	1523.34	1528.87	1523.50	1523.56	1523.67	1523.17	1523.12	1523.39	1523.23	1523.34	1523.34	1523.28	1523.23	1523.06	1523.12	1523.17	1523.17
P-7C	1528.40	1528.56	1528.19	1528.72	1527.71	1528.24	1528.19	1528.24	1528.14	1528.03	1527.97	1527.60	1527.81	1527.97	1528.03	1528.19	1527.44	1527.97	1528.30	1528.46

	7/22/2004	7/26/2004	8/6/2004	8/12/2004	8/16/2004	8/26/2004	9/3/2004	9/10/2004	9/27/2004	10/7/2004	10/15/2004	11/1/2004	11/11/2004	11/19/2004	11/23/2004	12/3/2004	12/17/2004	12/22/2004	12/30/2004
P-2A	1623.01	1623.01	1623.01	1623.01	1622.94	1622.94	1622.94	1622.88	1623.08	1623.21	1623.21	1623.15	1623.15	1623.28	1623.41	1623.62	1624.09	1624.09	1624.02
P-2B	1609.07	1609.13	1609.13	1609.19	1609.19	1609.19	1609.59	1609.13	1609.42	1609.42	1609.48	1609.53	1609.59	1609.71	1609.71	1609.82	1610.17	1610.34	1610.46
P-2C	1594.68	1594.68	1594.61	1594.80	1594.68	1594.61	1594.80	1594.61	1594.68	1594.80	1594.87	1595.00	1595.00	1595.06	1595.06	1595.19	1595.39	1595.45	1595.58
P-4A	1586.62	1586.81	1586.49	1586.36	1586.42	1585.97	1588.15	1585.46	1586.87	1587.83	1587.19	1586.74	1587.00	1587.45	1587.58	1589.12	1591.23	1590.72	1590.65
P-4B	1572.40	1572.40	1572.14	1572.01	1571.94	1571.75	1573.46	1571.42	1572.93	1573.46	1573.19	1572.80	1573.00	1573.33	1573.33	1573.98	1575.56	1575.50	1575.63
P-4C	1571.00	1571.06	1571.00	1570.88	1570.88	1570.76	1571.60	1570.58	1571.12	1571.48	1571.54	1571.36	1571.42	1571.60	1571.60	1571.90	1572.63	1572.87	1573.05
P-6A	1556.61	1556.71	1556.45	1556.29	1556.55	1556.61	1557.51	1556.87	1556.98	1557.35	1556.82	1556.98	1557.35	1557.40	1557.56	1557.72	1558.15	1557.94	1558.20
P-6B	1540.03	1539.98	1539.70	1539.65	1539.59	1539.65	1540.41	1539.54	1540.09	1540.25	1540.09	1540.19	1540.36	1540.69	1540.58	1540.85	1541.02	1540.91	1540.96
P-6C	1555.54	1555.59	1555.28	1555.13	1555.49	1555.49	1556.54	1555.74	1555.89	1556.19	1555.74	1555.89	1556.24	1556.29	1556.44	1556.64	1557.15	1556.89	1557.15
P-7A	1537.01	1536.90	1536.90	1536.90	1537.06	1537.22	1537.01	1537.60	1537.44	1537.44	1537.22	1537.44	1537.60	1537.66	1537.66	1537.66	1537.66	1537.39	1537.55
P-7B	1523.06	1523.12	1522.85	1522.85	1523.17	1523.12	1523.45	1523.12	1522.95	1523.45	1522.68	1523.12	1523.34	1523.23	1523.01	1523.28	1523.78	1523.67	1523.83
P-7C	1527.60	1527.65	1527.81	1527.92	1528.03	1528.24	1528.03	1527.87	1528.40	1527.81	1527.87	1528.24	1527.97	1528.35	1528.30	1528.46	1528.35	1528.35	1528.51

Table 2-1
Vibrating Wire Piezometer Data

	1/4/2005	1/13/2005	1/19/2005	2/4/2005	2/15/2005	2/25/2005	3/4/2005	3/11/2005	3/18/2005	3/24/2005	4/1/2005	4/4/2005	4/19/2005	4/29/2005	5/6/2005
	Water Elevation (ft MSL)														
P-2A	1624.02	1623.89	1623.82	1623.55	1623.41	1623.41	1623.62	1623.75	1623.75	1623.75	1623.89	1623.95	1624.16	1623.15	1623.68
P-2B	1610.57	1610.46	1610.46	1610.11	1609.94	1609.88	1609.88	1609.88	1610.00	1610.00	1610.11	1610.17	1610.69	1610.57	1610.46
P-2C	1595.71	1595.77	1595.71	1595.58	1595.52	1595.39	1595.32	1595.32	1595.32	1595.32	1595.39	1595.39	1595.71	1596.03	1595.90
P-4A	1590.33	1589.50	1589.37	1588.35	1587.90	1588.47	1589.82	1589.95	1589.95	1589.95	1591.55	1592.51	1591.49	1590.21	1589.95
P-4B	1575.50	1574.91	1574.84	1574.05	1573.66	1574.05	1574.71	1574.84	1574.84	1574.84	1575.50	1576.29	1576.29	1575.43	1575.30
P-4C	1573.11	1572.81	1572.69	1572.21	1571.90	1571.90	1572.15	1572.33	1572.45	1572.45	1572.57	1572.81	1573.59	1573.23	1573.05
P-6A	1558.04	1557.62	1558.20	1557.83	1557.62	1557.83	1557.78	1557.62	1557.88	1557.88	1558.26	1558.36	1558.04	1557.83	1557.88
P-6B	1540.91	1540.52	1540.41	1540.03	1540.47	1540.63	1540.91	1540.80	1540.58	1540.58	1540.47	1540.58	1540.52	1540.74	1541.23
P-6C	1557.05	1556.64	1556.89	1556.79	1556.54	1556.84	1556.84	1556.69	1556.84	1556.84	1559.76	1557.40	1557.05	1556.79	1556.89
P-7A	1537.49	1537.28	1537.49	1537.49	1537.28	1537.66	1537.39	1537.22	1537.33	1537.33	1537.55	1537.66	1537.33	1537.22	1537.39
P-7B	1523.72	1523.23	1523.50	1523.39	1523.34	1523.34	1523.34	1523.06	1523.23	1523.23	1534.34	1523.61	1523.56	1523.23	1523.23
P-7C	1528.62	1528.46	1528.56	1528.56	1528.56	1528.78	1528.83	1528.78	1528.88	1528.88	1530.48	1527.92	1528.35	1528.08	1528.24

	5/13/2005	5/19/2005	5/27/2005	6/14/2005	6/22/2005	7/18/2005	8/5/2005	8/19/2005	9/7/2005	9/28/2005	10/12/2005	10/21/2005	11/4/2005	11/17/2005	12/29/2005
P-2A	1623.62	1623.48	1623.41	1623.08	1623.21	1623.35	1623.48	1623.35	1623.28	1623.15	1623.01	1622.94	1622.81	1622.81	1622.67
P-2B	1610.40	1610.29	1610.34	1609.82	1609.71	1609.82	1610.05	1610.05	1609.82	1609.71	1609.53	1609.42	1609.19	1609.19	1609.01
P-2C	1595.90	1595.84	1595.90	1595.39	1595.32	1595.19	1595.39	1595.45	1595.39	1595.26	1595.13	1595.00	1594.74	1594.74	1594.61
P-4A	1589.44	1588.92	1589.12	1587.26	1621.49	1589.56	1588.92	1588.03	1587.32	1586.23	1586.04	1585.14	1584.50	1584.50	1583.79
P-4B	1574.84	1574.38	1574.38	1573.33	1553.51	1574.58	1574.25	1573.85	1573.06	1572.08	1571.55	1571.29	1570.63	1570.63	1570.30
P-4C	1572.75	1572.51	1572.51	1571.54	1558.30	1571.72	1572.27	1572.03	1571.60	1594.47	1570.76	1570.52	1570.10	1570.10	1569.92
P-6A	1557.46	1557.19	1557.14	1557.46	1557.08	1557.78	1557.19	1557.19	1556.82	1556.34	1556.29	1555.81	1556.07	1556.07	1556.13
P-6B	1540.63	1540.19	1540.14	1540.63	1540.69	1540.91	1540.30	1539.98	1540.09	1539.37	1538.99	1538.83	1538.28	1538.28	1537.79
P-6C	1556.39	1556.19	1556.09	1556.39	1556.04	1556.79	1556.14	1556.14	1555.74	1555.23	1555.13	1554.68	1554.88	1554.88	1554.93
P-7A	1537.12	1537.01	1537.06	1537.82	1537.39	1537.87	1537.44	1537.71	1537.49	1536.31	1536.79	1536.58	1536.52	1536.52	1536.74
P-7B	1523.17	1523.01	1528.37	1522.85	1523.01	1523.23	1523.06	1523.01	1523.06	1522.79	1522.79	1522.63	1522.90	1522.90	1522.52
P-7C	1528.19	1528.08	1528.03	1528.51	1528.56	1528.56	1528.03	1528.51	1528.08	1527.49	1527.87	1528.08	1527.81	1527.81	1527.71

Table 2-1
Vibrating Wire Piezometer Data

	1/27/2006	2/1/2005	2/10/2006	2/17/2006	2/21/2006	3/1/2006	3/9/2006	3/13/2006	4/7/2006	4/14/2006	4/21/2006	4/28/2006	5/8/2006	6/16/2006	6/23/2006	6/30/2006	7/17/2006	7/24/2006	8/10/2006	8/17/2006
									Water Elevation (ft MSL)											
P-2A	1623.01	1622.88	1622.81	1623.01	1623.41	1623.48	1623.48	1623.41	1623.28	1623.21	1623.08	1623.15	1623.08	1622.74	1622.67	1622.61	1622.67	1622.61	1622.47	1622.40
P-2B	1608.78	1608.84	1609.01	1608.90	1609.01	1609.13	1609.19	1609.19	1609.30	1609.13	1609.01	1603.35	1609.25	1608.90	1609.19	1608.84	1608.84	1608.73	1608.44	1608.32
P-2C	1594.29	1594.29	1594.29	1594.22	1594.42	1594.48	1594.48	1594.55	1594.68	1601.20	1601.07	1601.20	1594.68	1594.42	1594.48	1594.35	1594.29	1594.22	1594.03	1593.96
P-4A	1584.69	1584.63	1584.82	1585.14	1586.74	1586.87	1586.87	1586.87	1586.68	1586.81	1586.55	1586.10	1585.85	1584.69	1584.56	1584.37	1583.86	1583.86	1583.22	1583.09
P-4B	1571.15	1571.15	1571.42	1571.42	1572.21	1572.01	1572.27	1572.27	1572.27	1572.14	1571.94	1571.75	1571.55	1570.50	1570.36	1570.30	1569.97	1569.97	1569.71	1569.31
P-4C	1570.04	1569.98	1570.22	1570.34	1570.52	1570.70	1570.70	1570.70	1570.76	1570.76	1570.58	1570.58	1570.46	1569.80	1569.86	1569.62	1569.50	1569.56	1569.14	1569.02
P-6A	1557.03	1556.92	1556.87	1556.82	1556.82	1556.77	1556.50	1556.66	1556.45	1556.39	1556.29	1556.13	1556.07	1555.06	1555.33	1555.54	1555.11	1555.22	1554.95	1555.06
P-6B	1538.66	1538.77	1538.72	1538.83	1539.32	1539.48	1539.59	1539.59	1539.92	1539.92	1539.81	1539.76	1539.76	1538.94	1538.99	1538.99	1538.88	1538.99	1538.17	1538.01
P-6C	1555.94	1555.99	1555.89	1555.79	1555.74	1555.69	1555.49	1555.59	1555.33	1555.28	1555.28	1555.23	1554.98	1553.98	1553.98	1554.38	1553.98	1554.08	1553.27	1553.62
P-7A	1536.95	1536.90	1536.85	1536.74	1536.58	1536.63	1536.31	1536.41	1536.31	1536.20	1536.20	1536.25	1536.25	1535.77	1535.71	1536.58	1536.47	1536.41	1536.25	1536.52
P-7B	1523.23	1523.23	1522.95	1522.95	1522.90	1522.79	1522.74	1522.85	1522.68	1522.57	1522.52	1522.63	1522.68	1522.68	1522.68	1522.68	1522.63	1522.52	1522.41	1522.57
P-7C	1528.03	1527.97	1527.92	1527.81	1527.97	1528.08	1528.08	1528.03	1527.92	1527.87	1527.76	1527.49	1527.39	1527.12	1527.12	1527.55	1527.71	1527.81	1527.44	1527.49

	9/7/2006	9/18/2006	10/4/2006	10/13/2006	10/19/2006	11/10/2006	11/17/2006	11/23/2006	11/29/2006	12/12/2006	12/20/2006	1/3/2007	5/22/2008	7/26/2011	5/8/2012	8/2/2012	11/8/2012	8/15/2013	8/20/2013	6/6/2014
P-2A	1622.40	1622.34	1622.20	1622.20	1622.20	1622.27	1622.34	1622.27	1622.20	1622.74	1622.67	1623.01	1623.01	1622.94	1624.76	1635.81	1625.91	1627.32	1627.32	1626.72
P-2B	1608.21	1608.09	1607.69	1607.51	1607.51	1607.63	1607.74	1607.69	1607.57	1608.09	1608.09	1608.32	1609.42	1610.92	1612.02	1602.20	1608.49	1613.81	1613.87	1612.71
P-2C	1593.77	1593.64	1593.38	1593.25	1593.25	1593.19	1593.06	1593.06	1593.00	1593.51	1593.58	1593.64	1594.29	1594.80	1595.58	1595.13	1595.06	1596.94	1596.94	1595.97
P-4A	1582.96	1582.32	1582.32	1581.94	1581.81	1581.74	1581.68	1581.81	1581.94	1582.90	1583.22	1583.73	1585.59	1585.01	1587.13	1585.01	1582.83	1592.83	1592.64	1587.45
P-4B	1569.18	1569.11	1568.78	1568.52	1568.52	1568.78	1568.92	1568.85	1568.78	1570.03	1570.03	1570.30	1571.29	1570.43	1572.21	1570.36	1568.59	1555.16	1576.55	1572.40
P-4C	1568.84	1568.72	1568.59	1568.53	1568.47	1568.66	1568.53	1568.59	1568.53	1569.20	1569.26	1569.32	1569.80	1569.14	1570.40	1569.26	1568.17	1561.01	1573.11	1570.52
P-6A	1555.06	1554.85	1554.85	1554.58	1555.27	1555.27	1555.22	1555.17	1555.06	1555.91	1555.75	1556.50	1555.38	1554.37	1555.22	1554.26	1553.62	1556.71	1556.82	1555.22
P-6B	1537.62	1537.46	1537.18	1537.13	1536.86	1537.51	1537.57	1537.46	1537.46	1538.61	1538.77	1539.05	1538.39	1538.77	1538.72	1538.88	1537.57	1540.41	1540.30	1539.43
P-6C	1553.62	1553.72	1553.57	--	1554.03	1554.03	1554.13	1554.08	1554.18	1554.73	1554.53	1555.33	1554.33	1553.32	1554.23	1553.27	1552.62	1555.89	1556.04	1554.33
P-7A	1536.58	1536.63	1536.63	--	1536.63	1536.74	1536.85	1536.74	1536.85	1536.79	1536.58	1537.17	1536.25	1536.09	1535.60	1536.14	1535.87	--	1537.39	1536.36
P-7B	1522.57	1522.63	1522.63	--	1522.35	1522.46	1522.63	1522.52	1528.10	1522.95	1522.85	1523.01	1522.24	1521.91	1522.19	1522.02	1522.08	--	1522.95	1522.08
P-7C	1527.65	1527.60	1527.71	--	1527.49	1527.71	1527.76	1527.76	1527.71	1527.97	1527.87	1528.03	1527.44	1526.96	1526.96	1527.44	1526.96	--	1528.19	1527.33

Table 2-1
Vibrating Wire Piezometer Data

	9/5/2014	10/15/2014	1/27/2015	3/17/2015	6/15/2015	9/2/2015	10/21/2015	3/2/2016	4/4/2016	5/20/2016	6/23/2016	12/1/2016	6/28/2017	1/26/2018	12/14/2018	4/3/2019	7/15/2019	3/9/2020
				Water Elevation (ft MSL)														
P-2A	1626.11	1625.71	1626.31	1626.51	1626.92	1626.99	1626.04	1627.26	1627.26	1627.26	1625.77	1624.76	1626.312	1626.447	1626.380	1627.255	1626.110	1626.986
P-2B	1612.02	1611.85	1612.25	1612.60	1612.71	1612.14	1612.25	1613.64	1613.18	1612.42	1612.08	1602.20	1612.308	1611.442	1611.557	1607.050	1610.979	1613.175
P-2C	1595.00	1594.68	1595.06	1595.45	1606.82	1595.00	1595.00	1596.87	1596.55	1595.77	1595.32	1593.38	1595.774	1595.515	1595.709	1604.237	1595.903	1597.647
P-4A	1584.69	1583.47	1587.58	1588.60	1587.19	1585.01	1585.97	1592.32	1589.05	1586.49	1585.14	1581.42	1591.102	1587.000	1590.974	1591.744	1586.551	1594.436
P-4B	1569.71	1569.05	1572.21	1572.80	1572.34	1570.10	1570.69	1576.22	1573.79	1571.55	1570.17	1567.14	1574.248	1571.351	1574.445	1576.025	1571.483	1577.935
P-4C	1568.66	1568.29	1569.74	1573.29	1601.63	1568.78	1568.84	1572.57	1571.36	1569.86	1568.96	1567.09	1571.062	1569.558	1584.723	1573.289	1569.798	1574.132
P-6A	1554.16	1554.69	1555.43	1555.59	1555.01	1554.05	1554.79	1556.55	1555.70	1554.58	1553.41	1552.88	1555.593	1555.008	1556.020	1556.073	1554.262	1556.978
P-6B	1537.79	1537.62	1539.21	1538.88	1546.43	1538.50	1538.61	1540.63	1540.09	1538.99	1538.17	1537.07	1539.100	1538.772	1539.319	1540.085	1538.498	1540.414
P-6C	1553.17	1553.62	1554.48	1554.68	1554.03	1553.12	1553.78	1555.69	1554.78	1553.57	1552.52	1551.91	1554.731	1553.976	1555.083	1555.184	1553.322	1556.089
P-7A	1535.82	1536.25	1536.14	1536.14	1536.31	1536.25	1536.20	1536.47	1535.98	1535.87	1535.50	1535.93	1536.576	1536.198	1536.684	1536.144	1535.982	1536.900
P-7B	1522.02	1521.70	1521.97	1522.19	1522.19	1522.02	1522.19	1522.85	1522.41	1522.13	1522.02	1521.91	1528.100	1522.626	1522.681	1522.845	1522.079	1523.666
P-7C	1527.07	1527.07	1527.17	1527.55	1527.28	1527.17	1527.39	1528.99	1527.33	1527.07	1526.53	1527.01	1527.441	1527.601	1527.815	1527.975	1527.281	1528.402

Table 2-2
Standpipe Piezometer Water Elevation Data

	22-Oct-98	23-Oct-98	26-Oct-98	29-Oct-98	3-Jan-07	19-Jan-07	22-May-08	20-Aug-13	15-Nov-14	20-Oct-15
	Water Elevation (ft MSL)									
G-1A Shallow	1593.68	1593.43	1593.42	1593.67	1592.84	1592.84	1593.73	1599.59	1594.43	1594.00
G-1A Deep	1577.07	1576.93	1576.51	1576.92	1575.59	1575.59	1577.81	1581.31	1576.46	1576.46
G-1B	1580.87	1583.84	1583.85	1583.89	1583.44	1583.44	1583.98	-- [a]	1582.85	1583.07
G-2 Shallow	1566.23	1566.12	1566.06	1566.07	1566.70	1569.25	1567.50	1571.20	1565.52	1567.79
G-2 Intermediate	1588.90	1558.68	1558.81	1559.00	1534.17 *	1553.65	1557.40	1560.36	1555.68	1556.79
G-2 Deep	1553.41	1553.71	1553.52	1553.75	1518.64 *	1554.00	1553.77	1554.46	1552.96	1553.27
G-3	1531.94	1531.93	1531.92	1531.95	N/A	1533.82	1533.64	1535.49	1533.04	1533.08
	23-Jun-16	**26-Jan-18**	**9-Mar-20**							
	Water Elevation (ft MSL)									
G-1A Shallow	1595.86	1596.72	1601.9							
G-1A Deep	1577.1	1577.45	1582.08							
G-1B	1582.85	1582.93	1586.32							
G-2 Shallow	1566.51	1567.78	1575.95							
G-2 Intermediate	1556.22	1558.56	1562.62							
G-2 Deep	1553.09	1552.99	1555.39							
G-3	1533.24	1533.48	1536.84							

Note:

* water levels noted as anomolous on 3 Jan 2007. Re-measured 19 Jan 2007, and levels more consistent with previous readings.

a - No measurment in standpipe G-1B on 20 August 2013. Unable to locate due to overgrown grass.

FIGURES

1 / — SITE PLAN
SCALE: 1" = 60'

N

LEGEND

- EXISTING PIEZOMETER
- DROP INLET / MANHOLE
- ANIMAL BURROW
- MINOR SURFACE EROSION (6- TO 12-IN. UNLESS OTHERWISE NOTED)
- (#) INTERCEPTOR DRAIN
- DEBRIS

DAM INSPECTION OBSERVATIONS:

(a) A WET AREA WAS NOTED FROM APPROXIMATELY MID-SLOPE DOWN TO THE INTERCEPTOR DRAINS NON-CONTINUOUSLY ALONG THE SLOPE BETWEEN DRAINS (1) AND (13).

(b) A WET AREA WAS NOTED ALONG THE LEFT ABUTMENT APPROXIMATELY 6 FEET HIGH AND 90 FEET WIDE.

(c) UNDERMINED CONCRETE CHANNEL ON THE LEFT ABUTMENT. SEE PHOTOGRAPHS IN THE PHOTOLOG (APPENDIX B). THE UPSTREAM CHANNEL SHOULD BE CLEANED OF LOOSE DEBRIS AND LARGE VEGETATION, AND SOIL SHOULD BE RECOMPACTED BENEATH THE UNDERMINED AREA.

NOTES:

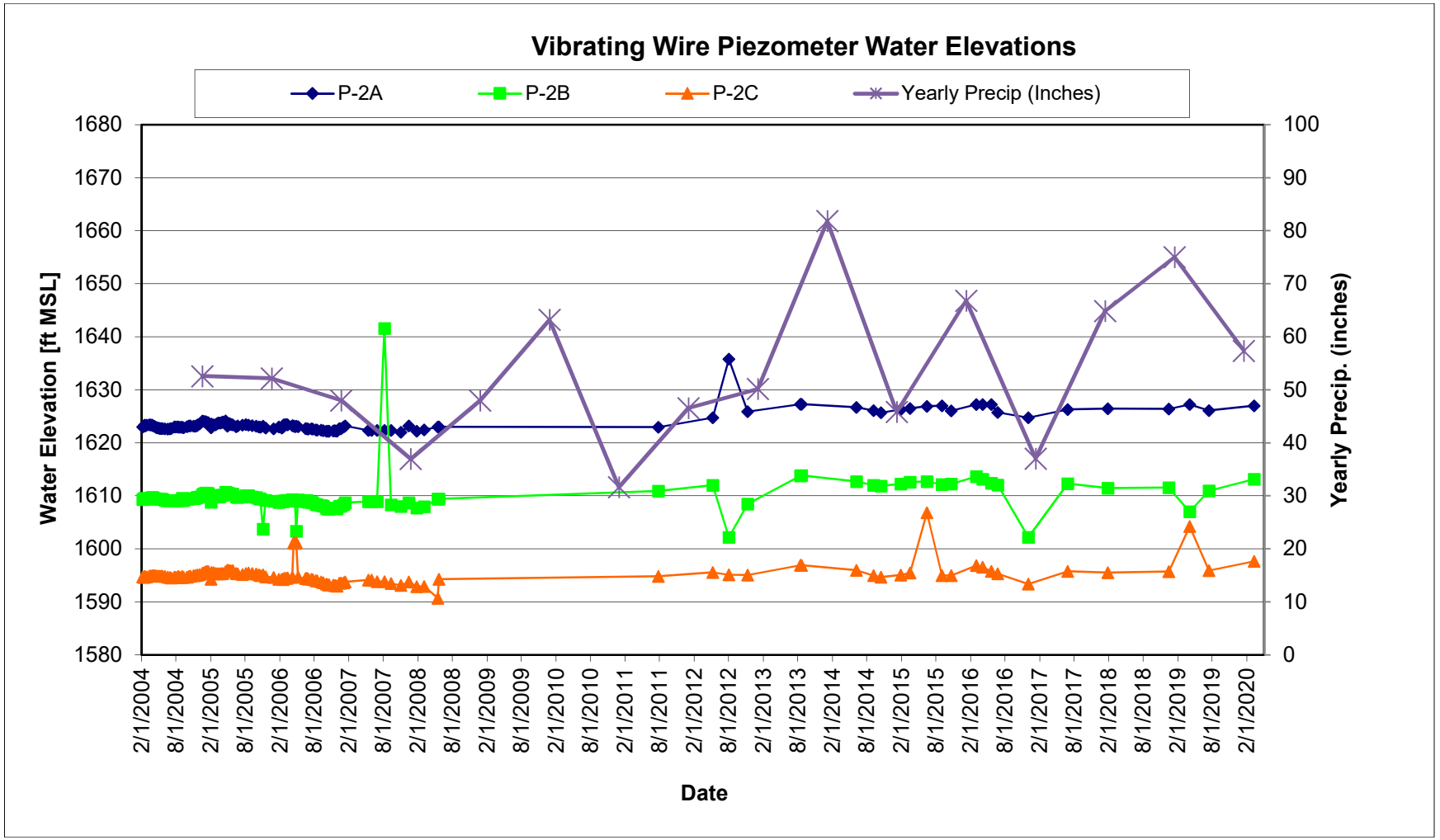
1. DRAWING INDICATES PLAN VIEW OF DAM SHOWING STATIONING USED ON LOWER PAVED BENCHES. ALL STATIONING MEASURED PERPENDICULAR TO ALIGNMENT OF EXISTING PIEZOMETER.
2. AERIAL PICTURE OBTAINED FROM TERRA SERVER ONLINE IMAGERY AND TAKEN ON 1 JANUARY 2007.

0 60' 120'
SCALE IN FEET

FIGURE 2-1: SITE PLAN AND FIELD OBSERVATIONS DATE: 09 MARCH 2020

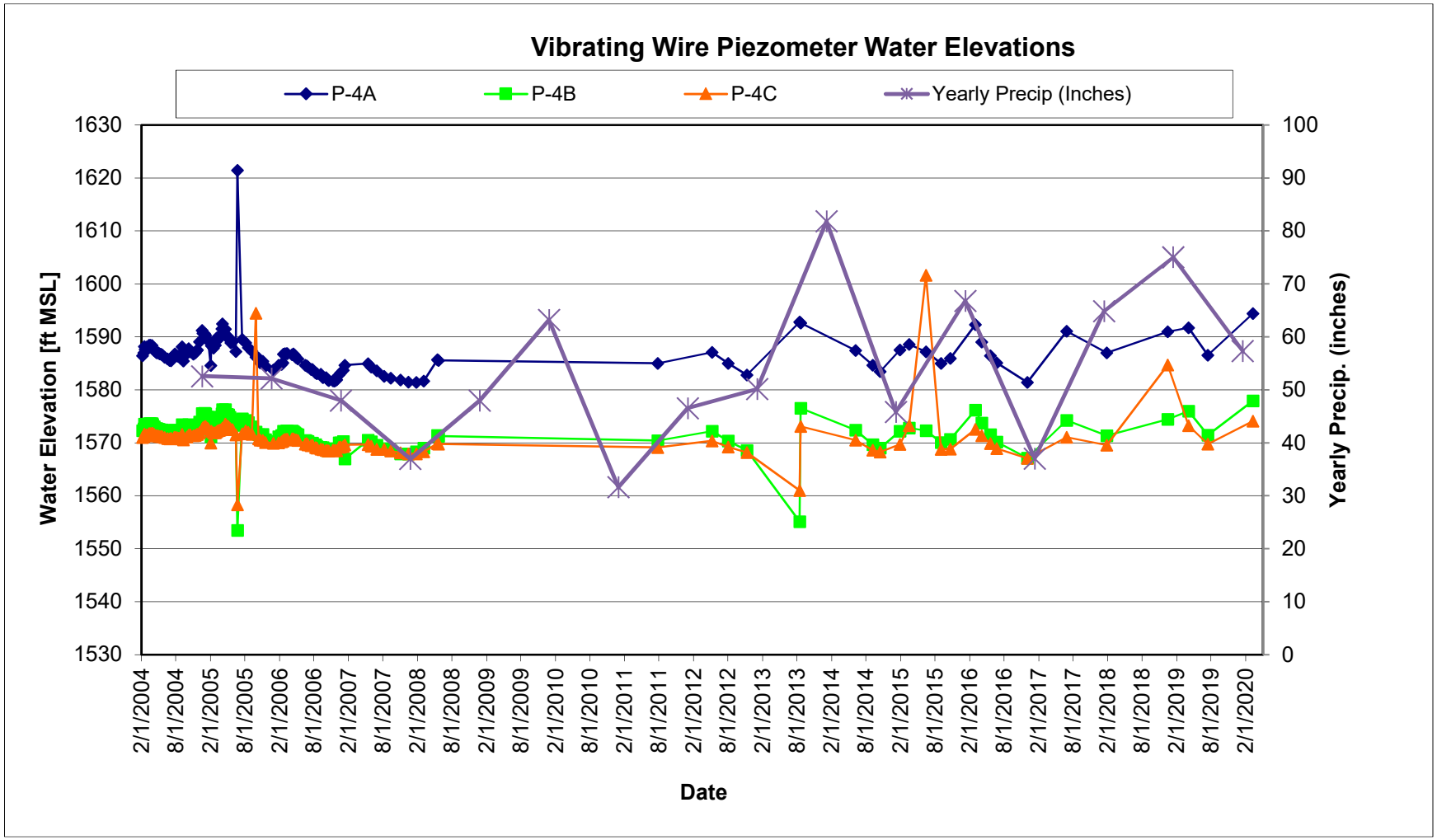
Geosyntec consultants

L:\CADD\LLAKE PETIT DAM\CONSTRUCTION\LAKE PETIT DAM DRAINAGE IMPROVEMENTS (SK422203)(REV-B)\422801



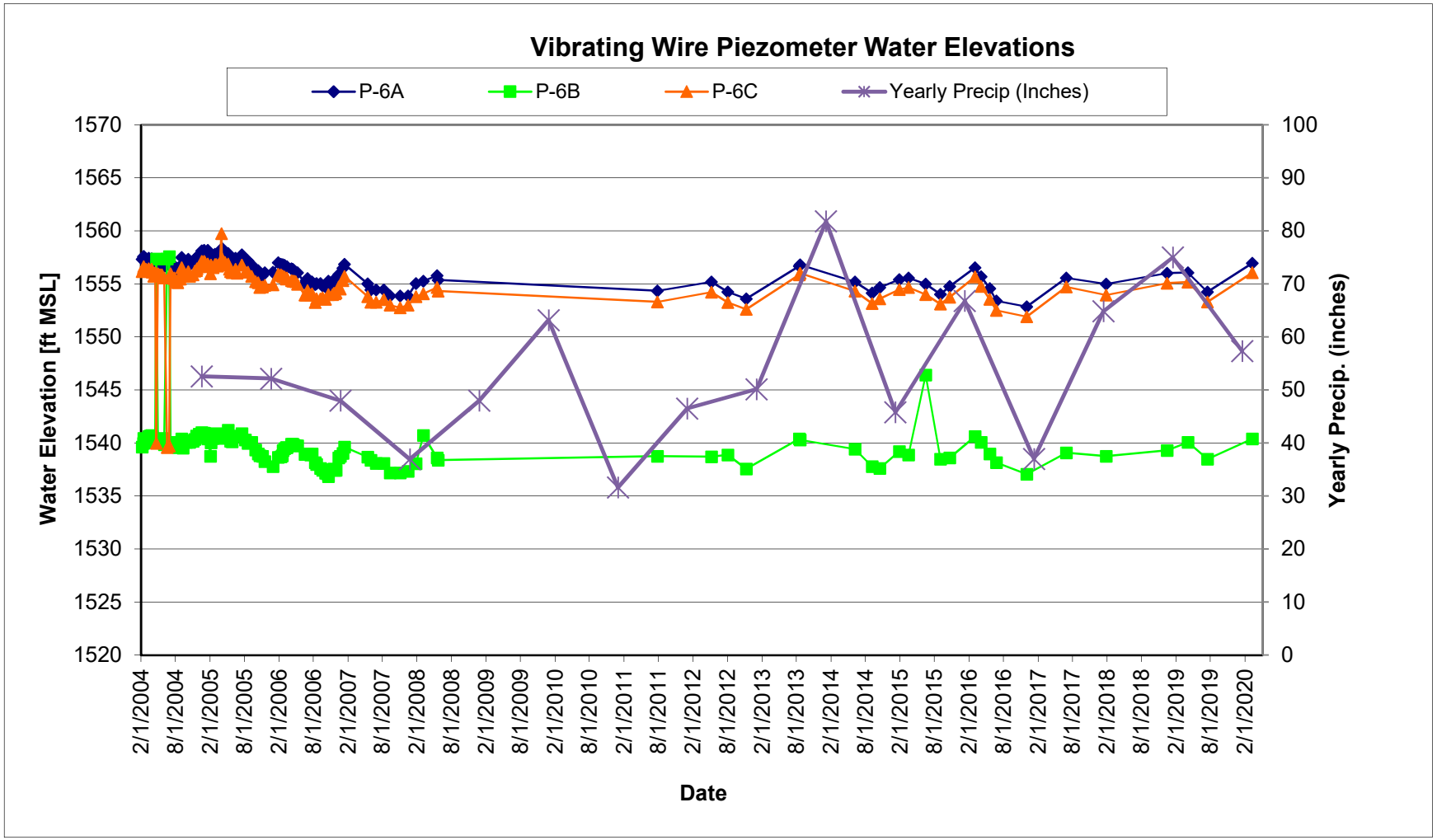
Note: Historical data anomalies generally appear to be the result of transcription errors.

Figure 2-2. Summary of Vibrating Wire Piezometer Data, P-2A, B, C (Feb 2004 through March 2020) - Lake Petit Dam, Big Canoe, GA



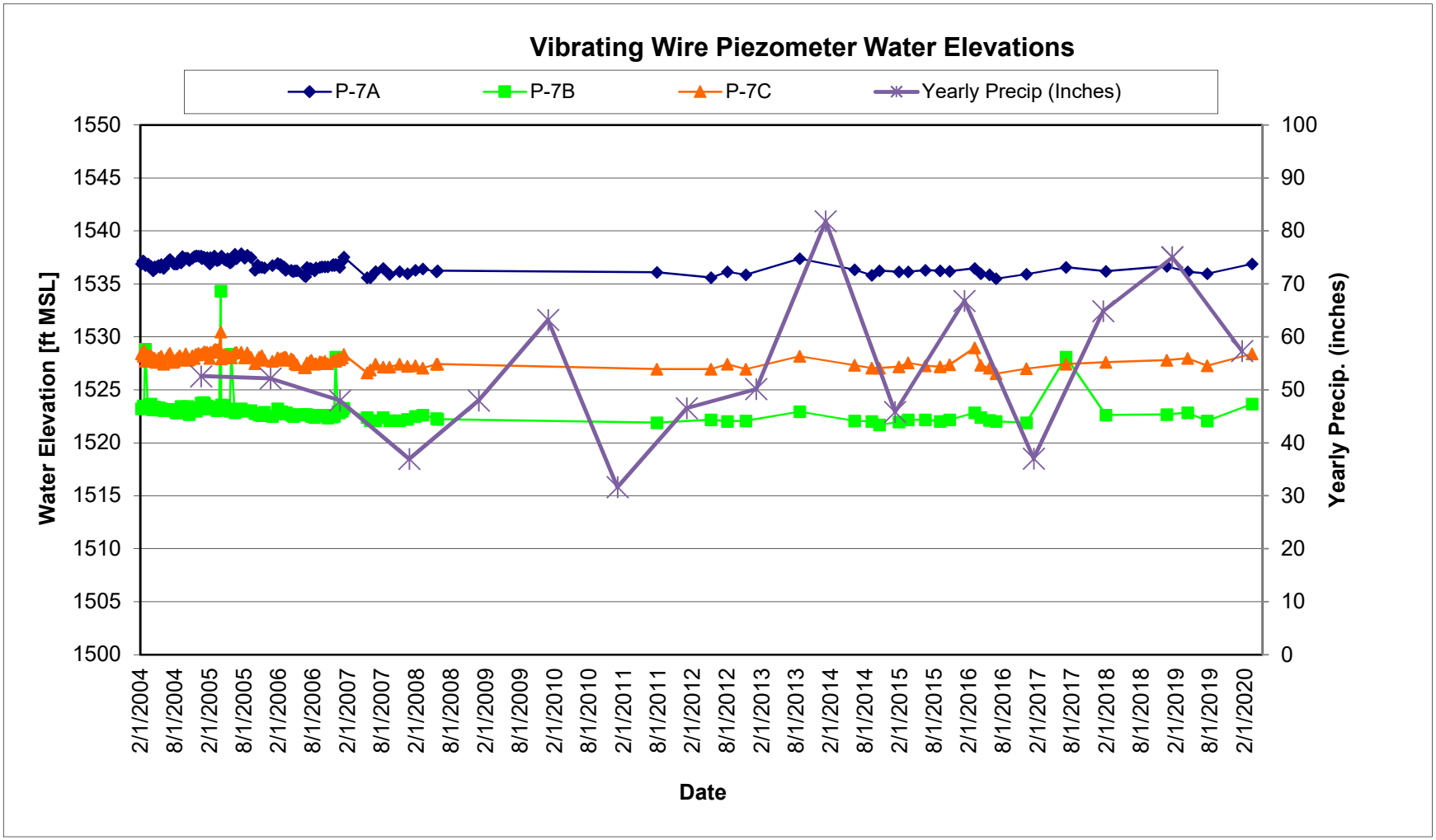
Note: Historical data anomalies generally appear to be the result of transcription errors.

Figure 2-3. Summary of Vibrating Wire Piezometer Data, P-4A, B, C (Feb 2004 through March 2020) - Lake Petit Dam, Big Canoe, GA



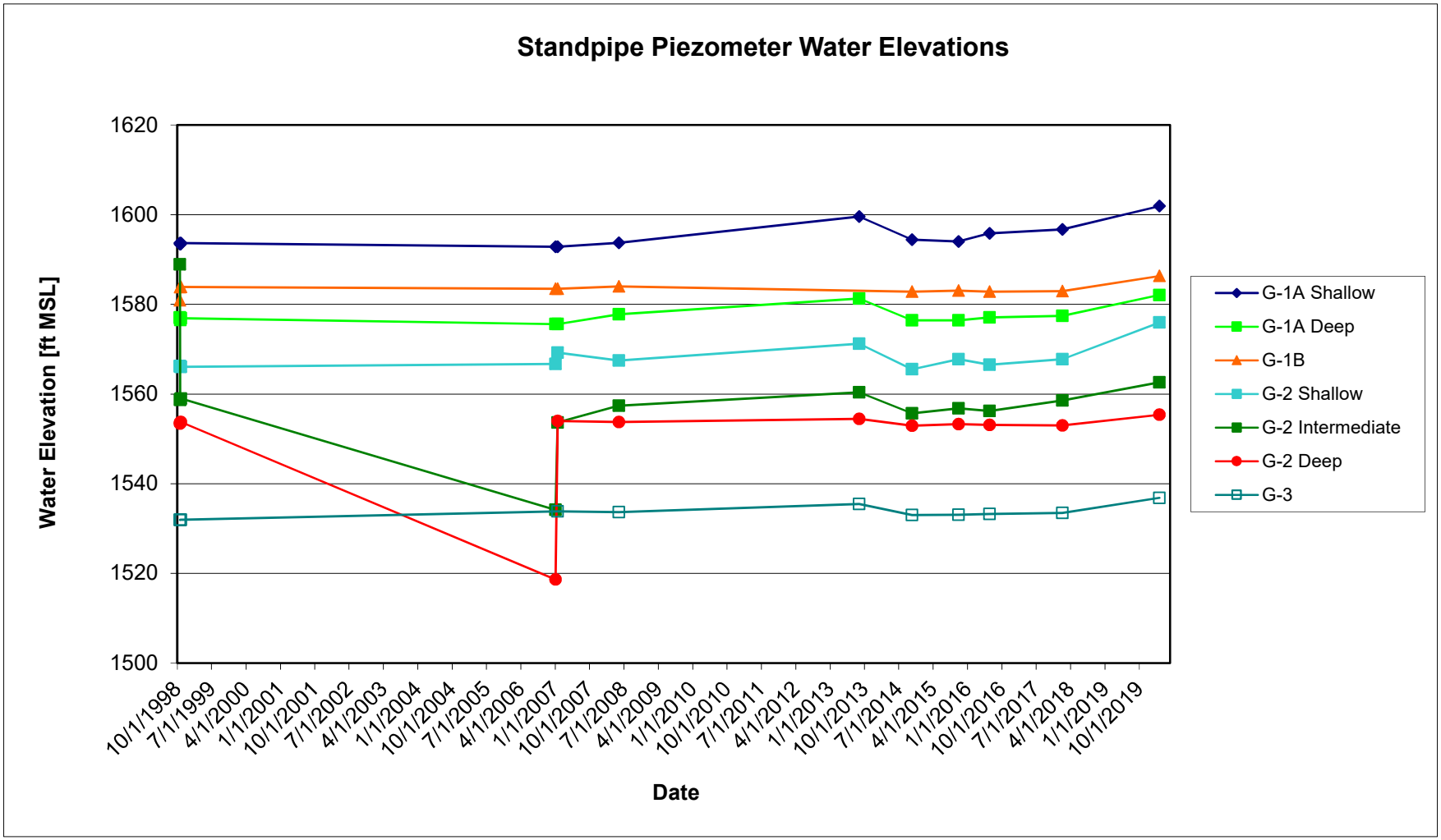
Note: Historical data anomalies generally appear to be the result of transcription errors.

Figure 2-4. Summary of Vibrating Wire Piezometer Data, P-6A, B, C (Feb 2004 through March 2020) - Lake Petit Dam, Big Canoe, GA



Note: Historical data anomalies generally appear to be the result of transcription errors.

Figure 2-5. Summary of Vibrating Wire Piezometer Data, P-7A, B, C (Feb 2004 through March 2020) - Lake Petit Dam, Big Canoe, GA



Note: G-2 Shallow water levels noted as anomolous on 3 Jan 2007. Re-measured 19 Jan 2007, and levels more consistent with previous readings.

Figure 2-6. Summary of Standpipe Piezometer Data (Oct 1998 through March 2020) - Lake Petit Dam, Big Canoe, GA.

APPENDIX A

Georgia EPD Safe Dams Program Embankment (Earth) Dam Inspection Form

Embankment (Earth) Dam Inspection Form

Name of Dam: Lake Petit Dam Date: 09 March 2020

Location of Dam (County): Pickens County Weather: Mostly Cloudy, 60 degrees

F Inspected by (Print Name): Michelle Lisi, E.I., Max Cange, P.G., Edisson Avila, E.I., and Wes MacDonald, P.E.

If an inspection item requires further action on your part, place a check mark to the left of the number of the item

A. Crest (refer to Glossary for description)

☐ 1. How would you describe the vegetation on the crest? (Check all that apply)

Recently Mowed__X___ Overgrown_____ Good Cover_____ Sparse_____

Other/Corrective Action (describe): The crest of the dam is an asphalt paved road. Vegetation on either side of the road was observed to be well-maintained.

☐ 2. Are there any trees or other inappropriate or excessive vegetation on the crest? Yes_____ No___X___

If yes, describe (type of vegetation, size, location, etc.)/Corrective Action: No trees or other inappropriate vegetation were observed

☐ 3. Is there a paved road or driveway on the crest? Yes_____ No_____

If yes, describe the condition (for example, good condition, numerous cracks, newly paved)/Corrective Action: Good condition. Paved in 2012.

☐ 4. Are there any depressions, ruts or holes on the crest? Yes_____ No__X____

If yes, describe (size, location, etc)/Corrective Action: There were no depressions, ruts, or large holes observed on the crest.

☒ 5. Are there any cracks on the crest? Yes___X___ No_____

If yes, describe (length and width, location, direction of cracking, etc.)/Corrective Action: Yes, a hairline transverse crack across the asphalt road was observed near the left abutment. This appears to be routine pavement stress, however this should continue to be monitored.

☒ 6. Other observations on the crest/Corrective Action: Some erosion at the left and right groins from foot traffic and surface runoff was observed. These areas should be re-established and seeded.

B. Upstream Slope (refer to Glossary for description)

1. What is the reservoir level today? At Normal Pool__X_ Above Normal Pool_____Feet Below Normal Pool_____Feet

☐ 2. How would you describe the vegetation on the upstream slope? (Check all that apply)

Recently Mowed__X____ Overgrown_____ Good Cover_____ Sparse_____

Other/Corrective Action (describe): This area is well-seeded and maintained short grass. A bare spot observed mid-way up the slope in 2013 was observed to have increased vegetation. Slight erosion along the water's edge was observed.

☐ 3. Are there any trees or other inappropriate or excessive vegetation on the slope? Yes_____ No_X_____

If yes, describe (type of vegetation, size, location, etc.)/Corrective Action: No trees or other inappropriate vegetation were observed. Continue to keep trees back 50 ft from abutment.

☒ 4. Are there any depressions, bulges, ruts or holes (such as animal burrows) on the slope? Yes_X_____ No_____

If yes, describe (size, location, etc.)/Corrective Action: Good condition, slight soft areas located 500-520 ft and 725-735 ft from left abutment on upper slope. Most likely resulting from animal burrows. Continue to monitor these areas.

☒ 5. Are there any eroded areas on the slope (such as wave erosion along the shoreline)? Yes_____ No_____

If yes, describe (size of area, location, severity, etc.)/Corrective Action: Slight "beaching" observed/reported in 2008 continued to be observed. Conditions do not appear to have worsened. Some erosion on the L and R groins, as noted in Item A.6.

Upstream Slope (continued)

☐ 6. Are there any cracks, sloughs or slides (vertical cliffs) on the slope? Yes_____ No__X____

If yes, describe (length, width, height, location, etc.)/Corrective Action: There were no sloughs, cracks, or slides observed.

☒ 7. Is there any type of slope protection along the shoreline (such as riprap)? Yes__X____ No_____

If yes, describe what type and its condition (for example, riprap - adequate, inadequate, sparse)/Corrective Action: Adequate rip rap exists on the shoreline, but filter layer behind rip rap appears to have been eroded, and should be replaced to prevent further erosion.

☐ 8. Other observations on the upstream slope/Corrective Action: No other observations.

C. Downstream Slope (refer to Glossary for description)

☐ 1. How would you describe the vegetation on the downstream slope? (Check all that apply)

Recently Mowed___X___ Overgrown_____ Good Cover_____ Sparse_____

Other/Corrective Action (describe): Some minor sparse vegetated patches, as noted on Figure 2-1.

☒ 2. Are there any trees or other inappropriate or excessive vegetation on the slope? Yes__X____ No_____

If yes, describe (type of vegetation, size, location, etc.)/Corrective Action: Small sprouting trees were observed on the downstream face of the dam near abutments. Debris should be removed to allow mowing to control these before they grow larger.

☒ 3. Are there any depressions, bulges, ruts or holes (such as animal burrows) on the slope? Yes_____ No_____

If yes, describe (size, location, etc.)/Corrective Action: Several animal burrows and depressions were observed throughout the downstream face. These should be backfilled.

☒ 4. Are there any eroded areas on the slope (such as along abutment contacts)? Yes___X___ No_____

If yes, describe (size of area, location, severity, etc.)/Corrective Action: Minor surface erosion was observed generally at the east and west abutments at each bench, corrective measures were previously installed, but need reseeding.

☐ 5. Are there any cracks, sloughs or slides (vertical cliffs) on the slope? Yes_____ No_X_____

If yes, describe (length, width, height, location, etc.)/Corrective Action: There were no sloughs, cracks, or slides observed.

☒ 6. Are there any wet areas or areas of hydrophilic (lush, water-loving) vegetation? Yes___X___ No_____

If yes, describe (size of area, location, etc.)/Corrective Action: A wet area was observed upstream and in the vicinity of the interceptor drains, and in several areas throughout the slope above Bench 1. Start planning to replace old drains.

☐ 7. Do any wet areas indicate seepage through the dam (such as rust-colored, stained water)? Yes_____ No__X__ N/A_____

If yes, describe (for example, new area of seepage, no change from past observations, size of area, location) /Corrective Action: Water flow from interceptor drains was clear.

☐ 8. Are there any leaks (flowing water) from the slope or beyond the toe of the dam? Yes_____ No___X___

If yes, describe (location, rate of flow, turbidity of flow)/Corrective Action: No leaks were observed.

☒ 9. Other observations on the downstream slope/Corrective Action: A concrete channel on the left abutment had the soil beneath it eroded. Recommend to replace and re-establish slope here.

D. Plunge Pool (refer to Glossary for description)

☐ 1. Is there any type of erosion protection around the plunge pool (such as riprap)? Yes___X___ No_____

If yes, describe what type and its condition (for example, riprap - adequate, inadequate, obstructed by vegetation) /Corrective Action: There is no plunge pool, but downstream from the impact-type stilling basin there does not appear to be riprap, however based on current operations it does not appear to be needed.

☒ 2. Is there any erosion and or seeps around or going into the plunge pool? Yes__X____ No_____

If yes, describe (size of area, location, severity, etc.) /Corrective Action: A drain pipe right of the stilling basin showed some signs of seepage around it. This area should be cleaned out to allow for inspection of pipes, and continue to monitor for changes.

☐ 3. Other observations around the plunge pool/Corrective Action: No other observations.

E. Principal and Emergency Spillways (refer to Glossary for description)

☐ 1. What types of spillways does the dam have (such as corrugated metal, concrete or siphon pipe; concrete or earth channel)?

Principal Spillway Gunnite, Stepped Spillway Emergency Spillway None, other than low-level draw-off pipe.

Other/Corrective Action:

☐ 2. Has the emergency spillway activated (had flow) since the last inspection? Yes_____ No___X___

If yes describe (date(s) of flow, reason for activation, depth of flow) /Corrective Action: N/A

☒ 3. For pipe spillways, is the intake obstructed in any way (such as with excessive debris)? Yes_____ No_____

If yes, describe (type of debris, reason for obstruction, etc.) /Corrective Action: The intake for the low-level draw-off is not visible from the surface and could not be inspected. A plan should be put in place to inspect this underwater feature.

☒ 4. For pipe spillways, what is the condition of any trash racks (for example, adequate, inadequate, damaged)? /Corrective Action: The intake for the low-level draw-off is not visible from the surface and could not be inspected. A plan should be put in place to inspect this underwater feature.

☐ 5. For pipe spillways, are there any visible cracks, separations or holes in the pipe(s) (intake or outlet)? Yes_____ No_X__

If yes, describe (location, width of crack or separation, etc.)/Corrective Action: There were no cracks/separations observed at the outlet.

☒ 6. For pipe spillways, are there any apparent leaks in the pipe(s)? Yes_____ No_X___

If yes, describe (location, rate of flow from leak, etc.)/Corrective Action: The full pipe was unable to be inspected, however a plan should be put in place to inspect the length of the pipe.

7. For pipe spillways, how would you describe the overall condition of the pipe(s)? (Check all that apply)
   Functioning Normally____ Not Functional__X__ Deteriorated____ Damaged____ Adequate____ Inadequate____

☐ 8. For concrete or earth channel spillways, is the entrance or channel obstructed in any way? Yes_____ No_X____
   If yes, describe (type of obstruction, location, etc.)/Corrective Action:

☐ 9. For earth channel spillways, how would you describe the vegetation in the spillway? (Check all that apply)
   Recently Mowed_____ Overgrown_____ Good Cover_____ Sparse_____
   Other (describe)/Corrective Action: N/A

☐ 10. For earth channel spillways, are there any trees or other inappropriate vegetation in the spillway? Yes__X__ No_____
   If yes, describe (type of vegetation, size, location, etc.)/Corrective Action: N/A

☐ 11. For earth channel spillways, are there any eroded areas in the spillway? Yes_____ No_____
   If yes, describe (size of area, location, severity, etc.)/Corrective Action: N/A

☒ 12. For concrete channel spillways, are there any cracks or holes in the spillway? Yes_X_____ No_____
   If yes, describe (width of crack or hole, location, etc.)/Corrective Action: Small cracks were observed on the sides and in steps throughout the spillway. Another inspection of the spillway should be conducted during a lower flow period.

☐ 13. For concrete channel spillways, are there any leaks or evidence of undermining (flow under the concrete)? Yes_____ No__X__
   If yes, describe (location, rate of flow from leak, indicators of undermining, etc.)/Corrective Action: Generally no evidence of leaks or undermining were observed. It is recommended that an inspection be conducted when water is not flowing through spillway.

14. For earth or concrete channel spillways, how would you describe the overall condition of the spillway? (Check all that apply)
   Functioning Normally_X__ Not Functional____ Deteriorated____ Damaged____ Adequate____ Inadequate____

☐ 15. Other observations on the spillways/Corrective Action: No other observations.

F. Instrumentation (refer to Glossary for description)

☒ 1. Are there any toe drains at the downstream toe or any other seepage drains on the dam? Yes_X____ No_____
   If yes, describe the condition (for example, clogged, free flowing, deteriorated, good condition) /Corrective Action: The toe drain appeared in good condition and low flow was observed. Some interceptor drains were clogged or had a lot of vegetation slowing flow. After unclogging most had limited flow. Several interceptor drain appeared to be deteriorated. Recommend removing vegetation continuously, and replacing Drains 8 and 9 at minimum. The underdrain system of the dam outlets in the impact stilling basin, and the two drain pipes appeared to be flowing however they did have an accumulation of growth at their outlet, and this should be removed.

☐ 2. For drains, is an animal guard installed at the outlet of each drain? Yes_____ No__X___

If no, which drains lack animal guards? /Corrective Action: Animal guards were not observed on drain pipes, however they do not appear necessary on the interceptor surface drains or underdrain outlet pipes, as these appear to continuously flow.

☐ 3. For drains, measure the rate of flow from each drain and record below (use additional pages if necessary):

Designation/Location of Drain	Flow Rate	Flow Rate in GPM*	Turbidity of Flow (describe – clear, muddy, etc.)
Interceptor Drains on Bench 1	Very low	<1 GPM	clear

☒ 4. Are there any piezometers on the dam? Yes__X___ No_____

If yes, describe the condition (for example, good condition, damaged, etc.)/Corrective Action: The piezometers are generally in good condition, but require the lid seals to be replaced to keep surface water out of monuments. Individual piezometers have caps to prevent water from intruding.

☒ 5. For piezometers, does each piezometer have a cap with a lock? Yes_____ No___X___

If no, which piezometers need caps (to prevent rain water intrusion) and/or locks (to prevent tampering)? /Corrective Action: Piezometers have caps, but no locks. They generally have monument covers with bolted lid to prevent tampering.

☐ 6. For piezometers, are you able to take a measurement (depth to water) in each piezometer? Yes__X___ No_____

If yes, record depth to water (in feet) in each piezometer, record on a separate page, and attach to this form.

☐ 7. Are there any other monitoring devices on the dam? Yes_____ No_X_____

If yes, describe what type and the condition (for example, monitoring wells - good condition, damaged) /Corrective Action:

☐ 8. Other observations on instrumentation/Corrective Action: No other observations.

G. Photographs

At a minimum, photographs should be taken of the crest, upstream slope, downstream slope and any other notable features.

List of photographs (be sure to date stamp the photos): Photographs included in Appendix B in the report.

**GPM (gallons per minute): to convert from oz/sec multiply by 0.4688; to convert from ml/sec multiply by 0.01585*

↑ Check if corrective action is noted/required.

Embankment (Earth) Dam Inspection Form

Name of Dam: Pettit Dam Date: 4/1/19

Location of Dam (County): Pickens Weather: 32° Clear

Inspected by (Print Name): Jacob VanSant / Mathew Parks

A. Crest (refer to Glossary for description)

1. How would you describe the vegetation on the crest? (Check all that apply)

   Recently Mowed_____ Overgrown_____ Good Cover_____ Sparse_____

   Other (describe): Road (asphalt)

2. Are there any trees or other inappropriate vegetation on the crest? Yes_____ No✓

   If yes, describe (type of vegetation, size, location, etc.):

3. Is there a paved road or driveway on the crest? Yes✓ No_____

   If yes, describe the condition (for example, good condition, numerous cracks, newly paved): good condition

4. Are there any depressions, ruts or holes on the crest? Yes_____ No✓

   If yes, describe (size, location, etc):

5. Are there any cracks on the crest? Yes_____ No✓

   If yes, describe (length and width, location, direction of cracking, etc.):

6. Other observations on the crest:

B. Upstream Slope (refer to Glossary for description)

1. What is the reservoir level today? At Normal Pool✓ Above Normal Pool_____Feet Below Normal Pool_____Feet
2. How would you describe the vegetation on the upstream slope? (Check all that apply)

   Recently Mowed✓ Overgrown_____ Good Cover_____ Sparse_____

   Other (describe):

3. Are there any trees or other inappropriate vegetation on the slope? Yes_____ No✓

   If yes, describe (type of vegetation, size, location, etc.):

4. Are there any depressions, bulges, ruts or holes (such as animal burrows) on the slope? (Yes)✓ No✓

   If yes, describe (size, location, etc.): Western side there are mole tunnels

5. Are there any eroded areas on the slope (such as wave erosion along the shoreline)? Yes✓ No_____

   If yes, describe (size of area, location, severity, etc.): East side of dam. Erosion from road run-off.

6. Are there any cracks, sloughs or slides (vertical cliffs) on the slope? Yes_____ No✓

   If yes, describe (length, width, height, location, etc.):

Upstream Slope (continued)

7. Is there any type of slope protection along the shoreline (such as riprap)? Yes ✓ No ____
   If yes, describe what type and its condition (for example, riprap - adequate, inadequate, sparse): R. Prap along shoreline. Need add more.
8. Other observations on the upstream slope: Depression on Western side near road

C. **Downstream Slope** (refer to Glossary for description)

1. How would you describe the vegetation on the downstream slope? (Check all that apply)
   Recently Mowed ____ Overgrown ____ Good Cover ✓ Sparse ____
   Other (describe): ____
2. Are there any trees or other inappropriate vegetation on the slope? Yes ____ No ✓
   If yes, describe (type of vegetation, size, location, etc.): ____
3. Are there any depressions, bulges, ruts or holes (such as animal burrows) on the slope? Yes ✓ No ____
   If yes, describe (size, location, etc.): Western side looking south on 3rd terrace. Mole burrows
4. Are there any eroded areas on the slope (such as along abutment contacts)? Yes ✓ No ____
   If yes, describe (size of area, location, severity, etc.): Western side 1st terrace looking South, bare spot
5. Are there any cracks, sloughs or slides (vertical cliffs) on the slope? Yes ____ No ✓
   If yes, describe (length, width, height, location, etc.): ____
6. Are there any wet areas or areas of hydrophilic (lush, water-loving) vegetation? Yes ✓ No ____
   If yes, describe (size of area, location, etc.): Eastern side on 6th terrace looking South
7. Do any wet areas indicate seepage through the dam (such as rust-colored, stained water)? Yes ____ No ✓ N/A ____
   If yes, describe (for example, new area of seepage, no change from past observations, size of area, location): ____
8. Are there any leaks (flowing water) from the slope or beyond the toe of the dam? Yes ____ No ✓
   If yes, describe (location, rate of flow, turbidity of flow): ____
9. Other observations on the downstream slope: ____

D. **Plunge Pool** (refer to Glossary for description)

1. Is there any type of erosion protection around the plunge pool (such as riprap)? Yes ____ No ✓
   If yes, describe what type and its condition (for example, riprap - adequate, inadequate, obstructed by vegetation): ____
2. Is there any erosion around the plunge pool? Yes ____ No ✓
   If yes, describe (size of area, location, severity, etc.): ____
3. Other observations around the plunge pool: Algae growing in pool.

Name of Dam: _____ Date: _____

E. Principal and Emergency Spillways (refer to Glossary for description)

1. What types of spillways does the dam have (such as corrugated metal, concrete or siphon pipe; concrete or earth channel)?
   Principal Spillway Concrete Channel Emergency Spillway Concrete Channel
   Other _____
2. Has the emergency spillway activated (had flow) since the last inspection? Yes ✓ No ____
   If yes describe (date(s) of flow, reason for activation, depth of flow, erosion damage if any): Principal and Emergency is the same spillway (24/7/8645)
3. For pipe spillways, is the intake obstructed in any way (such as with excessive debris)? Yes ____ No ____
   If yes, describe (type of debris, reason for obstruction, etc.): _____
4. For pipe spillways, what is the condition of any trash racks (for example, adequate, inadequate, damaged)? _____
5. For pipe spillways, are there any visible cracks, separations or holes in the pipe(s) (intake or outlet)? Yes ____ No ____
   If yes, describe (location, width of crack or separation, etc.): _____
6. For pipe spillways, are there any apparent leaks in the pipe(s)? Yes ____ No ____
   If yes, describe (location, rate of flow from leak, etc.): _____
7. For pipe spillways, how would you describe the overall condition of the pipe(s)? (Check all that apply)
   Functioning Normally ____ Not Functional ____ Deteriorated ____ Damaged ____ Adequate ____ Inadequate ____
8. For concrete or earth channel spillways, is the entrance or channel obstructed in any way? Yes ____ No ✓
   If yes, describe (type of obstruction, location, etc.): _____
9. For earth channel spillways, how would you describe the vegetation in the spillway? (Check all that apply)
   Recently Mowed ____ Overgrown ____ Good Cover ____ Sparse ____
   Other (describe): _____
10. For earth channel spillways, are there any trees or other inappropriate vegetation in the spillway? Yes ____ No ____
    If yes, describe (type of vegetation, size, location, etc.): _____
11. For earth channel spillways, are there any eroded areas in the spillway? Yes ____ No ____
    If yes, describe (size of area, location, severity, etc.): _____
12. For concrete channel spillways, are there any cracks or holes in the spillway? Yes ✓ No ____
    If yes, describe (width of crack or hole, location, etc.): Hole in bottom 1/3 way down. Numerous cracks in top at ground level
13. For concrete channel spillways, are there any leaks or evidence of undermining (flow under the concrete)? Yes ✓ No ____
    If yes, describe (location, rate of flow from leak, indicators of undermining, etc.): Some Undermining on the sides in several places

Principal and Emergency Spillways (continued)

14. For earth or concrete channel spillways, how would you describe the overall condition of the spillway? (Check all that apply)

Functioning Normally____ Not Functional____ Deteriorated____ Damaged✓ Adequate____ Inadequate____

15. Other observations on the spillways:_____

F. Instrumentation (refer to Glossary for description)

1. Are there any toe drains at the downstream toe or any other seepage drains on the dam? Yes✓ No____

If yes, describe the condition (for example, clogged, free flowing, deteriorated, good condition):_____

2. For drains, is an animal guard installed at the outlet of each drain? Yes____ No✓

If no, which drains lack animal guards?_____

3. For drains, measure the rate of flow from each drain and record below (use additional pages if necessary):

Designation/Location of Drain	Flow Rate	Flow Rate in GPM*	Turbidity of Flow (describe – clear, muddy, etc.)

4. Are there any piezometers on the dam? Yes✓ No____

If yes, describe the condition (for example, good condition, damaged, etc.):_____

5. For piezometers, does each piezometer have a cap with a lock? Yes____ No✓

If no, which piezometers need caps (to prevent rain water intrusion) and/or locks (to prevent tampering)? Have caps but no locks

6. For piezometers, are you able to take a measurement (depth to water) in each piezometer? Yes✓ No____

If yes, record depth to water (in feet) in each piezometer, record on a separate page and attach to this form.

7. Are there any other monitoring devices on the dam? Yes____ No____

If yes, describe what type and the condition (for example, monitoring wells - good condition, damaged):_____

8. Other observations on instrumentation:_____

G. Photographs

At a minimum, photographs should be taken of the crest, upstream slope, downstream slope and any other notable features.

List of photographs:_____

**GPM (gallons per minute): to convert from oz/sec multiply by 0.4688; to convert from ml/sec multiply by 0.01585*

Glossary of Common Dam Terms

Abutment – That part of the valley wall against which the dam is constructed.

Berm – A horizontal step in the slope of an embankment dam usually for the purpose of reducing erosion or to increase the thickness and stability of the embankment.

Crest – The top surface of the dam.

Dam – A barrier across a watercourse to impound or divert water.

Downstream slope – The inclined surface of a dam away from the reservoir.

Earth dam (earthfill dam) – An embankment dam in which more than 50 percent of the total volume is formed of compacted earth material.

Emergency spillway – A spillway designed to provide additional protection against overtopping of a dam intended for use under extreme conditions such as malfunction of the principal spillway or extreme rainfall.

Erosion – A gradual wearing away of soil or rock by running water, waves or abrasive action.

Freeboard – The difference in elevation between the normal water surface in the reservoir and the dam crest.

Groin – The contact between the upstream or downstream slope of a dam and the abutments.

Instrumentation – Any device installed into or near a dam (i.e., piezometers, toe drains) used to monitor the performance of the dam.

Intake structure – The entrance to an outlet works.

Left or right designation – In the context of dams, the designation is made with the observer facing downstream.

Normal pool - The normal operating elevation of the reservoir.

Outlet – An opening through which water can be freely discharged from a reservoir.

Outlet channel (exit channel) – Channel downstream of a dam that conveys water back to the "natural" stream.

Outlet works – Structures and equipment required for the safe operation and control of water released from a reservoir. A series of components located in a dam through which normal releases from the reservoir are made.

Piezometer – An instrument that measures hydraulic pressures within an earth dam.

Plunge pool – A natural or artificially created pool at the base of a dam that dissipates the energy of free-falling water.

Principal/Primary spillway – A spillway (pipe, channel, etc.) designed to provide continuous or frequent releases from a reservoir in order to maintain normal pool.

Riprap – A layer of large stones, broken rock or other suitable material generally placed in random fashion on the upstream and/or downstream faces of embankment dams to protect them from erosion.

Seepage – The slow movement or percolation of water through soil or rock without formation of definite channels.

Sinkhole – A steep-sided depression formed when removal of subsurface embankment or foundation material causes overlying material to collapse into the resulting void.

Slope protection – The protection of an embankment slope against wave action or erosion (such as the use of riprap).

Slough (slide) – A shallow slope failure. Movement of a soil mass downward along a slope because of a slope angle too great to support the soil, wetness reducing internal friction among particles of soil or seismic activity.

Spillway – A structure that passes normal and/or flood flows in a manner that protects the structural integrity of the dam. A structure over or through which flow is discharged from a reservoir.

Spillway channel – An open channel or conduit conveying water downstream from the spillway inlet.

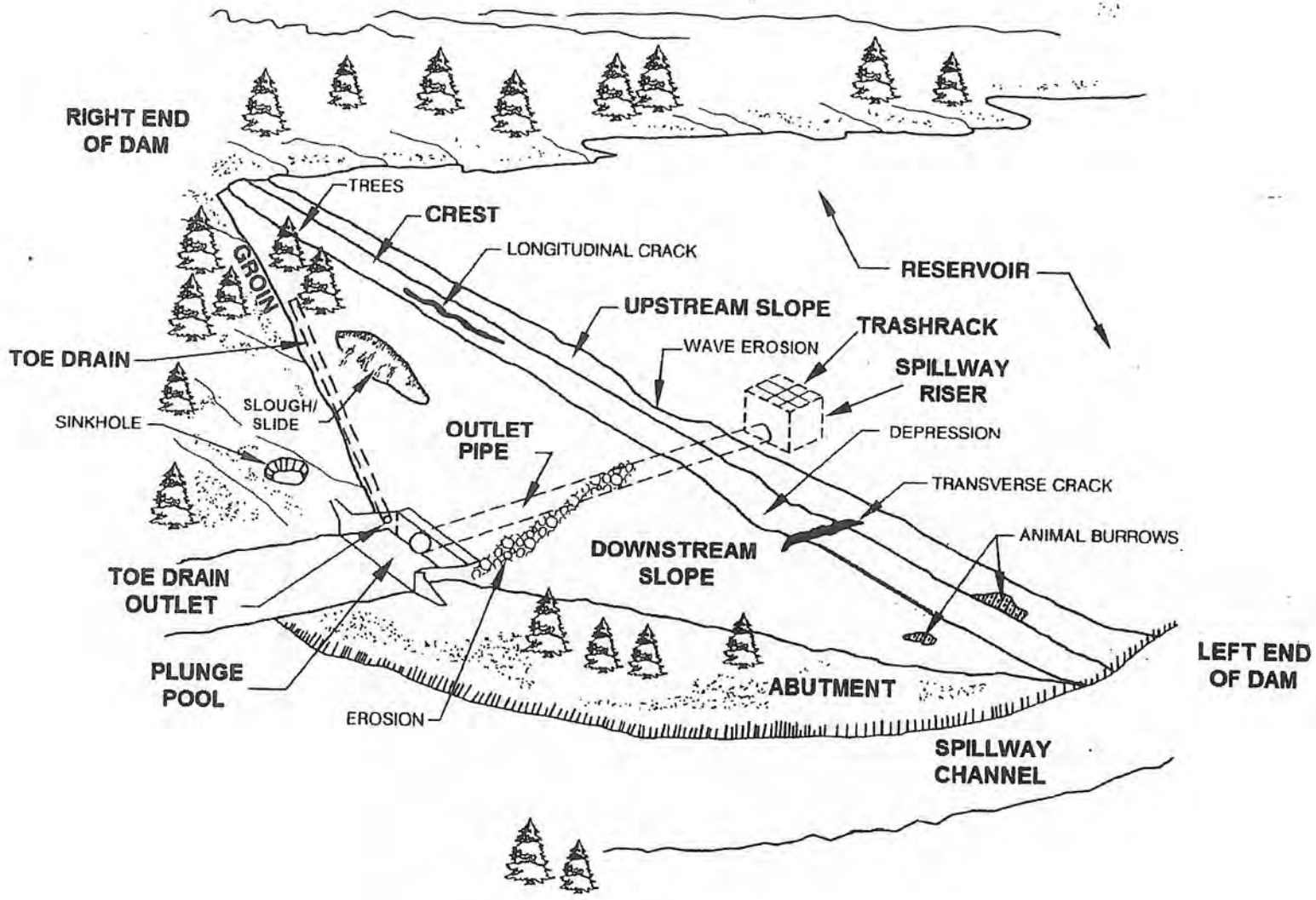
Toe (toe of slope) – The point of intersection between the bottom of a slope and the natural ground, for example, the upstream or downstream toe of a dam.

Toe drain(s) – A system of pipe and/or pervious material along the downstream toe of a dam used to collect seepage from the foundation and embankment and convey it to a free outlet.

Trash rack – A device or structure located at an intake to prevent floating or submerged debris from entering the intake.

Upstream slope – The inclined surface of a dam toward the reservoir.

Ref: Modified from U.S. Bureau of Reclamation – http://www.usbr.gov/library/glossary/index.html



TYPICAL EMBANKMENT DAM

(COMMON DEFICIENCES NOTED IN ORANGE)

REF: MODIFIED FROM TADS, U.S. BUREAU OF RECLAMATION; 1988.

PIEDMONT GEOTECHNICAL CONSULTANTS, INC.

PETIT DAM PROJECT, BIG CANOE, GA.

P-2 A 8830
P-2 B 8692
P-2 C 8802

P-4 A 8844
P-4 B 8352
P-4 C 8452

P- 6 A 8892
P-6 B 9050
P-6 C 8733

P-7 A 8896
P-7 B 8978
P-7 C 8793

DATE 12/14/18

PIEDMONT GEOTECHNICAL CONSULTANTS, INC.

PETIT DAM PROJECT, BIG CANOE, GA.

P-2 A 8817
P-2 B 8770
P-2 C 8670

P-4 A 8832
P-4 B 8328
P-4 C 8642

P- 6 A 8891
P-6 B 9036
P-6 C 8731

P-7 A 8906
P-7 B 8972
P-7 C 8790

DATE 4/3/19

PIEDMONT GEOTECHNICAL CONSULTANTS, INC.

PETIT DAM PROJECT, BIG CANOE, GA.

P-2 A 8834
P-2 B 8702
P-2 C 8799

P-4 A 8913
P-4 B 8397
P-4 C 8700

P- 6 A 8925
P-6 B 9065
P-6 C 8768

P-7 A 8909
P-7 B 8986
P-7 C 8803

DATE 7/15/19

APPENDIX B
Photograph Log

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 1: Upstream Face, 2013 – localized areas of erosion and beaching along shoreline.

Photograph 2: Upstream Face, 2020 – localized areas of erosion and beaching along shoreline.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 3: Upstream Face, 2013 – slope surface erosion midway up the western half of upstream face.

Photograph 4: Upstream Face, 2020 – slope surface with no erosion midway up the western half of upstream face.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 5: Upstream Face, 2013 – slope surface erosion midway up the western half of upstream face.

Photograph 6: Upstream Face, 2020 – slope surface with no erosion midway up the western half of upstream face.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 7: Upstream Face, 2013 – surface erosion around valve box.

Photograph 8: Upstream Face, 2020 – surface erosion decreased around valve box.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 9: Upstream Face, 2020 – erosion at left groin from foot traffic and surface water runoff.

Photograph 10: Downstream Face, 2020 – general conditions as viewed from right abutment.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 11: Downstream Face, 2020 – typical surface erosion observed along the left abutment.

Photograph 12: Downstream Face, 2020 – surface erosion observed on the right abutment between benches.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 13: Downstream Face, 2020 – debris at the abutment of a bench that could obstruct the path of stormwater flow and lead to surficial erosion on the slope downstream.

Photograph 14: Downstream Face, 2020 – vegetation along the right and left abutments have begun encroaching on the groin, slopes, and benches again.

Photograph 15: Downstream Face, 2014 – sediment and debris accumulated at the end of the concrete channel, partially obstructing the drop inlet at this location on the right abutment.

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Photograph 16: Downstream Face, 2020 – the drop inlet on the right abutment was generally clear of sediment and debris.

Geosyntec consultants

PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 17: Downstream Face, 2020 – concrete channel eroding underneath on left abutment.

Photograph 18: Downstream Face, 2020 – wet surface area found between downstream benches.

Photograph 19: Downstream Face, 2020 – clogged interceptor drain with low flow.

Photograph 20: Downstream Face, 2020 – heavy vegetative growth surrounding drainage channel from the downstream face.

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PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 21: Downstream Face, 2020 – overview of downstream face in good condition.

Photograph 22: Tail Water Creek, 2020 – view of the low-level outlet concrete stilling basin discharge to the tailwater creek.

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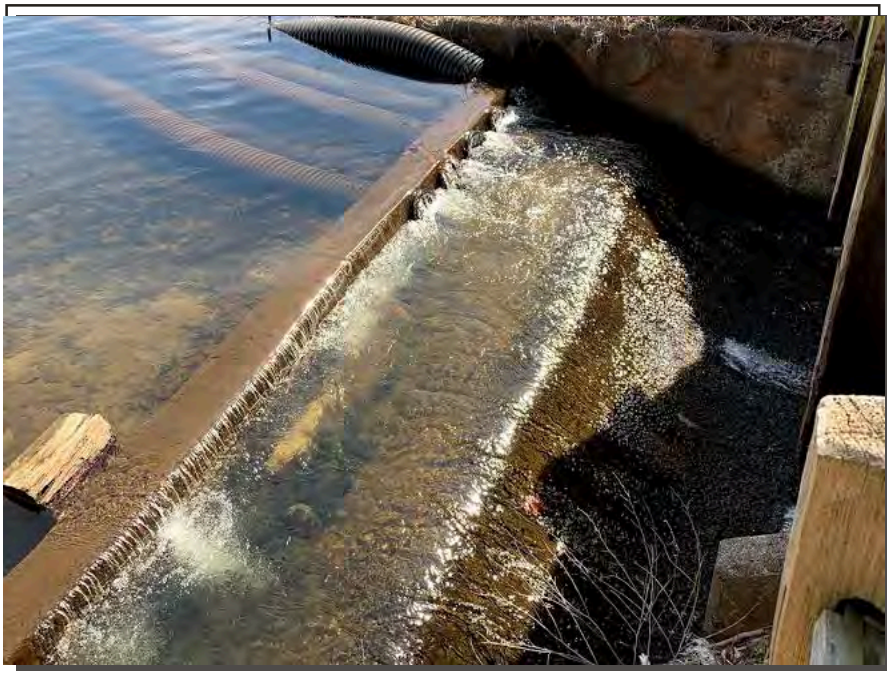
PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp



Photograph 23: Spillway, 2020 – general view of spillway crest and siphons with moderate flow during observation.

Photograph 24: Spillway, 2020 – general view of stepped spillway with moderate flow, and tree limbs and debris noted during inspection.

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PHOTOGRAPH LOG

PROJECT NAME: March 2020 Lake Petit Dam Visual Assessment	PROJECT NO.: TN7237
CLIENT: Big Canoe Property Owners Association	FILE NAME: Mar 2020 Dam Insp

Photograph 25: Spillway, 2020 – general view of broken area on the side of the spillway with moderate flow during observation.

Photograph 26: Spillway, 2020 – general view of cracking on the sides of the spillway near tree roots.

APPENDIX C
Upstream Erosion Mitigation Measures

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5 March 2013

Mr. Thomas Woosey
Georgia Department of Natural Resources
Environmental Protection Division
Safe Dams Program
4244 International Parkway, Suite 110
Atlanta, Georgia 30354

Subject: Lake Petit Dam Erosion Mitigation Measures, Pickens County

Dear Mr. Woosey,

On behalf of the Big Canoe Property Owner's Association (POA), Geosyntec Consultants, Inc. (Geosyntec) has prepared this brief letter in response to erosion concerns cited in the Georgia Environmental Protection Division's (GA EPD) Safe Dam Program inspection report dated 3 April 2008. This letter details the proposed engineering resolution to mitigate the shore erosion observed on the upstream side of the Late Petit Dam for Safe Dams concurrence.

BACKGROUND

In an annual inspection report GA EPD Safe Dams Program cited specific concern regarding "significant erosion at the waterline. [That] appears to have worsened and should be addressed by an Engineer of Record (EOR)," on the upstream face of the Lake Petit Dam. Geosyntec Consultants performed a site inspection in May 2008 and reported observing minor erosion and displacement of riprap along portions of the shoreline that was likely aggravated due to unusually low lake levels, associated with drought conditions, combined with wave action within the reservoir (Figure 1). Observations from a recent site visit on 14 December 2012, while the reservoir water level was low, indicate that the erosion has not significantly increased since 2008, but should be repaired (Figures 2 and 3).

To rectify this situation, the POA proposes placing additional riprap in the affected area and re-vegetating areas around the affected zones. The remainder of this letter presents a plan indicating the extent of areas to be improved and general recommendations.

SITE CONDITIONS

Riprap sizing at Lake Petit is primarily dependent on water velocity and wave height. The water velocity for this lake is considered negligible. Additionally, Lake Petit is a no-motor, private lake in which the maximum water craft speed is 5 mph; therefore, the wave height generated due to water traffic is negligible. However, wave height due to wind shall be considered in the design.

According to historical data, the maximum sustained wind velocity is 23 miles per hour (mph) and the maximum gust speed is 34 mph. Lake Petit is estimated to be 40-50 feet deep on average and nearly 80 feet deep near the dam, with a maximum possible fetch of 3,500 feet across the extent of the lake. Based on recommended methods presented in the United States Army Corps of Engineers (USACE) Coastal Engineering Manual[1] a maximum wave height of approximately 1 ft is anticipated at the shore.

The upstream side of the dam was constructed on approximately a 3.5H:1V slope with the existing riprap protection extending the length of the dam until terminating at wooded areas on both ends. Existing riprap is observed to range from roughly 0.5- to 2.5-ft in diameter and is placed as a relatively narrow strip at the normal lake level. Consequently, the area is subject to "beaching", aggravated during periods of reduced lake levels when waves act on lower and less protected portions of the shore.

EROSION MITIGATION PLAN

Geosyntec recommend placing a graded riprap revetment at the upstream toe of Lake Petit Dam to mitigate erosion. In consideration of site conditions (i.e., wave height, run-up, existing riprap, etc) the revetment shall generally extend at least three (3) ft above and five (5) ft below the normal pool elevation (evident by the grass line). Additionally, the revetment shall extend laterally to the adjacent woods on both the east and west ends to the extent practical. The riprap shall generally be placed in a 1.5-ft thick (min) layer requiring approximately 420 cubic yards of stone. All stones shall be contained reasonably well within the riprap layer thickness and be well-graded according to the following specifications.

Prior to placement of riprap for the revetment, a 4- to 6-in. thick bedding layer of No.4 stone will be placed around the existing stone to both reduce the potential for soil erosion and piping

[1] USACE, "*Coastal Engineering Manual*", United States Army Corps of Engineers, EM 1110-2-1100, Washington, D.C., 2008.

beneath the revetment. Generally following the guidance set forth by the USACE[2], the riprap gradation shall be as follows:

- median riprap particle size (D_{50}) shall be 0.5- to 1.0-ft;
- maximum riprap size (D_{100}) shall generally be two (2) times the median size and shall not exceed four (4) times the median size; and
- the D_{15} riprap size shall generally be 0.4 times the median size.

Minor variations to this riprap gradation are acceptable at the discretion of the Engineer of Record.

Construction of the revetment shall generally proceed by offloading material and carefully placing it from bottom to top and in accordance with the specifications outlined above. Vegetation will be re-established in any areas along the dam that are disturbed due to the wave action and during the field work. Work is planned to be conducted with the EOR (or designee) present for Construction Quality Assurance. A brief report will be issued detailing construction and documenting as-built conditions following completion of the project. This report will then be issued to the Safe Dams Program following receipt of the POA's approval.

CONCLUSION

To mitigate erosion observed on the upstream side of the Late Petit Dam, a graded riprap revetment is proposed. This system will armor the shore against light wave action characteristic of the site. A revetment will act as a flexible system, adjusting over time, and is also a means of shore protection that minimizes wave reflection, thus reducing the likelihood of causing erosion on a facing shore line. Furthermore, these mitigation measures should be compatible with, and enhance the existing site conditions.

The Big Canoe POA intends to initiate work in late 2013 and would appreciate it if you would confirm your concurrence with our recommended work plan and suggested path forward.

[2] USACE, "*Design of Coastal Revetments, Seawalls, and Bulkheads Engineering Manual*", United States Army Corps of Engineers, EM 1110-2-1614, Washington, D.C., 1995.

Sincerely,

Sarah B. Fick, E.I.T.
Engineer
Geosyntec Consultants, Inc.

R. Neil Davies, C.Eng., MICE, P.E.
Managing Principal
Geosyntec Consultants, Inc.

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ATTACHMENT A

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Figure 1: Lake Petit Dam extent of area where minor "beaching" erosion has been observed and is to be mitigated.

Figure 2: Looking east at minor "beaching" erosion at high lake level in 2008 (left) and low lake level in 2012 (right).

Figure 3: Looking west at minor "beaching" erosion at high lake level in 2008 (left) and low lake level in 2012 (right).

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Figure 4: Existing riprap representative of largest size.