

January 29, 2021

**Revised February 18, 2021**

Mr. Robert Burke  
Energy Transfer  
1300 Main Street  
Houston, TX 77002

RE: Geotechnical Follow-Up to Geophysical Survey  
Sunoco Pipeline, LP Pipeline Project  
Horizontal Directional Drill S3-0360 Biddle Drive  
Uwchlan Township, Chester County, Pennsylvania  
RETTEW Project No. 096303002

Dear Rob:

As described in our December 9, 2020 report, RETTEW Associates, Inc. completed a multi-technique geophysical survey at the S3-0360 Biddle Drive horizontal directional drill (HDD) site (see **Figure 1**). The purpose of the survey was to detect and delineate fractures, soft zones, or subsurface voids that could potentially contribute to possible earth features at the site or could act as preferred pathways for water flow prior to the proposed 20-inch HDD Drill. A coincident survey was completed on the east or downstream end of the HDD in January of 2020 following drilling of the 16-inch HDD. The results of this survey were presented in a report dated February 27, 2020.

Based on the December 9, 2020 report results, RETTEW recommended follow-up geotechnical borings. The figures from the December 9, 2020 report have been revised to show the locations of the follow-up borings, and all previous borings that fall within the geophysical survey areas (see **Figures 2, 7A, 7B**). In addition, a schematic log for each boring that falls within the survey limits has been projected onto the closest seismic or electrical profile (see **Figures 4A, 4B, 5A, 5B, 6**). The borings completed at the site to date are listed below:

Label	Reported By	Date Drilled	Lon	Lat	East	North	Station
			WGS-84		PA SPG feet		feet (approx.)
S3_0360_AP_A1	PSI	1/4/2021	-75.636860	40.039880	2560114	264464	1507850
S3_0360_AP_B1	PSI	1/5/2021	-75.636500	40.039560	2560217	264349	1508004
360A	PSI	6/10/2020	-75.636210	40.039069	2560303	264173	1508182
360B	PSI	6/10/2020	-75.636020	40.039127	2560356	264195	1508211
B6-9E	Terracon	10/13/2017	-75.643658	40.044422	2558171	266072	1505325
B6-4W	Terracon	10/13/2017	-75.636034	40.038964	2560353	264136	1508247
OW-1	Tetra Tech	6/21/2017	-75.636502	40.038798	2560224	264072	1508194
S3-0350_SB-04	Tetra Tech	1/22/2016	-75.643761	40.044528	2558142	266110	1505277
S3-0360_SB-01	Tetra Tech	6/17/2015	-75.640288	40.042278	2559133	265314	1506552
S3-0360_SB-03	Tetra Tech	6/14/2015	-75.635947	40.038873	2560378	264103	1508288
S3-0360_SB-02	Tetra Tech	6/13/2015	-75.637599	40.040638	2559900	264735	1507513



The recent borings generally encountered material that became more competent with depth – e.g. increasing Standard Penetration Test (SPT) N values – with no evidence of voids or soft zones working their way up from the HDD. Boring S3\_0360\_AP\_A1 encountered material with low N (<10) in the top 12 feet, providing a satisfactory explanation for the gravity anomaly for which it was located to proof. Boring S3\_0360\_AP\_B1 encountered saprolite at a depth of 6 feet, and highly-weathered phyllite bedrock at 10 feet. This boring was shifted from the originally-intended location to avoid an elevated sand mound septic system. That mound may be the source of the gravity anomaly in both the December (Fall) 2020 and February (Spring) 2020 data (see **Figures 7A and 7B**, respectively).

On **Figure 4B**, for Boring S3\_0360\_AP\_A1, the 5,000 feet per second (fps) P-wave velocity contour matches closely with the top of rock. The top of rock in Boring S3\_0360\_AP\_B1 is significantly above the 5,000 fps contour, suggesting that the boring may have encountered a float block or erosional remnant in the overburden. A similar float block was drilled-through in previous Boring B6-4W.

On **Figure 6**, the residuum-saprolite contact in Boring S3\_0360\_AP\_A1 matches closely with a sharp increase in resistivity (near the 1,000 Ohm-meter contour). Since resistivity is typically dominated by moisture content, this may be the result of the saprolite being more compacted (less porous).

In summary, the borings are consistent with the geophysics, and detected no features requiring further investigation or mitigation.



Timothy D. Bechtel, PhD, PG  
Senior Project Manager



Felicia Kegel Bechtel, MSc, PG  
Director of Geophysics

#### Enclosures

- Figure 1: Topographic Basemap – Fall 2020
- Figure 2: Data Coverage Map and Geologic Setting – Fall 2020
- Figure 3A: Residual Microgravity Results – Upstream (West) End – Fall 2020
- Figure 3B: Residual Microgravity Results – Downstream (East) End – Fall 2020
- Figure 4A: Seismic Refraction Profiles – Upstream (West) End – Fall 2020
- Figure 4B: Seismic Refraction Profiles – Downstream (East) End – Fall 2020
- Figure 5A: Seismic MASW Survey Profiles – Upstream (West) End – Fall 2020
- Figure 5B: Seismic MASW Survey Profiles – Downstream (East) End – Fall 2020
- Figure 6: Electrical Resistivity Survey Profiles – Fall 2020
- Figure 7A: Geophysical Survey Results Summary – December (Fall) 2020
- Figure 7B: Geophysical Survey Results Summary – February (Spring) 2020