610-692-7171
www.eastgoshen.org

BOARD OF SUPERVISORS

EAST GOSHEN TOWNSHIP
CHESTER COUNTY
1580 PAOLI PIKE, WEST CHESTER, PA 19380-6199

August 14, 2019

Dear Resident:

As you are aware, Sunoco/Energy Transfer is undertaking a project to install two pipelines through East Goshen Township. The pipelines will run from the intersection of Boot Road & Greenhill Road, south along Boot Road to its intersection with North Chester Road, then south along North Chester Road to the township boundary at Manley Road.

The two pipelines are being installed by a process known as horizontal directional drilling (HDD). Under this process, a pilot bore hole is drilled through the ground from one location to another. The pilot bore hole is then reamed out to the appropriate size. Once this is completed, the actual pipeline is pulled through the bore hole. This is called the "pullback" phase.

East Goshen Township has a noise ordinance which limits construction from 7 am to 10 pm. Energy Transfer is requesting a permit to have their contractor work around the clock during the pullback phase. The pullbacks are expected to last for one to two days depending on the length of the pipeline being installed.

I have enclosed a copy of the request from Energy Transfer which details the technical and safety needs for a continuous pullback for your review.

The Board of Supervisors will hold a public meeting on September 19, 2019, at 7 pm at Fugett Middle School Auditorium to receive public comment on this request.

Sincerely,

Rick

Louis F. Smith, Jr.
Township Manager

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ENERGY TRANSFER

Rick Smith
Township Manager
East Goshen Township
1580 Paoli Pike
West Chester, PA 19380

July 19, 2019

Dear Rick,

In relation to the Mariner East 2 project within East Goshen Township, ETC would like to begin planning for our pipeline pullback activities in East Goshen for the five horizontal directional drills (HDDs) currently underway. For the pullback phase only, we are requesting a waiver from East Goshen Township's Ordinance 156-5, Limitation on Hours of Construction Activities for the horizontal directional drills discussed below.

The pullback stage of the pipe installation consists of pulling the prefabricated pipe sections through the drilled borehole from the exit point back to the drill rig entry point.

To increase the chances for a successful installation, a continuous pullback operation is industry standard practice. A continuous pullback provides the highest likelihood for a success, and limits the factors that could lead to a pullback failure and possible requirement to re-drill. Due to limited workspace for pipeline pull section layout on the exit side, the pull section cannot be fabricated in one long continuous segment, but rather will require numerous mid-welds during pullback. Pullback operations are further complicated by the restrictive work hours under the township's ordinance. Any time pullback operations are stopped for extended periods, there is a risk that it will not be possible to get the pipe moving again due to unstable materials collecting around the wall of the pull section.

Since pullback activities for the drills detailed below will require East Goshen Township to grant waivers to the townships' noise ordinances, there are several factors that will determine the duration of the continuous pullback activities. Please note that the schedule and duration may change due to outside factors, including but not limited to the condition of the bore-hole or weather.

The details of the HDD segments that require continuous pullback are listed in order of anticipated pullback date:

HDD 460 (16-inch and 20-inch pipelines)

- **Location:** Drill staged at Goshen Fire Company in West Goshen Township to the pipe work space at Wellington/ Giant Shopping Center on Boot Rd.
  Description and length: This segment is a candidate for dual pipe pull, which allows for both the 16-inch and 20-inch pipelines to be installed simultaneously. If for any reason we are unable to perform a dual pipe pull, the contractor will install the 16-inch only and then begin the HDD for the 20-inch pipeline at a later date. This HDD segment has 6 mid- welds for both the 16-inch and 20-inch sections with an approximate length of 3391 feet.
- **Approximate date for pullback:** Targeting early October 2019
- **Approximate pullback duration:** It is estimated that the duration for pullback with 24/7 continuous work hours will be 40-44 hours. Without continuous pullback, the process will take 5-6 days, barring loss of bore hole integrity or changes in weather conditions. In the case where we are unable to complete a successful pullback due to non-continuous pull and/or loss of the borehole, we must restart the HDD process all over again, which is estimated to take 174 days for the dual pull of the 16-inch and 20-inch pipelines for this section.

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HDD 490 (16-inch and 20-inch pipelines)

- **Location:** Drill staged at New Kent Apartments to pipe work space at Goshen Executive
- **Description and Length:** This segment is a candidate for dual pipe pull, which allows for both the 16-inch and 20-inch pipelines to be installed simultaneously. If for any reason we are unable to perform a dual pipe pull, the contractor will install the 16-inch only and then begin the HDD for the 20-inch pipeline at a later date. This HDD segment has 5 mid-welds for both the 16-inch and 20-inch sections with an approximate length of 2970 feet.
- **Approximate date for pullback:** Targeting mid-December 2019
- **Timeline for pullback:** It is estimated that the duration for pullback with 24/7 continuous work will be 32-36 hours. Without continuous pullback, the process will take 4-5 days, barring loss of bore hole integrity or changes in weather conditions. In the case where we are unable to complete a successful pullback due to non-continuous pull and/or loss of the borehole, we must restart the HDD process all over again, which is estimated to take 157 days for the dual pull of the 16-inch and 20-inch pipelines for this section.

HDD 521 (16-inch and 20-inch pipelines)

- **Location:** Drill staged at West Chester Pike/ St. Simon and Jude Parish in Westtown Township to the pipe work space at Bow Tree Dr.
- **Description and length:** This drill segment is a combination of HDD 520 and HDD 530. This segment is a candidate for dual pipe pull, which allows for both the 16-inch and 20-inch pipelines to be installed simultaneously. If for any reason we are unable to perform a dual pipe pull, the contractor will install the 16-inch only and then begin the HDD for the 20-inch pipeline at a later date. This HDD segment has 4 mid-welds for both the 16-inch and 20-inch sections with an approximate length of 6943 feet.
- **Approximate date for pullback**: Targeting December 2019
- **Approximate pullback duration:** It is estimated that the duration for pullback with 24/7 continuous work will be 33-37 hours. Without continuous pullback, the process will take 5 to 6 days, barring loss of bore hole integrity or changes in weather conditions. In the case where we are unable to complete a successful pullback due to non-continuous pull and/or loss of the borehole, we must restart the HDD process all over again, which is estimated to take 198 days for the dual pull of the 16-inch and 20-inch pipelines for this section.

HDD 471 (20 -inch pipeline only; 16-inch pipeline has been installed)

- **Location:** Drill staged at Village Square Dr. to pipe work space at Goshen Executive
- **Description and Length:** This HDD segment is 3730 feet in length.
- **Approximate date for pullback:** Targeting mid-April 2020
- **Timeline for pullback**: This HDD segment is currently under review from the PA DEP. We will provide a timeline when DEP approval is received. This HDD segment is estimated to take 145 days to complete.

HDD 461 (20 -inch pipeline only; 16-inch pipeline has been installed)

- **Location:** Drill staged at Village Square Dr. to pipe work space at Carriage Dr.
- **Description and length:** This HDD segment is 882 feet in length.
- **Approximate date for pullback:** June 2020
- **Timeline for pullback:** This HDD segment is estimated to take 42 days to complete.

HDD 500 (20-inch pipeline only; 16-inch pipeline has been installed)

- **Location:** Drill staged at New Kent Apartments to pipe work space near Bow Tree Rd.
- **Description and length:** 2140 feet in length
- **Approximate date for pullback:** TBD
- **Timeline for pullback:** This HDD segment is currently under review from the PA DEP. We will provide a timeline when DEP approval is received. This HDD segment is estimated to take 94 days to complete.

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In anticipation of continuous pullback activities, we will work with the township to identify, notify and offer temporary lodging to neighbors close to the entry and exit points where the work will take place for the duration of the overnight work. All Occupational Safety and Health Administration must be followed; however, we can take certain measures to mitigate noise. Additionally, lighting will be directed away from residences in all drill entry and exit locations during non-daylight work.

I have attached the letter written by Professor Samuel T. Ariaratnam, Ph.D., P. E., P.Eng., F.ASCE., an independent expert on horizontal directional drills, on the need for uninterrupted pullback activities during this critical stage of pipeline installation.

I thank you for your time and consideration.

Sincerely,

Ronald Cummings
Project Manager, Energy Transfer
3807 West Chester Pike
Newtown Square, PA 19073

Ariaratnam Enterprises, Inc.
13663 E. Geronimo Road
Scottsdale, AZ 85259
480-236-5085

July 19, 2019

Rick Smith
Township Manager
East Goshen Township
1580 Paoli Pike
West Chester, PA 19380

Subject: Request for Ordinance Variance during Pipeline Pullback Operations for the Sunoco Pipeline, L.P. Mariner East 2 Project in East Goshen Township, Chester County.

Dear Mr. Smith:

I was asked to write this letter on behalf of Sunoco Pipeline, L.P. (SPLP) regarding a request for ordinance variation to facilitate continuous construction activity during the pullback segments installed by Horizontal Directional Drilling (HDD).

My name is Dr. Samuel T. Ariaratnam. I am a Professor and Construction Engineering Program Chair in the Ira A. Fulton Schools of Engineering at Arizona State University. For the past twenty-two (22) years, I have been involved in education and research in HDD. I am currently assisting SPLP in various technical aspects regarding HDD operations on the Mariner East 2 pipeline projects. I regularly deliver industry courses on "HDD Good Practices" and am active in numerous industry professional associations serving in leadership positions with the American Society of Civil Engineers Pipelines Division (Chairman); International Society for Trenchless Technology (Past Chairman); and Distribution Contractors Association (HDD Committee). I am a co-author of the "Horizontal Directional Drilling Good Practices Guidelines", which had its 4th Edition released in March 2017.

HDD is a trenchless construction method capable of installing a wide range of underground utilities including water, wastewater, telecommunication, electrical, natural gas, and petroleum products with minimal disruption to surface activities. Installation of product pipe using HDD is performed in two or three stages. The main two stages are the "pilot bore" and the "pullback". A middle stage, called the pre-ream, involves pullback of a reamer (without product pipe) to gradually enlarge the pilot bore in several passes. Pre-reaming is typically performed for installations involving installation of larger pipes, generally 12-inch (300mm) or larger. The HDD rig provides the torque, thrust, and pullback force required to drive the drill string. The drill drive assembly resides on a carriage that travels under hydraulic power along the frame of the drill rig. During the pilot bore, the drill string is launched from the surface and the pilot bore proceeds downward at an angle until the required depth is reached. Then, the path of the bore is gradually brought to the horizontal and the bore head is steered to the designated exit point where it is brought to the surface along a curved bore path. A directional monitoring device, located near the head of the drill string, is used to track the position of the drill head.

After the pilot string breaks the surface at the exit location, the bit is removed from the drill string and replaced with a reamer. As a rule of thumb, the final reamer is sized at 1.5 times the outside diameter of the product pipe up to 24-inch (600mm) as is followed by SPLP. For product pipe larger than 24-inch (600mm), the reamer would be the outside diameter plus 12-inch (300mm). The pilot hole is then reamed, enlarging the hole to the desired diameter while simultaneously pulling back the product pipe behind the reamer. During the boring process, drilling fluid is injected under pressure ahead of the advancing bit. Drilling fluid is composed of a carrier fluid (typically water) and solids (clay or polymer). On the Mariner East 2 project, SPLP is using water, non-toxic bentonite clay and PADEP-approved additives. The carrier fluid carries the solids down the borehole creating a "mud cake" along the perimeter of the borehole, thereby stabilizing the borehole and reducing friction during the pullback operation. Drilling fluids also function as coolant for the electronics at the drill head, suspension and transport of drill cuttings to the surface, and to reduce the shear strength of the soil to enable easier displacement during the pullback operation. During the drilling process, the bore path is tracked by interpreting signals sent by electronic sensors located near the drill head. At any stage along the drilling path, the operator may obtain information regarding the position, depth, and orientation of the drilling tool, therefore allowing the navigation of the drill head to its target. SPLP follows these best industry practices in the HDD installation process for the Mariner East 2 project, by using these electronic sensors in tracking the drilling head using this equipment.

Longer pipeline installations and/or those requiring pre-welding of smaller pipe sections due to space restrictions, generally require pullback times that exceed normal working hours. It is not prudent industry practice to cease a pullback operation once it has commenced. As outlined in relevant industry literature including the "Horizontal Directional Drilling Good Practices Guidelines, 4th Edition", *"pullback should be completed without interruption, to reduce the risk of bore collapse and becoming stuck in the bore"* (Bennett and Ariaratnam, 2017). The HDD Guidelines further state that, *"delays in pullback can result in over-stressing the pipe, or a failed pullback attempt."* Failure to complete pullback in a continuous operation results in a high risk to the completion of a pipeline. Drilling fluid used in the HDD operations has thixotropic properties, which means that it begins to solidify once it stops moving (i.e. flowing) through the borehole (Ariaratnam and Beljan, 2005). If pullback is stopped mid-installation, the drilling fluid set up (or solidifies) around the pipeline and increases in shear strength over time. Therefore, continuous operation is of utmost importance when pullback is performed.

I hope that this letter provides you with pertinent information to grant ordinance variance during pipeline pullback operations for SPLP. If you have any questions, please do not hesitate to contact me at (480) 236-5085 (M) or sariaratnam@yahoo.com.

Cordially yours,

Samuel T. Ariaratnam, Ph.D., P. E., P.Eng., F.ASCE
President, Ariaratnam Enterprises, Inc.

REFERENCES

Ariaratnam, S.T. and I.J. Beljan (2005), â€œPost-Construction Evaluation of HDD Installationsâ€, Practice Periodical on Structural Design and Construction, ASCE, May, Vol. 10, No. 2, pp. 115-126.

Bennett, R.D., and S.T. Ariaratnam (2017), Horizontal Directional Drilling Good Practices Guidelines 4th Edition, NASTT, Cleveland, OH, ISBN 1-928984-17-7, 300 pp.