Downstream Strategies
building capacity for sustainability
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Scope of Work for Water Sampling

To: [redacted]

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Downstream Strategies herein presents our approach to conduct baseline and post-construction water quality monitoring at five residential drinking water wells in Montgomery County, Virginia approximately three miles north of Blacksburg. Sample collection will be performed by Downstream Strategies staff in accordance with established standard operating procedures, which include a quality assurance/quality control program. Samples will be analyzed by an independent laboratory certified in Virginia.

The proposed monitoring shall consist of two monitoring events at each residential well prior to pipeline construction to establish baseline water quality data. Samples collected during the initial sampling event will be analyzed for the "comprehensive" suite of analytes (see Table 1 below). A second sampling event will occur three to four months following the initial collection event and prior to pipeline construction and will demonstrate changes in water quality that have occurred since the time of initial sample collection. Samples collected during the second sampling event will be analyzed for the "basic" list of analytes as described in Table 1. below.

We recommend that each landowner measures conductivity with a handheld meter routinely—at least once per week—in the time in between collection of both samples and following the second collection event. Ideally, conductivity monitoring could begin as soon as possible to improve the data set over time. Additionally, qualitative observations (color, odor, clarity, sediment, quantity…) should be routinely documented.

The following sections describe the proposed baseline monitoring sampling approach, analytical suite, and a cost estimate. The same procedures will be followed at both the initial and follow-up sampling events.

Interview. Staff will interview the landowners about the water resources and current/historical conditions on their property.

Well water quality sampling. Downstream Strategies will perform field monitoring for water quality indicator parameters and collect water samples in clean bottles provided by the laboratory. These

bottles will be transported to the laboratory within appropriate holding times and using approved methods. Chain of custody procedures will be utilized. Samples will be analyzed for the parameters listed in Table 1 below by a lab certified in Virginia.

Quality assurance/quality control:
Field blank***.*** One field blank will be collected for quality assurance/quality control during each sampling event—one per sampling day. A field blank involves following the same protocols as collecting real samples in the field, but instead of filling bottles with well water, we will fill the bottles with analyte-free water provided by the laboratory. These bottles are returned blind to the lab with the other samples and analyzed for total metals. Field blanks can help confirm the effectiveness of sample collection procedures and indicate the potential for sample contamination.

Duplicate. One duplicate sample will be collected on each day of sampling. To prepare a duplicate sample, a second sample will be prepared using well water at one site and following the same procedures as used for the original sample. The duplicate will be submitted blind to the laboratory and will provide information about the replicability of sampling procedures.

Trip blank. We will collect a single trip blank for quality assurance/quality control during each sampling event. Trip blanks are filled and provided by the laboratory and remain with the field samples and bottleware at all times. Trip blanks are used to determine whether contamination has occurred from the time the sample containers leave the laboratory until the time they are returned. Trip blanks are only analyzed for a select set of parameters known generally as volatiles.

Results. At the completion of each sampling event, results will be compiled into a concise summary report for each property owner presenting field documentation, equipment calibration, and lab results. Reports will include a summary table comparing sampling results with federal and state water quality standards, as applicable. We will also further discuss results with the client over the phone or at the Downstream Strategies office in Morgantown or Alderson, West Virginia.

Project team. Two qualified Downstream Strategies staff will perform the water quality monitoring. Principal Marc Glass will oversee the project and participate in the discussion of results.

Timeline. After sampling is conducted, it will take approximately twenty business days to produce the final report; the exact timeline will depend on when lab results are provided to Downstream Strategies.

Estimated Budget

The budget includes all labor, laboratory fees including QA/QC samples, travel costs, and expenses incurred by Downstream Strategies to perform the two proposed monitoring events. This labor includes coordination with landowners, preparation with the lab, calibration of field equipment, travel, field sample and site data collection, delivery of bottles to the lab courier, preparation of reports, and a discussion of results with client. The budget also includes quality assurance/quality control procedures (see above section).

Estimated budget per landowner for two sampling events at each landowner's drinking water well: $2,700.

This cost estimate assumes landowners will provide Downstream Strategies with property access agreements and contact information so we can efficiently plan for logistics in advance of each sampling

event. Additionally, if sample collection requires more than one day due to unforeseen circumstances or the total number of samples (landowners) changes the budget will need to be adjusted accordingly.

Due to laboratory costs incurred, we request a retainer. Should you wish to proceed, Downstream Strategies requests that we execute a standard contract for services and receive payment for the project retainer at or prior to the first sampling event.

Should you wish to discuss or if you require further assistance, please do not hesitate to contact Marc Glass at (304) 292-2450 or Meghan Betcher at (304) 445-7200.

Table 1: Analytical program

		Basic	Comprehensive
Meter measurements	pH	X	X
	Specific conductivity	X	X
	Temperature	X	X
	Total dissolved solids	X	X
	Turbidity	X	X
General chemistry	Hardness		X
	Total dissolved solids	X	X
Major ions	Chloride	X	X
	Sulfate	X	X
Nutrients and biologicals	Nitrate		X
	Total coliform	X	X
Metals	Aluminum		X
	Antimony		X
	Arsenic	X	X
	Barium		X
	Beryllium		X
	Cadmium		X
	Chromium	X	X
	Copper	X	X
	Iron	X	X
	Lead	X	X
	Manganese	X	X
	Mercury	X	X
	Nickel		X
	Potassium	X	X
	Selenium	X	X
Volatile organic compounds	Acrylonitrile Benzene Ethylbenzene m,p-Xylene Methyl tert-butyl ether o-Xylene tert-Butyl alcohol Toluene Xylenes, Total		X

		Basic	Comprehensive
Semi-volatile organic compounds	2-Chloronaphthalene 2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Chrysene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Naphthalene Phenanthrene Pyrene		X
BTEX		X	
Pesticides			X
Herbicides			X
Explosives			X
Explosives with MS			
Petroleum Hydrocarbons	Oil and Grease		
	Total Petroleum Hydrocarbons DRO/ORO		
	Total Petroleum Hydrocarbons GRO		
Total cost (analytical cost only)		**$160**	**$700**