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Watercourse ID and Crossing Number[1]	Watercourse Name	Milepost[2]	Latitude	Longitude	Primary Pipeline Crossing Method[3]	Secondary Pipeline Crossing Method[3]	Tertiary Pipeline Crossing Method[3]	Geology Constraints	Topography Constraints	Insufficient Workspace to Stage Trenchless	Practicality	Other (See Justification)	Implementing Trenchless Technology	Routing to Minimize	Crossing at Narrowest Location	Co-Locating	Reducing LOD	Minimizing Construction Duration	Adhering to Construction Timing Windows	Implementing BMPs	Justification
102114_JC_1001_P_MI	UNT to Black Creek	26.6	41.083979	-75.661245	DPX	FX	CD		X						X	X	X	X	X	X	Large wetland complex may challenge trenchless construction methods. Terrian issues justify open cut. Workspace reduced to 75' in stream and floodway. Existing route not conducive to trenchless methods.
042415_JC_1006_E_MI - 1	UNT to Hawk Run	30.4R2	41.041447	-75.626875	N/A	N/A	N/A				X	X				X	X	X	X	X	Workspace reduced to 75' in stream and floodway.
042415_JC_1006_E_MI - 2	UNT to Hawk Run	30.5R2	41.040321	-75.62667	N/A	N/A	N/A				X	X				X	X	X	X	X	Workspace reduced to 75' in stream and floodway.
042415_JC_1004_P_MI	UNT to Laurel Run	31.2R2	41.030532	-75.624535	DPX	FX	CD	X		X		X			X	X	X	X	X	X	Geology indicates cobble - not conducive to HDD, Direct Pipe, nor Microtunnel.
042415_JC_1002_P_IN - 1	UNT to Laurel Run	31.2R2	41.030393	-75.624569	N/A	N/A	N/A	X		X		X				X	X	X	X	X	Geology indicates cobble - not conducive to HDD, Direct Pipe, nor Microtunnel. Workspace reduced to 75' in stream, floodway, and riparian buffer.
042415_JC_1002_P_IN - 2	UNT to Laurel Run	31.2R2	41.029996	-75.624423	DPX	FX	CD	X		X		X				X	X	X	X	X	Geology indicates cobble - not conducive to HDD, Direct Pipe, nor Microtunnel. Workspace reduced to 75' in stream, floodway, and riparian buffer.
042415_JC_1005_D_MI	UNT to Laurel Run	31.2R2	41.030333	-75.62434	N/A	N/A	N/A				X	X			X	X	X	X	X	X	Workspace reduced to 75' in stream, floodway, and riparian buffer.
110316_GM_1004_I_MI	UNT to Mud Run	32.9R3	41.007813	-75.614905	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Workspace reduced to 75' in stream. Stream can be crossed in less than 24 hours.
110316_GM_1003_I_MI	UNT to Mud Run	32.8R3	41.009027	-75.615306	DPX	FX	DX-NF				X	X				X	X	X	X	X	Workspace reduced to 75' in stream. Time to cross justifies open cut.

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Watercourse ID and Crossing Number[1]	Watercourse Name	Milepost[2]	Latitude	Longitude	Primary Pipeline Crossing Method[3]	Secondary Pipeline Crossing Method[3]	Tertiary Pipeline Crossing Method[3]	Geology Constraints	Topography Constraints	Insufficient Workspace to Stage Trenchless	Practicality	Other (See Justification)	Implementing Trenchless Technology	Routing to Minimize	Crossing at Narrowest Location	Co-Locating	Reducing LOD	Minimizing Construction Duration	Adhering to Construction Timing Windows	Implementing BMPs	Justification
042115_JC_1001_P_IN	Mud Run	33.2R3	41.00281	-75.613321	DPX	FX	CD	X	X						X	X	X	X	X	X	Geotech presents challenges to trenchless methods (HDD, Direct Pipe and Microtunnel). North side of the crossing indicate low RQD bedrock material. Heavily weathered, joined, fractured and fissured bedrock was found. Cannot bore due to steep slope on the north side of crossing (37%). Workspace reduced to 75' in stream, floodway, and riparian buffer (Mud Run).
042115_JC_1002_P_MI	UNT to Mud Run	33.2R3	41.002554	-75.613245	DPX	FX	CD	X	X						X	X	X	X	X	X	Geotech presents challenges to trenchless methods (HDD, Direct Pipe and Microtunnel). North side of the crossing indicate low RQD bedrock material. Heavily weathered, joined, fractured and fissured bedrock was found. Cannot bore due to steep slope on the north side of crossing (37%). Workspace reduced to 75' in stream, floodway, and riparian buffer (Mud Run).
042115_JC_1004_I_MI	UNT to Mud Run	33.4R3	40.999391	-75.612116	DPX	FX	DX-NF				X	X		X		X	X	X	X	X	Time to cross justifies open-cut, project is co-located with existing ROW; workspace reduced to 75' in stream.
042115_JC_1005_E_MI	UNT to Mud Run	33.5R3	40.998924	-75.611895	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Time to cross justifies open-cut, project is co-located with existing ROW; workspace reduced to 75' in stream.
042315_JC_1001_I_MI	UNT to Stony Creek	34.7R2	40.983155	-75.620034	N/A	N/A	N/A				X	X			X	X	X	X	X	X	Project is co-located with existing ROW; workspace reduced to 75' in stream.
042315_JC_1002_P_MI	UNT to Stony Creek	34.7R2	40.982071	-75.620589	DPX	FX	CD				X	X				X	X	X	X	X	Timing to cross due to the stream width being 6'.' justifies open cut. Workspace reduced to 75' in stream, floodway, riparian buffer, and abutting wetlands.
042315_JC_1003_P_IN	Stony Creek	34.8R3	40.981007	-75.621247	DPX	FX	CD				X	X			X	X	X	X	X	X	Timing to cross justifies open cut Workspace reduced to 75' in stream, floodway, riparian buffer, and abutting wetlands.

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Watercourse ID and Crossing Number[1]	Watercourse Name	Milepost[2]	Latitude	Longitude	Primary Pipeline Crossing Method[3]	Secondary Pipeline Crossing Method[3]	Tertiary Pipeline Crossing Method[3]	Geology Constraints	Topography Constraints	Insufficient Workspace to Stage Trenchless	Practicality	Other (See Justification)	Implementing Trenchless Technology	Routing to Minimize	Crossing at Narrowest Location	Co-Locating	Reducing LOD	Minimizing Construction Duration	Adhering to Construction Timing Windows	Implementing BMPs	Justification
042315_JC_1003_I_IN	UNT to Stony Creek	34.8R3	40.980784	-75.621503	N/A	N/A	N/A				X	X			X	X	X	X	X	X	Workspace reduced to 75' in stream, floodway, riparian buffer, and abutting wetlands.
060117_MB_1001_P_MI	Yellow Run	36.1	40.96248	-75.629549	DPX	FX	CD				X	X				X	X	X	X	X	Timing to cross justifies open cut. Workspace reduced to 75' in stream and floodway.
061615_DB_1001_I_MI	UNT to Wild Creek	37.5	40.943444	-75.634616	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Timing to cross justifies open cut. Workspace reduced to 75' in stream.
061615_DB_1002_P_IN	Wild Creek	38.3	40.931373	-75.634393	DPX	FX	CD		X		X					X	X	X	X	X	Steep slope north of the crossing (18%) challenges trenchless methods (HDD, Direct Pipe, Microtunnel). Workspace reduced to 75' in stream, floodway, and riparian buffer.
040517_BT_1001_E_MI	UNT to White Oak Run	41	40.903157	-75.602164	DPX	FX	DX-NF				X	X			X		X	X	X	X	Timing to cross justifies open cut due to the width being less than 3 '. Workspace reduced to 75' in stream, floodway, and riparian buffer.
091516_GM_1002_E_MI	UNT to White Oak Run	41.1	40.903093	-75.600885	DPX	FX	DX-NF				X	X			X		X	X	X	X	Timing to cross justifies open cut due to the width being 3 '. Workspace reduced to 75' in stream, floodway, and riparian buffer.
012717_GM_1002_P_MI	UNT to White Oak Run	41.2	40.903032	-75.599669	DPX	FX	CD				X	X			X		X	X	X	X	Timing to cross justifies open cut due to the width being less than 5 '. Workspace reduced to 75' in stream, floodway, and riparian buffer.
012717_GM_1003_P_MI	UNT to White Oak Run	41.2	40.902948	-75.597997	DPX	FX	CD				X	X			X		X	X	X	X	Timing to cross justifies open cut due to the width being less than 5 '. Workspace reduced to 75' in stream, floodway, and riparian buffer.
020117_GM_1002_P_MI	UNT to White Oak Run	41.3	40.902886	-75.596767	DPX	FX	CD				X	X			X		X	X	X	X	Timing to cross justifies open cut due to the width being less than 5'. Workspace reduced to 75' in stream, floodway, and riparian buffer.
020117_GM_1001_P_MI	White Oak Run	41.6	40.900797	-75.592305	DPX	FX	CD		X		X	X			X		X	X	X	X	Workspace reduced to 75; in stream; steep topography on either side of crossing is impractical for trenchless methods.

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Watercourse ID and Crossing Number[1]	Watercourse Name	Milepost[2]	Latitude	Longitude	Primary Pipeline Crossing Method[3]	Secondary Pipeline Crossing Method[3]	Tertiary Pipeline Crossing Method[3]	Geology Constraints	Topography Constraints	Insufficient Workspace to Stage Trenchless	Practicality	Other (See Justification)	Implementing Trenchless Technology	Routing to Minimize	Crossing at Narrowest Location	Co-Locating	Reducing LOD	Minimizing Construction Duration	Adhering to Construction Timing Windows	Implementing BMPs	Justification
061715_DB_1001_I_MI	UNT to Pohopoco Creek	44.2R3	40.881022	-75.549557	N/A	N/A	N/A					X	X							X	Trenchlessly crossed as part of the Pohopoco Creek HDD.
122215_DB_1001_P_MI	UNT to Pohopoco Creek	44.3R3	40.880764	-75.549161	HDD	HDD	HDD					X	X							X	Trenchlessly crossed as part of the Pohopoco Creek HDD.
041018_WA_1000_P_MI	UNT to Hunter Creek	44.8R2	40.874316	-75.544467	DPX	FX	CD		X	X	X	X			X		X	X	X	X	Steep slope on the northwest side of the crossing (25%) is impractical for trenchless methods. Adjacent residence units limit the workspace required for other trenchless construction methods. Workspace reduced to 75' in stream and floodway.
051115_JC_1002_P_MI	UNT to Hunter Creek	45R2	40.872086	-75.54174	DPX	FX	CD		X		X				X		X	X	X	X	Steep side slope south of crossing (18%) limits the use of trenchless methods. Existing route presents challenges to trenchless methods. Timing to cross justifies open cut due to its width being less than 3 '. Workspace reduced to 75' through stream and floodway.
051115_JC_1001_P_MI	UNT to Hunter Creek	45.6	40.865571	-75.537937	DPX	FX	CD		X		X				X		X	X	X	X	Slope south of the crossing (28%) present challenges to trenchless methods (HDD, Direct Pipe and Microtunnel). The elevation difference on the south side would require deep boring pits (unsafe). Timing to cross justifies open cut. Workspace reduced to 75' through stream and floodway.
041018_WA_1003_I_MI	UNT to Hunter Creek	46.3	40.858313	-75.526976	DPX	FX	DX-NF		X		X				X		X	X	X	X	Timing to cross justifies open cut; stream width at crossing is approximately 3' and can by crossed in less than 24 hours.
090914_WA_1000_P_IM	Buckwha Creek	48.1	40.837393	-75.50885	DPX	FX	CD		X		X	X			X		X	X	X	X	Workspace reduced to 75' through stream and floodway; site is impinged by steep slopes to the south and a road to the north.
041217_GM_1001_P_IN	Aquashicola Creek	49.3R3	40.824367	-75.499251	BX	BX	BX				X	X	X							X	Trenchlessly crossed as part of the Aquashicola Creek bore.
072618_WA_1010_I_MI	UNT to Aquashicola Creek	50.6R3	40.821613	-75.479982	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Time to cross justifies open cut. Workspace reduced to 75' in stream and floodway. Stream can be crossed in less than 24 hours.

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Watercourse ID and Crossing Number[1]	Watercourse Name	Milepost[2]	Latitude	Longitude	Primary Pipeline Crossing Method[3]	Secondary Pipeline Crossing Method[3]	Tertiary Pipeline Crossing Method[3]	Geology Constraints	Topography Constraints	Insufficient Workspace to Stage Trenchless	Practicality	Other (See Justification)	Implementing Trenchless Technology	Routing to Minimize	Crossing at Narrowest Location	Co-Locating	Reducing LOD	Minimizing Construction Duration	Adhering to Construction Timing Windows	Implementing BMPs	Justification
072618_WA_1009_I_MI	UNT to Aquashicola Creek	50.6R3	40.821649	-75.479762	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Time to cross justifies open cut. Workspace reduced to 75' in stream and floodway. Stream can be crossed in less than 24 hours.
072618_WA_1007_I_MI	UNT to Aquashicola Creek	50.6R3	40.821693	-75.4795	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Time to cross justifies open cut. Workspace reduced to 75' in stream and floodway. Stream can be crossed in less than 24 hours.
072618_WA_1005_I_MI	UNT to Aquashicola Creek	50.7R3	40.821935	-75.478779	N/A	N/A	N/A				X	X			X	X	X	X	X	X	Workspace reduced to 75' in stream and floodway.
072618_WA_1004_I_MI	UNT to Aquashicola Creek	50.7R3	40.821837	-75.478641	DPX	FX	DX-NF				X	X			X	X	X	X	X	X	Time to cross justifies open cut. Workspace reduced to 75' in stream and floodway. Stream can be crossed in less than 24 hours.
072618_WA_1003_I_MI	UNT to Aquashicola Creek	50.7R3	40.821815	-75.478545	N/A	N/A	N/A				X	X			X	X	X	X	X	X	Workspace reduced to 75' in stream and floodway.
072618_WA_1001_P_MI	UNT to Aquashicola Creek	50.7R3	40.821894	-75.478306	DPX	FX	CD				X	X			X	X	X	X	X	X	Time to cross justifies open cut. Workspace reduced to 75' in stream and floodway. Stream can be crossed in less than 24 hours.
041017_GM_1001_P_IN	UNT to Aquashicola Creek	0.5R3	40.818068	-75.504663	N/A	N/A	N/A				X	X							X	X	Workspace reduced to 75' through stream.
041017_GM_1001_P_MI	UNT to Aquashicola Creek	0.5R3	40.818012	-75.50475	FX	DPX	DX-NF				X	X					X	X	X	X	Workspace reduced to 75' through stream. Timing to cross justifies open cut; stream width at crossing is approximately 8' and can by crossed in 24-48 hours.
041117_GM_1002_E_MI	UNT to Aquashicola Creek	0.51R3	40.817938	-75.504833	DPX	FX	DX-NF				X	X			X		X	X	X	X	Workspace reduced to 75' through stream. Timing to cross justifies open cut; stream width at crossing is approximately 9' and can by crossed in 24-48 hours.

Notes:
1. In instances where a watercourse is crossed by the proposed pipeline or workspace multiple times, crossing numbers (e.g. "-1", "-2") have been added to the Watercourse ID.
Watercourse ID Key: P = perennial, I = intermittent, E = ephemeral, MA = major, IN = intermediate, MI = minor, C = canal, D = ditch
2. All route deviations implemented after the FERC Certificate Application are denoted with an "R" and indicate a MP equation. MPs with an "R1" indicate route deviations implemented and provided to FERC prior to the issuance of the DEIS. MPs with an "R2" indicate route deviations implemented as part of the September 2016 Route Update. MPs with an "R3 indicate route deviations implemented post-FERC Certificate issuance. All MPs without an "R" indicate that the route has not changed since the Certificate Application.
3. Crossing Type Key for Watercourse Channels:
- BX = Conventional Bore Crossing
- CD = Cofferdam Crossing
- DPX = Dam-and-Pump Crossing
- DX-NF = Dry Crossing If No Flow
- FX = Flume Crossing
- HDD = HDD Crossing
- N/A = Not Applicable