		Waterbodies Being Crossed						Eva	uation Factors								
USACE Distric	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Decision Rationale	
Huntington	A-001	W-A1a, S-A1a	Dry-Ditch Open-Cut	69		N	106	51	648	N	N	\$11,990	\$2,620	\$193,186		This crossing is situated on a long and steep slope on one side that would create logistically difficul construction conditions and provide insufficient area for a bore pit spoils. Additionally, the researce of existing utilities and a completed road crossing do not allow sufficient workshops for exercision of a bore oil and operation of crossentional boring or tunneling enumerat	
			Conventional Bore	69	28	N	106	51	648	N	N	\$11,990	\$380	\$463,962			
Huntington	A-003	S-A3a	Dry-Ditch Open-Cut	47	- 34	N	71	49	932	N	N	\$5,995	\$753 \$359	\$71,657	- Dry-Ditch Open-Cu	This crossing is situated on a long and steep slope on one side that would involve logistically difficult construction conditions and provide insufficient area for a bore pit spoils. Furthermore, the cost to bore is unreasonably high relative to the proposed construction method.	
			Dry-Ditch Open-Cut	203	-	N	59	44	1432	N	N	\$5,995	\$3,000	\$197,747		This stream is situated on a long and steep slope that would involve logistically difficult construction conditions and would require an excessively deep hore nit for a trenchless crossion. An	
Huntington	A-005	S-A124	Conventional Bore	203	48	N	59	44	1432	N	N	\$5,995	\$359	\$3,200,647	Dry-Ditch Open-Cu	t already completed stream crossing is located near this resource which further reduces the available work space and creates an insufficient area for a bore pit soil stockpile. Furthermore, the time to complete a trenchless crossing is nearly four times as long and the cost to bore is unreasonably high relative to the proposed construction method.	
Huntington	A-006	W-A27-PFO, W-A27-	Dry-Ditch Open-Cut	95		N	74	62	1268	N	N	\$11,990	\$2,979	\$105,341	Dry-Ditch Open-Cu	ossing is located in a valley that has long and steep slopes on both sides which would require a technically and logistically challenging winching system. In addition, the deep bore pils equire additional areas to stockoile solis which may require additional tree clearing in known use Indiana Bat habitat. Furthermore, the cost to bore is unreasonably high relative to the	
		PEM, S-A118	Conventional Bore	95	36	N	74	62	1268	N	N	\$11,990	\$494	\$939,790		proposed construction method.	
Huntington	A-008	S-A120, S-A119, W-	Dry-Ditch Open-Cut	85	-	N	36	20	629	N	Y	\$17,985	\$4,418	\$124,742	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/minimized by	
		104	Conventional Bore	85	29	N	36	20	629	N	Y	\$17,985	\$17,985	\$542,105		use un ne convenional que menou. A minor anyona y inpar, associated with the pore of maintain access with de required.	
Pittsburgh	A-009	W-B1a	Dry-Ditch Open-Cut	40	-	N	57	47	350	N	N	\$5,995	\$64	\$34,059		This small wetland is located on a steep slope would create logistically difficult construction conditions on both sides of the crossing and provide insufficient room for the spoils from the accessive/view bare hore nits. The hore duration is estimated to be twice as long and the creat to avoid the temporary impacts is unreasonably high relative to the proposed construction method.	
			Conventional Bore	40	49	N	57	47	350	N	N	\$5,995	\$64	\$2,792,306			
Pittsburgh	A-010/011	S-B2a, W-A40, S-B3a	Dry-Ditch Open-Cut	243	-	N	58	47	711	N	N	\$17,985	\$2,436	\$218,744		is crossing is located on a long and steep slope on one side that would create logistically difficult construction conditions and would require an excessively deep bore pit for a trenchless ssing. Furthermore, the estimated time to complete a trenchless crossing is nearly five times as long and the cost to avoid the temporary impacts is unreasonably high relative to the pr struction method.	
			Conventional Bore	243	49	N	58	47	711	N	N	\$17,985	\$853	\$3,381,195		construction method.	
Pittsburgh	A-012	S-A11a, S-A11a-Braid- 1. S-A11a-Braid-2	Dry-Ditch Open-Cut	96	-	N	79	59	375	N	N	\$17,985	\$6,531	\$139,208		This crossing is located at the base of a steep slope that would involve logistically difficult construction conditions and would require an excessively deep bore pit for a trenchless crossing. It Furthermore, the estimated time to complete a trenchless crossing is nearly four times as long and the cost to avoid the temporary impacts is unreasonably high relative to the proposed	
			Conventional Bore	96	43	N	79	59	375	N	N	\$17,985	\$1,077	\$2,636,963		construction method.	
Pittsburgh	A-013	W-UU3	Dry-Ditch Open-Cut	30	-	N	38	7	0	N	Y	\$0	\$0	\$21,000		This narrow wetland (less than five feet wide at the pipeline crossing) would be excessively expensive to complete as a trenchless bore. In addition, the bore pits are of such depth (nearly 40- teet that benching would be required, thereby increasing the amount of socials created at the crossing and reducing the amount of available workspace.	
			Conventional Bore	30	17	N	38	7	0	N	Y	\$0	\$0	\$162,784			
Pittsburgh	A-014	S-UU3	Dry-Ditch Open-Cut	73	-	N	55	45	808	N	N	\$5,995	\$2,690	\$272,850		This crossing is located adjacent to long and steep slope that would involve logistically difficult construction conditions, an extensive equipment winching system, and an excessively deep bore pit for a trenchiese crossing.	
			Conventional Bore	73	36	N	55	45	808	N	N	\$5,995	\$359	\$871,224			
Pittsburgh	A-015	S-UU5, W-UU4	Dry-Ditch Open-Cut	190	-	N	48	32	412	N	Y	\$11,990	\$3,481	\$163,595	Dry-Ditch Open-Cu	This crossing is located on long and steep slope that would involve logistically difficult construction conditions, an extensive equipment winching system, and an excessively deep bore pit (37) It that would require benching for a trenchless crossing. Furthermore, the estimated time to complete a trenchless crossing is nearly twice as long and the cost to avoid the temporary impacts is increasenable to include the data in the consequences construction method.	
			Conventional Bore	190	37	N	48	32	412	N	Y	\$11,990	\$494	\$1,227,668			
Pittsburgh	A-016	W-K43, S-K73, S-K74, S-K75 W-K44	Dry-Ditch Open-Cut	286	-	N	58	36	453	N	N	\$29,975	\$8,702	\$261,408		This crossing is located in a valley that has long and steep slopes on both sides which would require an extensive equipment winching system. In addition, the deep bore pits would require It benching, which increases the total volume of material to be excavated. The lack of sufficient space to stockpile the material further complicates a trenchiess crossing. The estimated time to	
Pittsburgh A-016	G*N73, ¥¥*N44	Conventional Bore	286	36	N	58	36	453	N	N	\$29,975	\$988	\$1,500,324		complete a trenchless crossing is nearly double and the cost is excessively expensive.		

USACE District Crossing # Waterbodies I Crossed								Eva	luation Factors									
USACE	District Crossin	ng# Wa	terbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci	
		_		Dry-Ditch Open-Cut	38	-	N	70	35	645	N	N	\$11,990	\$4,773	\$58,295		This crossion is located adjacent to a lonn and steen slope that would involve lonistically difficult concern	
Hunti	ngton A-01:	7	W-K45, S-K77	Conventional Bore	38	28	N	70	35	645	N	N	\$11,990	\$494	\$376,099	- Dry-Ditch Open-Cut	pit for a trenchless crossing. Furthermore, the cost to bore is unreasonably high relative to the propos	
Hunti	ngton A-01	8	S-K67	Dry-Ditch Open-Cut	36	-	N	77	51	341	N	N	\$5,995	\$2,700	\$68,900	Dry-Ditch Open-Cut	This crossing is located adjacent to a steep slope that would involve logistically difficult construction artificing the processively deen brownite (nearly 40 faar) would reset a large volume of material to be	
		-	e nor	Conventional Bore	36	39	N	77	51	341	N	N	\$5,995	\$359	\$821,027	bry bran open out	complicates a trenchless crossing. The estimated time to complete a trenchless crossing is more than	
Hunti	ngton A-019	A	S-K65	Dry-Ditch Open-Cut	37	-	N	64	49	148	N	Y	\$5,995	\$2,452	\$63,681	- Dry-Ditch Open-Cut	This crossing is located adjacent to a steep slope that would involve logistically difficult construction of prore pits (over 40 feet) would create a larce volume of material to be excavated and stockoiled. The Is	
				Conventional Bore	37	41	N	64	49	148	N	Y	\$5,995	\$359	\$2,347,723		The estimated time to complete a trenchless crossing is more than four times longer than an open cut	
Hunti	ngton B-00	1 S-A1	10/K62, W-A23, S-	Dry-Ditch Open-Cut	238	-	N	73	33	0	N	Y	\$17,985	\$2,419	\$215,004	Dry-Ditch Open-Cut	The estimated time to complete a trenchless crossing is nearly three times and the cost is excessively treat the definition of the definition of the state of the	
			A109	Conventional Bore	238	39	N	73	33	0	N	Y	\$17,985	\$853	\$1,406,784		trenon shoring, and sufficient room to create the benon and store the stockpiled material.	
Hunti	ngton B-001	IA	S-A111	Dry-Ditch Open-Cut	38	-	N	75	58	667	N	N	\$5,995	\$2,726	\$86,703	- Dry-Ditch Open-Cut	This crossing, is located adjacent to a long and steep slope on one side that would involve logistically trenchless crossing. The proximity of adjacent resources reduces the available amount of room to sto	
				Conventional Bore	38	37	N	75	58	667	N	N	\$5,995	\$359	\$790,164		than double and the cost to avoid the temporary impacts is unreasonably high relative to the proposed	
Pittsb	ourgh B-00	2 W-J	40, S-K82, S-K94	Dry-Ditch Open-Cut	223	-	N	43	29	291	N	N	\$17,985	\$8,911	\$255,330	Dry-Ditch Open-Cut	The pipeline is already installed through a portion of the wetland at this crossing. The layout of a com- Borino also would not avoid or minimize impacts to the resources because it would require excavation	
				Conventional Bore	223	25	N	43	29	291	N	N	\$17,985	\$853	\$880,076			
Pittsb	burgh B-003	3	S-J44	Dry-Ditch Open-Cut	46	-	N	70	44	1017	N	N	\$5,995	\$2,797	\$59,329	Dry-Ditch Open-Cut	This stream is approximately five feet wide where the pipeline crosses. It is located a steep valley, with extensive winching systems, and bore pits would be approximately 40 feet deep. The lack of sufficient	
				Conventional Bore	46	39	N	70	44	1017	N	N	\$5,995	\$359	\$849,407		time to complete a trenchless crossing is three times longer than an open cut and the cost is excessive	
Hunti	ngton B-00	5	W-K33-PEM	Dry-Ditch Open-Cut	117	-	N	75	57	496	N	N	\$5,995	\$834	\$88,729	- Dry-Ditch Open-Cut	This crossing is located adjacent to a long and steep slope that would involve logistically difficult con- trenchiess crossing. In addition, the excessively deep bore bits would create a large volume of materi	
				Conventional Bore	117	48	N	75	57	496	N	N	\$5,995	\$135	\$2,956,356		further complicates a trenchless crossing. Furthermore, the cost to avoid the temporary impacts is un	
Pittsb	ourgh B-00	6	W-K31	Dry-Ditch Open-Cut	96	-	N	62	55	220	N	N	\$5,995	\$613	\$73,808	- Dry-Ditch Open-Cut	This crossing is situated on a steep slope that would involve logistically difficult construction condition Furthermore, the time to complete the trenchless crossing is nearly double of an open out and the cos	
				Conventional Bore	96	39	N	62	55	220	N	N	\$5,995	\$135	\$991,082		method.	
Pittsb	ourgh B-00	7	W-B46	Dry-Ditch Open-Cut	143	-	N	56	21	417	N	N	\$5,995	\$678	\$106,773	Dry-Ditch Open-Cut	This crossing is situated on a long and steep slope that would involve logistically difficult construction bore pit soil stockpile. Furthermore, the time to complete the trenchless crossing is double of an open	
				Conventional Bore	143	30	N	56	21	417	N	N	\$5,995	\$135	\$960,043		proposed construction method.	
Pittsb	ourgh B-00	8	S-H180	Dry-Ditch Open-Cut	45	-	N	32	20	0	N	Y	\$5,995	\$2,384	\$86,754	- Dry-Ditch Open-Cut	The trenchless crossing would require bore pits that are 39-feet deep, which minimizes the available c crossing is more than double of an open cut and the cost to avoid the temporary impacts is unreasona	
				Conventional Bore	45	39	N	32	20	0	N	Y	\$5,995	\$359	\$846,569			
Pittsb	sburgh B-009 W-H112	W-H112 Conver	Dry-Ditch Open-Cut	260	-	N	9	4	0	N	Y	\$5,995	\$125	\$188,120	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to 0.02 acre of PEM. Avoiding/minimizing thi requiring the operator to work from a shallow bonch within the pit. Furthermore, the conventional bone construction method and take neady tring the macrowed from the normalise.		
Pittsburgh B-009 W-H112	W-H112 Con		W-H112	W-H112 (W-H112	Conventional Bore	260	20	N	9	4	0	N	Y	\$5,995	\$125	\$926,689	

sion Rationale
truction conditions, a winching system that is beyond standard procedures and a deep bore ad construction method.
onditions, an extensive winching system and a deep bore pit for a trenchless crossing. In acavated and stockpile. The lack of sufficient space to stockpile the material further double and the cost is unreasonably high relative to the proposed construction method.
onditions and a deep bore pit for a tranchless crossing. In addition, the excessively deep ck of sufficient space to stockpile the material further complicates a trenchless crossing, and the cost is unreasonably high relative to the proposed construction method.
expensive. In addition, the bore pits are nearly 40-feet deep which requires benching,
Stiffcult construction conditions, an extensive whiching system and a deep bore pit for a e the excavated material. Furthermore, the time to complete the trenchless crossing is more construction method.
entional bore would require excavation of a bore pit unacceptably close to the installed pipe. of a bore pit within the wetland.
extremely long slopes that would create logistically difficult construction conditions, require space to stockpite the material further complicates a trenchiess crossing. The estimated by expensive.
truction conditions, an extensive winching system and a deep bore pit (48-feet) for a I to be excavated and stockpiled. The tack of sufficient space to stockpile the material easonably high relative to the proposed construction method.
s, deep bore pits (nearly 40-feet), and provide insufficient area for a bore pit soil stockpile. to avoid the temporary impacts is unreasonably high relative to the proposed construction
conditions, extensive winching systems, deep bore pits, and provides insufficient area for a cut and the cost to avoid the temporary impacts is unreasonably high relative to the
rea to complete an efficient crossing. Furthermore, the time to complete the trenchless bly high relative to the proposed construction method.
s minor impact through a conventional bore would require a 20 feet deep bore pit - possibly crossing cost to avoid the temporary impacts is unreasonably high relative to the proposed

								Eva	luation Factors							
USACE Distric	t Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Decision Rationale
			Dry-Ditch Open-Cut	74	-	N	100	59	341	N	N	\$5,995	\$2,407	\$130,678		This crossing is located in a valley that has long and steep slopes on both sides which would require an extensive equ
Huntington	B-010	S-163	Conventional Bore	74	52	N	100	59	341	N	N	\$5,995	\$359	\$3,052,729	- Dry-Ditch Open-Cut	to store the excess material is extremely limited due to the narrowed ROW and county road. Furthermore, the cost to construction method.
Huntington	B-011	W-115	Dry-Ditch Open-Cut	56	-	N	66	43	661	N	N	\$5,995	\$341	\$45,536	- Dry-Ditch Open-Cut	This crossing is situated on a long and steep slope that would involve logistically difficult construction conditions, exter here nit soil stocknie. Furthermore the cred to avoid the temporary impacts is unpresonably bink relative to the proport
			Conventional Bore	56	30	N	66	43	661	N	N	\$5,995	\$135	\$713,138		
Huntington	B-012	W-H103, S-H160	Dry-Ditch Open-Cut	148	-	N	33	14	462	N	Y	\$11,990	\$841	\$200,006	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the use of the consuminous hora mathod. A minor temporary impact associated with the hora to maintain access will be re-
			Conventional Bore	148	24	N	33	14	462	N	Y	\$11,990	\$841	\$652,085		
Huntington	B-013	S-H153	Dry-Ditch Open-Cut	42		N	58	41	567	N	N	\$5,995	\$2,690	\$91,607	Dry-Ditch Open-Cut	This crossing is situated in a valley with steep slopes on both sides of the resource. The topographical constraints co construction condition and deep bore pits. In addition there is insufficient area to store the bore pit stockpile in the imm
			Conventional Bore	42	36	N	58	41	567	N	N	\$5,995	\$359	\$783,247		urreasonably high relative to the proposed construction method.
Huntington	B-014A	S-H145	Dry-Ditch Open-Cut	32	-	N	76	39	520	N	N	\$5,995	\$3,221	\$94,664	Dry-Ditch Open-Cut	This crossing is adjacent to a long and steep slope that would involve logistically difficult construction conditions, deep stockpile. Furthermore, the time to complete the trenchless crossing is nearly five times the duration of an open cut an
			Conventional Bore	32	39	N	76	39	520	N	N	\$5,995	\$359	\$809,675		ine proposed construction memoa
Huntington	B-014B	S-H165	Dry-Ditch Open-Cut	17	-	N	61	55	599	N	N	\$5,995	\$5,049	\$46,936	Dry-Ditch Open-Cut	This small stream (less than 10-feet wide) is situaled on a long and steep slope that would involve logistically difficult: for a bore pit soil stockpile. Furthermore, the time to complete the trenchless crossing is nearly six times the duration
			Conventional Bore	17	31	N	61	55	599	N	N	\$5,995	\$359	\$620,951		high relative to the proposed construction method.
Huntington	B-015A	S-CD16, S-VV13, W-	Dry-Ditch Open-Cut	193	-	N	17	6	0	N	N	\$17,985	\$3,013	\$221,093	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the use of the nerventional beam method. A minor transcenary encode servicing of with the beam to mainting occesse will be an
		6017	Conventional Bore	193	25	N	17	6	0	N	N	\$17,985	\$3,013	\$790,920		use o me convenional dore menico. A minici temporary impact associated with the core to manifain access will be re
Huntington	B-015B	S-VV12, W-CD16, W-	Dry-Ditch Open-Cut	132	-	N	63	40	873	N	Y	\$17,985	\$3,230	\$183,615	Dry-Ditch Open-Cut	This multiple resource crossing present several factors that support an open-cut crossing. The resources are located system of nearly 900-tect. In addition, the bore pits would be 35-tect deep, resulting in an excessive amount of soil, w
		***	Conventional Bore	132	35	N	63	40	873	N	Y	\$17,985	\$ 629	\$1,032,656		unreasonably high relative to the proposed construction method.
Huntington	B-016	S-UV11	Dry-Ditch Open-Cut	54	-	N	71	45	782	N	N	\$5,995	\$1,805	\$98,453	Dry-Ditch Open-Cut	Stream S-UV11 is a perennial stream located adjacent to a steep slope that is extremely long, nearly 800 feet in lengt 20 feat which would remark benching and additional area for englisterane.
			Conventional Bore	54	23	N	71	45	782	N	N	\$5,995	\$359	\$369,703		
Huntington	B-017	W-VV3-PEM, W-VV3- PEO, S-VV2	Dry-Ditch Open-Cut	145	-	N	40	32	439	N	N	\$11,990	\$3,427	\$194,832	Dry-Ditch Open-Cut	This crossing is immediately adjacent to a mainline valve. Trenchless crossing methods are logistically difficult becaus connection to the valve site. An open cut crossing is necessary to facilitate connection to the mainline valve. Furtherm
			Conventional Bore	145	30	N	40	32	439	N	N	\$11,990	\$494	\$972,073		the proposed construction method.
Huntington	C-001	S-L60	Dry-Ditch Open-Cut	42	-	N	60	32	189	N	N	\$5,995	\$2,655	\$143,526	Dry-Ditch Open-Cut	The pipeline has already been installed under Big Knaw Road and there is a fully restored steep hill adjacent to the pi crossing because they would require the removal of the completed mead bore and are not less environmentally damagi
			Conventional Bore	42	16	N	60	32	189	N	N	\$5,995	\$359	\$198,627		ierooong, minor naa veen nay reakines, mooru nare is ve retalaluteta lo cumprete a bore. A minor temporary impact
Huntington	C-002	S-LL1	Dry-Ditch Open-Cut	66	-	N	57	48	420	N	N	\$5,995	\$2,800	\$179,965	- Dry-Ditch Open-Cut	This crossing is located adjacent to a steep slope that is extremely long, approximately 420-feet in length with an aver. These factors create logistically difficult construction conditions, complicated winching systems, and excessive spoils. the duration a.
			Conventional Bore	66	30	N	57	48	420	N	N	\$5,995	\$359	\$741,742		

sion Rationale
n extensive equipment winching system and excessively deep bore pits. The available area ve, the cost to avoid the temporary impacts is unreasonably high relative to the proposed
conditions, extensive winching systems, deep bore pits, and provides insufficient area for a ve to the proposed construction method.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by cceass will be required.
I constraints complicate the limits of the winching system, creating a logistically difficult spite in the immediate area. Furthermore the cost to avoid the temporary impacts is
conditions, deep bore pits (nearly 40-feet), and provide insufficient area for a bore pit soil an open cut and the cost to avoid the temporary impacts is unreasonably high relative to
sically difficult construction conditions, 31-feet deep bore pits, and provide insufficient area so the duration of an open cut and the cost to avoid the temporary impacts is unreasonably
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
ces are located on a steep slope that is extremely long, which would require a winching mount of soil, with limited area for storage. The cost to avoid the temporary impacts is
00 feet in length with an average slope exceed 45%. The bore pits are estimated to be over
y difficult because they would require the pipe to be installed too deeply to facilitate valve. Furthermore, the cost to avoid the temporary impacts is unreasonably high relative to
diacent to the pipe tie-in. Trenchlass methods are technically and logistically difficult for this mentally damaging than this temporary stream impact because the steep hill adjacent to the sporary impact associated with the bore to maintain access will be required.
pth with an average slope exceeding 45%. The bore pits are estimated to be nearly 30 feet. ccessive spoils. Furthermore, the time to complete the trenchless crossing is nearly double

			eing Crossing Methods					Eva	luation Factors											
USACE Dis	trict Crossing #	Waterbodies Being Crossed	g Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Set Crossing Method Decision Rationale This small stream (less than 10-feet wide) is situated in a valley with long and steep slopes on both approaches. The bore pits are projected to be nearly 50-feet deep, which creates logistically pen-Cut difficult construction conditions and insufficient area for a bore pit sol stockpite. Furthermore, the time to complete the trenchless crossing is two times the duration and the cost to avoid the				
Huntingto	n C-003	S-QR30	Dry-Ditch Open-Cut	t 47	-	N	79	52	609	N	N	\$5,995	\$2,797	\$66,965	Drv-Ditch Open-Cu	This small stream (less than 10-feet wide) is situated in a valley with long and steep slopes on both approaches. The bore pits are projected to be nearly 50-feet deep, which creates logistically I difficult construction conditions and insufficient area for a bore oit soil stockoile. Furthermore, the time to complete the trenchless crossing is five times the duration and the cost to avoid the				
			Conventional Bore	47	50	N	79	52	609	N	N	\$5,995	\$359	\$2,867,012		temporary impacts is unreasonably high relative to the proposed construction method.				
Huntingto	n C-004	S-J70	Dry-Ditch Open-Cut	t 62	-	N	70	57	886	N	N	\$5,995	\$2,726	\$158,268	– Dry-Ditch Open-Cu	This stream is located in a valley with long and steep slopes on both approaches. The bore pits are projected to be nearly 50-feet deep, which creates logistically difficult construction conditions and insufficient area for a bore pit soil stockpile. Furthermore, and the cost to avoid the temporary impacts is unreasonably high relative to the proposed construction method.				
			Conventional Bore	62	49	N	70	57	886	N	N	\$5,995	\$359	\$2,855,036						
Huntingto	n C-005	S-H123	Dry-Ditch Open-Cut	t 130	-	N	36	22	431	N	N	\$5,995	\$2,903	\$124,757	– Dry-Ditch Open-Cu	This small stream (less than 10-feet wide) is located adjacent to a steep slope, creating an extremely difficult construction procedure due to the winching requirements, bore pit depths (nearly 50 t feet deep), and lack of sufficient work space. Furthermore, the time to complete the trenchless crossing is nearly four times the duration of an open cut and the cost to avoid the temporary				
			Conventional Bore	130	48	N	36	22	431	N	N	\$5,995	\$359	\$2,993,474		Impacts is dimensionally mgin relative to the proposed construction memod.				
Huntingto	n C-006	W-H90, S-H123	Dry-Ditch Open-Cut	t 135	-	N	63	37	413	N	N	\$11,990	\$3,112	\$134,462	Dry-Ditch Open-Cu	These resources are located adjacent to a long and steep slopes. The bore pits are projected to be over 50-teet deep and the winch hill length is greater than 400 feet, which creates logistically difficult construction conditions and insufficient area for a bore pit soil stockpile. Furthermore, the cost to avoid the temporary impacts is unreasonably high relative to the proposed construction				
			Conventional Bore	135	54	N	63	37	413	N	N	\$11,990	\$494	\$3,341,066		menou and the construction raine is greater than six times an open col.				
Huntingto	n C-007	S-H117	Dry-Ditch Open-Cut	t 146	-	N	87	66	571	N	N	\$5,995	\$2,903	\$168,123	– Dry-Ditch Open-Cu	This stream is located in a valley with steep slopes on both approaches. The steep slopes, extremely deep bore pits (67-feet), extreme winch hill conditions and lack of sufficient work spinares is unascalably high relative to the proposed contraction method.				
			Conventional Bore	146	67	N	87	66	571	N	N	\$5,995	\$359	\$4,075,245		ts is unreasonably high relative to the proposed construction method.				
Huntingto	n C-008	S-L46	Dry-Ditch Open-Cut	t 95	-	N	47	40	617	N	N	\$5,995	\$2,761	\$128,419	- Dry-Ditch Open-Cu	This stream is located in a valley with steep slopes on both approaches. The steep slopes, extremely deep bore pits (65-feet), extreme winch hill conditions and lack of sufficient work space prease a situation that is conducive to an open cut. Furthermore, the time to complete the trenchless crossing is more than double the duration of an open cut and the cost to avoid the temporary				
			Conventional Bore	95	65	N	47	40	617	N	N	\$5,995	\$359	\$3,821,417		Impacts is unreasonably high relative to the proposed construction method.				
Huntingto	n C-009	S-L44	Dry-Ditch Open-Cut	t 57	-	N	38	27	52	N	Y	\$5,995	\$2,867	\$83,995	– Dry-Ditch Open-Cu	Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit - creating excessive spoil piles, with limited area for storage. Furthermore, the cost to avoid the temporary impacts is unreasonably high relative to the proceed construction method.				
			Conventional Bore	57	36	N	38	27	52	N	Y	\$5,995	\$359	\$825,817						
Huntingto	n C-010	S-157	Dry-Ditch Open-Cut	t 78	-	N	51	34	690	N	N	\$5,995	\$2,726	\$169,064	– Dry-Ditch Open-Cu	This stream is located on a steep slope. The steep slope, extremely deep bore pits (49-feet), extreme which hill conditions and lack of sufficient work space create a situation that is conducive to a more out. Furthermore, the cost to avoid the temporary impacts is unpessonably binh relative to the proposed construction method.				
			Conventional Bore	78	49	N	51	34	690	N	N	\$5,995	\$359	\$2,900,444						
Huntingto	n C-011	S-A96/A103	Dry-Ditch Open-Cut	t 80	-	N	43	38	201	N	N	\$5,995	\$2,910	\$84,365	– Dry-Ditch Open-Cu	This small stream (less than 10-feet wide) is located on a steep slope, creating an extremely difficult construction procedure due to bore pit depths (nearly 40-feet deep), steep slopes, and lack of sufficient work space. Furthermore, the time to complete the trenchless crossing is nearly three times the duration of an open cut and the cost to avoid the temporary impacts is unreasonably				
			Conventional Bore	80	37	N	43	38	201	N	N	\$5,995	\$359	\$909,360		high relative to the proposed construction method.				
Huntingto	n C-012	S-A97, S-A98	Dry-Ditch Open-Cut	t 121	-	N	41	35	334	N	N	\$11,990	\$10,655	\$155,701	– Dry-Ditch Open-Cu	These small streams are less than 10-feet wide and are located on a steep slope, creating an extremely difficult construction procedure due to bore pit depths (64-feet deep), steep slopes, and Lack of sufficient work space. Furthermore, the time to complete the trenchiess crossing is nearly 5 times the duration of an open cut and the cost to avoid the temporary impacts is unreasonable				
			Conventional Bore	121	64	N	41	35	334	N	N	\$11,990	\$359	\$3,846,654		high relative to the proposed construction method.				
Huntingto	n C-013A	S-A100	Dry-Ditch Open-Cut	t 124	-	Y	42	22	460	N	N	\$5,995	\$779	\$373,574	 Conventional Bore 	There are multiple complicating factors at this crossing location that necessitated the development of a unique solution. The Left Fork Holly River at this location is both wide and deep, and it is bounded on one side by a steep slope. Dealing with high water and unfavorable flow conditions, combined with the need to use winched equipment on one side of the river, make an open out crossing at this location extraordinantly dealenging. Mountain Valley sempreting and construction slaff developed a plan to complete this crossing with a conventional bloce. A minor temporary				
			Conventional Bore	124	24	Y	42	22	460	N	N	\$5,995	\$779	\$577,916		Impact associated with the bore to maintain access will be required.				
Huntingto	n C-013B	S-E78/E82/R1	Dry-Ditch Open-Cut	t 84	-	N	27	7	0	N	Y	\$5,995	\$3,752	\$350,247	- Dry-Ditch Open-Cu	The stream is located next to a steep slope and would require a bore pit exceeding 20 test which creates excessive spoils in a limited area for storage. The duration of the trenchless crossing is nearly three times longer than the open-out process, thereby increasing the noise, aesthetic, and other impacts on nearby persons. Reducing the time at the crossing and permanently stabilizin in any outperformation area more time configuration and the horize.				
			Conventional Bore	84	21	N	27	7	0	N	Y	\$5,995	\$359	\$436,573	Uny-Utch Upen-Cut (nearly three times longer than the open-cut process, thereby increasing the noise, aesthetic, and other impacts on nearby persons. Reducing the time at the crossing and permanently stabilizing this area will reduce the potential for sedimentation and erosion along the hillside.					

							luation Factors	Eva								
ed Crossing Method	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Average Slope (%)	Maximum Steep Slop (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ct Crossing #	USACE Distri
The open cut method would result in a temporary impacts to three small unnamed tribularies (UI impacts through a conventional brea would require a relatively deen been bit of nearly differences.		\$195,304	\$9,221	\$17,985	N	N	396	30	50	N	-	220	Dry-Ditch Open-Cut	S.KK2 S.KK35 S.		
rem-Cut injugada introgin a contentional due would require a reastrey deep doie prior heavy volted on dramatically increasing the pageo ecocycle dy the bore pit and apoli pile. The construction time i unreasonably high relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$1,337,655	\$1,077	\$17,985	N	N	396	30	50	N	38	220	Conventional Bore	KK4b	C-015	Huntington
There are no significant constraints on available crossing methods or significant environmental in	Convertional Rese	\$172,666	\$779	\$5,995	N	N	11	24	42	N	-	92	Dry-Ditch Open-Cut	5.540	C 019	Huntington
use of the conventional bore method. A minor temporary impact associated with the bore to main	- Conventional Bore	\$532,774	\$779	\$5,995	N	N	11	24	42	N	29	92	Conventional Bore	3-140	0.018	riunungion
		\$41,815	\$120	\$5,995	N	N	296	26	60	N	-	51	Dry-Ditch Open-Cut		0.040	
ren-Cut bore is unreasonably high relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$223,930	\$120	\$5,995	N	N	296	26	60	N	16	51	Conventional Bore	W-KK3	C-019	Huntington
A trenchless crossing on this hillside would require bore pits that are greater than thirty feet deer		\$109,514	\$3,375	\$5,995	N	N	53	28	45	N	-	74	Dry-Ditch Open-Cut	0.5%	C 020	Uniteda
ren-Cutt time for the bore is nearly twice as long as the open cut and the cost to bore is unreasonably high	– Dry-Ditch Open-Cu	\$800,985	\$359	\$5,995	N	N	53	28	45	N	32	74	Conventional Bore	S-F43	C-020	Huntington
The open cut method would result in a temporary impact Right Fork Holy River. Avoiding/minim	Dev Diteb Organ Cu	\$435,618	\$3,257	\$5,995	N	N	284	45	62	N	-	147	Dry-Ditch Open-Cut	8 567	C 021	Huntinaton
Lert-Lut i nearly su teet on the edge of a long steep slope and the excavation of an interm lampinehon. If area that has already been minimized. The construction time for the bore is nearly three times a	- Dry-Ditch Open-Cu	\$1,044,696	\$359	\$5,995	N	N	284	45	62	N	34	147	Conventional Bore	5-E6/	6-021	Huntington
The Elk River will be crossed using Microtunnel trenchless methodology. While Mountain Valley the open cut methodology. There are numerous large boulders within the proposed crossing - rr	Guided	\$860,247	\$0	\$0	Y	N	63	12	47	Y	-	296	Dry-Ditch Open-Cut	5 500	C 022	Huntinaton
al Bore al Bore accomption. In adoution, the stream depth complicates the constructioning since a larger instream already been minimized. The ER Nore is also classified by the VVDNR as Group 1 mussel stre crossing will further minimize any potential impacts to mussel species.	Conventional Bore	\$3,112,112	\$0	\$0	Y	N	63	12	47	Y	49	296	Guided Conventional Bore	5-608	0-022	Huntington
This small unnamed tributary (UNT) to the Elk River (less than five feet wide) would require a bo	Day Ditab Gaza Cu	\$74,014	\$1,543	\$5,995	Y	N	0	18	26	N	-	84	Dry-Ditch Open-Cut	8 574	0.000	Uniteda
ren-cut, interim access range would be required which would cleare a large volume of material to be excan trenchiess crossing. Furthermore, the cost to bore is unreasonably high relative to the proposed	Diy-Dich Open-Cu	\$427,438	\$359	\$5,995	Y	N	0	18	26	N	20	84	Conventional Bore	3-E/1	0-023	Huntington
There are no significant constraints on available crossing methods or significant environmental in	Conventional Reso	\$242,872	\$3,086	\$17,985	N	N	10	12	36	N	-	272	Dry-Ditch Open-Cut	S-H111, S-H114, S-	C 024	Huntinaton
use of the conventional bore method. A minor temporary impact associated with the bore to main		\$875,214	\$3,086	\$17,985	N	N	10	12	36	N	18	272	Conventional Bore	H112	0.024	riunungion
This UNT to the Elk River is located in an area that would require a bore pit depth of nearly 301		\$91,908	\$3,257	\$5,995	Y	N	0	9	14	N	-	53	Dry-Ditch Open-Cut	S-11112	C 025	Huntington
minimized further complicates a trenchless crossing. Furthermore, the cost to bore is unreasonal minimized further complicates a trenchless crossing.	Diy-Dicit Open-Cu	\$421,673	\$359	\$5,995	Y	N	0	9	14	N	29	53	Conventional Bore	341113	0.023	riunungion
non Cut Avoiding/minimizing this minor impact through a conventional bore would require a relatively der		\$37,553	\$58	\$5,995	N	N	369	47	59	N	-	45	Dry-Ditch Open-Cut	W 175	C-026	Huntington
Furthermore, the cost to avoid the temporary impacts is unreasonably high relative to the propose	biy bian open ou	\$398,669	\$58	\$5,995	N	N	369	47	59	N	29	45	Conventional Bore			
nen-Cuit The open cut method would result in a temporary impact of approximately 0.001 acre of a PEM v	– Drv-Ditch Open-Cu	\$60,602	\$7	\$5,995	Y	N	0	9	13	N	-	78	Dry-Ditch Open-Cut	W-H86	C-027	Huntington
relative to the proposed construction method.	biy bian open ou	\$300,442	\$7	\$5,995	Y	N	0	9	13	N	16	78	Conventional Bore			
al Bore There are no significant constraints on available crossing methods or significant environmental in	Conventional Bore	\$258,139	\$771	\$5,995	Y	N	0	9	12	N	-	267	Dry-Ditch Open-Cut	S-H110	C-028	Huntinaton
use of the conventional bore method. A minor temporary impact associated with the bore to main	Serventional DUP	\$965,471	\$771	\$5,995	Y	N	0	9	12	N	22	267	Conventional Bore	STITU	5 020	migdli

sion Rationale
o Left Fork Holly River, each less than three feet wide. Avoiding/minimizing these minor dge of a steep slope, thereby requiring the excavation of an interim name and bench and b bore is estimated to be five times as long as the open cut and the cost to bore is
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
ng system on a long steep slope in an already reduced area of work. In addition the cost to
ch necessitates the use of a bench and interim ramp to access the bore pit. The construction tive to the proposed construction method.
these minor impacts through a conventional bore would require a relatively deep bore pit of disonal equipment and excess spoil materials will greatly limit the available space in a work as the open cut.
ypically avoid crossings with bore pits of this depth, several logistical constraints complicate on and restoring these to preconstruction contours would be extremely difficult to strion would be regired thereby reducing the available speci in a work rest that has While mussel survey and relocation efforts were completed in 2019, completing a trenchless
that is a minimum of 20 feet deep. Due to this depth, it is likely that the use of a bench and and stockpile. The lack of sufficient space to stockpile the material further complicates a truction method.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
The excavation to this depth would require the use of a bench and interim access ramp ack of sufficient space to stockpile the material in a work area that has already been igh relative to the proposed construction method.
e pit, with an excevator operating from a bench within the pit, at the edge of a steep slope. nstruction method.
d. Avoiding/minimizing this minor impact through a conventional bore is unreasonably high
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.

	Crossing #	Waterbodies Being Cr	Crossing Methods					Eval	uation Factors							
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Decision Rationale
Huntington	C-029	S-T29	Dry-Ditch Open-Cut	78	-	Ν	32	13	1903	N	N	\$5,995	\$2,690	\$171,066	Dry-Ditch Open-Cut	The stream (Houston Run) is located in a valley with extremely steep and long approaches. Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit of nawh 20 feet at the edge of long steep stopes. The additional equipment and excess spoil materials will greatly limit the available space in a work area that has already been minimized, which
			Conventional Bore	78	17	N	32	13	1903	N	N	\$5,995	\$359	\$305,362	,	increases the construction difficulty.
Huntington	C-030	S-A83/A91	Dry-Ditch Open-Cut	72	-	N	56	39	866	N	N	\$5,995	\$2,655	\$146,758	- Dry-Ditch Open-Cut	This UNT to Camp Creek is adjacent to a steep long slope. A trenchless crossing on this hilliside would require bore pits that are nearly 50-feet deep which would necessitate the use of a bench and interim ramp to access the bore pit and a winching system that is technically and logistically difficult. The construction time for the bore is nearly three times as long as the open cut and the cost to bore is unreasonably high relative to the proposed construction method.
			Dry-Ditch Open-Cut	120	-	N	78	39	1190	N	N	\$11,990	\$5,750	\$139,481		These two very small UNTs to Camp Creek are located on a long steep slope. Both streams are less than 10 feet wide. A trenchless crossing on this hillside would require bore pits that are over
Huntington	C-031	S-A93, S-A92	Conventional Bore	120	63	Ν	78	39	1190	N	N	\$11,990	\$718	\$3,789,630	Dry-Ditch Open-Cut	60-feet deep which would generate a significant amount of spoils and require a significant winching system to be located on the reduced LOD. The construction time for the bore is nearly twice as long as the open cut and the cost to bore is unreasonably high relative to the proposed construction method.
Huntington	C-032	S-H108, W-H67, W-	Dry-Ditch Open-Cut	367	-	N	57	34	1371	N	N	\$23,980	\$7,295	\$339,004	Day Ditch Open Cut	Avoiding/minimizing these minor impacts through a conventional bore would require a relatively deep bore pit of nearly 40 feet on the edge of a very long and steep slope, thereby requiring and endering without the bore set of the edge of a very long and steep slope. The event scale and without the bore set of the edge of a very long and steep slope.
Tuninger	0 004	H66, S-H105	Conventional Bore	367	36	N	57	34	1371	N	N	\$23,980	\$359	\$1,723,577	biy-bith open-cut	exercises with any system and the exercision of all intention and use for and use and exercises with any of the space occupied by the oute private space s
Huntington	C-033	S-H107	Dry-Ditch Open-Cut	45	-	Ν	7	3	0	N	Y	\$5,995	\$3,506	\$49,386	Dry-Ditch Open-Cut	This crossing is immediately adjacent to a mainline valve. Trenchless crossing methods are logistically difficult due to the connection to the valve site. An open cut crossing is necessary to fainlited the connection to the mainline valve.
			Conventional Bore	45	13	N	7	3	0	N	Y	\$5,995	\$359	\$193,439		
Huntington	W-H64-PEM, W- tington C-034 PEM-2, W-H64-PS	W-H64-PEM, W-H64- PEM-2, W-H64-PSS, S-	Dry-Ditch Open-Cut	172	-	Ν	48	20	0	N	Y	\$11,990	\$4,075	\$189,972	Dry-Ditch Open-Cut	This crossing is adjacent to a mainline valve. Trenchess crossing methods are logistically difficult because they would require the pipe to be installed too deeply to facilitate connection to the
		H104	Conventional Bore	172	20	N	48	20	0	N	Y	\$11,990	\$135	\$682,952		varre site. Ar open cut cidosing is necessary to tadinate connector to the manime vare.
Huntington	C-035	W-H60, W-H61	Dry-Ditch Open-Cut	312	-	N	20	8	0	N	Y	\$11,990	\$318	\$230,708	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/mil use of the conventional bore method. A minor temporary impact associated with the bore to maintain access will be required.
			Conventional Bore	312	16	N	20	8	0	N	Y	\$11,990	\$318	\$970,836		use of the conventional bore method. A minor temporary impact associated with the bore to maintain access will be required.
Huntington	C-036	W-B39	Dry-Ditch Open-Cut	101	-	N	36	23	288	N	N	\$5,995	\$489	\$77,184	Dry-Ditch Open-Cut	Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit - creating excessive spoil piles, with limited area for storage. Furthermore, the cost to bore is
			Conventional Bore	101	24	N	36	23	288	N	N	\$5,995	\$135	\$511,999		unreasonaby nigh relative to the proposed construction method.
Huntington	C-037	W-B31	Dry-Ditch Open-Cut	99	-	N	36	31	1103	N	Y	\$5,995	\$278	\$75,573	Dry-Ditch Open-Cut	Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit on an extremely long and steep slope which would create excessive spoil piles in a topographical setting that requires an extensive winching system, all while being located within an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the
			Conventional Bore	99	25	Ν	36	31	1103	N	Y	\$5,995	\$135	\$515,458		proposed construction method.
Huntington	C-038	S-B34, S-B35, S-B36, S B37, S-B38, W-B35, S- B42, S-B39b, S-	Dry-Ditch Open-Cut	339	-	N	54	32	54	N	N	\$59,950	\$31,140	\$436,279	Dry-Ditch Open-Cut	These crossings are located along steep slopes and would require the installation of bore pits nearly 40 feet deep requiring the excavation of an interim ramp and bench and dramatically increasing the space occupied by the bore pit and spoil pite. The bore pits would need to be located on a steep stope that would require a logistically difficult winching process. The duration of the trenchiese crossing is nearly five times longer than the open-cut process, hereby increasing the noise, asstetical, and other impacts on nearby persons. Returing the trenchiese
		B39a/B46, S-B45	Conventional Bore	339	38	N	54	32	54	N	N	\$59,950	\$3,232	\$1,719,495		and permanently stabilizing this area will reduce the potential for sedimentation and erosion along the hillside.
Huntington	C-039	S-04	Dry-Ditch Open-Cut	79	-	N	54	35	1723	N	N	\$5,995	\$3,257	\$147,043	- Dry-Ditch Open-Cut	This crossing is situated on a long steep slope leading into the resource. The topographical constraints would create an extreme winching system, creating a logistically difficult construction condition and deep bore pits. In addition there is insufficient area to store the bore pit stockpile in the immediate area. Furthermore, the cost to bore is unreasonably high relative to the proposed construction method
			Conventional Bore	79	33	N	54	35	1723	N	N	\$5,995	\$359	\$833,444		
Huntington D-002	S-F36b	Dry-Ditch Open-Cut	38	-	N	27	11	0	N	Y	\$5,995	\$2,761	\$105,977	Dry-Ditch Open-Cut	A trenchless crossing method at this location could not be completed without excavaling a bore pit within a landowner's driveway and blocking access to their home. This situation would continue for several weeks. Accordingly, a trenchless crossing of this resource has been deemed logistically impracticable. Additionally, boring is not "appropriate and practicable" for this crossing of a	
	S-F36b	Conventional Bore	38	26	Ν	27	11	0	N	Y	\$5,995	\$2,761	\$354,101		perennal UNI to Birch Kiver because the temporary impacts to be avoided are minor, especially when considered in light of the significant adverse impacts on the homeowner.	

							luation Factors	Eva					Crossing Methods	USACE District Crossing # Waterbodies Being		
Crossing Method Deci	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ct Crossing #	USACE Distri
-		\$90,270	\$3,874	\$11,990	N	N	188	26	39	N	-	59	Dry-Ditch Open-Cut			
I here are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	 Conventional Bore 	\$365,999	\$3,874	\$11,990	N	N	188	26	39	N	20	59	Conventional Bore	S-B32, W-B30	D-004	Huntington
This section is benefitiated as a data with the section beau time section with the section beautiful to section the section of the		\$118,935	\$3,545	\$11,990	N	N	262	40	52	N	-	112	Dry-Ditch Open-Cut			
This closeling to scaled on a slope line would require dole pins greater that to reace deep which would furthermore, the cost to bore is unreasonably high relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$951,497	\$494	\$11,990	N	N	262	40	52	N	34	112	Conventional Bore	W-B28, S-B29	D-005	Huntington
T		\$72,849	\$3,502	\$11,990	N	N	197	32	35	N	-	50	Dry-Ditch Open-Cut			
This closeling is obtained on a slope that would require done pins that are up reactively minut would dee Furthermore, the time to bore the resources is nearly three times the duration of the open cut and the o	– Dry-Ditch Open-Cu	\$702,465	\$494	\$11,990	N	N	197	32	35	N	30	50	Conventional Bore	S-E50, W-E21	D-006	Huntington
This crossing is located on a slope that would require bore pits that are nearly 30 feet deep which wou		\$75,162	\$3,015	\$11,990	N	N	136	39	49	N	-	54	Dry-Ditch Open-Cut	S.E50 W.E18.PSS W		
Because the pipeline ROW must remain free of woody vegetation, a conversion impact is unavoidable unreasonably high relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$403,214	\$471	\$11,990	N	N	136	39	49	N	26	54	Conventional Bore	E18-PEM	D-007	Huntington
The UNT to Gauley River is approximately one foot in width, creating less than 0.01 acre of temporary		\$32,885	\$3,086	\$5,995	N	N	74	31	44	N	-	29	Dry-Ditch Open-Cut			
feet deep which would create excessive spoil piles, all while being located within an already reduced I unreasonably high relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$326,158	\$359	\$5,995	N	N	74	31	44	N	26	29	Conventional Bore	S-E49	D-008	Huntington
There are no similifeant constraints on available crossion mathods or similifeant anvironmental impar		\$158,062	\$779	\$5,995	N	N	371	27	35	N	-	59	Dry-Ditch Open-Cut			
there due no agginitication constraints of a variable concerning interaction or agginitication in the minimum import use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	 Conventional Bore 	\$420,851	\$779	\$5,995	N	N	371	27	35	N	27	59	Conventional Bore	S-E46	D-010	Huntington
There are no similicant constraints on available conssion methods or similicant environmental impact		\$140,309	\$524	\$17,985	Y	N	0	4	7	N	-	174	Dry-Ditch Open-Cut			
use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$580,828	\$524	\$17,985	Y	N	0	4	7	N	15	174	Conventional Bore	W-F12, W-F13, W-F15	D-011	Huntington
There are no significant constraints on available crossing methods or significant environmental impac		\$122,820	\$1,131	\$11,990	Y	N	0	4	8	N	-	104	Dry-Ditch Open-Cut	0.500 10.544	D. GLO	
use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	- Conventional Bore	\$395,051	\$1,131	\$11,990	Y	N	0	4	8	N	19	104	Conventional Bore	S-F20, W-F11	D-012	Huntington
This crossing is located adjacent to a slope that would require bore pits that are nearly 20 feet deep w	Des Diteb George Cu	\$60,159	\$264	\$5,995	Y	N	32	26	42	N	-	77	Dry-Ditch Open-Cut	W K22	D 012	Unitientee
LCD. Furthermore, the cost to bore is unreasonably high relative to the proposed construction method	Diy-Dich Open-Cu	\$302,300	\$135	\$5,995	Y	N	32	26	42	N	17	77	Conventional Bore	W-K23	D-013	Huntington
The open cut would result in approximately 0.05 acre of temporary impacts to the wetland and stream and 20 feet doop convision the presentation of an interim range and breach and demosterable increases in a	Day Ditch Open Cu	\$53,268	\$3,124	\$11,990	N	N	92	32	54	N	-	37	Dry-Ditch Open-Cut	S.1167 W.1164	D-014	Huntington
user to need usery requiring the excersion of an interim range and certar, and calinatically increasing users in a second se	Diy-Dicit Open-Cu	\$720,379	\$494	\$11,990	N	N	92	32	54	N	33	37	Conventional Bore	3-657, 19-651	5014	Tunungun
This crossing is located on a slope that would require bore pits that are nearly 20 feet deep which wou	– Drv-Ditch Open-Cu	\$39,880	\$285	\$5,995	Y	N	0	17	24	N	-	48	Dry-Ditch Open-Cut	W-LI50	D-015	Huntington
Furthermore, the time to complete the bore is nearly double and the cost to bore is unreasonably high	biy bion open ou	\$229,133	\$135	\$5,995	Y	N	0	17	24	N	19	48	Conventional Bore			
The crossing of this small UNT to Rockcamp Run (less than 10 feet in width) open cut would result in that would require bore pits that are over 40 feet deeo which would create excessive exnin nike; all wh	- Dry-Ditch Open-Cu	\$57,237	\$2,726	\$5,995	N	N	119	45	62	N	-	40	Dry-Ditch Open-Cut	Hunticator D.016 CUT	Huntington	
bore is nearly six times the open cut method and the cost to bore is unreasonably high relative to the	,	\$2,410,783	\$359	\$5,995	N	N	119	45	62	N	42	40	Conventional Bore			

sion Rationale
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
create excessive spoil piles, all while being located within an already reduced LOD.
te excessive spoil piles, all while being located within an already reduced LOD. cost to bore is unreasonably high relative to the proposed construction method.
Id create excessive spoil piles, all while being located within an already reduced LOD. . Furthermore, the time to bore the resources is nearly double and the cost to bore is
impact. This crossing is located on a slope that would require bore pits that are nearly 30 . .OD. Furthermore, the time to bore the resources is nearly double and the cost to bore is
s relevant to the available methods. The direct aquatic impact will be avoided minimized by ccess will be required.
s relevant to the available methods. The direct aquatic impact will be avoided minimized by access will be required.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
nich would create excessive spoil piles, all while being located within an already reduced L
system. This crossing is located adjacent to a slope that would require bore pits that are he space occupied by the bore pit and spoil pile. Furthermore, the cost to bore is
Id create excessive spoil piles, all while being located within an already reduced LOD. relative to the proposed construction method.
less than 0.02 acre of temporary impact. This crossing is located adjacent to a steep slope le being located within an already reduced LOD. Furthermore, the time to complete the roposed construction method.

		Waterbodies Being Crossed	Crossing Methods Evaluated					Eva	luation Factors											
USACE Distric	t Crossing #	Waterbodies Being Crossed	g Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Nethod Crossing Method Decision Rationale Processing of the small PEM system would result in approximately 0.02 acre of temporary impacts. This crossing is located on a slope that would require bore pits that are over 30 feet deep which would create excessive spoil piles, all while being located within an already reduced LOD. Furthermore, the time to complete the bore is nearly double the time of the open cut method and the cost to bore is unreasonably high relative to the proposed construction method.				
Huntington	D-017	W-IJ55	Dry-Ditch Open-Cut	t 49	-	N	40	23	0	N	Y	\$5,995	\$118	\$40,413	- Dry-Ditch Open-Cu	The crossing of the small PEM system would result in approximately 0.02 acre of temporary impacts. This crossing is located on a slope that would require bore pits that are over 30 feet deep which would create excessive spoil piles, all while being located within an already reduced LOD. Furthermore, the time to complete the bore is nearly double the time of the open cut method and				
			Conventional Bore	49	32	N	40	23	0	N	Y	\$5,995	\$118	\$729,794		the cost to bore is unreasonably high relative to the proposed construction method.				
Huntington	D-018	S-1162	Dry-Ditch Open-Cut	t 18	-	N	54	28	74	N	N	\$5,995	\$2,770	\$29,238	– Dry-Ditch Open-Cu	he crossing of this small UNT to Cherry Run (less than 5 feet in width) open cut would result in less than 0.01 acre of temporary impact. This crossing is located adjacent to a steep s rould require bore pits that are nearly 30 feet deep which would create excessive spoil piles, all while being located within an already reduced LOD. Furthermore, the time to complete nearly double the time of the open cut method and the cost to bore is unreasonably high relative to the proposed construction method.				
			Conventional Bore	18	32	N	54	28	74	N	N	\$5,995	\$359	\$642,058						
Huntington	D-019	S-B28, W-B27	Dry-Ditch Open-Cut	t 47	-	N	6	3	0	N	Y	\$11,990	\$1,251	\$83,559	 Conventional Bore 	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/minimized by use of the conventional bore method. A minor temporary impact associated with the bore to maintain access will be required.				
			Conventional Bore	47	18	N	6	3	0	N	Y	\$11,990	\$1,251	\$228,838						
Huntington	D-020	W-FF6-PEM, W-FF6 PSS	Dry-Ditch Open-Cut	t 158	-	N	22	11	0	N	Y	\$5,995	\$430	\$117,025	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/minimized by use of the conventional bore method. A minor temporary impact associated with the bore to maintain access will be required.				
			Conventional Bore	158	19	N	22	11	0	N	Y	\$5,995	\$430	\$541,606						
Huntington	D-021	W-FF3	Dry-Ditch Open-Cut	t 37	-	N	23	11	0	N	Y	\$5,995	\$240	\$32,135	– Dry-Ditch Open-Cu	The crossing of the small PEM system would result in approximately 0.04 acre of temporary impacts. Furthermore, the cost to bore is unreasonably high relative to the proposed constr method.				
			Conventional Bore	37	14	N	23	11	0	N	Y	\$5,995	\$135	\$175,078		method.				
Huntington	D-022	S-J32	Dry-Ditch Open-Cut	t 117	-	N	28	19	10	N	N	\$5,995	\$779	\$214,020	 Conventional Bore 	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/minimized by use of the conventional hore method. A minor temporary impact associated with the hore to maintain access will be required.				
			Conventional Bore	117	23	N	28	19	10	N	N	\$5,995	\$779	\$548,916						
Huntington	D-023	S-A76, W-FF4	Dry-Ditch Open-Cut	t 43	-	N	35	16	21	N	N	\$11,990	\$2,746	\$65,993	– Dry-Ditch Open-Cu	The crossing of the small PEM system and UNT to Big Beaver Creek would result in less than 0.02 acre of temporary impacts. The stream is less than ten feet in width. The bore pits associated with this crossing are 20 feet deep, which may require the use of a ramp and benching thereby creating excessive spoil pites, all while being located within an already reduced LOD.				
			Conventional Bore	43	20	N	35	16	21	N	N	\$11,990	\$379	\$317,096		Furthermore, the cost to bore is unreasonably high relative to the proposed construction method.				
Huntington	D-024	W-A17	Dry-Ditch Open-Cut	t 79	-	N	16	9	0	N	Y	\$5,995	\$702	\$61,997	– Dry-Ditch Open-Cu	The duration of the trenchless crossing would take longer to complete than the open-cut process, thereby increasing the noise, aesthetic, and other impacts on nearby persons. Reducing the time at the crossing and permanently stabilizing this area will reduce the potential for sedimentation and erosion along the hilliside. In addition, the cost to bore is unreasonably high relative to the				
			Conventional Bore	79	15	N	16	9	0	N	Y	\$5,995	\$135	\$298,841		proposed construction method.				
Huntington	D-025	S-A75	Dry-Ditch Open-Cut	t 25	-	N	31	13	0	N	Y	\$5,995	\$2,974	\$56,929	– Dry-Ditch Open-Cu	Stream S-A75 is an UNT to Big Beaver Creek and would have approximately 0.02 acre of temporary impact. The resource is located adjacent to a slope that would require a bore pit exceeding 20 feet. Bore pits of this depth require an interim ramp and benching to successfully reach the required depth. The deep excavation will create an excessive amount of spoil material that will be				
			Conventional Bore	25	22	N	31	13	0	N	Y	\$5,995	\$359	\$278,267		difficult to store within the already reduced LOD. In addition, the cost to bore is unreasonably high relative to the proposed construction method.				
Huntington	D-026	S-A74	Dry-Ditch Open-Cut	t 29	-	N	31	14	0	N	Y	\$5,995	\$2,631	\$40,820	– Dry-Ditch Open-Cu	An open cut crossing would create approximately 0.007 acre of temporary impact. However the resource is located on a slope that would require a bore pit nearing 20 feet. Bore pits of this depth may require an interim ramp and benching to successfully reach the required depth. The deep auxavation will create an excessive amount of spoil material that will be difficult to store				
			Conventional Bore	29	19	N	31	14	0	N	Y	\$5,995	\$359	\$175,435		within the already reduced LOD. In addition, the cost to bore is unreasonably high relative to the proposed construction method.				
Huntington	D-027	S-A73, W-A15	Dry-Ditch Open-Cut	t 59	-	N	18	13	0	N	Y	\$11,990	\$2,910	\$79,372	– Dry-Ditch Open-Cu	The open cut would result in approximately 0.10 acre of temporary impacts to the wetland and stream. This crossing is located on a slope requiring bore pits that are over 20 feet deep which necessitate the use of a ramp and benching, resulting in excessive spol piles, all while being located within an already reduced LOD. Because the pipeline ROW must remain free of woody				
			Conventional Bore	59	23	N	18	13	0	N	Y	\$11,990	\$359	\$389,888		Dry-Ditch Open-Cut necessitate the use of a ramp and benching, resulting in excessive spoil ples, all while being located within an aiready reduced LOD. Because the pipeline RVM must remain free of woody vegetation, a conversion impact to the wetland is unavoidable. Furthermore, the cost to bore is unreasonably high relative to the proposed construction method.				
Huntington	D-028	W-A14, S-A72, S-A7 S-A71-Braid	Dry-Ditch Open-Cut	t 92	-	N	35	25	20	N	N	\$23,980	\$2,322	\$120,509	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/minimized by use of the conventional bore method. A minor temporary impact associated with the bore to maintain access will be required.				
			Conventional Bore	92	22	Ν	35	25	20	N	N	\$23,980	\$2,322	\$488,359	Conventional Bore There are no significant constraints on available crossing methods or significant environmental impacts relevant to the available methods. The direct aquatic impact will be avoided/mill use of the conventional bore method. A minor temporary impact associated with the bore to maintain access will be required.					

								Eva	luation Factors							
USACE Distri	t Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec
			Dry-Ditch Open-Cut	24	-	N	40	27	50	N	N	\$5,995	\$2,690	\$46,203		Crossings D-029 and D-30 are immediately adjacent to each other and have been evaluated in concr brore nit within a landrawner's driveway and blocking access to their home. This situation would contin
Huntington	D-029	S-A67	Conventional Bore	24	23	N	40	27	50	N	N	\$5,995	\$359	\$284,564	Dry-Ditch Open-Cut	deemed logistically impracticable. Additionally, boring is not "appropriate and practicable" for these or temporary impacts to be avoided are minor, especially when considered in light of the significant adve unreasonably high relative to the proposed construction method.
Huntington	D-030	S-A69	Dry-Ditch Open-Cut	53	-	N	30	24	0	N	Y	\$5,995	\$3,435	\$72,316	Dry-Ditch Open-Cut	Crossings D-029 and D-30 are immediately adjacent to each other and have been evaluated in concr bore pit within a landowner is driveway and blocking access to their them. This situation would confin demend togatisation jumparticatals. Acciditionally, bording in on the "propriate and practicately" for these o
			Conventional Bore	53	23	N	30	24	0	N	Y	\$5,995	\$359	\$366,865		temporary impacts to be avoided are minor, especially when considered in agric or the significant adve unreasonably high relative to the proposed construction method.
Huntington	D-031	W-H53, S-H99	Dry-Ditch Open-Cut	37	-	N	24	14	11	N	N	\$11,990	\$3,419	\$55,630	Drv-Ditch Open-Cut	The open cut would result in approximately 0.01 acre of temporary impacts to the wetland and stream LOD. However, the trenchless crossing would require bore pits that are approximately 20 feet deep.
			Conventional Bore	37	20	N	24	14	11	N	N	\$11,990	\$380	\$300,069	, , , , , , , , , , , , , , , , , , , ,	excessive spoil piles that would need to be located within an already reduced LOD. The minimized L high relative to the proposed construction method.
Huntington	D.022	5 405	Dry-Ditch Open-Cut	99	-	N	58	45	441	N	N	\$5,995	\$2,726	\$329,989	Day Ditab On an Out	The crossing of Big Beaver Creek using a trenchless method would require bore pits up to 40-feet d
nuningion	0-032	3-465	Conventional Bore	99	40	N	58	45	441	N	N	\$5,995	\$359	\$2,469,133	Dry-Ditch Open-Cut	but pris and sheep stuples would require excessive excession, the need of significant stock pre-soul is nearly six times the open cut method and the cost to bore is unreasonably high relative to the propr
Livetiantes	B.024	0.115	Dry-Ditch Open-Cut	40		N	39	33	132	N	N	\$5,995	\$771	\$76,781	0	There are no significant constraints on available crossing methods or significant environmental impact
Huntington	D-034	S-N15	Conventional Bore	40	23	N	39	33	132	N	N	\$5,995	\$771	\$330,384	 Conventional Bore 	use of the conventional bore method. A minor temporary impact associated with the bore to maintain
			Dry-Ditch Open-Cut	44	-	N	12	6	0	N	Y	\$5,995	\$1,558	\$72,593		There are an elevificant constraints on queilable proceine motivade or elevificant onviconmental impact
Huntington	D-035	S-N14	Conventional Bore	44	17	N	12	6	0	N	Y	\$5,995	\$1,558	\$210,069	Conventional Bore	There is the lossing mean consistent to invariable clossing memory of significant environmental impart use of the conventional bore method. A minor temporary impact associated with the bore to maintain
			Dry-Ditch Open-Cut	73	-	N	26	16	0	N	Y	\$11,990	\$771	\$100,506		There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain a
Huntington	D-036	S-143, W-17	Conventional Bore	73	20	N	26	16	0	N	Y	\$11,990	\$771	\$402,628	Conventional Bore	
			Dry-Ditch Open-Cut	32	-	N	28	19	0	N	Y	\$5,995	\$779	\$59,061		_
Huntington	D-037	S-144	Conventional Bore	32	19	N	28	19	0	N	Y	\$5,995	\$779	\$184,369	Conventional Bore	I nere are no significant constraints on available crossing memods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain .
			Dry-Ditch Open-Cut	20	-	N	51	21	10	N	N	\$5,995	\$779	\$40,478		
Huntington	D-038	S-145	Conventional Bore	20	19	N	51	21	10	N	N	\$5,995	\$779	\$150,313	Conventional Bore	There is an originitical Constant of transmission and the costing memory of the conventional territorinitema inpact use of the conventional bore method. A minor temporary impact associated with the bore to maintain
			Dry-Ditch Open-Cut	27	-	N	15	12	0	N	Y	\$5,995	\$2,805	\$33,603		Stream S.147 is an INIT in Gauley Priver and is very small a less than five feet in with . The termova
Huntington	D-039	S-147	Conventional Bore	27	14	N	15	12	0	N	Y	\$5,995	\$359	\$146,922	Dry-Ditch Open-Cut	unreasonably high relative to the proposed construction method.
			Dry-Ditch Open-Cut	35	-	N	33	16	41	N	N	\$5,995	\$779	\$66,624		There are no similicant constraints on available crossing methods or similicant environmental impage
Huntington	D-040	S-148	Conventional Bore	35	14	N	33	16	41	N	N	\$5,995	\$779	\$170,046	 Conventional Bore 	use of the conventional bore method. A minor temporary impact associated with the bore to maintain
Hustinates	D-044	C. 100	Dry-Ditch Open-Cut	420	-	N	54	0	1732	N	Y	\$0	\$0	\$1,389,500	Migrot	Mountrie Valley has seensited to the VEEWS that the Annual Processing of the second
riuntington	D-041	5-J29	Microtunnel	420	57	N	54	0	1732	N	Y	\$0	\$0	\$7,309,091	Microtunnel	wournam valley has committed to the USHWS that the Gauley River would be bored to prevent possi

cision Rationale
cert. A trenchless crossing method at this location could not be completed without excavating a nue for several weeks. Accordingly, a trenchless crossing of these resources has been crossings (a small perennial and intermittent UNT to Big Beaver Creek) because the verse impacts on the homeower. Furthermore, the cost to avoid the temporary impacts is
cert. A trenchless crossing method at this location could not be completed without excavaling a nue for several weeks. Accordingly, a trenchless crossing of these resources has been crossing (a small perennial and intermitten LVT to Big Server Creek) because the verse impacts on the homeowner. Furthermore, the cost to avoid the temporary impacts is
m. The stream is extremely small, less than five feet in width and the wetland barely enters the Bore pits of this depth may necessitate the use of a ramp and benching, resulting in LOD is insufficient to stockpile the material. Furthermore, the cost to bore is unreasonably
Keep. The crossing is also located adjacent to a long steep slope. The combination of deep arage, and a using an extensive winching system. Furthermore, the time to complete the bore losed construction method.
acts relevant to the available methods. The direct aquatic impact will be avoided/minimized by n access will be required.
acts relevant to the available methods. The direct aquatic impact will be avoided/minimized by n access will be required.
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acts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
acts relevant to the available methods. The direct aquatic impact will be avoided/minimized by n access will be required.
ary impact associated with an open cut is less than 0.01 acre. The cost to bore is
acts relevant to the available methods. The direct aquatic impact will be avoided/minimized by n access will be required.
sible impacts to potential Candy Darter habitat.

								Eva	luation Factors								
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci	
			Dry-Ditch Open-Cut	87		N	43	27	306	N	N	\$11,990	\$2,770	\$93,265		The open cut would result in approximately 0.06 acre of temporary impacts to the wetland and stream	
Huntington	D-042	W-J8, S-J28	Conventional Bore	87	26	N	43	27	306	N	N	\$11,990	\$359	\$496,756	– Dry-Ditch Open-Cu	which would create excessive spoil piles and require multiple winching equipment, all while being loc vegetation, a conversion impact to the wetland is unavoidable. Furthermore, the time to bore the reso construction method.	
			Dry-Ditch Open-Cut	73	-	N	29	18	0	N	Y	\$5,995	\$2,700	\$78,335		The temporary impact associated with an open cut is less than 0.01 acre. However, the trenchless cr	
Huntington	D-043	S-J25	Conventional Bore	73	21	N	29	18	0	N	Y	\$5,995	\$359	\$405,355	– Dry-Ditch Open-Cu	I may necessitate the use of a ramp and benching, resulting in excessive spoil piles that would need to the material. Furthermore, the cost to bore is unreasonably high relative to the proposed construction	
			Dry-Ditch Open-Cut	73	-	N	31	9	0	N	Y	\$5,995	\$5,381	\$114,622		This area has been subject to frequent flooding from adjacent streams, which previously caused Mou	
Huntington	D-044	S-J24	Conventional Bore	73	17	N	31	9	0	N	Y	\$5,995	\$359	\$291,172	– Dry-Ditch Open-Cu	I ins area nas oeen subject to requiert horong irom adjacent streams, which previously caused Mou unacceptable next for crews and equipment completing shore at this location over an extended duratio minimizes the time construction crews and equipment must be onsite, thereby greatly reducing risks to	
			Dry-Ditch Open-Cut	25	-	N	23	14	0	N	Y	\$5,995	\$3,822	\$30,795		Stream S-J23 is an UNT to Little Laurel Creek and is very small-less than two feet in width. The term receives you would require hore nits that are anonximately 20 feet deen. Bore nits of this death may near	
Huntington	D-045	S-J23-EPH	Conventional Bore	25	17	N	23	14	0	N	Y	\$5,995	\$359	\$154,949	– Dry-Ditch Open-Cu	be located within an already reduced LOD. The minimized LOD is insufficient to stockpile the materia method.	
Unitiantea	D.046	0.000.000.07	Dry-Ditch Open-Cut	58	-	N	23	18	0	N	Y	\$11,990	\$2,980	\$67,366		The trenchless crossing would require bore pits that are approximately 20 feet deep. Bore pits of this	
Huntington	D-046	S-J22, W-J7	Conventional Bore	58	21	N	23	18	0	N	Y	\$11,990	\$359	\$368,781	Dry-Ditch Open-Cu	conversion impact is unavoidable. Furthermore, the cost to bore is unreasonably high relative to the p	
Huntington	D-047	S N10 S N10 Broid	Dry-Ditch Open-Cut	84	-	N	25	18	0	N	Y	\$11,990	\$4,313	\$94,772	Day Ditch Open Cu	The resources are very small (less than five feet in width) UNT to Skelt Run. The trenchless crossing t necessitate the use of a ramp and benching, resulting in excessive spoil piles that would need to be lo	
Tuningeon	5 047	SHETO, SHETO-Blad	Conventional Bore	84	20	N	25	18	0	N	Y	\$11,990	\$718	\$433,793	biy-bitti Oper-Cu	Indecessing the use of a range and perioding, resumply indecessing symphony material. Furthermore, the cost to bore is unreasonably high relative to the proposed construction me	
Huntington	D-048	S-EE1	Dry-Ditch Open-Cut	30	-	N	17	11	0	N	Y	\$5,995	\$771	\$40,638	Convertingel Born	There are no significant constraints on available crossing methods or significant environmental impactors use of the conventional hore method. A minor temocrary immact associated with the hore to maintain a	
			Conventional Bore	30	15	N	17	11	0	N	Y	\$5,995	\$771	\$160,416		use of the conventional bore method. A minor temporary impact associated with the bore to maintain	
Huntington	D-049	S-N13	Dry-Ditch Open-Cut	27	-	N	38	18	0	N	Y	\$5,995	\$3,121	\$35,600	- Dry-Ditch Open-Cu	The stream is a very small (less than five feet in width) UNT to Skelt Run. The trenchless crossing w Inecessitate the use of a ramp and benching, resulting in excessive spoil piles that would need to be lo	
			Conventional Bore	27	18	N	38	18	0	N	Y	\$5,995	\$359	\$165,192		material. Furthermore, the cost to bore is unreasonably high relative to the proposed construction me	
Huntington	D-050	S-L41	Dry-Ditch Open-Cut	88	-	N	77	63	644	N	N	\$5,995	\$2,690	\$140,721	- Dry-Ditch Open-Cu	The crossing of the Jims Creek (S-L41) using a trenchless method would require bore pits that are ne approach. Avoiding/minimizing this minor impact through a conventional bore would require a deep but a technically and individual transfer source and while hain cortexet within an attractive carture of the source of the s	
			Conventional Bore	88	58	N	77	63	644	N	N	\$5,995	\$359	\$3,419,733		a rechindeny and higher and the second	
Huntington	D-051	S-L38	Dry-Ditch Open-Cut	66	-	N	34	29	21	N	N	\$5,995	\$2,447	\$65,143	– Dry-Ditch Open-Cu	Stream S-L38 is an UNT to Riley Branch and is very small - less than five feet in width. The crossing less than 0.01 acre. The tenchless crossing would require bore pits that are approximately 30 feed deen bore nit which would create concessive scoll index is a thoronarbotic settion bat would remite a 1	
			Conventional Bore	66	32	N	34	29	21	N	N	\$5,995	\$359	\$778,281		reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed construction	
Huntington	D-052	S 1 26	Dry-Ditch Open-Cut	28		N	29	21	10	N	N	\$5,995	\$2,641	\$42,986	Day Ditch Open Cur	S-L35 is Riley Branch is less than four feet wide through the project area. Crossing #D-052, 053, and are applicable to all three crossings. Each of these crossings would require a bore pit exceeding 20 for meaning of motivation that much be checkled. The second motivation area with the domb	
Tuttingon	5-032	3-L35	Conventional Bore	28	21	N	29	21	10	N	N	\$5,995	\$359	\$277,646	Diy-Dich Open-Cu	excertain Interest into interest by subclands. The subcess interest is not unly associated with the depin reach depth greater than 20 test. Each of these crossings is also located and a steps spoe- tant in the deep bore pits and limited operating room, the costs to bore these crossings is unneasonably hi	
			Dry-Ditch Open-Cut	h Open-Cut 42	-	N	30	16	0	N	Y	\$5,995	\$3,080	\$55,975		S-L35 is Riley Branch is less than four feet wide through the project area. Crossing #D-052, 053, and on emericity of all three sections. Each of these sections and targets a barrow of the section of t	
Huntington D-053	S-L35	Conventional Bore	42	21	N	30	16	0	N	Y	\$5,995	\$359	\$317,378	Dry-Ditch Open-Cu	are expressions of an enter outcompty. Each ou thread Critising's Would reguine a constraint and the Woold Mick Child executed an anterial that must be solution). The excess material is not only associated with the deph reach depha greater than 20 lest. Each of these crossings is also located neer a steep stope witch to be deep bore pits and limited operating room, the costs to bore these crossings is unreasonably his		

sion Rationale
. This crossing is located on a slope that would require bore pits that are nearly 30 feet deeg ated within an already reduced LOD. Because the pipeline ROW must remain free of woody urces is double and the cost to bore is unreasonably high relative to the proposed
reasing would require bore pits that are approximately 20 feat deep. Bore pits of this depth be located within an already reduced LOD. The minimized LOD is insufficient to stockpile method.
ntain Valley to relocate a mainline valve to a different location. These conditions present an on. Completing this crossing of a small UNT to Little Laurel Creek with an open cut othe safety of the crew, the environment, and the success of the crossing installation.
porary impact associated with an open out is less than 0.01 acre. However, the trenchless sastate the use of a ramp and benching, resulting in excessive spoil piles that would need to it. Furthermore, the cost to bore is unreasonably high relative to the proposed construction
depth may necessitate the use of a ramp and benching, resulting in excessive spoil piles fockpile the material. Because the pipeline ROW must remain free of woody vegetation, a reposed construction method.
would require bore pits that are approximately 20 feet deep. Bore pits of this depth may cated within an already reduced LOD. The minimized LOD is insufficient to stockpile the hod.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
suld require bore pits that are approximately 20 feet deep. Bore pits of this depth may cated within an already reduced LOD. The minimized LOD is insufficient to stockpile the hod.
arly 60 feet deep. In addition, the crossing is at the base of an extremely long and steep one pit which would create excessive spoil piles in a topographical setting that would require ad LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed
is located adjacent to a steep slope. The temporary impact associated with an open cut is eege. Avoiding/minimizing this minor impact through a conventional bore would require a achinicatily and logistically difficult winching system, all while being located within an already in method.
1054 are discussed together since the requirements associated with a trenchless crossing set, with D-054 exceeding 30 feet. Bore pills of this depth result in a significant amount of of the bore, but as the access ramp and associated bening that would be required to aduces the available area to sociapile soils without compromising worker safety. In addition h relative to the proposed construction method.
1054 are discussed together since the requirements associated with a trenchless crossing et, with D-054 exceeding 30 dete. Bore pils of this depth result in a significant amount of of the bore, but also the access rampe and associated benching that would be required to aduces the available area to stockpile soils without compromising worker safety. In addition in relative to the proposed construction method.

								Eva	luation Factors								
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec	
Huntington	D-054	S-1 25	Dry-Ditch Open-Cut	51	-	N	32	25	20	N	N	\$5,995	\$2,746	\$61,941	Dry Ditch Open Cut	S1.35 in Riley Branch is less than four fact wide through the project area. Crossing #D-052.053, and are applicable to all threa costings. Each of these costings would require a born pit exceeding 20 exceeding	
			Conventional Bore	51	33	N	32	25	20	N	N	\$5,995	\$359	\$753,981		reach depths greater than 20 feet. Each of these crossings is also located near a steep slope which to the deep bore pits and limited operating room, the costs to bore these crossings is unreasonably hi	
Huntington	D-055	S-137	Dry-Ditch Open-Cut	36	-	N	38	25	32	N	Y	\$5,995	\$1,403	\$53,948	- Dry-Ditch Open-Cut	This resource is an extremely small UNT to Hominy Creek. The width of the stream is less than 10 fe depth. Avoiding/minimizing this minor impact through a conventional bore would create excessively	
			Conventional Bore	36	20	N	38	25	32	N	Y	\$5,995	\$359	\$291,215		the proposed construction method.	
Huntington	D-056	S-138, S-139	Dry-Ditch Open-Cut	142	-	N	63	45	436	N	N	\$11,990	\$4,011	\$142,986	- Dry-Ditch Open-Cut	Both of these resources are UNT to Hominy Creek and each is less than 10 feet in width. Due to the Avoidingminimizing this minor impact through a conventional bore would require a deep bore pit veluce technically and objectically difficult which any settern all while being Located within an already reduced	
			Conventional Bore	142	47	N	63	45	436	N	N	\$11,990	\$718	\$2,979,338		construction method.	
Huntington	D-057	S-140	Dry-Ditch Open-Cut	24	-	N	59	27	104	N	N	\$5,995	\$2,399	\$47,577	- Dry-Ditch Open-Cut	Stream S-40 is an UNT to Hominy Creek and is very small - less than ten feet in width. The trenchle this minor impact through a conventional bore would require a deep bore pit near a steep slope which	
			Conventional Bore	24	26	N	59	27	104	N	N	\$5,995	\$359	\$311,968		bore is unreasonably high relative to the proposed construction method.	
Huntington	D-058	W-I11a, S-I41	Dry-Ditch Open-Cut	47	-	N	42	10	489	N	Y	\$11,990	\$2,250	\$76,399	Dry-Ditch Open-Cut	D-058 and D-059 are adjacent crossings are discussed together due to their proximity. These crossing and necessitated the development of a unique solution. The access to the location of these crossings	
			Conventional Bore	47	13	N	42	10	489	N	Y	\$11,990	\$494	\$205,245		available for construction equipment and spoil piles necessary to complete a trenchless crossing. A r	
Huntington	D-059	S-136	Dry-Ditch Open-Cut	116	-	Y	16	7	840	N	N	\$5,995	\$2,726	\$288,508	- Dry-Ditch Open-Cut	D-058 and D-059 are adjacent crossings are discussed together due to their proximity. These crossing and necessitated the development of a unique solution. The access to the location of these crossings	
			Conventional Bore	116	26	Y	16	7	840	N	N	\$5,995	\$359	\$573,062		available for construction equipment and spoil piles necessary to complete a trenchless crossing. A r	
Huntington	D-061	S-131	Dry-Ditch Open-Cut	25	-	N	38	32	424	N	N	\$5,995	\$2,560	\$34,569	- Dry-Ditch Open-Cut	The bore pits for this crossing are greater than 20 feet in depth and the crossing is located on a long It require a deep bore pit which would create excessive spoil piles in a topographical setting that would	
			Conventional Bore	25	22	N	38	32	424	N	N	\$5,995	\$359	\$278,267		an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed	
Huntington	E-001	S-H88	Dry-Ditch Open-Cut	37	-	N	45	35	122	N	N	\$5,995	\$2,690	\$175,790	- Dry-Ditch Open-Cut	The bore pits for this crossing are greater than 30 feet in depth and the crossing is located on a steeg deep bore pit which would create excessive spoil piles in a topographical setting that would require a	
			Conventional Bore	37	32	N	45	35	122	N	N	\$5,995	\$359	\$695,980		cut method also minimiazes construction near the landowners private wells.	
Huntington	E-002	S-H71, W-H33, W-H35	Dry-Ditch Open-Cut	150	-	N	75	46	282	N	N	\$17,985	\$3,290	\$178,775	- Dry-Ditch Open-Cut	This group of resources are located adjacent to a steep slope with bore pits to be 80 feet deep. Avoid excessive spoil piles in a topographical setting that would require a technically and logistically difficult	
			Conventional Bore	150	80	Ν	75	46	282	N	N	\$17,985	\$629	\$4,807,948		cost to bore is unreasonably high relative to the proposed construction method.	
Huntington	E-003	S-H67	Dry-Ditch Open-Cut	30	-	N	39	24	31	N	N	\$5,995	\$2,381	\$68,768	- Dry-Ditch Open-Cut	The trenchless crossing would require bore pits that are more than 20 feet deep. Avoiding/minimizing deep hore nit creation excessive social niles in an already reduced I OD. Furthermore, the creat to hore to hore	
			Conventional Bore	30	24	Ν	39	24	31	N	N	\$5,995	\$359	\$310,726		and point prior dating electronic apon prior in a nanody reacced 2.00. To the manual, inclose in don	
Huntington	E-004	S-H64, W-H31	Dry-Ditch Open-Cut	54	-	N	26	10	0	N	Y	\$11,990	\$1,832	\$66,604	Dry-Ditch Open-Cut	The trenchless crossing would require bore pits that are more than 20 feet deep. Avoiding/minimizing deep hore nit creation excessive social niles in an already reduced I OD. Furthermore, the creat to hore to hore	
			Conventional Bore	54	24	N	26	10	0	N	Y	\$11,990	\$434	\$384,908		deep bore pit creating excessive spoil piles in an already reduced LOD. Furthermore, the cost to bo	
Huntington	E-005	S-V3	Dry-Ditch Open-Cut	56	-	N	47	26	342	N	N	\$5,995	\$820	\$247,047	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact top of the consistence box method. A minor torserver international statement of the statem	
Huntington E-00		S-V3	Conventional Bore	56	23	N	47	26	342	N	N	\$5,995	\$820	\$375,840		use or one convenional over meanor. A minor temporary impact associated with the bore to maintain	

sion Rationale
054 are discussed together since the requirements associated with a trenchless crossing et, with D-054 exceeding 30 here. Bore pits of this depth result in a significant amount of the bore, but also the access range and associated borning that would be required to duces the available area to stockpile sold without compromising worker safety. In addition h slative to the proposed construction method.
rt. Due to the location on steep slopes, the bore pits for this stream are nearly 20 feet in seep bore pits and spoil piles. Furthermore the cost to bore is unreasonably high relative to
ocation on steep slopes, the bore pits for this crossing are nearly 50 feet in depth. h would create excessive spoil piles in a topographical setting that would require a LCD. Furthermore, the cost to bore is unreasonably high relative to the proposed
s crossing would require bore pits that are more than 20 feet deep. Avoiding/minimizing would create excessive spoil piles in an already reduced LOD. Furthermore, the cost to
sp present multiple confounding constructability challenges that limit the available options severely limited by long steep slopes, and there is insufficient suitable workspace inor temporary impact associated with the bore to maintain access will be required.
is present multiple confounding constructability challenges that limit the available options is severely limited by long steep slopes, and there is insufficient suitable workspace inor temporary impact associated with the bore to maintain access will be required.
steps steps. Avoiding/minimizing this minor impact through a conventional bore would squire a technically and logistically difficult winching system, all while being located within construction method.
slepe. Avoiding/minimizing this minor impact through a conventional bore would require a difficult winching system, all while being located within an already reduced LOD. The open
ng/minimizing this minor impact through a conventional bore would create extremely winching system, all while being located within an already reduced LOD. Furthermore, the
this minor impact (approximately 0.02 acre) through a conventional bore would require a is unreasonably high relative to the proposed construction method.
this minor impact (approximately 0.03 acre) through a conventional bore would require a is unreasonably high relative to the proposed construction method.
relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.

								Eval	uation Factors								
USACE Distric	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec	
			Dry-Ditch Open-Cut	55	-	N	20	9	0	N	Y	\$11,990	\$2,308	\$58,510		-	
Huntington	E-006	W-EF31, S-EF41	Conventional Bore	55	21	N	20	9	0	N	Y	\$11,990	\$471	\$360,379	Dry-Ditch Open-Cut	bore is unreasonably high relative to the proposed construction method.	
Huntington	E-009	W.M18	Dry-Ditch Open-Cut	223		N	35	10	0	N	Y	\$5,995	\$197	\$162,292	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac	
			Conventional Bore	223	17	Ν	35	10	0	N	Y	\$5,995	\$135	\$716,645		use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	
Huntipaton	E.010	W M22 W M22	Dry-Ditch Open-Cut	86	-	N	26	16	0	N	Y	\$11,990	\$333	\$72,523	Day Ditab On an Out	The trenchless crossing would require bore pits that are nearly 20 feet deep, which may necessitate to	
Huntington	2 010	W-W22, W-W23	Conventional Bore	86	17	N	26	16	0	N	Y	\$11,990	\$270	\$333,971	biy-bitai opari-oat	most remain nee or woody vegesiation, a conversion impactis unarousable. In uniterintitie, the cost of as long to complete.	
Huntington	E-011	W-J6	Dry-Ditch Open-Cut	101	-	N	26	10	o	N	Y	\$5,995	\$0	\$76,695	Drv-Ditch Open-Cut	The trenchless crossing would require bore pits that are nearly 20 feet deep, which may necessitate b	
			Conventional Bore	101	15	N	26	10	o	N	Y	\$5,995	\$0	\$361,141		must remain free of woody vegetation, a conversion impact is unavoidable. Furthermore, the cost to	
Huntington	E-012	S-J20	Dry-Ditch Open-Cut	255	-	N	43	16	327	N	N	\$5,995	\$779	\$305,270	Conventional Bor	FERC has approved the variance for this crossing which will be completed during the boring of the ac	
			Conventional Bore	255	37	N	43	16	327	N	N	\$5,995	\$441	\$1,406,089			
Huntington	E-013	S-125	Dry-Ditch Open-Cut	89	-	N	34	24	10	N	N	\$5,995	\$1,610	\$87,442	Stream S Dry-Ditch Open-Cut this minon high relat	Stream S-125 is an UNT to Meadow Creek and is very small - less than ten feet in width. The trenchit this minor impact through a conventional bore would require a deep bore oit which would create exce	
			Conventional Bore	89	26	N	34	24	10	N	N	\$5,995	\$359	\$496,437		high relative to the proposed construction method.	
Huntington	E-014	S-126	Dry-Ditch Open-Cut	26	-	N	31	20	10	N	N	\$5,995	\$1,552	\$41,373	Dry-Ditch Open-Cut	Stream S-I26 is an UNT to Meadow Creek and is very small - less than ten feet in width. The trenchler ut this minor impact through a conventional bore would require a deep bore pit which would create exces high relative to the proposed construction method.	
			Conventional Bore	26	20	N	31	20	10	N	N	\$5,995	\$359	\$262,835			
Huntington	E-015	S-127	Dry-Ditch Open-Cut	41	-	N	17	13	0	N	Y	\$5,995	\$441	\$53,264	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac use of the conventional bore method. A minor temporary impact associated with the bore to maintain	
			Conventional Bore	41	18	N	17	13	0	N	Y	\$5,995	\$441	\$205,005		access will be required.	
Huntington	E-016	W-HS1	Dry-Ditch Open-Cut	41	-	N	54	33	724	N	N	\$0	\$0	\$28,700	Dry-Ditch Open-Cut	The bore pits for this crossing are greater than 30 feet in depth . Avoiding/minimizing this minor impa slope which would create excessive spoil piles in a topographical setting that would require a technic:	
			Conventional Bore	41	32	N	54	33	724	N	N	\$0	\$0	\$700,977		reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed construction	
Huntington	E-017	W-QR2	Dry-Ditch Open-Cut	322	-	N	10	8	0	N	Y	\$5,995	\$1,315	\$232,710	Dry-Ditch Open-Cut	A trenchless crossing in this location would require bore pits that are nearly thirty feet deep, which ne this minor impact through a conventional bore would create excessive spoil piles in an already reduce	
			Conventional Bore	322	27	N	10	8	0	N	Y	\$5,995	\$135	\$1,166,597	bry bion open ou	construction method.	
Huntington	E-018	S-L26, W-L16	Dry-Ditch Open-Cut	42	-	N	27	9	0	N	Y	\$11,990	\$7,390	\$61,590	Dry-Ditch Open-Cut	This crossing is immediately adjacent to a mainline valve. Trenchless crossing methods are logistical connection to the valve site. An open cut crossing is necessary to facilitate connection to the mainline mell interminent therm and welland work of a uncernanda high divides to the necessor described of the set of	
			Conventional Bore	42	23	N	27	9	0	N	Y	\$11,990	\$492	\$341,776		anan memmuan susam anu welanu wulu be umeasunaby ngi malawa ku ne propused usharusi	
Huntington	E-020	S-L30, W-L19, W-L12, W-L13, S-L22	Dry-Ditch Open-Cut	315	-	N	77	46	1723	N	N	\$29,975	\$6,010	\$361,485	Dry-Ditch Open-Cut	Due to the location on steep slopes, the bore pits for this crossing are greater than sixty leet in depth- require a technically and logistically difficult winching system, all while being located within an afreac construction method and would take nearly 60 days as icon to complete.	
			Conventional Bore	315	62	N	77	46	1723	N	N	\$29,975	\$1,123	\$4,306,881		construction method and would take nearly 60 days as long to complete.	

sion Rationale
tate benching and stockpiling significant amounts of spoil material. Furthermore, the cost to
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
enching and stockpiling significant amounts of spoil material. Because the pipeline ROW one is unneasonably high relative to the proposed construction method and would take twice
enching and stockpiling significant amounts of spoil material. Because the pipeline ROW core is unreasonably high relative to the proposed construction method.
iacent rail line.
ss crossing would require bore pits that are more than 20 feet deep. Avoiding/ininimizing sive spoil piles in an already reduced LOD. Furthermore, the cost to bore is unreasonably
ss crossing would require bore pits that are more than 20 feet deep. Avoiding/minimizing sive spoil piles in an already reduced LOD. Furthermore, the cost to bore is unreasonably
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required. A minor temporary impact associated with the bore to maintain
ct through a conventional bore would require a deep bore pit on an extremely long and steep Ily and logistically difficult winching system, all while being located within an already n method.
essitates the use of a bench and interim ramp to access the bore pit. Avoiding/minimizing d LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed
y difficult because they would require the pipe to be installed too deeply to facilitate valve. Furthermore, using a conventional bore method to avoid a temporary impact to this in method.
which would create extremely excessive spoil piles in a topographical setting that would reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed

								Eva	luation Factors								
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec	
			Dry-Ditch Open-Cut	53	-	N	76	43	765	N	N	\$11,990	\$3,503	\$70,190		Due to the location, the bore pits for this crossing are greater than thirty feet in depth. Avoiding/minim	
Huntington	E-021	W-L11, S-L20	Conventional Bore	53	31	N	76	43	765	N	N	\$11,990	\$464	\$729,218	– Dry-Ditch Open-Cu	I a deep bore pit which would create excessive spoil piles in a topographical setting that would require already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed co	
Huntington	E-022	W-L4, S-L10, S-L11, W	Dry-Ditch Open-Cut	92	-	N	32	20	0	N	Y	\$17,985	\$4,988	\$108,512	- Dry-Ditch Open-Cu	A tranchless crossing in this location would require bore pits that are greater than twenty feel deep, wh t Avading/mnimizing this minor impact through a conventional bore would create excessive spoil piles the proposed construction method.	
			Conventional Bore	92	25	N	32	20	0	N	Y	\$17,985	\$988	\$508,435			
Huntington	E-023	S-I21, S-I22	Dry-Ditch Open-Cut	70	-	N	37	28	249	N	N	\$11,990	\$7,084	\$86,067	– Dry-Ditch Open-Cu	A trenchless crossing in this location would require bore pits that are greater than twenty feet deep, w Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil piles	
			Conventional Bore	70	28	N	37	28	249	N	N	\$11,990	\$718	\$467,138		the proposed construction method.	
Huntington	F-001	W-K7, S-K17, W-U30, W-UV9, W-UV11, W- UV10, W-K9-PEM-1, S-	Dry-Ditch Open-Cut	1168		N	28	20	92	N	Y	\$47,960	\$10,426	\$945,986	– Dry-Ditch Open-Cu	A tranchless crossing in this location would require bore pits that are nearly twenty feet deep. Numer minor impact through a conventional bore would create excessive spoil piles in an already reduced L/ proposed method would take approximately 24 days to complete – compounding the noise, assthetic	
		K19	Direct Pipe	1168	15	N	28	20	92	N	Y	\$47,960	\$1,169	\$9,461,639		relative to the proposed construction method.	
Huntington	F-002	S-K21, S-K22	Dry-Ditch Open-Cut	123		N	78	32	185	N	N	\$11,990	\$5,044	\$142,190	- Dry-Ditch Open-Cu	The open cut method would result in a temporary impact to two small UNTs to Buffalo Creek. Avoidin deep bore pit greater than 40 text at the edge of a steep slope, thereby requiring the exavation of an pit and spoil pice. Using a conventional bore crossing method to avoid/minume this minor temporary	
			Conventional Bore	123	48	N	78	32	185	N	N	\$11,990	\$718	\$2,979,962			
Huntington	F-003	S-UV6, W-UV4	Dry-Ditch Open-Cut	70		N	49	27	52	N	N	\$11,990	\$3,115	\$90,966	Dry-Ditch Open-Cu	A trenchless crossing of this small UNT to Morris Fork and wellands system would require bore pits it access the bore pit. Avoiding/minimizing this minor impact through a conventional bore would create free of woody vegetation, a conversion impact is unavoidable. Furthermore, the cost to bore is unrease the of woody vegetation, and the second seco	
			Conventional Bore	70	27	N	49	27	52	N	N	\$11,990	\$359	\$457,645			
Huntington	5.004	W 10/0 C 10/2	Dry-Ditch Open-Cut	345		N	65	52	371	N	N	\$11,990	\$5,768	\$308,374	Day Dist Orac Cu	This crossing of a small UNT to Morris Fork presents multiple challenges that limit the available option would required the excavation of an interim ramp and bench and dramatically increases the space to waterbody also increase the comprisity of a board crossing, increase safely risk to persone, and ad	
Tuningen	1.004	W-000, 3-002	Guided Conventional Bore	345	36	N	65	52	371	N	N	\$11,990	\$494	\$1,182,302	- Diy-Dich Open-Cu	in close proximity to residences, and a trenchless crossing of this location would take longer than six, persons. The open-cut method reduces construction duration thereity minimizing the disruption the to been deemed logistically difficult due to the compounding constructability constraints.	
			Dry-Ditch Open-Cut	593	-	N	52	35	293	N	Y	\$5,995	\$2,805	\$470,600		This crossing presents multiple challenges that limit the available options and necessitated the devel Interstate-64 makes it difficult to tie-in a bore of this resource. A bore pit depth nearing 40 feet at the water scare occuried they the hore rai and ano initie. Stens chares (mater than 30%) adapted to the two terms of the state the sterm of the state of the sta	
Huntington	F-004A	S-U22	Guided Conventional Bore	593	37	N	52	35	293	N	Y	\$5,995	\$359	\$1,562,575	– Dry-Ditch Open-Cu	adds risk of impact to the waterbody from upland work during a bore. A trenchless crossing would tak construction duration and minimize noise and other disruptions to nearby persons due to construction difficult due to the compounding constructability constraints.	
	5.005		Dry-Ditch Open-Cut	154	-	N	19	12	0	N	Y	\$11,990	\$5,048	\$137,755		A trenchless crossing of this small UNT to Red Spring Branch and wetland system would require bor	
Huntington	F-005	W-EE4, S-EE4	Conventional Bore	154	32	N	19	12	0	N	Y	\$11,990	\$494	\$1,034,154	- Dry-Ditch Open-Cu	Laccess the bore pit. Avoiding/minimizing this minor impact through a conventional bore would create unreasonably high relative to the proposed construction method.	
Huntington	F-006	S-M6, W-M2	Dry-Ditch Open-Cut	163	-	N	47	32	51	N	N	\$11,990	\$4,431	\$146,735	– Dry-Ditch Open-Cu	A trenchless crossing of this small UNT to Red Spring Branch and wetland system would require bor to access the bore pit. Avoiding/minimizing this minor impact through a conventional bore would crea	
			Conventional Bore	163	38	N	47	32	51	N	N	\$11,990	\$494	\$1,169,312		unreasonably high relative to the proposed construction method and would also take three times as lo	
Unitiatia	5 007		Dry-Ditch Open-Cut	37	-	N	25	15	0	N	Y	\$5,995	\$3,226	\$52,621		S-113 is an UNT to Patarizon Creek, a very small stream, and is crossed three times by the project. with a timochiese crossion are analizable to all time crossions. Fields of these presidence would convin	
Huntington F-007	S-J13	S-J13 -	Conventional Bore	37	22	N	25	15	0	N	Y	\$5,995	\$359	\$312,323	ory-bitch Open-Cu	Logan reson or a significant entroum u excersion material that must be stocpted. The brocks matter benching that would be required to each depths greater than 20 text. Crossing F-009 is in a topogr addition to the deep bore pits and limited operating room, the costs to bore these crossings is unrease.	

ision Rationale
izing his minor impact (approximately 0.03 acre) through a conventional bore would require a technically and logistically difficult winching system, all while being located within an nstruction method.
hich necessitates the use of a bench and interim ramp to access the bore pit. in an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to
hich necessitates the use of a bench and interim ramp to access the bore pit. in an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to
us cultural resources have been avoided by the current alignment. Avoiding/minimizing this Do. The trenchless crossing method would take nearly 160 days to complete, while the and other impacts on nearby persons. Furthermore, the cost to bore is unreasonably high
griminizing this minor impact through a conventional bore would require an excessively interim ramp and two benches and dramatically increasing the space occupied by the bore impact would be unreasonably expensive and would take twice as long to complete.
nat are nearly thirty feet deep, which necessitates the use of a bench and interim ramp to excessive spoil piles in an already reduced LOD. Because the pipeline ROW must remain onably high relative to the proposed construction method.
ns and necessitate the development of a unique solution. A bore pit depth just short of 40 feet cupied by the bore pit and spool pile. Steep adopes (greater than 30%) adjacent to this drisk of impact to the waterbody from upland work during a bore. In addicen, this rocsening is weeks to complete – compounding the noise, aesthetic, and other impacts on nearby iffected residences and businesses. Accordingly, a trenchless crossing of this resource has
opment of a site-specific solution. The proximity of this stream to the adjacent hore of occition requires the excavation of an interim ramp and banch and dramatically increases the ody increases the complexity of this crossing if bored, increases safety risk to personnel, and more than aix weeks to be complexed. Use of the oper-un method would reduce the activities. Accordingly, a trenchless crossing of this resource has been deemed logistically
a pits greater than thirty feet deep, which necessitates the use of a bench and interim ramp to excessive spoil piles in an already reduced LOD. Furthermore, the cost to bore is
a pits that are nearly forty feet deep, which necessitates the use of a bench and interim ramp te excessive spoil piles in an already reduced LOD. Furthermore, the cost to bore is ng to complete.
Crossing # F-007, 008, and 009 are discussed together since the requirements associated a bore pit exceeding 20 feet, with F-009 being nearly thirty feet deep. Eore pits of this all ont only associated with the depth of the bore, but sho the access ranges and associated phical setting that would require a technically and logistically difficult winching system. In nubly high relative to the proposed construction method.

								Eva	aluation Factors								
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	e Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec	
			Dry-Ditch Open-Cut	45	-	N	32	21	21	N	Y	\$5,995	\$3,366	\$58,361		S-J13 is an UNT to Patterson Creek, a very small stream, and is crossed three times by the project. with a trenchless crossing are applicable to all three crossings. Each of these crossings would require	
Huntington	F-008	S-J13	Conventional Bore	45	21	N	32	21	21	N	Y	\$5,995	\$359	\$325,892	– Dry-Ditch Open-Cut	benching that would be required to reach depths greater than 20 feet. Crossing F-000 is in a topogra addition to the deep bore pits and limited operating room, the costs to bore these crossings is unreaso	
			Dry-Ditch Open-Cut	75	-	N	42	34	419	N	Y	\$5,995	\$4,348	\$80,343		S-J13 is an UNT to Patterson Creek, a very small stream, and is crossed three times by the project.	
Huntington	F-009	S-J13	Conventional Bore	75	27	N	42	34	419	N	Y	\$5,995	\$359	\$465,839	- Dry-Ditch Open-Cut	I depth result in a significant amount d excavated material that must be stockpiled. The excess materin benching that would be required to exact depth organicat than 20 text. Crossing F-009 is na topogra addition to the deep bore pits and limited operating room, the costs to bore these crossings is unreasc	
Huntington	F-010	S-I17	Dry-Ditch Open-Cut	43	-	N	56	44	1538	N	N	\$5,995	\$2,735	\$47,585	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small UNT to Lick Creek. The crossing forty feet. Avoiding/minimizing this minor impact through a conventional bore would require a deep ta technically and logisatily afficiativening system, all while being located within an arteady reduce the convention of the state	
			Conventional Bore	43	31	N	56	44	1538	N	N	\$5,995	\$359	\$694,738		impact would be unreasonably expensive and would take twice as long to complete.	
Huntington	F-011	S-I19	Dry-Ditch Open-Cut	66	-	N	50	36	1200	N	N	\$5,995	\$2,726	\$110,390	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to Lick Creek. The crossing is located at the Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil piles system, all while being located within an already reduced LOD. Using a conventional bore crossing re	
			Conventional Bore	66	44	N	50	36	1200	N	N	\$5,995	\$359	\$2,593,661		wourd take twice as long to complete.	
Huntington	F-011A	S-120	Dry-Ditch Open-Cut	39	-	N	78	57	735	N	N	\$5,995	\$5,971	\$87,966	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small UNT to Lick Creek. The crossing feet deep. Avoiding/minimizing this minor impact through a conventional bore would require a deep require a technically and logistically difficult winching system, all while being located within an alread	
			Conventional Bore	39	35	N	78	57	735	N	N	\$5,995	\$359	\$756,464		temporary impact would be unreasonably expensive and would take twice as long to complete.	
Huntington	F-012	S-N5	Dry-Ditch Open-Cut	63	-	N	33	24	10	N	N	\$5,995	\$3,080	\$61,301	- Dry-Ditch Open-Cut	A trenchless crossing of this small UNT to Hungard Creek would require bore pits greater than 20 fee Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil piles the proposed construction method.	
			Conventional Bore	63	24	N	33	24	10	N	N	\$5,995	\$359	\$404,380			
Huntington	F-013	S-K14	Dry-Ditch Open-Cut	35	-	N	40	34	252	N	N	\$5,995	\$3,401	\$53,560	- Dry-Ditch Open-Cut	A trenchless crossing of this small UNT to Hungard Creek would require bore pits greater than twenty Cut Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil piles the crossed construction method.	
			Conventional Bore	35	22	N	40	34	252	N	N	\$5,995	\$359	\$306,647			
Huntington	F-014	S-N3	Dry-Ditch Open-Cut	106	-	N	6	3	0	N	Y	\$5,995	\$771	\$104,688	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	
			Conventional Bore	106	15	N	6	3	0	N	Y	\$5,995	\$771	\$376,103			
Huntington	F-015	S-N2	Dry-Ditch Open-Cut	48	-	N	36	10	0	N	Y	\$5,995	\$787	\$114,014	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac use of the conventional bore method. A minor temporary impact associated with the bore to maintain	
			Conventional Bore	48	15	N	36	10	0	N	Y	\$5,995	\$787	\$211,516			
Huntington	F-016	S-CD23	Dry-Ditch Open-Cut	128	-	N	8	3	0	N	Y	\$5,995	\$784	\$105,129	- Conventional Bore	This crossing is adjacent to planned bored, which will allow the existing bore pits to be utilized to avoi associated with the bore to maintain access will be required.	
			Conventional Bore	128	15	N	8	3	0	N	Y	\$5,995	\$784	\$438,551			
Huntington	F-017	S-N4, W-EF40	Conventional Bore	99	- 16	N	9	4	0	N	Y	\$11,990	\$1,264	\$367,292	- Conventional Bore	There are no significant constraints on available crossing methods or significant anvironmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain	
			Dry-Ditch Open-Cut	208	-	N	46	0	0	N	Y	\$5,995	\$2,655	\$308,250		The nineline has already been installed under an adiacent read (East Cluster, Drit. Thus: t14.	
Huntington	F-019	S-M3, S-KL29	Conventional Bore	208	35	N	46	0	0	N	Y	\$5,995	\$359	\$1,236,083	Dry-Ditch Open-Cut	crossing. A tranchless crossing would require bore pits prate than 30 teach only on row. There is 10 teaching and lost time (four weeks to complete bore) to avoid a temporary impact to this resource.	
L	I	1	1		1	1		1	1		1	1	1	1	1		

sion Rationale
Crossing # F-007, 008, and 009 are discussed together since the requirements associated a bore pit exceeding 20 feet, with F-000 being nearly thinty feet deep. Bore pits of this is not only associated with the depth the bore, but also the access range and associated phical setting that would require a technically and logistically difficult winching system. In nably high relative to the proposed construction method.
Crossing # F-007, 008, and 009 are discussed together since the requirements associated a bore pit exceeding 20 feet, with F-000 being nearly thirty feet deep. Bore pits of his is no cork associated with the depth the bore, but also the access range and associated phical setting that would require a technically and logistically difficult winching system. In nably high relative to the proposed construction method.
is located at the base of an extremely long and steep slope and require bore pits exceeding ve pit which would create excessive spoil piles in a topographical setting that would require ad LOD. Using a conventional bore crossing method to avoid/minimize this minor temporary
base of an extremely long and steep slope and require bore pits exceeding forty feet. in a topographical setting that would require a technically and logistically difficult winching nethod to avoid/minimize this minor temporary impact would be unreasonably expensive and
is located on an extremely long and steep slope and require bore pits that are nearly forty ore pit on which would create excessive spoil piles in a topographical setting that would reduced LOD. Using a conventional bore crossing method to avoid/minimize this minor
deep, which necessitates the use of a bench and interim ramp to access the bore pit. In an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to
feet deep, which necessitates the use of a bench and interim ramp to access the bore pit. In an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
Iminimize the aquatic impact at this location by boring. A minor temporary impact
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
e way to fe the two sections of pipe together if a trenchless method is used to install this the use of a bench and interim access to the bore pit. Lastly, substantial increase in cost

							luation Factors	Fva								
Crossing Method Dec	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ct Crossing #	USACE Dist
		\$14,126	\$2,836	\$11,990	Y	N	0	0	0	N	-	0	Dry-Ditch Open-Cut			
Crossing these resources requires the pipeline to negotiate a bend that cannot be completed with an	– Dry-Ditch Open-Cu	\$12,349	\$359	\$11,990	Y	N	0	0	0	N	0	0	Conventional Bore	W-MM20-PFO, S-CV17	F-020	Huntington
The Greenbrier River will be crossed using the Direct Pipe trenchless methodology. The stream deg workspace in an already reduced LOD. The Greenbrier River is also classified by the WVDNR as G	Direct Pipe	\$2,287,563	\$0	\$0	Y	N	0	3	9	Y	-	1250	Dry-Ditch Open-Cut	S-18	F-021	Huntingtor
completing a trenchless crossing will further minimize any potential impacts to mussel species.		\$10,059,375	\$0	\$0	Y	N	0	3	9	Y	13	1250	Direct Pipe			
There are no significant constraints on available crossing methods or significant environmental impa- use of the conventional bore method. A minor temporary impact associated with he bore to maintain	 Conventional Bore 	\$132,628	\$2,228	\$5,995	Y	N	0	6	14	N	-	91	Dry-Ditch Open-Cut	S-19	F-022	Huntington
		\$348,691	\$2,228	\$5,995	Y	N	0	6	14	N	18	91	Conventional Bore			
A trenchless crossing of this small UNT to Greenbrier River would require bore pits greater than thirty Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil pilet the processed construction method.	– Dry-Ditch Open-Cu	\$60,096	\$2,726	\$5,995	N	N	293	33	42	N	-	30	Dry-Ditch Open-Cut	S-L4	F-023	Huntington
		\$694,383	\$359	\$5,995	N	N	293	33	42	N	33	30	Conventional Bore			
A trenchless crossing of this small UNT to Greenbrier River would require bore pits greater that are n bore pit. Avoiding minimizing this minor impact through a conventional bore would create excessive s relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$50,935	\$2,228	\$5,995	N	N	105	35	37	N	-	41	Dry-Ditch Open-Cut	S-L2	F-024	Huntington
		\$387,617	\$359	\$5,995	N	N	105	35	37	N	29	41	Conventional Bore			
A trenchless crossing of this small wetland and small UNT to Kelly Creek would require bore pits gre the bore pit. Avoiding/iminimizing this minor impact through a conventional bore would create excessi relative to the proposed construction method.	– Dry-Ditch Open-Cu	\$63,759	\$2,766	\$11,990	N	N	146	41	60	N	-	40	Dry-Ditch Open-Cut	W-K2-PEM, S-L1	F-025	Huntingtor
		\$710,564	\$435	\$11,990	N	N	146	41	60	N	32	40	Conventional Bore			
This crossing presents multiple challenges that limit the available options and necessitated the devel an interim ramp and bench and increases the space occupied by the bore pit and spoil pile. Sheep si crossing, increase safety risk to personnel, and add risk of impact to the waterbody from upland work method reduces the construction duration near the well/spring.	– Dry-Ditch Open-Cu	\$110,424	\$3,646	\$5,995	N	N	240	57	82	N	- 24	42	Dry-Ditch Open-Cut	S-J5	F-026	Huntington
		\$344,702	\$305	\$5,555	N	N	172	34	47	N	24	30	Dev Diteb Once Cut			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$178.273	\$359	\$5,995	N	N	173	34	47	N	- 19	30	Conventional Bore	S-J4	F-027	Huntington
		\$99,316	\$3,495	\$11,990	N	N	228	25	72	N	-	104	Dry-Ditch Open-Cut			
The pipeline is already installed through a portion of the wetland at this crossing. The layout of a con- diadtionarily, architesise method outle require excavation of a bore pit whin the wetland, meaning much shorter duration impact associated with an open cut through the wetland and adjacent stream, to the proposed construction method, especially in light of the fact that boring does not materially avo	Dry-Ditch Open-Cu	\$394,414	\$494	\$11,990	N	N	228	25	72	N	19	104	Conventional Bore	W-OP1-PEM, S-OP1	F-028	Huntington
A tranchiless mossion in this area would require hore bits that are pearly 20 feet deen. Avaiding/min		\$587,943	\$9,563	\$23,980	Y	N	0	9	20	N	-	742	Dry-Ditch Open-Cut			
already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to the proposed co longer to complete than the proposed construction method – compounding the noise, aesthetic, and stabilizing this area will reduce the potential for sedimentation and erosion along the hillside.	– Dry-Ditch Open-Cu	\$6,029,702	\$1,212	\$23,980	Y	N	0	9	20	N	15	742	Direct Pipe	S-A63, W-A13, S-A61, S-A60	F-029-030	Huntington
This crossing presents multiple challenges that limit the available options and necessitated the devel		\$293,083	\$2,655	\$5,995	N	N	99	42	55	N	-	81	Dry-Ditch Open-Cut			
an interim ramp and bench and dramatically increase the space occupied by the bore pit and spoil pit crossing, increases stafty risk to personnel, and adds risk of impact to the waterbody from upland we businesses, which would cause increased noise and other impacts to persons nearby for the approxi- method would reduce construction duration and minimize disruptions to persons due to construction	– Dry-Ditch Open-Cu	\$930,467	\$359	\$5,995	N	N	99	42	55	N	38	81	Conventional Bore	S-D31	F-031	Huntington
		\$43,045	\$618	\$5,995	Y	N	74	11	23	N	-	32	Dry-Ditch Open-Cut			
There are no significant constraints on available crossing methods or significant environmental impar use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$184,208	\$618	\$5,995	Y	N	74	11	23	N	19	32	Conventional Bore	S-D25	F-032	Huntington
		\$45,923	\$3,479	\$11,990	N	Y	10	25	32	N	-	31	Dry-Ditch Open-Cut			
use containons do not allow sufficient space to stockpile spoils from bore pils. Karst terrain increases impact to this small stream with a conventional bore crossing would be unreasonably expensive.	Dry-Ditch Open-Cu	\$338,188	\$718	\$11,990	N	Y	10	25	32	N	26	31	Conventional Bore	S-Z5, S-Z4	F-034	Huntington
							1			1	1			1	1	· · · · · · · · · · · · · · · · · · ·

sion Rationale
available trenchless crossing technology.
h would require an instream diversion system that would severely limit the amount of usable up 1 mussel stream. While mussel survey and relocation efforts were completed in 2020,
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
feet deep, which necessitates the use of a bench and interim ramp to access the bore pit, In an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to
arly 30 feet deep, which necessitates the use of a bench and interim ramp to access the oil piles in an already reduced LOD. Furthermore, the cost to bore is unreasonably high
ter than thiny feet deep, which necessitates the use of a bench and interim ramp to access a spoil piles in an already reduced LOD. Furthermore, the cost to bore is unreasonably high
pment of a unique solution. A bore pit depth greater than 20 feet requires the excavation of ose (greater than 30%) adjacent to these waterbodies increase the complexity of a bored furing a bore. In addition, this crossing is on a property with a well or spring. The open cut
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
entional bore would require excavation of a bore pit unacceptably close to the installed pipe. That that a longer-duration bore pit in the wetland is not less environmentally damaging than a asaly, the cost to avoid a temporary impact to these resources is unreasonably high relative or minimize the impact at this location.
nizing this minor impact through a conventional bore would create excessive spoil piles in an struction method. A trenchess crossing of this area would take approximately three times their impacts on nearby persons. Reducing the time at the crossing and permanently
pment of a unique solution. A bore pit depth of nearly 40 feet will require the excavation of Steep alogue (greater than 30%) adjacent to steem increases the complexity of a bored it watming a took. In addition, this costant is in does provide to readences and addition, the costant is in does provide to readence and the steep of the steep
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
ne risk of bore failure and environmental impact. Furthermore, avoiding this temporary

								Eva	luation Factors							
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec
		W-MN15 W-MN14 S-	Dry-Ditch Open-Cut	88	-	N	51	33	191	N	N	\$17,985	\$2,873	\$106,966		A trenchless crossing of these small wellands and small UNT to Hans Creek would require bore pits to bore nit. Auridion/minimizing this minor impact through a consensional bore would create excession a
Huntington	F-035	MN2	Conventional Bore	88	20	N	51	33	191	N	N	\$17,985	\$608	\$451,029	- Dry-Ditch Open-Cut	vertailive to the proposed construction method. The proposed crossing method is also shorter in durat time at the crossing and permanently stabilizing this area will reduce the potential for sedimentation a
Huntington	F-036	S-CV19	Dry-Ditch Open-Cut	84	-	N	53	28	536	N	N	\$5,995	\$2,841	\$157,408	- Dry-Ditch Open-Cut	This crossing presents multiple challenges that limit the available options and necessitated the devel an interim ramp and bench and dramatically increase the space occupied by the bore pit and spoil pil crossing, increases safely risk to personnel, and adds risk of impact to the waterbody from upland wo limit on a winching system further increasing the worker askly risk. Furthermore, the cost to bore is u
			Conventional Bore	84	33	N	53	28	536	N	N	\$5,995	\$359	\$847,634		method is also shorter in duration, which reduces the noise, aesthetic, and other impacts on nearly p the potential for sedimentation and erosion along the hillside. Accordingly, a trenchless crossing of th constraints.
Huntington	5.027	S-MN39, S-MN40, S- MN38, S-MN37, W-	Dry-Ditch Open-Cut	180	-	N	64	54	254	N	N	\$41,965	\$8,442	\$190,407	Day Ditch Open Cut	This crossing presents multiple challenges that limit the available options and necessitated the devel deep bore pit (38 leet) at the bottom of a steep hill that would require winched equipment. There is ins
Tunington	1-037	MN18-PFO, W-MN18- PEM	Conventional Bore	180	38	N	64	54	254	N	N	\$41,965	\$1,454	\$1,248,492	Dry-Dich Open-Cut	Avoiding/minimize impacts to this cluster of small aquatic resources would require an extended consti associated with completed the crossing. Lastly, the cost to avoid a temporary impact to these resource
Huntington	F-038	S-G44	Dry-Ditch Open-Cut	34	-	N	30	23	0	N	Y	\$5,995	\$2,272	\$47,136	- Dry-Ditch Open-Cut	A tranchless crossing of this small UNT to Hans Creek would require bore pits that are greater than 2 Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil piles
			Conventional Bore	34	24	N	30	23	o	N	Y	\$5,995	\$359	\$322,078		the proposed construction method. The proposed crossing method is shorter in duration, which redu crossing and permanently stabilizing this area will reduce the potential for sedimentation and erosion
Huntington	F-039	S-G43, W-MN1	Dry-Ditch Open-Cut	52	-	N	40	27	73	N	N	\$11,990	\$882	\$69,291	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact of the second of the seco
			Conventional Bore	52	19	N	40	27	73	N	N	\$11,990	\$882	\$247,226		use o ne convenional doe menco. A minor temporary impact associated with the doe to maintain a
Huntington	F-040	W-G6, S-G42	Dry-Ditch Open-Cut	83	-	N	61	51	312	N	N	\$11,990	\$2,351	\$83,363	- Dry-Ditch Open-Cut	A trenchless crossing of this small welland and UNT to Hans Creek would require bore pits that are g access the bore pit. Avoiding/minimizing this minor impact through a conventional bore would create unreascrable bind healties to the concessed construction matchot. The surrowset method is a
			Conventional Bore	83	34	N	61	51	312	N	N	\$11,990	\$494	\$869,196		encountery high statutes to any proposed construction methods. This proposed a string method to be persons. Reducing the time at the crossing and permanently stabilizing this area will reduce the pote
Huntington	F-041	S-MN45, W-MN24	Dry-Ditch Open-Cut	42	-	N	45	33	342	N	N	\$11,990	\$2,405	\$50,859	Dry-Ditch Open-Cut	A trenchless crossing of this small wetland and UNT to Hans Creek would require bore pits that are th in addition the crossing is located at the bottom of a long, steep slope, further complicating construction would create excessive spoil piles in an already reduced LOD. Furthermore, the cost to bore is unrea
			Conventional Bore	42	30	N	45	33	342	N	N	\$11,990	\$413	\$679,680		is also shorter in duration, which reduces the nose, aesthetic, and other impacts on nearby persons. potential for sedimentation and erosion along the hillside.
Huntington	F-042	W-CV25-PEM-2, W- CV25-PSS-1, S-CV27	Dry-Ditch Open-Cut	50	-	N	27	13	0	N	Y	\$11,990	\$1,090	\$53,330	- Dry-Ditch Open-Cut	A trenchless crossing of these small wetlands and UNT to Hans Creek would require bore pits that an access the bore pit. Avoiding/minimizing this minor impact through a conventional bore would create unreasonably high relative to the proposed construction method. The proposed crossing method is a
			Conventional Bore	50	20	N	27	13	0	N	Y	\$11,990	\$467	\$337,050		Reducing the time at the crossing and permanently stabilizing this area will reduce the potential for se
Huntington	F-043	S-E43, S-E45	Dry-Ditch Open-Cut	42	-	N	34	30	210	Y	N	\$11,990	\$7,013	\$77,271	- Dry-Ditch Open-Cut	Site conditions do not allow sufficient space to stockpile spoils from bore pits. Karst terrain presents g small stream with a conventional bore crossing would be unreasonably expensive.
			Conventional Bore	42	28	N	34	30	210	Y	N	\$11,990	\$718	\$387,675		
Huntington	F-044	W-E12, S-E40, S-E41	Dry-Ditch Open-Cut	48	-	N	41	25	295	Y	N	\$17,985	\$3,731	\$100,368	- Dry-Ditch Open-Cut	Site conditions reduce the available space to stockpile spoils from bore pits. Karst terrain presents gree
			Conventional Bore	48	14	N	41	25	295	Y	N	\$17,985	\$740	\$218,891		
Huntington	F-045	W-C14, W-C13, S-C38, S-C39	Dry-Ditch Open-Cut	181	-	N	31	19	10	N	Y	\$23,980	\$1,952	\$177,735	- Dry-Ditch Open-Cut	A trenchless crossing of these small wetlands and Painters Run would require bore pits that are appro the bore pit. Avoiding/minimizing this minor impact through a conventional bore would create excessi and technical challenges. Furthermore, the cost to bore is unreasonably high relative to the proposed vioration (nearly half), which reduces the noise, easthetic, and other impacts on nearby presons. Red
			Conventional Bore	181	29	N	31	19	10	N	Y	\$23,980	\$988	\$803,549		for sedimentation and erosion along the hillside.
Huntington	F-046	S-C41	Dry-Ditch Open-Cut	72	-	N	56	46	295	N	N	\$5,995	\$3,901	\$71,057	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to this small UNT to Painters Run. The cros this minor impact through a conventional bowuld require a deep bore pit which would create serve conventional bore crossing method to avoid/minimize this minor temporary impact would be unreason
			Conventional Bore	72	29	Ν	56	46	295	N	N	\$5,995	\$359	\$475,595		

sion Rationale
hat are 20 feet deep, which necessitates the use of a bench and interim ramp to access the poli piles in an already reduced LOD. Furthermore, the cost to bore is unreasonably high on, which reduces the noise, aesthetic, and other impacts on nearby persons. Reducing the nd erosion along the hillside.
pment of a unique solution. A bore pit depth of nearly 30 feet will require the excavation of a. Steep slopes (greater than 30%) adjacent to stream increases the complexity of a bored ik during a bore. In addition, the topographical constraints oreate a technical and logistical resonably high results to the proposed construction method. The proposed consing errors. Reducing the time at the crossing and permanently stabilizing this area will reduce is resource has been deemed logistically difficult due to the multiple compounding
opment of a unique solution. Installing a trenchless crossing at this location would require a ufficient space available at this location to stockple spoils from the bore pit. ution period greater than six weeks and triple the total greenouse gas emissions is is unreasonably high relative to the proposed construction method
) feet deep, which necessitates the use of a bench and interim ramp to access the bore pit, in an already reduced LOD. Furthermore, the cost to bore is unreasonably high relative to case the noise, aesthetic, and other impacts on nearby persons. Reducing the time at the along the hillside.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
reater than thirty leet deep, which necessitates the use of a bench and interim ramp to axcessive spoil piles in an already reduced LOD. Furthermore, the cost to bore is los shorter in duration, which reduces the noise, aesthetic, and other impacts on nearby ntial for sedimentation and erosion along the hillside.
irty feet deep, which necessitates the use of a bench and interim ramp to access the bore pit an and worker satety. Avoiding/minimizing this minor impact through a conventional bore soughby this fleaties to the proposed construction method. The proceed crossing method Reducing the time at the crossing and permanently stabilizing this area will reduce the
a approximately twenty feet deep, which necessitates the use of a bench and interim ramp to excessive goal piles in an arready reduced LOD. Furthermore, the cost to bore is horter in duration, which includes the noise, seathetic, and other impacts on nearby persons. dimentation and erosion along the hillside.
reater logistical and technical challenges. Furthermore, avoiding this temporary impact to this
ater logistical and technical challenges.
ximately thirty feet deep, which necessitates the use of a bench and interim ramp to access ve spoil pies in an already reduced LOD. In addition, the presence of steep slopes logistica construction method. The time to complete the proposed roomsing method is also shorter in using the time at the crossing and permanently stabilizing this area will reduce the potential
sing is located on a steep slope and require bore pits nearly 30 feet. Avoiding/minimizing save spoil piles, all while being located within an already reduced LOD. Using a ably expensive and would take over forty days to complete.

			Evaluation Factors													
Crossing Method Dec	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ct Crossing #	USACE Distr
The open cut method would result in a temporary impact to this small UNT to Kimballton Branch. Th		\$52,369	\$2,925	\$5,995	N	Y	75	44	64	N	-	42	Dry-Ditch Open-Cut			
I Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit whi challenges. Using a conventional bore crossing method to avoid/minimize this minor temporary impa- tion of the second sec	– Dry-Ditch Open-Cu	\$3,126,207	\$1,017	\$5,995	N	Y	75	44	64	N	55	42	Conventional Bore	S-Q12	G-001	Norfolk
The open cut method would result in a temporary impact to Kimbailton Branch. The crossing is locat		\$130,318	\$6,075	\$5,995	N	Y	331	29	45	N	-	69	Dry-Ditch Open-Cut			
I minor impact through a conventional bore would require a deep bore pit which would create excessiv a conventional bore crossing method to avoid/minimize this minor temporary impact would be unreased of the second seco	– Dry-Ditch Open-Cu	\$805,722	\$1,017	\$5,995	N	Y	331	29	45	N	33	69	Conventional Bore	S-Q13	G-002	Norfolk
The open cut method would result in a temporary impact to UNT to Stony Creek. The crossing is loc		\$60,761	\$2,925	\$5,995	N	Y	84	32	42	N	-	44	Dry-Ditch Open-Cut			
I Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit whi challenges. Using a conventional bore crossing method to avoid/minimize this minor temporary impa- tion of the second sec	– Dry-Ditch Open-Cu	\$396,789	\$1,017	\$5,995	N	Y	84	32	42	N	29	44	Conventional Bore	S-P6	G-003	Norfolk
There are no significant constraints on available crossing methods or significant environmental impage	Guided	\$377,368	\$3,375	\$17,985	N	N	66	5	21	N	-	300	Dry-Ditch Open-Cut	S-S5-Braid-1, S-S5-	0.004	No. 7. 8
use of the guided conventional bore method. A minor temporary impact associated with the bore to n	Conventional Bore	\$466,358	\$3,051	\$17,985	N	N	66	5	21	N	0	300	Guided Conventional Bore	Braid-2, S-S5	G-004	NOTOIK
The open cut method would result in a temporary impact to two UNT to Dry Branch. Both streams ar and require bore pits nearly forty feet deep. Avoiding/minimizing this minor impact through a conven	Day Ditch Open Cu	\$84,759	\$1,852	\$11,990	N	Y	110	38	49	N	-	58	Dry-Ditch Open-Cut	5 620 5 620	G-005	Norfolk
terrain increases the logistical and technical challenges. Using a conventional bore crossing method take three times longer to complete.	Diy-Dicit Open-Cu	\$871,486	\$657	\$11,990	N	Y	110	38	49	N	38	58	Conventional Bore	3-330, 3-328	0 000	TUTUR
The open cut method would result in a temporary impact to Dry Branch. The crossing is located adja minor impact through a conventional bore would require a deep bore pit adjacent to an extremely lon	- Dry-Ditch Open-Cu	\$111,964	\$5,220	\$5,995	N	Y	607	28	46	N	-	100	Dry-Ditch Open-Cut	5-632	G-006	Norfolk
would require a technically and logistically dimicult whiching system, all while being located with a conventional bore crossing method to avoid/minimize this minor temporary impact would take t	biy bion open ou	\$510,043	\$1,017	\$5,995	N	Y	607	28	46	N	24	100	Conventional Bore	0.002		
A trenchless crossing of this small UNT to Dry Branch (less than 10 feet) would require bore pits that access the bore pit. Avoiding/minimizing this minor impact through a conventional bore would create	- Drv-Ditch Open-Cu	\$103,604	\$3,960	\$5,995	N	N	289	34	38	N	-	90	Dry-Ditch Open-Cut	S-G33	G-007	Norfolk
unreasonably high relative to the proposed construction method. The proposed crossing method is persons. Reducing the time at the crossing and permanently stabilizing this area will reduce the pote		\$810,512	\$1,017	\$5,995	N	N	289	34	38	N	30	90	Conventional Bore			
A trenchless crossing of this small wetland would require bore pits that are greater than twenty feet of Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil pilet	– Dry-Ditch Open-Cu	\$48,136	\$141	\$5,995	N	N	220	26	39	N	-	60	Dry-Ditch Open-Cut	W-Z11	G-008	Norfolk
the proposed construction method. The proposed crossing method is shorter in duration, which red crossing and permanently stabilizing this area will reduce the potential for sedimentation and erosion		\$368,237	\$135	\$5,995	N	N	220	26	39	N	21	60	Conventional Bore			
Mountain Valley must use a conventional bore to cross an adjacent road (Big Branch Hollow Road).	 Conventional Bore 	\$234,188	\$2,970	\$5,995	N	N	608	34	38	N	-	139	Dry-Ditch Open-Cut	S-G35	G-009	Norfolk
		\$951,526	\$2,970	\$5,995	N	N	608	34	38	N	30	139	Conventional Bore			
This stream is listed as trout water. The direct aquatic impact will be avoided/minimized by use of the	Conventional Bore	\$37,071	\$1,017	\$5,995	Y	N	0	16	22	N	-	30	Dry-Ditch Open-Cut	S-SS4	G-010	Norfolk
		\$338,788	\$1,017	\$5,995	Y	N	0	16	22	N	27	30	Conventional Bore			
This stream is listed as trout water. The direct aquatic impact will be avoided/minimized by use of the access will be required.	 Conventional Bore 	\$56,729	\$1,170	\$5,995	N	N	21	29	45	N	-	48	Dry-Ditch Open-Cut	S-29	G-011	Norfolk
		\$390,025	\$1,170	\$5,995	N	N	21	29	45	N	27	48	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impares of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$57,558	\$1,440	\$11,990	Y	N	0	14	24	N	-	47	Dry-Ditch Open-Cut	S-Z7, S-Z7-Braid-1	G-012	Norfolk
		\$233,595	\$1,440	\$11,990	Y	N	0	14	24	N	19	47	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	Guided Conventional Bore	\$356,607	\$4,033	\$29,975	Y	N	0	4	9	N	-	331	Dry-Ditch Open-Cut	S-Z10, S-Z11, S-Z12- EPH, W-Z3, S-Z13	G-013	Norfolk
		\$735,445	\$4,033	\$29,975	Y	N	0	4	9	N	23	331	Guided Conventional Bore			

sion Rationale
crossing is located on a steep slope and require bore pits exceeding fifly feet. In would create excessive spoil piles. Karst terrain presents greater logistical and technical would be unreasonably expensive and would take six times longer to complete.
d on a steep slope and require bore pits exceeding thirty leat. Avoiding/minimizing this spoil pites. Karst terrain increases the risk of bore failure and environmental impact. Using nably expensive and would take three times longer to complete.
ted adjacent to a steep slope and require bore pits nearly thirty feet deep. h would create excessive spoil piles. Karst terrain increases the logistical and technical t would be unreasonably expensive and would take nearly twice as long to complete.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by aintain access will be required.
very small - less than ten feet in width. The crossing is located adjacent to a steep slope onal bore would require a deep bore pit which would create excessive spoil piles. Karst o avoid/minimize this minor temporary impact would be unreasonably expensive and would
ent to a steep slope and require bore pits greater than twenty feet. Avoiding/minimizing this and steep slope which would create excessive spoil piles in a topographical setting that aready reduced LOD. Karst terrain increases the logistical and technical challenges. Using as long to complete.
are approximately thirty feet deep, which necessitates the use of a bench and interim ramp to excessive spot piles in an already reduced LOD. Furthermore, the cost to bore is so softwer in duration, which reduces the noise, aesthetic, and other impacts on nearby tial for sedimentation and erosion along the hillside.
sp, which necessitates the use of a bench and interim ramp to access the bore pit, in an aiready reduced LOD. Furthermore, the cost to bore is unreasonably high relative to one the noise, assisthet, and other impacts on nearby persons. Reducing the time at the along the hillside.
he bore can be extended to avoid this resource.
conventional bore method. A minor temporary impact associated with the bore to maintain
conventional bore method. A minor temporary impact associated with the bore to maintain
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.

								Eva	luation Factors							s . Crossine Method Deci
USACE Distric	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec
			Dry-Ditch Open-Cut	53	-	N	37	32	292	N	N	\$5,995	\$1,080	\$60,957		
Norfolk	G-014	S-Z14	Conventional Bore	53	15	N	37	32	292	N	N	\$5,995	\$1,080	\$225,998	 Conventional Bore 	There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain the bore to maintain the bore to maintain the bore to bore temporary impact associated with the bore to maintain the bore to bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain the bore temporary impact associated with the bore to maintain temporary impact associated with the bore temporary impact associated with the bore to maintain temporary impact associated with the bore temporary impact as occurs
			Dry-Ditch Open-Cut	77	-	N	36	32	330	Y	N	\$5,995	\$1,080	\$81,975		The open cut method would result in a temporary impact to a small UNT to Doe Creek. The stream it
Nortolk	G-015A	S-A34	Conventional Bore	77	29	N	36	32	330	Y	N	\$5,995	\$1,017	\$490,443	– Dry-Ditch Open-Cu	I Avoiding/iminimizing this minor impact through a conventional bore would require a deep bore pit whi challenges. Using a conventional bore crossing method to avoid/iminimize this minor temporary impa- tion of the second s
No.6 B	0.0450		Dry-Ditch Open-Cut	58	-	N	36	30	388	Y	Y	\$5,995	\$1,980	\$76,824		The open cut method would result in a temporary impact to a small UNT to Doe Creek. The stream i deeo on a steep slope. Avoiding/minimizing this minor impact through a conventional bore would rec
NOTIOIK	G-015B	S-A33	Conventional Bore	58	24	N	36	30	388	Y	Y	\$5,995	\$1,017	\$390,848	– Dry-Ditch Open-Cu	stockpiling. Karst terrain increases the logistical and technical challenges. Using a conventional bol expensive and would take twice as along to complete.
			Dry-Ditch Open-Cut	103	-	N	36	32	975	Y	N	\$5,995	\$3,510	\$140,332		The open cut method would result in a temporary impact to an UNT to Doe Creek. The crossing is lo wording/minimizing this minor impact through a conventional bore would require a deep bore pit adj
Norfolk	G-016	S-A32	Conventional Bore	103	40	N	36	32	975	Y	N	\$5,995	\$1,017	\$2,481,142	– Dry-Ditch Open-Cu	It poorgraphical setting that would require a technically and logistically difficult winching system, all with technical challenges. Using a conventional bore crossing method to avoid/minimize his minor tempo Reducing the time at the crossing and permanently stabilizing this area will reduce the potential for set
			Dry-Ditch Open-Cut	246		N	52	25	328	Y	N	\$11,990	\$1,695	\$276,885		
Norfolk	G-017	S-Y3, S-Y2	Conventional Bore	246	37	N	52	25	328	Y	N	\$11,990	\$1,695	\$1,387,796	 Conventional Bore 	Mountain Valley must use a conventional bore to cross an adjacent road (Doe Creek Road). The bore
Norfolk	G-019A	5-F24	Dry-Ditch Open-Cut	69	-	N	28	13	0	N	Y	\$5,995	\$4,635	\$131,096	Dor-Ditch Open-Cur	This crossing is immediately adjacent to another crossing (G-(1188) that will be bored. A significant of the temporary in the
NUHUK	0-01aA	3°L24	Conventional Bore	69	32	N	28	13	0	N	Y	\$5,995	\$1,017	\$787,453	biy-bici oper-cu	i agenter uness nis clossing is completed with an open cut. I uniternitive, avoiding this lemporaly in expensive.
Norfolk	G-019B	S-E25-Downstream	Dry-Ditch Open-Cut	92	-	Ν	48	20	450	N	Y	\$5,995	\$2,250	\$107,645	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact
			Conventional Bore	92	19	N	48	20	450	N	Y	\$5,995	\$2,250	\$356,119		use of the conventional bore method. A minor temporary impact associated with the bore to maintain
Norfolk	G-020	S-RR5	Dry-Ditch Open-Cut	154	-	N	56	45	400	N	N	\$5,995	\$4,500	\$156,866	– Dry-Ditch Open-Cu	The open cut method would result in a temporary impact to an UNT to Sinking Creek. The crossing i Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit agi
			Conventional Bore	154	35	N	56	45	400	N	N	\$5,995	\$1,017	\$1,083,490		sopograpinal setting the woold require a technicary and ogeneary unicut writering system, an will method to avoid/minimize this minor temporary impact would be unreasonably expensive and would t
Norfolk	G-020A	S-U18	Dry-Ditch Open-Cut	22		N	41	13	11	N	N	\$5,995	\$1,305	\$28,600	– Dry-Ditch Open-Cu	A trenchless crossing of this small stream (UNT to Sinking Creek) would require bore pits that are ne would create excessive spoil piles in an already reduced LOD. Furthermore, the cost to bore is unrea is shorter in duration, which reduces the noise, assettiecil, and other immacts on nearby corresons. Red
			Conventional Bore	22	19	N	41	13	11	N	N	\$5,995	\$1,017	\$156,227		for sedimentation and erosion along the hillside.
Norfolk	G-022	S-IJ16-b	Dry-Ditch Open-Cut	50	-	N	70	42	537	Y	N	\$5,995	\$1,395	\$60,302	– Dry-Ditch Open-Cu	The open cut method would result in a temporary impact to an UNT to Sinking Creek. The crossing Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil plee system, all while being located within an already reduced LOD. Karst terrain increases the logistical system.
			Conventional Bore	50	33	N	70	42	537	Y	N	\$5,995	\$1,017	\$751,801		this minor temporary impact would be unreasonably expensive and would take nearly twice as long to reduce the potential for sedimentation and erosion along the hillside.
Norfolk	G-023	S-NN17	Dry-Ditch Open-Cut	140	-	N	62	40	372	Y	N	\$5,995	\$2,970	\$305,328	Conventional Bore	Mountain Valley must use a conventional bore to cross an adjacent road (Rt. 604). The bore can be e
			Conventional Bore	140	23	N	62	40	372	Y	N	\$5,995	\$2,970	\$616,381		
Norfolk	G-024	S-RR2, S-YZ6, W- RR1b	Dry-Ditch Open-Cut	133		N	63	42	702	Y	N	\$17,985	\$1,110	\$148,483	- Conventional Bore	Mountain Valley must use a conventional bore to cross an adjacent road (Rt. 42). The bore can be ex
			Conventional Bore	133	28	N	63	42	702	Y	N	\$17,985	\$1,110	\$652,318		
Norfolk	G-025	S-MM18	Dry-Ditch Open-Cut	35	-	N	45	41	349	Y	N	\$5,995	\$1,710	\$50,958	– Dry-Ditch Open-Cu	The open cut method would result in a temporary impact to a small UNT to Sinking Creek. The streat feet deep. Avoiding/minimizing this minor impact through a conventional bore would require creating and technical challenges. Using a conventional bore crossing method to avoid/minimize this minor te
			Conventional Bore	35	20	N	45	41	349	Y	Ν	\$5,995	\$1,017	\$289,035		Longues.

sion Rationale
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
very small - less than ten feel in width and would require bore pits nearly thirty feel desp, th would create excessive spoil piles. Karst terrain increases the logistical and technical ct would be unreasonably expensive and would take twice as along to complete.
very small - less than ten feet in width and would require bore pits greater than twenty feet uire a deep bore pit which would create excessive spol piles, with limited room for e crossing method to avoid/minimize this minor temporary impact would be unreasonably
cated adjacent to a steep slope and require bore pits up to forty feet in depth. Sent to an externetly long and steep slope which would ocasie excessive spoil galace in a superstand the externet steep slope and steep slope and steep steep slope and steep slope steep ste
can be extended to avoid this resource.
sange in elevation between the two crossing locations does not allow the pipeline to be tied-in pact to a UNT to Sinking Creek with a conventional bore crossing would be unreasonably
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
s located adjacent to a steep slope and require bore pits nearly forty feet deep. cent to an extremely long and steep slope which would create excessive spoil piles in a being located within an already reduced LOD. Using a conventional bore crossing ake longer to complete.
infy twenty feet deep. Avoiding/minimizing this minor impact through a conventional bore sonably high relative to the proposed construction method. The proposed crossing method ucing the time at the crossing and permanently stabilizing this area will reduce the potential
Ilocated adjacent to a steep slope and require bore pits up to thirty fast in depth. in a topographical setting that would require a technically and logisically difficult winching and technical chalenges. Using a conventional bore crossing method to avoid/minimize complete. Reducing the time at the crossing and permanently stabilizing this area will
tended to avoid this resource.
anded to avoid this resource.
n is very small - less than ten feet in width and would require bore pits approximately twenty excessive spoil piles, with limited room for stockpiling. Kant terrain increases the logistical mporary impact would be unreasonably expensive and would take three times as along to

								Eval	uation Factors											
USACE Distric	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Decision Rationale				
Norfolk	6.026	S.NN12	Dry-Ditch Open-Cut	41	-	N	41	28	276	Y	N	\$5,995	\$1,755	\$45,067	Day Ditch Open Cut	The open cut method would result in a temporary impact to a small UNT to Sinking Creek. The stream is very small - less than five leet in width and would require bore pits that are twenty leet deep. Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit which would create excessive spoil piles, with limited room for stockpiling. Karst terrain				
NUTUR	G-026	3-11112	Conventional Bore	41	20	N	41	28	276	Y	N	\$5,995	\$1,017	\$306,063	Dry-bitch Open-Cut	increases the logistical and technical challenges. Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive and would take longer to complete.				
Norfolk	6-027	C.NN11	Dry-Ditch Open-Cut	147	-	N	38	26	43	Y	N	\$5,995	\$4,635	\$132,129	Day Ditch Open Cut	The open cut method would result in a temporary impact to a small UNT to Sinking Creek. The stream is very small - less than five feet in width and would require bore pits greater than twenty feet deep. Avoiding/minimizing this minor impact through a conventional bore would require a deep bore pit which would create excessive spoil pits, with limited room for stockpling. Karst				
		0.000	Conventional Bore	147	24	N	38	26	43	Y	N	\$5,995	\$1,017	\$643,428	biy bion open out	terrain increases the logistical and technical challenges. Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive and would take longer to complete.				
Norfolk	G-028	S-KL43	Dry-Ditch Open-Cut	48	-	N	43	28	102	Y	N	\$5,995	\$4,500	\$72,143	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small UNT to Sinking Creek. The stream is very small - less than ten feet in width and would require bore pits greater than twenty feet deep. Avoiding/minimizing this minor impact through a conventional bore would create excessive spoil piles, with limited room for stockpiling. Karst terrain increases the logistical and				
			Conventional Bore	48	19	N	43	28	102	Y	N	\$5,995	\$1,017	\$230,015		hnical challenges.				
Norfolk	G-029	W-CD12, S-OO14	Dry-Ditch Open-Cut	70	-	N	23	11	0	Y	Y	\$11,990	\$4,657	\$80,014	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small welland and small UNT to Sinking Creek. The stream is very small - less than ten feet in width and would require bore pits greater than twenty feet deep. Avoiding/minimizing this minor impact through a conventional boxe would create excessive spoil pits, with limited room for stockpilling. Karst terrain increases the increases the intervent of the stockpilling and would be creased in avoid the survival minimized interval the uncernary data would be creased and would take to not no more than the stockpilling and the survival minimized the survival minimized intervent of the stockpilling. Karst terrain increases the intervent of the stockpilling and would take to be avoid the survival minimized the stockpilling and would be avoid the intervent of the stockpilling.				
			Conventional Bore	70	22	N	23	11	0	Y	Y	\$11,990	\$1,129	\$412,741		registrice and controls changes. Cong control to do on a cong mendo o creatmining and mind changes y specific out and to be regist to complete.				
Norfolk	G-030	S-0012, S-0013	Dry-Ditch Open-Cut	45	-	N	41	21	73	Y	N	\$11,990	\$4,995	\$118,888	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to two small UNTs to Sinking Creek. This crossing is in proximity to a residence, and a trenchless crossing of this location would take nearly three times as long to complete compounding the noise, aesthetic, and other impacts on nearby persons. The open-cut method reduces construction duration to minimize disruption due				
			Conventional Bore	45	18	N	41	21	73	Y	N	\$11,990	\$2,034	\$223,945		to construction activities on the affected residents. Karst terrain increases the logistical and technical challenges.				
Norfolk	G-031	S-PP1	Dry-Ditch Open-Cut	46	-	N	16	8	0	Y	Y	\$5,995	\$3,735	\$53,078	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (three-feet wide) intermittent UNT to Sinking Creek. This crossing is in close proximity to a residence, and a trenchless crossing of this location would take four times as long to complete – compounding the noise, aesthetic, and other impacts on nearby persons. The open-cut method reduces construction duration to minimize disturble on the different evidents. Karet transmission increases the longistical and technical challenous.				
			Conventional Bore	46	15	N	16	8	0	Y	Y	\$5,995	\$1,017	\$206,069						
Norfolk	G-032	S-PP3	Dry-Ditch Open-Cut	25	-	N	17	12	0	Y	Y	\$5,995	\$1,980	\$34,339	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (three-feet wide) UNT to Sinking Creek. Karst terrain increases the logistical and technical challenges. Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive.				
			Conventional Bore	25	17	N	17	12	0	Y	Y	\$5,995	\$1,017	\$155,606						
Norfolk	G-033	S-PP4	Dry-Ditch Open-Cut	38	-	N	22	11	0	Y	Y	\$5,995	\$4,140	\$44,877	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (two-feet wide) intermittent UNT to Sinking Creek. Karst terrain increases the logistical and technical challenges. Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive.				
			Conventional Bore	38	11	N	22	11	0	Y	Y	\$5,995	\$1,017	\$165,096						
Norfolk	G-034	S-PP22	Dry-Ditch Open-Cut	48	-	N	57	48	203	N	N	\$5,995	\$675	\$50,770	- Conventional Bore	Mountain Valley has only been authorized to boring the streams in this section of the project.				
			Conventional Bore	48	19	N	57	48	203	N	N	\$5,995	\$675	\$229,673						
Norfolk	G-035	S-PP21	Dry-Ditch Open-Cut	35	-	N	33	26	0	N	N	\$5,995	\$1,035	\$46,005	Conventional Bore	Mountain Valley has only been authorized to boring the streams in this section of the project.				
			Conventional Bore	35	22	N	33	26	0	N	N	\$5,995	\$1,035	\$307,323						
Norfolk	G-036	S-PP20	Dry-Ditch Open-Cut	48	-	N	26	9	0	N	Y	\$5,995	\$1,125	\$65,964	- Conventional Bore	Mountain Valley has only been authorized to boring the streams in this section of the project.				
			Conventional Bore	48	18	N	26	9	0	N	Y	\$5,995	\$1,125	\$225,555						
Norfolk	G-037	S-006	Conventional Perce	61	- 11	N	20	8	0	N	r v	\$5,995 \$5,005	\$1,935 \$1,935	\$231.288	Conventional Bore	Mountain Valley has only been authorized to boring the streams in this section of the project.				
			Der Diel Com	20				40				es oor	6000	\$50.400						
Norfolk	G-038	S-RR14	Convontional Provident	38	12	N	33	19	21	N	N	\$5,005	\$36U	309,108 \$172 574	1057 Conventional Bore Mountain Valley has only been authorized to boring the streams in this 1,574	Mountain Valley has only been authorized to boring the streams in this section of the project.				
			Conventional Bore	38	13	N	33	19	21	N	N	ə ə ,995	\$360	\$1/3,574						

								Eva	luation Factors							
USACE Distric	t Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec
			Dry-Ditch Open-Cut	55	-	N	42	24	216	N	N	\$5,995	\$990	\$66,594		
Norfolk	G-039	S-HH18	Conventional Bore	55	29	N	42	24	216	N	N	\$5,995	\$990	\$427,980	- Conventional Bore	Mountain Valley has only been authorized to boring the streams in this section of the project.
			Dry-Ditch Open-Cut	32		N	53	42	287	N	N	\$5,995	\$4,320	\$50,611		Access to this crossing location is extremely limited and requires removal and replacement of approxi
Norfolk	G-040	S-MN21	Conventional Bore	32	28	N	53	42	287	N	N	\$5,995	\$1,017	\$353,599	- Dry-Ditch Open-Cut	t operation at this location is logistically and technically challenging. Furthermore, avoiding this tempo expensive.
Notfolk	6.041	S 10100	Dry-Ditch Open-Cut	40	-	N	30	24	0	N	Y	\$5,995	\$1,620	\$51,321	Des Dieb Oren Cut	The open cut method would result in a temporary impact to a small (four-feet wide) stream. Avoiding/
Nonoix	0.041	3101422	Conventional Bore	40	20	N	30	24	0	N	Y	\$5,995	\$1,017	\$303,225	Diy-Dich Open-Cu	I but prior zvietica in the expert of a steep suppr, thereby requiring the excatation or of interain rainy and Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be
Norfolk	G-042	S-EF65	Dry-Ditch Open-Cut	88	-	N	43	27	560	Y	N	\$5,995	\$7,740	\$180,036	- Dry-Ditch Open-Cut	Avoiding/minimizing this minor impact through a conventional bore would require a relatively deep bor dramatically increasing the space occupied by the bore pit and spoil pile. The stream is also located
			Conventional Bore	88	22	N	43	27	560	Y	N	\$5,995	\$1,017	\$457,718		in an already reduced work area. Karst terrain increases the logistical and technical challenges.
Norfolk	G-043	S-EF62	Dry-Ditch Open-Cut	38	-	N	28	17	293	Y	N	\$5,995	\$4,365	\$68,463	Dry-Ditch Open-Cut	The stream is located on a steep slope that would require logistically and technically challenging wind
			Conventional Bore	38	16	N	28	17	293	Y	N	\$5,995	\$1,017	\$187,933		echnika utaienges.
Norfolk	G-044	S-IJ52, W-IJ46-PEM	Dry-Ditch Open-Cut	46	-	N	63	35	178	Y	N	\$11,990	\$4,524	\$74,187	Dry-Ditch Open-Cut	Site conditions do not allow sufficient space to stockpile spoils from bore pits. Karst terrain increases email stream with a conventional hore crassing would be unreasonable expensive and would take long
			Conventional Bore	46	24	N	63	35	178	Y	N	\$11,990	\$1,152	\$362,922		
			Dry-Ditch Open-Cut	301	-	N	74	46	1576	N	N	\$5,995	\$4,365	\$242,724	-	The open cut method would result in a temporary impact to a small (six-feet wide) intermittent UNT to require a deep bore pit of nearly 40 feet at the edge of a steep slope, thereby requiring the excavator
Norfolk	H-001	S-G39	Conventional Bore	301	36	N	74	46	1576	N	N	\$5,995	\$1,017	\$1,518,943	Dry-Ditch Open-Cut	In that good pair. The slope appears to the crossing is steep and excessively indig regularing explain- tion of the slope
Norfolk	H-002	S.MM15	Dry-Ditch Open-Cut	37	-	N	39	29	74	N	N	\$5,995	\$4,185	\$58,159	Dry Ditch Open Cut	The open cut method would result in a temporary impact to a small (six-feet wide) intermittent UNT to usual require a deep bore nit of naarly 20 fast at the order of a steam close. Thereby requiring the even
Nonoix	11002	0 111110	Conventional Bore	37	33	N	39	29	74	N	N	\$5,995	\$1,017	\$714,907	bry bran open ou	bore pit and spoil pile. Using a conventional bore crossing method to avoid/minimize this minor temp
Norfolk	H-003	S-MM14	Dry-Ditch Open-Cut	100	-	N	42	33	243	N	N	\$5,995	\$1,710	\$112,099	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a UNT to Flatwoods Branch. Avoiding/imit the nearly 40 feet at the edge of a steep slope, thereby requiring the excavation of an interim ramp and b
			Conventional Bore	100	37	N	42	33	243	N	N	\$5,995	\$1,017	\$966,777		conventional bore crossing method to avoid/minimize this minor temporary impact would be unreason
Norfolk	H-004	S-MM13	Dry-Ditch Open-Cut	33	-	N	59	34	33	N	N	\$5,995	\$1,260	\$49,179	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (five-feet wide) UNT to Flatwoods relatively deep bore pit exceeding 30 feet at the edge of a steep slope, thereby requiring the excavation pit and spoil pile. This crossing is in close proximity to a residence, and a trenchless crossing of this I
			Conventional Bore	33	32	N	59	34	33	N	N	\$5,995	\$1,017	\$685,286		and other impacts on nearby persons. The open-cut method reduces construction duration to minimi bore crossing method to avoid/minimize this minor temporary impact would be unreasonably expensi
Norfolk	H-005	S-MM11	Dry-Ditch Open-Cut	34	-	N	46	24	33	N	N	\$5,995	\$1,305	\$61,478	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (nine-feet wide) UNT to Flatwood relatively deep bore pit exceeding 20 feet at the edge of a steep slope, thereby requiring the excavation pit and spoil pite. This crossing is in close proximity to residences, and a ternchiess crossing of this to and other impacts on nearby persons. The open-cut method reduces construction duration to minimi
			Conventional Bore	34	25	N	46	24	33	N	N	\$5,995	\$1,017	\$331,871		would reduce the construction duration near a private drinking water well on the property. Using a cor unreasonably expensive.
Norfolk	H-006	W-F9-PFO, S-F15	Dry-Ditch Open-Cut	55	-	N	56	17	0	N	Y	\$11,990	\$7,650	\$104,916	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to an intermittent UNT to Flatwoods Branch conventional bore would require a relatively deep bore pit exceeding 30 feet at the edge of a steep sit convening the space occupied by the bore pit and spale. This orcsains is in proximity to residence compounding the noise, assistentic, and other impacts on nearby persons. The open-cut method redue innoise method would be approximately and an experimentation of the second and the space of the space occupied by the unresengeble accession. Advances and prede dimiting water minor temporements would be unresengeble accession.
			Der Dint C	30		IN NI		45				\$1,000 \$5.005	#1,017	\$40.014		The open cut method would result in a townoon imposition of a seal Alass factuated in the
Norfolk	H-007	S-F16a/F16b	Dry-Ditch Open-Cut	32		N	30	15	0	N	Y	\$5,995	\$1,350	\$40,244	- Dry-Ditch Open-Cut	The upon currentiation would result in a temporary impact to a small (three-beet weld) UNT to Entwoor a relatively deep bore ji of nearly 30 bet at the dege of a steep stope, threely requiring the excavation pit and spoil pile. This crossing is in close proximity to residences, and a tenchless crossing of this in their impacts on nearby persons. The open-cut method reduces construction duration to minimize d reduce the construction duration near a private drinking water well on the property. Using a convention excavamenth excension.
			Conventional Bore	32	27	N	30	15	U	N	Y	\$5,995	\$1,017	\$344,464		un easunably expensive.

sion Rationale
nately 200 waterbars per day during period of active construction. Operating a boring ny impact to this small stream with a conventional bore crossing would be unreasonably
inimizing this minor impact through a conventional bore would require a relatively deep bench and dramatically increasing the space occupied by the bore pit and spoil pile. nreasonably expensive.
e pit exceeding 20 feet, thereby requiring the excavation of an interim ramp and bench and n a steep slope that would require logistically and technically challenging winching system
ing system in an already reduced work area. Karst terrain increases the logistical and
e logistical and technical challenges. Furthermore, avoiding this temporary impact to this er to complete.
Reancke River. Avoiding/minimizing this minor impact through a conventional bore would of an interim ramp and bench and dramatically increasing the space occupied by the bore to perating within and around the bore pit to be winched to other equipment. That increases evalatively from loginal work during a bore. There is insufficient space are this location for 16 to 79 days, thereby increasing the greenhouse gas emissions associated with the importany impact would be unreasonably expensive.
Tatwoods Branch. Avoiding/minimizing this minor impact through a conventional bore vation of an interim ramp and bench and dramatically increasing the space occupied by the ary impact would be unreasonably expensive.
mizing this minor impact through a conventional bore would require a deep bore pit of ch and dramatically increasing the space occupied by the bore pit and spoil pile. Using a bbly expensive.
tranch. Avoiding minimizing this minor impact through a conventional bore would require a of an interim ramp and bench and dramatically increasing the space occupied by the bore action would take once than twice as loss to complete – compounding the noise, aesthetic, disruption due to construction activities on the affected residents. Using a conventional a.
Branch. Avoiding/minimizing this minor impact through a conventional bore would require a of an interim ramp and bench and dramatically increasing the space occupied by the bore addro would take more than twice as long to complete – compounding the noise, aesthetic, disruption due to construction activities on the affected residents. The open cut method entional bore crossing method to avoid/minimize this minor temporary impact would be
nd an adjacent PFO wetland (0.02 ac). Avoiding/minimizing this minor impact through a e, hereby requiring the excavation of an interim ramp and bench and dramatically and a tenchless cosing of this location would lake twice as long to complete is construction duration to minimize disruption due to construction activities on the affected ell on the property. Using a conventional bore crossing method to avoid/minimize these
Branch. Avoiding/minimizing this minor impact through a conventional bore would require of an interim ramp and bench and dramatically increasing the space occupied by the bore addrowould take nearly twice as king to complete - compounding the noise, aesthetic, and ruption due to construction activities on the affected residents. The open cut method would al bore crossing method to avoid/minimize this minor temporary impact would be

								Eva	luation Factors							
USACE Distric	t Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deck
			Dry-Ditch Open-Cut	313	-	N	21	15	0	N	Y	\$11,990	\$6,525	\$258,615		The open cut method would result in a temporary impact to a UNT to Flatwoods Branch. Avoiding/min
Norfolk	H-008	S-C36, W-C11	Conventional Bore	313	23	N	21	15	0	N	Y	\$11,990	\$1,017	\$1,111,394	- Dry-Ditch Open-Cut	I pit more than 20 feet, thereby requiring the excavation of an interim ramp and bench and dramatically would extend the duration of this crossing from 2 to 30 days, thereby increasing the greenhouse gas e
N. C.B.			Dry-Ditch Open-Cut	40	-	N	5	3	0	N	Y	\$5,995	\$360	\$49,921		There are no significant constraints on available crossing methods or significant environmental impact
NUTUK	H-009	5-MM31	Conventional Bore	40	11	N	5	3	0	N	Y	\$5,995	\$360	\$170,115	Conventional Bore	use of the conventional bore method. A minor temporary impact associated with the bore to maintain a
Norfolk	H-010	5.020	Dry-Ditch Open-Cut	44	-	N	21	16	0	N	Y	\$5,995	\$683	\$42,004	Day Ditch Open Cut	The open cut method would result in a temporary impact to the small (one-foot wide) Flatwoods Branch
NUTUR	11-010	3-029	Conventional Bore	44	17	N	21	16	0	N	Y	\$5,995	\$297	\$208,808	Diy-Dich Open-Cu	interacy indexang the greenitose gas emissions associated with the clossing by over 450%. Using a be unreasonably expensive.
Norfolk	H-012	W-C5	Dry-Ditch Open-Cut	68	-	N	31	19	0	N	Y	\$5,995	\$245	\$53,840	Doy-Ditch Open-Cut	The open cut method would result in a small temporary impact to a PEM wetland (0.05 ac). Avoiding/in nearly 20 feet, thereby requiring the excavation of an interim ramp and bench and dramatically increase
			Conventional Bore	68	23	N	31	19	0	N	Y	\$5,995	\$135	\$409,211	biy bian open ou	extend the duration of this crossing from 2 to 8 days, thereby increasing the greenhouse gas emission avoid/minimize this minor temporary impact would be unreasonably expensive.
Norfolk	H-013	S-C25	Dry-Ditch Open-Cut	65	-	N	39	29	52	N	N	\$5,995	\$5,760	\$73,848	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (five-feet wide) UNT to Bradshaw (deep bore pit of nearly 40 feet at the edge of a steep slope, thereby requiring the excavation of an inter
		0.020	Conventional Bore	65	38	N	39	29	52	N	N	\$5,995	\$1,017	\$885,717	biy bian open ou	Spoil pile. A conventional bore crossing would extend the duration of this crossing from 2 to 18 days, I 900%. Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be avoid to avoid/minimize the second s
Norfolk	H-014	S-C24	Dry-Ditch Open-Cut	67	-	N	38	20	21	N	N	\$5,995	\$5,670	\$76,077	- Drv-Ditch Open-Cut	The open cut method would result in a temporary impact to a UNT to Bradshaw Creek. Avoiding/minin exceeding 30 feet at the edge of a steep slope, thereby requiring the excavation of an interim ramp and
			Conventional Bore	67	34	N	38	20	21	N	N	\$5,995	\$1,017	\$818,316		conventional bore crossing would skew on the dutation of this crossing inton 2 to 10 bays, thereby inter- conventional bore crossing method to avoid/minimize this minor temporary impact would be unreasor
Norfolk	H-015	S-C21	Dry-Ditch Open-Cut	90	-	N	18	6	21	N	N	\$5,995	\$1,395	\$175,581	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact
			Conventional Bore	90	26	N	18	6	21	N	N	\$5,995	\$1,395	\$500,310		use or the conventional oble metrico. A minor temporary impact associated with the oble or maintain a
Norfolk	H-017	S-0016	Dry-Ditch Open-Cut	360	-	N	45	36	282	Y	N	\$0	\$0	\$266,002	Conventional Bore	Mountain Valley must use a conventional bore to cross an adjacent road (I-81). The bore can be exter
			Conventional Bore	360	39	N	45	36	282	Y	N	\$0	\$0	\$1,734,180		
Norfolk	H-018	S-NN19	Dry-Ditch Open-Cut	34	-	N	53	27	11	Y	N	\$5,995	\$4,050	\$46,198	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (four-feet wide) UNT to Roanoke R relatively deep bore pit exceeding 30 feet at the edge of a steep slope, thereby requiring the excavation pit and spoil pile. This crossing is in close proximity to a residence, and a trenchless crossing of this Is
			Conventional Bore	34	33	N	53	27	11	Y	N	\$5,995	\$1,017	\$706,393		impacts on nearby persons. The open-cut method reduces construction duration to minimize disruption logistical and technical challenges. Using a conventional bore crossing method to avoid/minimize this
Norfolk	H-019	S-NN16, W-NN8	Dry-Ditch Open-Cut	316	-	N	23	14	0	Y	Y	\$0	\$0	\$504,735	– Microtunnel	Mountain Valley will cross this resource using a microtunnel.
			Microtunnel	316	31	N	23	14	0	Y	Y	\$0	\$0	\$3,726,351		
Norfolk	H-020	S-I1, S-AB16, W-AB7	Dry-Ditch Open-Cut	280	-	N	4	3	74	Y	Y	\$17,985	\$1,957	\$264,941	Microtunnel	Mountain Valley must use microtunneling to cross an adjacent road (Rt. 11). The bore can be extende
			Conventional Bore	280	16	N	4	3	74	Y	Y	\$17,985	\$1,957	\$887,654		
Norfolk	H-021	S-CD12b	Dry-Ditch Open-Cut	38	-	N	3	2	0	N	Y	\$5,995	\$990	\$44,085	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain a
			Conventional Bore	38	11	N	3	2	0	N	Y	\$5,995	\$990	\$165,069		
Norfolk	H-022	W-KL58	Dry-Ditch Open-Cut	114	-	N	1	0	0	N	Y	\$0	\$0	\$79,800	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method.
			Conventional Bore	114	12	N	1	0	0	N	Y	\$0	\$0	\$378,338		

mixing this minor impact through a conventional bore would require a relatively deep bore norreasing the space occupied by the bore pit and gool pile. A conventional bore crossing
insidens associated with the clossing by over 150078.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
A conventional bore crossing would extend the duration of this crossing from 2 to 9 days, conventional bore crossing method to avoid/minimize this minor temporary impact would
inimizing this minor impact through a conventional bore would require a deep bore pit of ng the space occupied by the bore pit and spoil pile. A conventional bore crossing would associated with the crossing by over 400%. Using a conventional bore crossing method to
reek. Avoiding/minimizing this minor impact through a conventional bore would require a m ramp and bench and dramatically increasing the space occupied by the bore pit and ereby increasing the greenhouse gas emissions associated with the crossing by over d be unreasonably expensive.
izing this minor impact through a conventional bore would require a relatively deep bore pit bench and dramatically increasing the space occupied by the bore pit and spoil pile. A sing the greenhouse gas emissions associated with the crossing by over 900%. Using a bly expensive.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
ded to avoid this resource.
ver. Avoiding/minimizing this minor impact through a conventional bore would require a of an interim ramp and bench and dramatically increasing the space occupied by the bore cation would take three weeks to complete – compounding the noise, aesthetic, and other due to construction activities on the affacted residents. Karat terrain increases the minor temporary impact would be unreasonably expensive.
I to avoid this resource.
relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by

					Evaluation Factors												
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci	
			Dry-Ditch Open-Cut	30	-	N	76	60	647	N	N	\$5,995	\$1,215	\$31,389		The open cut method would result in a temporary impact to a small (one-foot wide) UNT to Indian Rur excessively deep bore pit exceeding 50 feet, thereby requiring the excavation of an interim ramp and	
Norfolk	Norfolk H-023 S-E	S-EF19	Microtunnel	30	51	N	76	60	647	N	N	\$5,995	\$1,017	\$3,088,830	- Dry-Ditch Open-Cut	pile. The slope adjacent to the crossing is steep and excessively long, requiring equipment operating complexity of this crossing if boret, increases safety risk to personnel, and adds risk of Impact to the spoil piles from a bore pit. Using a trenchless method to avoid/minimize this minor temporary impact v	
			Dry-Ditch Open-Cut	83	-	N	63	52	768	N	N	\$11,990	\$3,870	\$95,865		The open cut method would result in a temporary impact to a small (five-feet wide) UNT to Roanoke	
Norfolk	H-024	W-EF5-PFO, S-EF20a	Conventional Bore	83	44	N	63	52	768	N	N	\$11,990	\$1,017	\$2,648,560	Dry-Ditch Open-Cut	through a conventional bore would require an accessively deep bore pt greater than 40 teet, thereby space occupied by the bore pit and spon pile. The slope adjacent to the crossing is sheep and excessi other equipment. That increases the complexity of this crossing if bored, increases safety risk to perso similarient space at this location for spon piles from tab other pil. In forseted wetlands, a 30-bord condor wetland are unavoidable, even if a bore is used. This crossing alloo is in close proximity to a residence ascherice, and theringmatch on nearby persons. The open-cut method reduces construction duration conventional bore crossing method to avoid/minimize these minor temporary impacts would be unrear	
			Dry-Ditch Open-Cut	200	-	N	33	25	2582	N	N	\$5,995	\$11,835	\$210,330	- Dry-Ditch Open-Cut	The stream is located on a slone that will increase the lonistical and technical difficulty of crossion this	
Norfolk	H-025	S-MM22	Conventional Bore	200	17	N	33	25	2582	N	N	\$5,995	\$1,017	\$652,254	- Dry-Ditch Open-Cut	such steep slope and logistical challenge.	
Masfalls	11.026	5.1150	Dry-Ditch Open-Cut	88	-	N	74	66	2681	N	N	\$5,995	\$4,725	\$107,504	Des Diteb Onen Cut	The open cut method would result in a temporary impact to a small UNT to Roanoke River. Avoiding/ deep bore pit of nearly 60 feet, thereby requiring the excavation of an interim ramp and up to three ber	
NOTOK	H-026	3-030	Microtunnel	88	59	N	74	66	2681	N	N	\$5,995	\$1,017	\$4,105,194	Diy-Ditch Open-Cut	usupe usuper in use crossing is seep and excessively long, requiring equipment operating within a crossing if breach, increases safety risk to personnel, and adds risk of impact to the waterbody from tilt. Using a trenchless method to avoid/minimize this minor temporary impact would be unreasonable.	
Norfolk	H-027	S.V13 S.V14	Dry-Ditch Open-Cut	104		N	66	45	670	Ν	N	\$11,990	\$8,865	\$145,468	Dou Ditch Open-Cut	The open cut method would result in a temporary impact to two small UNTs to Bottom Creek. The slo within and around the bore pit to be winched to other equipment. That increases the complexity of this	
NUTUR	11027	3-113, 3-114	Conventional Bore	104	38	N	66	45	670	Ν	N	\$11,990	\$2,034	\$1,003,411	biy-bith open-out	waterbooy from uplano work ouring a bore. I nere is insumcient space at this location for spoil piles in temporary impacts would be unreasonably expensive.	
Norfolk	H-028	S-EF34b, S-EF55	Dry-Ditch Open-Cut	100	-	N	63	51	508	N	N	\$11,990	\$6,165	\$123,155	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to two small UNTs to Bottom Creek. Avoiding deep bore pit greater than 40 feet, thereby requiring the excavation of an interim ramp and two bench adiacent to the cosisn is steep and excessively lown, requiring equivament operating within and arou	
			Conventional Bore	100	45	N	63	51	508	N	N	\$11,990	\$2,034	\$2,752,368		crossing if bored, increases safety risk to personnel, and adds risk of impact to the waterbody from up pit. Using a conventional bore crossing method to avoid/minimize these minor temporary impacts wo	
Norfolk	H-029	S-EF33	Dry-Ditch Open-Cut	43	-	N	42	19	560	N	N	\$5,995	\$7,605	\$62,409	- Drv-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (five-feet wide) intermittent UNT to t require a relatively deep bore oit of nearly 30 feet, thereby requiring the excavation of an interim ramo	
			Conventional Bore	43	31	N	42	19	560	N	N	\$5,995	\$1,017	\$695,396		Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be u	
Norfolk	H-030	S-U82	Dry-Ditch Open-Cut	73	-	N	25	14	0	N	Y	\$5,995	\$990	\$77,260	Conventional Bore	The stream is a trout water and the direct aquatic impact will be avoided/minimized by use of the con-	
			Conventional Bore	73	27	N	25	14	0	N	Y	\$5,995	\$990	\$460,794			
Norfolk	H-031	W-IJ94-PEM, W-IJ95- PSS, S-IJ83, S-IJ88, S-	Dry-Ditch Open-Cut	362	-	N	25	12	0	N	Y	\$35,970	\$17,209	\$345,403	Conventional Bore	Orangelin madtom habitat may be present in this stream and it is a trout water. The direct aquatic imp	
		U84, W-U102	Conventional Bore	362	28	N	25	12	0	N	Y	\$35,970	\$17,209	\$1,336,300		nipos asocialeu wiri ne uvre iu inainain access win ue requireu.	
Norfolk	H-032	S-U89, S-U90	Dry-Ditch Open-Cut	108	-	N	34	22	212	N	N	\$11,990	\$2,700	\$108,824	Conventional Bore	Orangefin madtom habitat may be present in this stream and it is a trout water. The direct aquatic imp	
			Conventional Bore	108	22	N	34	22	212	N	N	\$11,990	\$2,700	\$522,155			
Norfolk	H-033	W-KL17, S-KL25	Dry-Ditch Open-Cut	59	-	N	14	9	521	N	N	\$11,990	\$5,535	\$70,526	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (three-feet wide) intermittent UNT excessively long, requiring equipment operating within and around the bore pit to be winched to other personnel, and adds risk of impact to the waterbody from upland work during a bore. There is insuffic	
			Conventional Bore	59	16	N	14	9	521	N	N	\$11,990	\$1,017	\$253,526		proximity to a residence, and a trenchless crossing of this location increases the duration of the crossi open-cut method reduces construction duration to minimize disruption due to construction activities or	
Norfolk	H-035	W-KL15	Dry-Ditch Open-Cut	59	-	N	15	12	0	N	Y	\$5,995	\$162	\$47,457	Dry-Ditch Open-Cut	The open cut method would result in a small temporary impact to a PEM wetland (0.03 ac). This cross triples the duration of the crossing work - compounding the noise, aesthetic, and other impacts on ne	
11-033		W-KL15	W-KL15	Conventional Bore	59	16	N	15	12	0	N	Y	\$5,995	\$162	\$246,676		upwes we usuawan or the crossing work - compounding the noise, aesthetic, and other impacts on ne due to construction activities on the affected residents. Using a conventional bore crossing method to

sion Rationale
Avoiding/minimizing this minor impact through a trenchless crossing would require an up to three benches and dramatically increasing the space occupied by the bore pit and spoi within and around the bore pit to be winched to other equipment. That increases the atterbody from upland work during a bore. There is insufficient space at this location for could be unreasonably expensive.
liver and an adjacent PFO wetland (0.11 ac). Avoiding/minimizing these minor impacts requiring the excavation of an interim ramp and two benches and dramatically increasing the vel/long, requiring euryoment within and around the bore pit to be winched to nonel, and adds risk of impact to the waterbody from upland work during a bore. There is generally must be minimation effect effects. Accordingly, coversion impacts to the PFO and a tenchess crossing of this location would take 27 days – compounding the nose, to minimize disputs on the to construction activities on the affected residents. Using a sonably expensive.
small stream. The bore pits are nearly 20 feet deep which makes stockpiling the spoils on
ninimizing this minor impact through a trenchless crossing would require an excessively inches and dramatically increasing the space occupied by the bore pit and spoil pile. The around he bore pit to be winched to other equipment. This increases the complexity of this land work during a bore. There is insufficient space at this location for spoil piles from a bore expensive.
be adjacent to the crossing is steep and excessively long, requiring equipment operating crossing if bored, increases safety risk to personnel, and adds risk of impact to the orn a bore pit. Using a conventional bore crossing method to avoid/minimize these minor
g/minimizing these minor impacts through a conventional bore would require an excessively as and dramatically increasing the space occupied by the bore pit and spoil pile. The slope of the bore pit to be winched to other equipment. That increases the complexity of this land work during a bore. There is insufficient space at this location for spoil piles from a bore uld be unreasonably expensive.
Bottom Creek. Avoiding/minimizing this minor impact through a conventional bore would and banch and dramatically increasing the space occupied by the bore pit and spoil pile. measonably expensive.
entional bore method.
act will be avoided/minimized by use of the conventional bore method. A minor temporary
act will be avoided/minimized by use of the conventional bore method. A minor temporary
to Mill Creek and a PSS wetland (0.04 ac). The slope adjacent to the crossing is steep and equipment. That increases the complexity of his crossing if bored, increases safety risk to then space at this location for spot place from a bore pt. This crossing all os in close ng work – compounding the noise, aesthetic, and other impacts on nearby persons. The the affected residents.
ing is in close proximity to residences, and a trenchless crossing of this location nearly arby persons. The open-cut method reduces construction duration to minimize disruption avoid/minimize the impact to this PEM would be unreasonably expensive.

							luation Factors	Eva								
Crossing Method Dec	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ict Crossing #	USACE Dist
The open cut method would result in a small temporary impacts several closely grouped wetland feat the excessively long crossing distance. The trenchiess crossing would take more than one month to the excessively long crossing distance.	Day Ditch Open Cu	\$1,154,533	\$4,558	\$29,975	Y	N	0	2	4	N	-	1600	Dry-Ditch Open-Cut	W-EF42, W-HS02, W- AB6-PEM-2, W-AB6- PEO 1 W AB6 PEM 1	ц.026	Norfelk
of the crossing would therefore increase by over 1.400%. Furthermore, using a Direct Pipe crossing expensive. A minor temporary impact associated with the bore to maintain access will be required.	Dry-Ditch Open-Cu	\$12,876,728	\$1,080	\$29,975	Y	N	0	2	4	N	10	1600	Direct Pipe	W-AB6-PSS, W-AB5, W-AB3-PEM-2	H-036	Nonoik
Orangelin madtom habitat may be present in this stream and it is a trout water. The direct aquatic import associated with the hore to maintain across will be remained	Conventional Bore	\$165,157	\$1,035	\$11,990	N	N	10	17	31	N	-	179	Dry-Ditch Open-Cut	W-EF46, S-ST9b	H-040	Norfolk
		\$712,852	\$1,035	\$11,990	N	N	10	17	31	N	21	179	Conventional Bore			
t The open cut method would result in a small temporary impact to PSS wetland. Using a conventional expensive.	– Dry-Ditch Open-Cu	\$54,995	\$0	\$5,995	Y	N	0	5	10	N	-	70	Dry-Ditch Open-Cut	W-KL48-PSS-1	H-041	Norfolk
		\$282,299	\$0	\$5,995	Y	N	0	5	10	N	17	70	Conventional Bore			
Orangefin madiom habitat may be present in this stream and it is a trout water. The direct aquatic imp impact associated with the bore to maintain access will be required.	- Conventional Bore	\$200,382	\$1,241	\$17,985	Y	N	0	13	17	N	-	202	Dry-Ditch Open-Cut	W-KL49-PEM, W-KL51 PEM, S-KL55, W-KL51 PSS	H-042	Norfolk
		\$793,462	\$1,241	\$17,985	Y	N	0	13	17	N	22	202	Conventional Bore			
Orangefin madrom habitat may be present in this stream and it is a trout water. The direct aquatic imp impact associated with the bore to maintain access will be required.	 Conventional Bore 	\$88,042	\$1,053	\$11,990	N	N	340	22	31	N	-	87	Dry-Ditch Open-Cut	W-MN7-PEM, S-U12	H-043	Norfolk
		\$488,314	\$1,053	\$11,990	N	N	340	22	31	N	25	87	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method.	- Conventional Bore	\$62,170	\$1,126	\$11,990	N	N	84	33	45	N	-	45	Dry-Ditch Open-Cut	S-EF44, W-EF44	Norfolk H-044 S-EF44, W-EF	Norfolk
		\$332,654	\$1,126	\$11,990	N	N	84	33	45	N	21	45	Conventional Bore			
Orangefin madrom habitat may be present in this stream and it is a trout water. The direct aquatic imp	Conventional Bore	\$263,118	\$125	\$11,990	N	N	230	26	43	N	-	282	Dry-Ditch Open-Cut	W-IJ36, S-IJ43	H-045	Norfolk
		\$1,361,508	\$1,125	\$11,990	N	N	230	26	43	N	30	282	Conventional Bore			
Orangefin madtom habitat may be present in this stream and it is a trout water. The direct aquatic imp	 Conventional Bore 	\$137,882	\$2,622	\$17,985	N	N	43	24	44	N	-	140	Dry-Ditch Open-Cut	S-Y7, W-Y2, S-Y8	H-046	Norfolk
		\$646,292	\$2,622	\$17,985	N	N	43	24	44	N	25	140	Conventional Bore			
Orangefin madtom habitat may be present in this stream and it is a trout water. The direct aquatic imp	 Conventional Bore 	\$66,131	\$1,080	\$5,995	Y	N	0	5	9	N	-	64	Dry-Ditch Open-Cut	S-B22	H-047A	Norfolk
		\$252,649	\$1,000	\$5,995	r v	N	0	4	9	N	14	154	Dry-Ditch Open-Cut			
The open cut method would result in a small (0.19 ac) temporary impact to PEM wetland. This crossi t take 30 days to complete compounding the noise, aesthetic, and other impacts on nearby persons. construction activities on the affected residents.	– Dry-Ditch Open-Cu	\$502,555	\$135	\$5,995	Y	N	0	4	9	N	13	154	Conventional Bore	W-B25-PEM-1	H-047B	Norfolk
		\$218,210	\$4,185	\$11,990	Y	N	0	1	3	N	-	253	Dry-Ditch Open-Cut			
There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method.	 Conventional Bore 	\$784,426	\$4,185	\$11,990	Y	N	0	1	3	N	11	253	Conventional Bore	W-B25-PSS-2, S-B25	H-048A	Norfolk
		\$193,721	\$5,237	\$11,990	Y	N	0	6	9	N	-	228	Dry-Ditch Open-Cut			
The pipeline is already installed through a portion of the wetland at this crossing. The layout of a con I Additionally a tenchless method, meaning the value within the wetland, meaning damaging than a much shorter duration impact associated with an open cut through the wetlands and	– Dry-Ditch Open-Cu	\$843,031	\$1,287	\$11,990	Y	N	0	6	9	N	20	228	Conventional Bore	W-B24-PEM, W-B24- PSS, S-B21	H-048B	Norfolk
The open cut method would result in a temporary impact to two small UNTs to Green Creek and a PE		\$120,447	\$7,142	\$17,985	N	N	130	48	57	N	-	96	Dry-Ditch Open-Cut			
I pit and spol pile. This crossing is in close proximity to a residence, and a tenchless crossing of this is aesthetic, and other impacts on nearby persons. The open-cut method reduces construction duration conventional bore crossing method to avoid/minimize these minor temporary impacts would be unrea	Dry-Ditch Open-Cu	\$950,298	\$2,169	\$17,985	N	N	130	48	57	N	36	96	Conventional Bore	W-ST2-PEM, S-G24, S G25	H-051	Norfolk
	1	1	1	1	1		1	1	1	1	1	1	1	1	1	L

sion Rationale
res. To avoid excavating bore pits in wetland areas, Direct Pipe would be necessary to span mplete (as opposed to three days for an open cut crossing). The greenhouse gas footprint ethod to avoid/minimize the temporary impacts to these features would be unreasonably
act will be avoided/minimized by use of the conventional bore method. A minor temporary
orre crossing method to avoid/minimize this minor temporary impact would be unreasonably
act will be avoided/minimized by use of the conventional bore method. A minor temporary
sct will be avoided/minimized by use of the conventional bore method. A minor temporary
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by
sct will be avoided/minimized by use of the conventional bore method.
ct will be avoided/minimized by use of the conventional bore method.
sct will be avoided/minimized by use of the conventional bore method.
g is in close proximity to several residences, and a trenchless crossing of this location would The open-cut method reduces construction duration to minimize disruption due to
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by
entional bore would require excavation of a bore pit unacceptably close to the installed pipe. at that a longer-duration bore pit in the wetland (3 to 4 weeks) is not less environmentally adjacent four-foot-wide UNT to Mill Creek.
A wetland Avoiding/minimizing these minor impacts through a conventional bore would of an interim ramp and bench and dramatically increasing the space occupied by the bore cation increases the duration of the crossing from 2 to 19 days - compounding the noise, to minimize disruption due to construction activities on the affected residents. Using a onably expensive.

USACE District Valerbodies Being Crossing # Crossing Methods Evaluated Crossing Methods Evaluated Cossing Methods Evaluated Crossing Method Evaluated Crossing Method Evaluated <th>Crossing Method Dec</th>	Crossing Method Dec
USACE District Crossing # Waterbodies Being Crossing Methods Evaluated Crossing Methods	Crossing Method Dec
Crossing Length Pit Depth Deep Stream Maximum Steep Slope Maximum Average Maximum Winch Hill Length (feet) Present Stockpie Resource Monitoring Costs (for Cost Cost Cost Cost Cost Cost Cost Cost	
Dry-Ditch Open-Cut 79 - N 34 24 729 N N \$5.995 \$11,070 \$82,885 The one out method would result in a temporary intract to the one out method would result in a temporary intract to the one out method would result in a temporary intract to the one out method would result in a temporary intract to the one out method would result in a temporary intract to the one out method would result in a temporary intract to the one out method would result in a temporary integration.	a small (three-feet wide) UNT. The slope
Norfolk H-052 S-D14 Conventional Bore 79 19 N 34 24 729 N N \$\$5,995 \$\$1,017 \$\$317,992 Dry-Ditch Oper-Cut and around the bore pit to be winched to other equipment. upland work during a bore. There is insufficient space at the space at	That increases the complexity of this cross is location for spoil piles from a bore pit.
Dry-Ditch Open-Cut 89 - N 27 20 83 N N \$17,985 \$10,256 \$112,317 The open cut method would result in a temporary impact to	two small intermittent LINTs to North For
Norfolk H-053 W-D7-PEM, S-D13, S- D12	xceeding 20 feet at the edge of a steep sk . Using a conventional bore crossing met
Dry-Ditch Open-Cut 81 - N 33 10 51 N N \$5,995 \$1,260 \$126,943	ethods or significant environmental impag
Normal H-104 S-U11 Conventional Bore 81 22 N 33 10 51 N N \$5.995 \$1.260 \$438.095 Universitional Bore early of the conventional bore method. A minor temporary in	pact associated with the bore to maintain
Dry-Ditch Open-Cut 60 - N 43 37 585 N N \$5,995 \$4,725 \$118,511 The open cut method would result in a temporary impact to would require a deep bore pit exceeding 30 feet, threaty n	a small (four-feet wide) UNT to North For quiring the excavation of an interim ramp
Nortoix H-055 S-D8 Dry-Dich Open-Cut pile: The slope adjacent becrossing is stease and excess complexity with corcessing in the corcessing is stease and excess complexity with corcessing in the corcessing is stease and excess complexity with corcessing in the corcessing in the corcessing is stease and excess complexity with corcessing in the corcessing in the corcessing in the corces in the corces in the corcessing in the corces in the corces in the corces in the corcessing in the corces in the corces in the corcessing in the corces i	ively long, requiring equipment operating personnel, and adds risk of impact to the ing method to avoid/minimize this minor to
Nnrfink H-056 S_rOH 15 Dry-Ditch Open-Cut 35 - N 62 54 148 N N \$5,995 \$3,735 \$48,256	a small (four-feet wide) intermittent UNT t
Normalian Occurrentional Bore 35 24 N 62 54 148 N N \$5,995 \$1,017 \$325,574 Order to a local regime a reasivery use to be print does not in equile a reasivery	I bore crossing method to avoid/minimize
Nnrfink H-057 S_rOH 14 54 - N 48 34 109 N N \$5,995 \$3,960 \$62,005 The open cut method would result in a temporary impact to the cut method wou	a small (four-feet wide) UNT to North For
Conventional Bore 54 36 N 48 34 109 N N \$5,995 \$1,017 \$817,961	the bore pit and spoil pile. Using a conventional bore crossing method to avoid/minimize this minor te
Narfalk H-058 S-GH11 - N 54 42 231 N N \$5,995 \$3,870 \$42,553 The open cut method would result in a temporary impact to would resul	a small (three-feet wide) intermittent UNT the edge of a steep slope, thereby requir lose proximity to a residence, and a trend
Conventional Bore 31 32 N 54 42 231 N N \$5,995 \$1,017 \$679,610 and the particular method would be unreasonably expensive.	essenteic, and other impacts on nearby persons. The open-cut method reduces construction duration method would reduce the construction duration near private drinking water wells on the property. Us would be unreasonably expensive.
Norbik H-059 S-GH9 Dry-Ditch Open-Cut 48 - N 47 24 62 N N \$5,995 \$3,735 \$57,933 Proper cut method would result in a temporary impact to require a relatively dep lob in pit exceeding is of beep at the etermine	a small (four-feet wide) UNT to North For Ige of a steep slope, thereby requiring the y to a residence, and a trenchless crossin
Conventional Bore 48 34 N 47 24 62 N N \$5,995 \$1,017 \$764,394 aesthetic, and other impacts on nearby persons. The oper conventional bore crossing method to avoid/minimize this r	cut method reduces construction duration inor temporary impact would be unreasor
Norbik H-060 S-R08 Image:	ethods or significant environmental impart
Conventional Bore 43 15 N 20 12 0 N Y \$5,995 \$360 \$196,898 Annual does intercontentional does intercontentintercontentional does intercontentintercontentional does	part associated with the bore to maintain
Norfolk H-061 S-R09 Dry-Ditch Open-Cut 30 - N 56 34 64 N N \$5,995 \$1,350 \$55,773 The open cut method would result in a temporary impact to the por pit acceeding 30 feet at the complex and spoil pile. This crossing is in close proxim	a small (nine-feet wide) UNT to North For Ige of a steep slope, thereby requiring the y to a residence, and a trenchless crossin
Conventional Bore 30 31 N 56 34 64 N N \$5.995 \$1.017 \$668,502 aesthetic, and other impacts on nearby persons. The open conventional bore crossing method to avoid/minimize his r	cut method reduces construction duration inor temporary impact would be unreasor
Norfolk H-062 S-RR11 Dry-Ditch Open-Cut 38 - N 39 26 136 N N \$5,995 \$1,395 \$58,515 The open cut method would result in a temporary impact to dependence of the open-Cut The open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence of the open cut method would result in a temporary impact to dependence op	a small (seven-feet wide) UNT to North F bit greater than 20 feet at the edge of a ste and socil pile. Using a conventional bore
Conventional Bore 38 27 N 39 26 136 N N \$5,995 \$1,017 \$361,492	and open price. Coming a contrantional pore
Dry-Ditch Open-Cut 133 - N 44 37 928 N N \$17,985 \$8,145 \$161,874	two small UNTs to North Fork Blackwater bit greater than 40 feet, thereby requiring 1 to the crossing is steep and excessively lo
Norfolk H-063 S-U1, W-U1, S-U2 Opp-Dict Open-Cut sequences. That issues the complexity of list crossing insufficiency of list crossing insufficiences. Norfolk H-063 S-U1, W-U1, S-U2 Conventional Bore 133 41 N 44 37 928 N N \$17,985 \$2,169 \$2,633,069 Portal requirement. That increase the completery of list crossing insufficience and other in insufficience and other in the advectance of the product sequences. That increase the completery of list crossing insufficience and other in the advectance of the product sequences. N \$17,985 \$2,169 \$2,633,069 Portal requirement. That increase the complexity of list crossing in the advectance of the product sequences. N N \$17,985 \$2,169 \$2,633,069 Portal requirement. That increase the complexity of list crossing in the advectance of the product sequences. N N \$17,985 \$2,169 \$2,633,069 Portal requirement. The increase the complexity of list crossing in the advectance of the product sequences.	bored, increases safety risk to personnel, bit. This crossing is in close proximity to a pacts on nearby persons. The open-cut he construction duration near a private dr reasonably expensive.
Dry-Ditch Open-Cut 56 - N 46 18 0 N Y \$5,995 \$5,535 \$106,730	ranchlann aranning
Nortolik HOU1 S-E28 Conventional Bore 56 16 N 46 18 0 N Y \$5,995 \$1,017 \$239,017 Ope-Dick Open-Cut Initiational by adjusted to a maintime varies.	sary to facilitate connection to the mainline

sion Rationale
adjacent to the crossing is steep and excessively long, requiring equipment operating within ng if bored, increases safety risk to personnel, and adds risk of impact to the waterbody from
Blackwater River and a PEM wetland. Avoiding/minimizing these minor impacts through a ps, thereby requiring the excension of an interim ramp and banch and dramatically od to avoid/minimize these minor temporary impacts would be unreasonably expensive.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
Blackwater River. Avoiding/minimizing these minor impacts through a conventional bore ind two benches and dramatically increasing the space occupied by the bore pit and spail within and around the bore pit to be winched to other equipment. That increases the valenchody from upland work during a bore. There is insufficient space at this location for mporary impact would be unreasonably expensive.
North Fork Blackwater River. Avoiding/minimizing this minor impact through a conventional quiring the excavation of an interim ramp and bench and dramatically increasing the space this minor temporary impact would be unreasonably expensive.
Blackwater River. Avoiding/minimizing this minor impact through a conventional bore would excavation of an interim ramp and bench and dramatically increasing the space occupied by morary impact would be unreasonably expensive.
to Blackwater River. Avoiding/minimizing this minor impact through a conventional bore ng the excavation of an interim ramp and bench and dramatically increasing the space less crossing of this location would take longer to complete – compounding the noise, to minimize dispution due to construction activities on the affected residents. The open cut ng a conventional bore crossing method to avoid/minimize this minor temporary impact
Blackwater River. Avoiding/minimizing this immor impact through a conventional bore would excavation of an interim ramp and bench and dramatically increasing the space occupied by of this location would take nearly twice as long to complete – compounding the noise, to minimize disruption due to construction activities on the affected residents. Using a ably expensive.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
K Blackwater River. Avoiding/minimizing this minor impact through a conventional bore would excavation of an interim ramp and bench and dramatically increasing the space occupied of this location would take nearly twice as long to complete – compounding the noise, to minimize disruption due to construction activities on the affected residents. Using a ably expensive.
vk Blackwater River Blackwater River. Avoiding/minimizing this minor impact through a p slope, thereby requiring the excavation of an interim ramp and two benches and roossing method to avoid/minimize this minor temporary impact would be unreasonably
River and a PEM wetland (0.002 ac). Avoiding/minimizing these minor impacts through a ne excavation of an interim ramp and two benches and dramatically increasing the space ray, requiring equipment operating within and around the bore pit to be winched to other and adds risk of unpact to the waterbody from upland work during a bore. There is residence, and a trenches crossing of this location would take nearly three times as long to ethod reduces construction duration to minimize disruption due to construction activities on nking water well on the property. Using a conventional bore crossing method to
y difficult because they would require the pipe to be installed too deeply to facilitate valve.

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							luation Factors	Eva								
Crossing Method Dec	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ict Crossing #	USACE Distr
There are no similify and constraints on available crossion methods or similify and environmental impa		\$40,445	\$1,350	\$5,995	N	N	31	19	41	N	-	22	Dry-Ditch Open-Cut			
use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$133,390	\$1,017	\$5,995	N	N	31	19	41	N	14	22	Conventional Bore	S-GH3	I-001A	Norfolk
This UNT to Teels Creek is in an area with highly erodible soils. The stream banks at the crossing to lecteam work will be necessary to normanently restrice and stabilize the banks, which will provide o	Dor-Ditch Open-Cur	\$76,778	\$5,400	\$5,995	Y	N	0	2	4	N	-	52	Dry-Ditch Open-Cut	S.E20	1-002	Norfolk
the stream. That work can be done efficiently and effectively after completion of an open-out crossing	biy bian open ou	\$218,530	\$1,017	\$5,995	Y	N	0	2	4	N	14	52	Conventional Bore	0 110		
Teels Creek in an area with highly erodible soils. The stream banks at the crossing location are rapid necessary to permanently restore and stabilize the banks, which will provide greater protection for th	– Dry-Ditch Open-Cu	\$98,625	\$5,130	\$5,995	Y	N	0	3	15	N	-	45	Dry-Ditch Open-Cut	S-E28	1-003	Norfolk
can be done efficiently and effectively after completion of an open-cut crossing. Therefore, temporary		\$203,231	\$1,017	\$5,995	Y	N	0	3	15	N	15	45	Conventional Bore			
Avoiding/minimizing these minor impacts through a conventional bore would require a relatively deep benches and dramatically increasing the space occupied by the bore pit and spoil pile. This crossing days to complete – compounding the noise, assittetic, and other impacts on nearby persons. The op	– Dry-Ditch Open-Cu	\$215,741	\$1,146	\$5,995	Y	N	0	6	18	N	-	298	Dry-Ditch Open-Cut	W-E7	1-004	Norfolk
activities on the affected residents. The open cut method would reduce the construction duration nea avoid/minimize the impact to this PEM would be unreasonably expensive.		\$1,043,677	\$135	\$5,995	Y	N	0	6	18	N	21	298	Conventional Bore			
The open cut method would result in a small temporary impact (0.07 ac) to a PEM wetland. Avoiding bore pit of nearly 30 feet on the edge of a steep slope, thereby requiring the excavation of an interim spail pit. This crossing is in close proximity to residences, and a trenchless crossing of this location readw correctors. The same out encoded on those concentration during the training during during during during the training during during	– Dry-Ditch Open-Cu	\$111,368	\$373	\$5,995	Y	N	0	29	37	N	-	150	Dry-Ditch Open-Cut	W-E8	I-005A	Norfolk
nearby persons. The uper-out mentor reduces considuant our adult of minimizer disruption due to o avoid/minimizer the impact to this PEM would be unreasonably expensive.		\$678,464	\$135	\$5,995	Y	N	0	29	37	N	27	150	Conventional Bore			
This Section of Teels Creek is in an area with highly erodible soils. The stream banks at the crossing Instream work will be necessary to permanently restore and stabilize the banks, which will provide go the stream. That work can be done difficiently and efforcively after completion of an open-cut crossing the stream. That work can be done difficiently and efforcively after completion of an open-cut crossing the stream. That work can be done difficiently and the stream that work can be done at the stream that work can be done at the stream. That work can be done at the stream that work can be done at the stream. That work can be done at the stream that work will be necessary to be done at the stream. That work can be done at the stream that work can be done at the stream. That work can be done at the stream that work can be done at the stream. That work can be done at the stream that work can be done at the stream that work can be done at the stream. That work can be done at the stream that work can be done at the stream that work can be done at the stream. That we done at the stream that work can be done at the stream that work can be done at the stream. That work can be done at the stream that we done at the stream that work can be done at the stream that work can be done at the stream that the stream that work can be done at the stream that the stream that work can be done at the stream that the str	- Dry-Ditch Open-Cu	\$115,713	\$6,818	\$5,995	Y	N	0	18	24	N	-	67	Dry-Ditch Open-Cut	S-E28	I-005B	Norfolk
		\$407,255	\$1,017	\$5,995	Y	N	0	18	24	N	23	67	Conventional Bore			
This intermittent UNT to Teels Creek is in an area with highly erodible soils. The stream banks at the construction. Instream work will be necessary to permanently restore and stabilize the banks, which sediment loads in the stream. That work can be done efficiently and effectively after completion of an Entrimerrore. It would be unreascenable wenersive to use a trenchlese creasing the avrid on a traction entrimerrore.	– Dry-Ditch Open-Cu	\$91,799	\$3,825	\$5,995	N	N	62	29	48	N	-	59	Dry-Ditch Open-Cut	S-EF4	1-006	Norfolk
		\$795,612	\$1,017	\$5,995	N	N	62	29	48	N	34	59	Conventional Bore			
This UNT to Teels Creek is in an area with highly ercdible soils. The stream banks at the crossing lo Instream work will be necessary to permanently restore and stabilize the banks, which will provide g the stream. That work can be done efficiently and effectively after completion of an open-cut crossing the stream.	– Dry-Ditch Open-Cu	\$134,560	\$5,333	\$5,995	N	N	124	2	8	N	-	68	Dry-Ditch Open-Cut	S-EF12	1-007	Norfolk
		\$273,072	\$1,017	\$5,995	N	N	124	2	8	N	16	68	Conventional Bore			
The open cut method would result in a temporary impact to a small (two-feet wide) UNT to Teels Cre- relatively deep bore pit exceeding 20 teet, threeby requiring the excersion of an interim ramp and be crossing is in close proximity to residences, and a trenchiess crossing of this location would take nea- nearby persons. The open-cut method reduces construction duration to minimize disruption due to o construction duration near private dirinking water wells on the property. Using a conventional bore cro- ssing and the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison of the property. Using a conventional bore cro- ssing the comparison of the property of the comparison	– Dry-Ditch Open-Cu	\$45,080	\$1,395	\$5,995	Y	N	0	18	25	N	-	43	Dry-Ditch Open-Cut	S-MM42	1-008	Norfolk
expensive.		\$339,143	\$1,017	\$5,995	Y	N	0	18	25	N	23	43	Conventional Bore			
Although the bore pits associated with this crossing are 20 feet deep, the relatively flat approaches a pits can be managed appropriately.	Conventional Bore	\$359.985	\$1,035	\$5,995	N	N	30	12	25	N	20	60	Conventional Bore	S-RR15	1-009	Norfolk
		\$146,846	\$4,635	\$5,995	N	N	87	19	39	N	-	71	Dry-Ditch Open-Cut			
The stream banks at the crossing location are rapidly eroding due to natural conditions unrelated to p banks, which will provide gradest protection for the pipeline and have the benefit of roducing long-ter completion of an open-cut crossing. Therefore, temporary stream impacts are unavoidable at this loc space for soil stockpiles. The open cut method also reduces the construction duration near a private	– Dry-Ditch Open-Cu	\$464,280	\$1,017	\$5,995	N	N	87	19	39	N	28	71	Conventional Bore	S-D23	I-010	Norfolk
		\$71,392	\$3,735	\$5,995	Y	N	0	21	31	N	-	42	Dry-Ditch Open-Cut			
The open cut method would result in a temporary impact to a small eight-feet wide) intermittent UNT require a relatively deep bore pit nearly 20 feet at the edge of a steep slope, thereby requiring the exc bore pit and spoil pile. Using a conventional bore crossing method to avoid/minimize this minor temp	– Dry-Ditch Open-Cu	\$318,036	\$1,017	\$5,995	Y	N	0	21	31	N	21	42	Conventional Bore	S-D22	ŀ011	Norfolk
The open cut method would result in a temporary impact to a small (eight-feet wide) intermittent UNT		\$53,244	\$3,285	\$5,995	N	N	113	27	35	N		29	Dry-Ditch Open-Cut			
require a reasively deep bore pt nearly 30 teet at the edge of a steep slope, thereby requiring the ex- bore pit and spoil pile. This crossing is in close proximity to a residence, and a tenchless crossing of aesthetic, and other impacts on nearby persons. The open-cut method reduces construction duration conventional bore crossing method to avoid/minimize this minor temporary impact would be unreaso	Dry-Ditch Open-Cu	\$345,085	\$1,017	\$5,995	N	N	113	27	35	N	28	29	Conventional Bore	S-D20	Norfolk I-012 S-	
İ	1	1	1	1	1	L	1	1	1	1	1	1	1	1	1	L

sion Rationale
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
ation are rapidly eroding due to natural conditions unrelated to pipeline construction. eater protection for the pipeline and have the benefit of reducing long-term sediment loads in Therefore, temporary stream impacts are unavoidable at this location.
y eroding due to natural conditions unrelated to pipeline construction. Instream work will be pipeline and have the benefit of reducing long-term sediment loads in the stream. That work stream impacts are unavoidable at this location.
bore pit of nearly 30 feet, thereby requiring the excavation of an interim ramp and two is in close proximity to residences, and a tenchless crossing of this location would take 14 n-out method reloace construction duration to minimize darguing due to construction private drinking water wells on the property. Using a conventional bore crossing method to
inimizing these minor impacts through a conventional bore would require a relatively deep amp and two benches and dramatically increasing the space occupied by the bore pit and would take 10 days to complete – compounding the noise, assettier, and other impacts on nstruction activities on the affected residents. Using a conventional bore crossing method to
location are rapidly eroding due to natural conditions unrelated to pipeline construction. aater protection for the pipeline and have the benefit of reducing long-term sediment loads in Therefore, temporary stream impacts are unavoidable at this location.
crossing location are rapidly eroding due to natural conditions unrelated to pipeline ill provide greater protection for the pipeline and have the benefit of reducing long-term generul crossing. Therefere, temporary stream impacts are unavoidable at this location. of the aquasic impact to this small (three-foot wide) stream.
ation are rapidly eroding due to natural conditions unrelated to pipeline construction. eater protection for the pipeline and have the benefit of reducing long-term sediment loads in Therefore, temporary stream impacts are unavoidable at this location.
k. Avoiding/minimizing this minor impact through a conventional bore would require a ch and dramatically increasing the space occupied by the bore pit and spoil pite. This by twice as long to complete – compounding the noise, aesthetic, and other impacts on narrucinon activities on the affected residents. The open our method vould reduce the assing method to avoid/minimize this minor temporary impact would be unreasonably
e reasonable for winching equipment and the excessive spoils associated with deeper bore
peline construction. Instream work will be necessary to permanently restore and stabilize the nediment loads in the stream. That work can be done efficiently and effectively after from. This location has construction constraints, including winch-hill construction and limited drinking water well on the property.
to Teels Creek. Avoiding/minimizing this minor impact through a conventional bore would wation of an interim ramp and bench and dramatically increasing the space occupied by the rany impact would be unreasonably expensive.
to Teels Creek. Avoiding/minimizing this minor impact through a conventional bore would wation of an interim ramp and bench and dramatically increasing the space occupied by the initio location would like more than twice as long to complete – compounding the noise, to minimize disruption due to construction activities on the affected residents. Using a ably expensive.

					Evaluation Factors											
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	e Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci
			Dry-Ditch Open-Cut	90	-	N	40	28	53	N	N	\$5,995	\$4,275	\$281,474		Teels Creek is in an area with highly erodible soils. The stream banks at the crossing location are rapi be necessary to permanently restore and stabilize the banks. which will provide greater protection for
Norfolk	ŀ013	S-C14	Conventional Bore	90	38	N	40	28	53	N	N	\$5,995	\$1,017	\$956,667	- Dry-Ditch Open-Cut	t work can be done efficiently and effectively after completion of an open-out crossing. Therefore, temp location include a bore pit depth of nearly 40 feet and steep slopes on both sides of the creek, one of duration near a private drinking water well on the property.
Norfolk	F014	S-C17	Dry-Ditch Open-Cut	62	-	N	21	16	0	N	Y	\$5,995	\$2,025	\$195,071	Conventional Bore	Roanske lonnarch hakitat may he nossant in this stream. The direct anualic imnart will be avoided fimi
			Conventional Bore	62	20	N	21	16	0	N	Y	\$5,995	\$2,025	\$366,669		rcuantive rugperch madinal may de present in mis sideant. The direct aquaid impact will be avoided mi
Norfolk	ŀ015	S-CD6	Dry-Ditch Open-Cut	109	-	N	4	1	0	N	Y	\$5,995	\$4,365	\$286,561	Dry-Ditch Open-Cut	Little Creek is in an area with highly erodible soils. The stream banks at the crossing location are rapic necessary to permanently restore and stabilize the banks. which will provide greater protection for the
		0.000	Conventional Bore	109	20	N	4	1	0	N	Y	\$5,995	\$1,017	\$499,046	bry bran open out	received by point action in tradition was observed and open could receive a provide growing processing or normal can be done efficiently and effectively after completion of an open-could crossing. Therefore, temporary :
Norfolk	ŀ016	W-CD6	Dry-Ditch Open-Cut	94	-	N	4	1	0	N	Y	\$5,995	\$504	\$72,299	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac
			Conventional Bore	94	11	N	4	1	0	N	Y	\$5,995	\$504	\$323,511		use of the conventional bore method. A minor temporary impact associated with the bore to maintain a
Norfolk	ŀ017	W-CD5	Dry-Ditch Open-Cut	88	-	N	67	54	122	N	N	\$5,995	\$0	\$67,595	Dry-Ditch Open-Cut	The open cut method would result in a small temporary impact (0.11 ac) to a PFO wetland. Avoiding/n deep bore pit exceeding 50 fact on the edge of a very steep slope, thereby requiring the excavation of bore pit and spoil pile. This crossing is in proximity to a residence, and a trenchless crossing of this I
			Conventional Bore	88	52	N	67	54	122	N	N	\$5,995	\$0	\$3,092,101		notes, easthetic, and other impacts on nearby persons. I he open-cut method reduces construction du Because the pipeline ROW must remain free of woody vegetation, a conversion impact is unavoidable portion of the impact to this PFO would be unreasonably expensive.
Norfolk	ŀ018	S-112	Dry-Ditch Open-Cut	98	-	N	13	3	0	N	Y	\$5,995	\$5,130	\$289,929	Dry-Ditch Open-Cut	Little Creek is in an area with highly erodible soits. The stream banks at the crossing location are rapic necessary to permanently restore and stabilize the banks, which will provide greater protection for the
			Conventional Bore	98	20	N	13	3	0	N	Y	\$5,995	\$1,017	\$467,828		can be done ethicently and effectively after completion of an open-cut crossing. I herefore, temporary : construction duration near a private drinking water wells on the property.
Norfolk	ŀ019	S-CD1, W-CD1	Dry-Ditch Open-Cut	110	-	N	22	12	0	N	Y	\$11,990	\$5,175	\$106,965	Dry-Ditch Open-Cut	This crossing is in close proximity to a residence, and a trenchless crossing of this location would take
			Conventional Bore	110	18	N	22	12	0	N	Y	\$11,990	\$1,017	\$407,397		
Norfolk	1-020	S-KL35, W-EF48	Dry-Ditch Open-Cut	72	-	N	32	14	106	N	N	\$11,990	\$2,406	\$77,169	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact
			Conventional Bore	72	16	N	32	14	106	N	N	\$11,990	\$2,406	\$291,808		use or the conventional oure mentor. A minor emporary impact associated with the oure to maintain a
Norfolk	ŀ021	S-KL36	Dry-Ditch Open-Cut	39	-	N	34	18	32	N	Y	\$5,995	\$1,350	\$62,475	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bear method. A minor temporary import accessing with the bear to minimize
			Conventional Bore	39	17	N	34	18	32	N	Y	\$5,995	\$1,350	\$195,671		use or the conventional oure mentor. A minor emporary impact associated with the oure to maintain a
Norfolk	ŀ022	S-KL38	Dry-Ditch Open-Cut	200	-	N	54	24	0	N	Y	\$5,995	\$5,265	\$176,514	Dry-Ditch Open-Cut	The pipeline has already been installed under an adjacent road (Hwy, 220). There is no feasible way the provided the small UNT to the Blackwater River with a crowent
			Conventional Bore	200	35	N	54	24	0	N	Y	\$5,995	\$1,017	\$1,214,037		r un reminike, arouwng uns tempolary impak to ans annañ o'n'r to are blakwater river wan a conveni
Norfolk	ŀ023	S-KL39	Dry-Ditch Open-Cut	98	-	N	40	31	85	N	N	\$5,995	\$3,960	\$102,668	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (seven-feet wide) UNT to Blackwa relatively deep bore pit exceeding 30 feet at the edge of a steep slope, thereby requiring the excavatio pit and spoil pile. This crossing is in close proximity to a residence, and a terchless crossing of this to their impact no machine various. The canon of method would reduce the construction duration near
			Conventional Bore	98	32	N	40	31	85	N	N	\$5,995	\$1,017	\$869,754		construction of minimum pressure. In construction activities on the affected residents. Using a conver unreasonably expensive.
Norfolk	1-024	S-YZ5	Dry-Ditch Open-Cut	40	-	N	31	19	0	N	Y	\$5,995	\$5,805	\$54,880	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (four-feet wide) UNT to Blackwater relatively deep bore pit nearly 30 feet at the edge of a steep slope, thereby requiring the excavation of and spoil pile. This crossing is in does proximity to several residences, and a trenchless crossing of th
			Conventional Bore	40	28	N	31	19	0	N	Y	\$5,995	\$1,017	\$376,303		The group process the volume is an user provide the state the state of the state of the state state state of the state of
Norfolk	1-025	S-YZ4	Dry-Ditch Open-Cut	32	-	N	37	28	52	N	N	\$5,995	\$5,670	\$44,847	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (three-feet wide) UNT to Blackwait relatively deep bore pit nearly 30 feet at the edge of a steep slope, thereby requiring the excavation of and spoil pile. This crossing is in close proximity to several residences, and a terchises crossing of the impacts on nearby persons. The open-cut method reduces construction duration to minimize n\vec{service}.
			Conventional Bore	32	22	N	37	28	52	N	N	\$5,995	\$1,017	\$298,791		the construction duration near private drinking water wells on the property. Using a conventional bore expensive.

ision Rationale
iely ending due to natural conditions unrelated to pipeline construction. Instream work will the pipeline and have the benefit of reducing long-term sedment loads in the stream. That orary stream impacts are unavoidable at this location. Construction constraints at this which would require winched equipment. The open cut method also reduces the construction
nimized by use of the conventional bore method.
dly eroding due to natural conditions unrelated to pipeline construction. Instream work will be pipeline and have the benefit of reducing long-term sediment loads in the stream. That work stream impacts are unavoidable at this location.
Its relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
minimizing these minor impacts through a conventional bore would require an excessively an interim ramp and two benches and dramatically increasing the space occupied by the location would increase the duration of the crossing from 4 to 35 days – compounding the articlo to minimize disruption due to construction achivities on the affected relations. e with any crossing method. Using a conventional bore crossing method to avoid/minimize a
dly eroding due to natural conditions unrelated to pipeline construction. Instream work will be pipeline and have the benefit of reducing long-term sediment toads in the stream. That work stream impacts are unavoidable at this location. The open cut method also reduces the
e nearly four times longer to long to complete – compounding the noise, assthetic, and other on due to construction activities on the affected residents.
Its relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
Its relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
to lie the two sections of pipe together if a trenchless method is used to install this crossing, ional bore crossing would be unreasonably expensive.
ter River. Avoiding/minimizing this minor impact through a conventional bore would require a on dan interim rang and bench and dramatically increasing the space occupied by the bore ocation would take nearly twice as long to complete — compounding the noise, aesthetic, and private drinking water wells on the property. The open-cut method reduces construction ntional bore crossing method to avoid/minimize this minor temporary impact would be
r River. Avoiding/minimizing this minor impact through a conventional bore would require a an interim ramp and banch and dramatically increasing the space occupied by the bore pit in location would this more than twice as long to complete - compounding the noise, to minimize disruption due to construction activities on the affected residents. Using a aby expensive.
er River. Avoiding/minimizing this minor impact through a conventional bore would require a an interim rame and bench and dramatically increasing the space occupied by the bore pit this location would take longer to complete – compounding the noise, aesthetic, and other on due to construction achivities on the affected residents. The open cut method would reduce crossing method to avoid/minimize this minor temporary impact would be unreasonably

								Eva	uation Factors									
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec		
Norfolk	1026	S EE49 W EE61	Dry-Ditch Open-Cut	42	-	N	32	29	0	N	Y	\$11,990	\$3,672	\$52,065	Day Ditch Open Cut	The open cut method would result in a temporary impact to a small (two-feet wide) intermittent UNT to impact through a conventional bore would require a nelatively deep bore pit nearly 30 feet at the edge dramatically increasing the space occupied by the bore pit and spoil pit. This crossing is in close pro and amatically increasing the space occupied by the bore pit and spoil pit. This crossing is in close pro the space of the space of th		
THOTOIR	1020	0 2140, 11 2101	Conventional Bore	42	28	N	32	29	0	N	Ŷ	\$11,990	\$1,089	\$388,045	biy biar opar oa	long to complete - compounding the noise, assthetic, and other impacts on nearby persons. The ope activities on the affected residents. The open cut method would reduce the construction duration near avoid/minimize this minor temporary impact would be unreasonably expensive.		
Norfolk	ŀ027	S-KI 41	Dry-Ditch Open-Cut	48	-	N	41	32	83	Ν	N	\$5,995	\$5,063	\$86,747	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a UNT to Blackwater River. Avoiding/mini exceeding 30 feet at the edge of a steep slope, thereby requiring the excavation of an interim ramp an		
			Conventional Bore	48	33	N	41	32	83	N	N	\$5,995	\$1,017	\$746,125		would increase the duration of the crossing from 8 to 33 days. The open cut method would reduce th conventional bore crossing method to avoid/minimize this minor temporary impact would be unreasor		
Norfolk	ŀ028	S-C8	Dry-Ditch Open-Cut	44	-	N	32	23	31	N	N	\$5,995	\$3,600	\$58,449	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (five-feet wide) intermittent UNT It require a relatively deep bore pit of nearly 30 feet at the edge of a steep slope, thereby requiring the edge of the born at the dege of a steep slope. Thereby requiring the edge of the born at the dege of a steep slope. Thereby requiring the edge of the born at the dege of a steep slope. Thereby requiring the edge of the born at the dege of a steep slope. Thereby requiring the edge of the born at the dege of the born at the born at the dege of the born at the dege of the born at the b		
			Conventional Bore	44	28	N	32	23	31	Ν	N	\$5,995	\$1,017	\$387,655		are use priority and point press a acconventional bore crossing method to avoid/minimize this minor tempo		
Norfolk	1-029	S-KL51	Dry-Ditch Open-Cut	45	-	N	36	27	105	N	N	\$5,995	\$4,523	\$61,279	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (six-feet wide) stream. Avoiding/m plt exceeding 20 feet at the edge of a steep slope, thereby requiring the excavation of an interim ramp This crossing is in close proximity to a residence, and a trenchless crossing of this location would tak inpacts on nearby versions. The come-rut method reduces construction duration to minimize disruption		
			Conventional Bore	45	24	N	36	27	105	N	N	\$5,995	\$1,017	\$353,954		the construction duration near a private drinking water well on the property. Using a conventional bon expensive.		
Norfolk	I-030	S-KL52	Dry-Ditch Open-Cut	59	-	N	23	18	0	N	Y	\$5,995	\$7,088	\$59,049	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (one-foot wide) stream. Avoiding/ ple acceeding 20 feet, thereby requiring the excavation of an interim ramp and a bench and dramatica proximity to a residence, and a trenchless crossing of this location would take twice as long to comple		
			Conventional Bore	59	23	N	23	18	0	Ν	Y	\$5,995	\$1,017	\$384,551		memoa reduces construction duration to minimize disruption due to construction activities on the are drinking water wells on the property. Using a conventional bore crossing method to avoid/minimize th		
Norfolk	Norfolk I-031 S-I	S-KL54	Dry-Ditch Open-Cut	32	-	N	29	21	0	N	Y	\$5,995	\$3,870	\$67,504	- Dry-Ditch Open-Cut	The open-cut method would result in a temporary impact to a small (one-foot wide) stream. Avoiding/r bore pit that is nearly 20 feet deep, potentially requiring the excavation of an interim ramp and a bend is in proximity to a residence, and a trenchless crossing of this location would take wice as long to co- ut methor drefunces construction duration to minimize elivation test on construction activities on the		
			Conventional Bore	32	20	N	29	21	0	N	Y	\$5,995	\$1,017	\$280,521		drinking water wells on the property.		
Norfolk	ŀ032	S-F8	Dry-Ditch Open-Cut	206	-	N	32	26	0	N	Y	\$5,995	\$5,603	\$268,925	Dry-Ditch Open-Cut	The pipeline has already been installed under an adjacent road (Rt. 122). There is no feasible way to a trenchess crossing were attempted, it would require a bore pit depth exceeding 40 feet, which woul occupied by the bore pit and spol pite. Lasty, avaiding this temporary impact to this small UNT to the		
			Conventional Bore	206	41	N	32	26	0	N	Y	\$5,995	\$1,017	\$2,828,000				
Norfolk	ŀ033	S-HH4	Dry-Ditch Open-Cut	63	-	N	29	18	20	N	N	\$5,995	\$6,548	\$90,006	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to an intermittent UNT to Maggodee Creek. A deep bore pit exceeding 30 leet at the edge of a steep slope, thereby requiring the excavation of an int t spoil lipe. This crossing is in close proximity to residences, and a tenchless crossing of this location nearbor versions. The open-cut method reduces construction duration to minimize distruction due to co		
			Conventional Bore	63	32	N	29	18	20	N	N	\$5,995	\$1,017	\$770,425		avoid/minimize this minor temporary impact would be unreasonably expensive.		
Norfolk	I-034	S-C20	Dry-Ditch Open-Cut	52	-	N	20	13	0	N	Y	\$5,995	\$270	\$56,702	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impar use of the conventional bore method. A minor temporary impact associated with the bore to maintain		
			Conventional Bore	52	17	N	20	13	0	N	Y	\$5,995	\$270	\$231,485				
Norfolk	1-035	S-C19	Dry-Ditch Open-Cut	100	-	N	49	41	234	N	N	\$5,995	\$3,510	\$237,103	Dry-Ditch Open-Cut	The open-cut method would result in a temporary impact to Maggodee Creek. Avoiding/minimizing th greater than 40 feet at the edge of a steep slope, thereby requiring the excavation of an interim rang no pile. This crossing is in close provinging to residences, and a tenchlese crossing of this location would persons. The open-cut method reduces construction duration to minimize disruption due to construct available in the reserved tent of the steep state of the steep state.		
			Microtunnel	100	46	N	49	41	234	N	N	\$5,995	\$1,017	\$3,516,103				
Norfolk	ŀ036	S-F11	Dry-Ditch Open-Cut	139	-	N	56	40	100	N	N	\$5,995	\$4,545	\$426,467	- Dry-Ditch Open-Cut	The Blackwater River's banks at the crossing location are rapidly eroding due to natural conditions u stabilize the banks, which will provide greater protection for the pipeline and have the benefit of reduut after completion of an open-out crossing. Therefore, temporary stream impacts are unavoidable at this constraints. The bore pits for this crossing would be just short of 40-bet deep. Site conditions do not		
			Conventional Bore	139	39	N	56	40	100	N	N	\$5,995	\$1,017	\$1,113,997				
Norfolk	ŀ037	S-F9b	Dry-Ditch Open-Cut	56	-	N	37	30	62	N	N	\$5,995	\$4,635	\$102,678	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a UNT to Blackwater River. Avoiding/mini exceeding 30 feet at the edge of a steep slope, thereby requiring the excavation of an interim ramp an crossing is in close proximity to residences, and a trenchless crossing of this location would take 16 d The open-cut method reduces construction duration to minimize disruption due to construction activit mear several private drinking water wells on the property. Using a convenional bore crossing method reduces the several private drinking water wells on the property. Using a convenional bore crossing method several private drinking water wells on the property. Using a convenional bore crossing method several private drinking water wells on the property. Using a convenional bore crossing method several private drinking water wells on the property. Using a convenional bore crossing method several private drinking water wells on the property. Using a convenional bore crossing method several privater drinking water barries and the several privater barries and the several privater drinking water barries and the several privater barries and the several privater drinking water barries and the several privater barries and the several privater barries and the several privater drinking water wells on the property. Using a conventional barries crossing method several privater barries and the several privater barries and the seve		
			Day Ditch Corre C . :	3b	31	N	3/	30	02	N	v	90,995 \$5.005	\$1,017	\$1.52,290		near several private drinking water wells on the property. Using a conventional bore crossing method		
Norfolk	ŀ038	S-F10	Conventional Per-	47	16	N	16	۰ ۵		N	v	\$5.005	\$1,030	\$213.475	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impar use of the conventional bore method. A minor temporary impact associated with the bore to maintain		
			Conventional Bore	-47	10	IN	10	э	U	IN		40,880	φ1,017	9213,473				

ision Rationale
b) Blackwater River and an adjacent PEM wetland (0.01 ac). Avoiding/minimizing this minor of a steep slope, thereby requiring the excavation of an interim ramp and bench and xximity to several residences, and a trenchess crossing of this location would take twice as n-out method reduces construction duration to minimize disruption due to construction a private drinking water well on the property. Using a conventional bore crossing method to
mizing this minor impact through a conventional bore would require a relatively deep bore pit of bench and dramatically increasing the space occupied by the bore pit and spoil pile. It also e construction duration near a private drinking water well on the property. Using a tably expensive.
b Blackwater River. Avoiding/minimizing this minor impact through a conventional bore would watwation of an interim ramp and bench and dramatically increasing the space occupied by per cut method would reduce the construction druation near several private drinking water rary impact would be unreasonably expensive.
ininizing this minor impact through a conventional bore would require a relatively deep bore and bench and dramatically increasing the space occupied by the bore pit and spoil pile. errore than twice as long to complete – compounding the noise, asefhetic, and other on due to construction activities on the affected residence. The open out method would reduce a crossing method to avoid/minimize this minor temporary impact would be unreasonably
ninimizing this minor impact through a conventional bore would require a relatively deep bore illy increasing the space occupied by the bore pit and spoil pile. This crossing is in close te – compounding the noise, aesthetic, and other impacts on nearby persons. The open-cut ted residents: The open-cut method would reduce the construction duration near private is minor temporary impact would be unreasonably expensive.
minimizing this minor impact through a conventional bore would require a relatively deep h and dramatically increasing the space occupied by the bore pit and spoil pile. This crossing mplete – compounding the noise, aesthetic, and other impacts on nearby persons. The open- affected residents. The open-cut method would reduce the construction duration near private
te the two sections of pipe together if a trenchless method is used to install this crossing. If d require the excavation of an interim ramp and bench and dramatically increase the space Maggodee Creek with a conventional bore crossing would be unreasonably expensive.
Avoiding/infinitinizing this minor impact through a conventional bore would require a relatively terim ramp and bench and dramatically increasing the space occupied by the bore pit and would take 17 days to complete – compounding the noise, aesthetic, and other impacts on instruction activities on the affected residents. Using a conventional bore crossing method to
its relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
is minor impact through a conventional bore would require an excessively deep bore pit of and two benches and dramatically increasing the space occupied by the bore pit and spoil take 34 days to complete – compounding the noise, aesthetic, and dher impacts on nearby on activities on the affected residents. Using a microtunnel crossing method to
nrelated to pipeline construction. Instream work will be necessary to permanently restore and cing long-term sediment back in the stream. That work can be done efficiently and effectively location. A trenches crossing at this location also faces significant constructability allow sufficient space to stockpile spoils from bore pits of that size.
mixing this minor impact through a conventional bore would require a relatively deep bore pit of bench and dramatically increasing the space occupied by the bore pit and spoil pite. This lays to complete compounding the noise, aesthetic, and other impacts on nearby persons, es on the affected residents. The open cut method would reduce the construction dutation to avoid/minimize this minor temporary impact would be unreasonably expensive.
its relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.

			Evaluation Factors													
Crossing Method De	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ct Crossing #	USACE Dist
		\$106,045	\$1,350	\$5,995	Y	N	0	12	20	N	-	66	Dry-Ditch Open-Cut			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	- Conventional Bore	\$377,013	\$1,017	\$5,995	Y	N	0	12	20	N	20	66	Conventional Bore	S-F9a	1-039	Norfolk
There are no significant constraints on available crossing methods or significant environmental impa	Conventional Bore	\$62,320	\$315	\$5,995	Y	N	0	13	18	N	-	53	Dry-Ditch Open-Cut	S-664	1-040	Norfolk
use of the conventional bore method. A minor temporary impact associated with the bore to maintai		\$234,368	\$315	\$5,995	Y	N	0	13	18	N	17	53	Conventional Bore			
The open cut method would result in a temporary impact to a small (four-feet wide) UNT to Foul Groa a relative) deep torce pit exceeding 20 feet, thereby requiring the excavation of an interim ramp and crossing is in locate proximity to several residences, and a trenchless crossing of this location would	Dry-Ditch Open-Cut	\$57,151	\$1,260	\$5,995	Y	N	0	10	21	N	-	51	Dry-Ditch Open-Cut	S-A36	ŀ041	Norfolk
on nearby persons. The open-cut method reduces construction duration to minimize disruption due to avoid/minimize this minor temporary impact would be unreasonably expensive.		\$352,712	\$1,017	\$5,995	Y	N	0	10	21	N	22	51	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$99,723	\$1,485	\$5,995	Y	N	0	16	20	N	-	78	Dry-Ditch Open-Cut	S-A38	1-042	Norfolk
		\$411,068	\$1,017	\$5,995	Y	N	0	16	20	N	20	78	Conventional Bore			
Foul Ground Creek is in an area with highly erodible soils. The stream banks at the crossing location work will be necessary to permanently restore and stabilize the banks, which will provide greater gr. Tratem. That work can be done efficiently and effectively after completion dan open-cut crossing.	Dry-Ditch Open-Cut	\$131,305	\$3,510	\$5,995	Y	N	0	10	14	N	-	114	Dry-Ditch Open-Cut	S-A41	I-043A	Norfolk
unreasonably expensive to use a trenchless crossing to avoid only a fraction of the aquatic impact to		\$408,187	\$1,017	\$5,995	Y	N	0	10	14	N	17	114	Conventional Bore			
The open cut method would result in a small (0.05 ac) temporary impact to PEM wetland. The open bore crossing method to avoid/minimize this minor temporary impact would be unreasonably expens	– Dry-Ditch Open-Cut	\$83,873	\$878	\$5,995	Y	N	0	7	14	N	-	110	Dry-Ditch Open-Cut	W-DD1	I-043B	Norfolk
		\$400,520	\$135	\$5,995	Y	N	0	7	14	N	18	110	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintair	 Conventional Bore 	\$102,895	\$1,305	\$11,990	Y	N	0	9	21	N	-	103	Dry-Ditch Open-Cut	S-GH36, S-KL17	I-044A	Norfolk
		\$392,387	\$1,305	\$11,990	Y	N	0	9	21	N	19	103	Conventional Bore			
The open cut method would result in a temporary impact to a small (four-feet wide) intermittent UNT would require a relatively deep bore pit of nearly 30 feet, thereby requiring the excavation of an interi pile. It also would increase the duration of the crossing from 8 to 25 days. The open out method would Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be	– Dry-Ditch Open-Cut	\$67,015	\$4,320	\$5,995	Y	N	0	23	27	N	-	61	Dry-Ditch Open-Cut	S-GH39	I-044B	Norfolk
		\$417,631	\$1,017	\$5,995	Y	N	0	23	27	N	26	61	Conventional Bore			
The open-cut method would result in a temporary impact to a small (three-feet wide) UNT to Foul Gr a relative/ deep bore pit of exceeding 20 feet, thereby requiring the excavation of an interim range are would double the duration of the creation. The open-cut method would reduce the construction dura crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive.	– Dry-Ditch Open-Cut	\$58,456	\$1,710	\$5,995	Y	N	0	13	17	N	-	57	Dry-Ditch Open-Cut	S-GH40	1-045	Norfolk
		\$369,740	\$1,017	\$5,995	Y	N	0	7	17	N	22	247	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$823,563	\$7,042	\$17,895	Y	N	0	7	11	N	20	217	Conventional Bore	S-GH44, S-IJ47, W- GH16	1-046	Norfolk
		\$85,998	\$3,870	\$5,995	N	N	87	38	50	N	-	48	Dry-Ditch Open-Cut			
The open cut memo would result in a temporary impact to a UN to Popar Camp Uncer. Avoiding pi of nearly 40 eto the deg do a tesp along, hereby requiring the sexiation of an interim ramp also would increase the duration of the crossing from 4 to 44 days. The open cut method would redu conventional bore crossing method to avoid/minimize this minor temporary impact would be unreaso	- Dry-Ditch Open-Cut	\$819,202	\$1,017	\$5,995	N	N	87	38	50	N	37	48	Conventional Bore	S-G22	I-047	Norfolk
		\$90,367	\$3,105	\$5,995	N	N	93	18	39	N	-	62	Dry-Ditch Open-Cut			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$253,565	\$3,105	\$5,995	N	N	93	18	39	N	15	62	Conventional Bore	S-G20	1-048	Norfolk
-		\$42,522	\$3,105	\$5,995	N	N	10	18	35	N	-	37	Dry-Ditch Open-Cut			
I he open cut method would result in a temporary impact to a small (two-feet wide) intermittent UNT I near a private drinking water well on the property. Using a conventional bore crossing method to avo	Dry-Ditch Open-Cut	\$198,797	\$1,017	\$5,995	N	N	10	18	35	N	19	37	Conventional Bore	S-G18	1-049	Norfolk
¥	1	1	1	1	1	1	1		-		1	1	1	1		

sion Rationale
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
nd Creak. Avoiding/minimizing this minor impact through a conventional bore would require ench and dramatically increasing the space occupied by the bore pit and spail pile. This ke nearly twice as long to complete – compounding the noise, aesthetic, and other impacts construction activities on the affected residents. Using a conventional bore crossing method
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
are rapidly eroding due to natural conditions unrelated to pipeline construction. Instream ection for the pipeline and have the benefit of reducing long-term sediment backs in the erefore, temporary stream impacts are unavoidable at this location. Lastly, it would be his resource.
ut method would reduce construction time for this crossing by 11 days. Using a conventional e.
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
Foul Ground Creek. Avoiding/minimizing this minor impact through a conventional bore ramp and bench and dramatcally increasing the space occupied by the bore pit and spoil reduce the construction duration near several private drinking water wells on the property. nreasonably expensive.
and Creek. Avoiding/minimizing this minor impact through a conventional bore would require bench and dramatically increasing the space occupied by the bore pit and spoil pile. It also on near several private drinking water wells on the property. Using a conventional bore
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
inimizing this minor impact through a conventional bore would require a relatively deep bore and bench and dramatically increasing the space occupied by the bore pit and spoil pite. It be construction duration near two private drinking water wells on the property. Using a ably expensive.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
the Blackwater River. The open cut method would reduce by half the construction duration firminimize this minor temporary impact would be unreasonably expensive.

			Evaluation Factors													
Crossing Method Dec	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Average Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ict Crossing #	USACE Dist
The open cut method would result in a temporary impact to a small (eight-feet wide) UNT to Blackwa		\$64,081	\$3,870	\$5,995	Y	N	0	18	27	N	-	38	Dry-Ditch Open-Cut			
require a relatively deep bore pit of exceeding 20 feet, thereby requiring the excavation of an interim pile. Using a conventional bore crossing method to avoid/minimize this minor temporary impact woul	- Dry-Ditch Open-Cu	\$306,684	\$1,017	\$5,995	Y	N	0	18	27	N	21	38	Conventional Bore	S-E18	1-050	Norfolk
The open-cut method would result in a temporary impact to a UNT to the Blackwater River. This cros		\$99,404	\$4,815	\$5,995	Y	N	32	16	35	N	-	77	Dry-Ditch Open-Cut	0.547	1054	blasfalls
as long to complete - componing the hole, abarried, and the impacts of headly persons. The activities on the affected residents. The open-cut method would reduce the construction duration nea	Diy-Dich Open-Cu	\$298,614	\$1,017	\$5,995	Y	N	32	16	35	N	16	77	Conventional Bore	3-E1/	1001	NUTUR
The open-cut method would result in a temporary impact to a UNT to the Blackwater River. Avoiding bore pit exceeding 20 feet, thereby requiring the excervation of an interim ramp and bench and drams minimity to a residence and a tenches crossion of this location would there twice as fonon to commi	- Dry-Ditch Open-Cur	\$128,866	\$5,535	\$5,995	Y	N	0	18	25	N	-	60	Dry-Ditch Open-Cut	S-F14	1-052	Norfolk
method reduces construction duration to minimize disruption due to construction activities on the affe drinking water well on the property.		\$405,658	\$1,017	\$5,995	Y	N	0	18	25	N	25	60	Conventional Bore			
Orangefin madium habitat may be present in this stream. The direct aquatic impact will be avoided/r	 Conventional Bore 	\$177,648	\$990	\$11,990	Y	N	0	6	18	N	-	169	Dry-Ditch Open-Cut	S-H38, W-H17	1-053	Norfolk
		\$693,562	\$990	\$11,990	Y	N	0	6	18	N	22	169	Conventional Bore			
The open cut method would result in a temporary impact to the small (six-feet wide) UNT to Jacks Cr relatively deep bore pit exceeding 30 feet on the edge of a steep slope, thereby requiring the excavat pit and spoil pile. This crossing is in dose proximity to a residence, and a tenchless crossing of this	– Dry-Ditch Open-Cu	\$57,215	\$5,535	\$5,995	N	N	31	23	47	N	-	35	Dry-Ditch Open-Cut	S-H37	1-054	Norfolk
impacts on nearby persons. The open-cut method reduces construction duration to minimize disrupti method to avoid/minimize this minor temporary impact would be unreasonably expensive.		\$709,231	\$1,017	\$5,995	N	N	31	23	47	N	33	35	Conventional Bore			
Orangefin madium habitat may be present in this stream. The direct aquatic impact will be avoided/m	- Conventional Bore	\$181,869	\$1,475	\$11,990	N	N	10	25	31	N	-	84	Dry-Ditch Open-Cut	S-H36, W-H16	1-055	Norfolk
		\$799,937	\$1,475	\$11,990	N	N	10	25	31	N	30	84	Conventional Bore			
Orangelin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/m	- Conventional Bore	\$39,988	\$990	\$5,995	N	N	32	24	40	N	-	32	Dry-Ditch Open-Cut	S-H34	1-056	Norfolk
		\$317,033	\$990	\$5,995	N	N	32	24	40	N	24	32	Conventional Bore			
Orangefin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/m	- Conventional Bore	\$74,406	\$115	\$5,995	N	N	74	29	38	N	-	46	Dry-Ditch Open-Cut	S-H32	1-057	Norfolk
		\$374,199	\$155	\$5,995	N	N	74	29	38	N	26	46	Conventional Bore			
The open cut method would result in a small temporary impact to a PEM wetland. Avoiding/minimizir test, thereby requiring the excavation of an interim ramp and bench and dramatically increasing the residences, and a trenchess crossing of this location would take 17 days to complete - compoundin construction, drating to minimize drating within the drating test of test of the drating test of t	- Dry-Ditch Open-Cu	\$64,348	\$253	\$5,995	Y	N	0	18	32	N	-	83	Dry-Ditch Open-Cut	W-H11	1-058	Norfolk
on the property. Using a conventional bore crossing method to avoid/minimize this minor temporary i		\$789,764	\$135	\$5,995	Y	N	0	18	32	N	30	83	Conventional Bore			
The open cut method would result in a temporary impact to the small (four-feet wide) intermittent UN require a relatively deep bore pit of nearly 20 feet, thereby requiring the excavation of an interim namy This crossing is in proximity to a residence, and a trenchless crossing of this location would take 13 a The coen-cut method reduces construction duration to minimize disturbing due to construction activity and the composition of the compo	– Dry-Ditch Open-Cu	\$89,913	\$3,915	\$5,995	Y	N	0	17	26	N	-	92	Dry-Ditch Open-Cut	S-A18	1-059	Norfolk
this minor temporary impact would be unreasonably expensive.		\$487,339	\$1,017	\$5,995	Y	N	0	17	26	N	24	92	Conventional Bore			
The open cut method would result in a temporary impact to an intermittent UNT to Jacks Creek. Avoi deep bore pit of greater than 40 leet, thereby requiring the excavation of an interim ramp and two ber conventional bore crossing method to avoid/minimize this minor temporary impact would be unreaso	- Dry-Ditch Open-Cu	\$162,441	\$7,346	\$5,995	Y	N	52	28	39	N	-	93	Dry-Ditch Open-Cut	S-A19/H26	I-060A	Norfolk
		\$2,507,308	\$1,017	\$5,995	Y	N	52	28	39	N	41	93	Conventional Bore			
Orangefin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/r	- Conventional Bore	\$88,615	\$720	\$5,995	Y	N	0	23	39	N	-	82	Dry-Ditch Open-Cut	S-A20	I-060B	Norfolk
		\$951,935	\$720	\$5,995	Y	N	0	23	39	N	39	82	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impa use of the conventional bore method. A minor temporary impact associated with the bore to maintain	Conventional Bore	\$74,705	\$810	\$5,995	Y	N	0	18	27	N	-	52	Dry-Ditch Open-Cut	S-A22	I-061A	Norfolk
		\$227,458	\$810	\$5,995	Y	N	0	18	27	N	16	52	Conventional Bore			

ion Rationale
River. Avoiding/minimizing these minor impacts through a conventional bore would mp and bench and dramatically increasing the space occupied by the bore pit and spail be unreasonably expensive.
ng is in proximity to a residence, and a trenchlass crossing of this location would take twice an-out method reduces construction duration to minimize disruption due to construction a private dininking water well on the property.
inimizing this minor impact through a conventional bore would require a relatively deep cally increasing the space occupied by the bore pit and spol pile. This crossing is in - compounding the noise, aesthetic, and other impacts on nearby persons. The open-cut ad residents. The open cut method would reduce the construction duration near a private
imized by use of the conventional bore method.
A. Avoiding/minimizing this minor impact through a conventional bore would require a of an interim ramp and bench and dramatically increasing the space occupied by the bore atom would take 16 days to complete - compounding the traces, estibilitic, and other due to construction activities on the affected residents. Using a conventional bore crossing
imized by use of the conventional bore method.
imized by use of the conventional bore method.
imized by use of the conventional bore method.
imitzed by use of the conventional bore method. imitzed by use of the conventional bore method. this minor impact through a conventional bore would require a relatively deep bore pit of 30 ace occupied by the bore pit and spoil pile. This crossing is in close proximity to several the noise, assisted, and other impacts on nearby persons. The open-out method reduces open out method would reduce the occustuction duration near a private dinking water well pact would be unreasonably expensive.
imized by use of the conventional bore method. imized by use of the conventional bore method. this minor impact through a conventional bore would require a relatively deep bore pit of 30 ace occupied by the bore pit and spoil pile. This corsaing is in close proximity to several horise, aesthetic, and char impacts to nearby persons. The open-ut method reduces a open-ut method would reduce the construction duration near a private drinking water well pact would be unreasonably expensive. to Jacks Creek. Avoiding/minimizing this minor impact through a conventional bore would and bench and dramatically increasing the space occupied by the bore pit and apol pile. is on the affected residents. Using a conventional bore crossing method to avoid/minimize
Imited by use of the conventional bore method. Imited by use of the conventional bore method. It is minor impact through a conventional bore would require a relatively deep bore pit of 30 are occupied by the bore pit and spoil pite. This consing is in close proximity to several exponse of the conventional bore would require a relatively deep bore pit of 30 are occupied by the bore pit and spoil pite. This consing is in close proximity to several exponse of the conventional bore would require a relatively deep bore pit of 30 are occupied by the bore pit and spoil pite. It is a conventional bore would require a relatively deep bore pit of 30 are occupied by the bore pit and spoil pite. It is a conventional bore would require an excessively the affected residents. Using a conventional bore would require an excessively meminimizing this minor impact through a conventional bore would require an excessively the and dramatically increasing the space occupied by the bore pit and spoil pite. Using a bity expensive.
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imitzed by use of the conventional bore method. imitzed by use of the conventional bore method. this minor impact through a conventional bore would require a relatively deep bore pit of 30 ace occupied by the bore pit and spoil pile. This crossing is in dose proximity to several ace of the roles, estheling, and other impacts to nearby persons. It is a conventional bore method would be unreasonably expensive. to Jacks Creek. Avoiding/minimizing this minor impact through a conventional bore would nd berch and dramatically increasing the space occupied by the bore pit and spoil pile. It is a conventional bore would require a nearby person. It is an the affected residents. Using a conventional bore would require an excessively thes and dramatically increasing the space occupied by the bore pit and spoil pile. Using a bity expensive. nimized by use of the conventional bore method. s relevant to the available methods. The direct aquatic impact will be avoided/minimized by coses will be required.

					Evaluation Factors											
USACE Distric	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slop (%)	e Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci
			Dry-Ditch Open-Cut	60	-	N	28	14	0	N	Y	\$5,995	\$2,430	\$85,425		The men rul method would result in a temporary impact to a small LINT to Jacks Craek Auriclini/mim
Norfolk	I-061B	S-H27	Conventional Bore	60	29	N	28	14	0	N	Y	\$5,995	\$1,017	\$442,197	Dry-Ditch Open-Cut	bore pit of nearly 30 feet, thereby requiring the excavation of an interim ramp and bench and dramatic crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive.
			Dry-Ditch Open-Cut	54	-	N	36	24	0	N	Y	\$5,995	\$1,350	\$61,889		Oranoafin marken habitat may be present in this stream. The direct anualir impart will be avoided/mi
Norfolk	1-062	S-MM44	Conventional Bore	54	36	N	36	24	0	N	Y	\$5,995	\$1,350	\$818,294	 Conventional Bore 	configurer maximi nanak naj je prodri ni na aromi ni orodani ni orodano mpor ni oc aronodim te bore to maintain access will be required.
Norfolk	1062	5 10/0	Dry-Ditch Open-Cut	83	-	N	29	18	0	N	Y	\$5,995	\$1,688	\$99,528	Conventional Ran	Orangefin madtom habitat may be present in this stream. The direct aquatic impact will be avoided/mi
NUTUR	1-003	S-MM48	Conventional Bore	83	29	N	29	18	0	N	Y	\$5,995	\$1,688	\$508,141	- Conventional Bore	the bore to maintain access will be required.
Norfolk	1-064	S-H25 W-H0	Dry-Ditch Open-Cut	31	-	N	40	21	31	N	N	\$11,990	\$1,081	\$66,391	Conventional Bore	Orangefin madtom habitat may be present in this stream. The direct aquatic impact will be avoided/m
			Conventional Bore	31	26	N	40	21	31	N	N	\$11,990	\$1,081	\$338,550		the bore to maintain access will be required.
Norfolk	1-065	S-H24	Dry-Ditch Open-Cut	79	-	N	31	21	0	N	Y	\$5,995	\$1,350	\$223,723	Conventional Bore	Orangefin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/mi
			Conventional Bore	79	28	N	31	21	0	N	Y	\$5,995	\$1,350	\$487,317		are ode to maintain access will be required.
Norfolk	1-066	S-H23	Dry-Ditch Open-Cut	45		N	30	23	0	N	Y	\$5,995	\$6,210	\$61,884	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to the small (five-feet wide) intermittent UNT require a relatively deep bore pit of nearly 30 feet, thereby requiring the excavation of an interim ramp This crossing is in close proximity to a residence. and a terrchless crossing of this location would take
			Conventional Bore	45	27	N	30	23	0	N	Y	\$5,995	\$1,017	\$381,358		impacts on nearby persons. The open-cut method reduces construction duration to minimize disruptic method to avoid/minimize this minor temporary impact would be unreasonably expensive.
Norfolk	1067	S-A13	Dry-Ditch Open-Cut	54	-	N	21	16	0	N	Y	\$5,995	\$1,350	\$88,905	- Conventional Bore	Orangefin madtom habitat may be present in this stream. The direct aquatic impact will be avoided/mi
			Conventional Bore	54	20	N	21	16	0	N	Y	\$5,995	\$1,350	\$343,290		the bore to maintain access will be required.
Norfolk	I-069A	S-A7	Dry-Ditch Open-Cut	61	-	N	23	10	0	N	Y	\$5,995	\$5,760	\$85,955	Conventional Bore	Orangefin madium habitat may be present in this stream. The direct aquatic impact will be avoided/mi
			Conventional Bore	61	19	N	23	10	0	N	Y	\$5,995	\$5,760	\$271,652		ere dore lo maninari access wie de required.
Norfolk	I-069B	S-H17	Dry-Ditch Open-Cut	90		N	27	20	0	N	Y	\$5,995	\$5,760	\$98,653	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to the small (seven-feet wide) intermittent Di require a relatively deep bore pit nearing 30 feet, thereby requiring the excavation of an interim ramp a This crossing is in proximity to a residence, and a trenchless crossing of this location would take 22 di
			Conventional Bore	90	28	N	27	20	0	N	Y	\$5,995	\$1,017	\$518,202		The open-out method reduces construction duration to minimize discuption due to construction activiti near several private drinking water wells on the property. Using a conventional bore crossing method
Norfolk	ŀ070	S-SS8	Dry-Ditch Open-Cut	51	-	Ν	31	24	0	N	Y	\$5,995	\$1,260	\$85,058	Conventional Bore	Orangefin madtom habitat may be present in this stream. The direct aquatic impact will be avoided/mit
			Conventional Bore	51	26	N	31	24	0	N	Y	\$5,995	\$1,260	\$389,494		
Norfolk	ŀ071	S-CD8	Dry-Ditch Open-Cut	38	-	N	27	24	0	N	Y	\$5,995	\$4,320	\$53,913	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (five-feet wide) intermittent UNT to require a relatively deep bore pit of nearly 30 feet, thereby requiring the excavation of an interim ramp
			Conventional Bore	38	27	N	27	24	0	N	Y	\$5,995	\$1,017	\$361,492		Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be u
Norfolk	ŀ072	S-AB8	Dry-Ditch Open-Cut	44	-	N	35	24	11	N	N	\$5,995	\$4,140	\$59,715	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (five-feet wide) intermittent UNT to require a relatively deep bore pit exceeding 30 feet on the edge of a short but steep stope, thereby reg-
			Conventional Bore	44	34	N	35	24	11	N	N	\$5,995	\$1,017	\$753,042		Coopera by the one pit and open pite. Comy a contraction area crossing meaned to areastimistic
Norfolk	ŀ073	S-DD3	Dry-Ditch Open-Cut	81		N	10	8	91	N	Y	\$5,995	\$1,125	\$128,634	Conventional Bore	Orangelin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/mi the bore to maintain access will be required.
			Conventional Bore	81	16	Ν	10	8	91	N	Y	\$5,995	\$1,125	\$310,074		

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imizing these minor impacts through a conventional bore would require a relatively deep illy increasing the space occupied by the bore pit and spoil pile. Using a conventional bore
imized by use of the conventional bore method. A minor temporary impact associated with
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nimized by use of the conventional bore method. A minor temporary impact associated with
imized by use of the conventional bore method. A minor temporary impact associated with
to Turkey Creek. Avoiding/minimizing this minor impact through a conventional bore would and bench and dramatically increasing the space occupied by the bore pt and spoil pile. Howere than twice a long to complete – compounding the noise, assthetic, and other induce to construction activities on the affected residents. Using a conventional bore crossing
imized by use of the conventional bore method. A minor temporary impact associated with
imized by use of the conventional bore method. A minor temporary impact associated with
ner Creek. Avoiding/minimizing this minor impact through a conventional bore would nd bench and dramatically increasing the space occupied by the bore pit and spoil pile. yo is ocmpitele – compounding the noise, essitheit, and other impacts on nearby persons. so no the affected residents. The open cut method would reduce the construction duration avoid/minimize this minor temporary impact would be unreasonably expensive.
imized by use of the conventional bore method. A minor temporary impact associated with
Owens Creek. Avoiding/minimizing these minor impacts through a conventional bore would and bench and dramatically increasing the space occupied by the bore pit and spoil pile. measonably expensive.
Owens Creek. Avoiding/minimizing these minor impacts through a conventional bore would uiring the excavation of an interim ramp and bench and dramatically increasing the space his minor temporary impact would be unreasonably expensive.
imized by use of the conventional bore method. A minor temporary impact associated with

					Evaluation Factors											
USACE Distric	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec
Norfolk	1074	5.616	Dry-Ditch Open-Cut	53	-	N	34	23	0	N	Y	\$5,995	\$2,025	\$150,177	Conventional Rom	Orangelin madrom habitat may be present in this stream. The direct aquatic impact will be avoided m
NUTUR	1-074	3-616	Conventional Bore	53	31	N	34	23	0	N	Y	\$5,995	\$2,025	\$724,784	Conventional Bore	the bore to maintain access will be required.
Norfolk	1-075	S-G15	Dry-Ditch Open-Cut	54	-	N	31	20	10	N	Y	\$5,995	\$4,635	\$82,835	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small intermittent UNT to Parrott Brand relatively deep bore pit exceeding 30 feet on the edge of a short but steep slope, hereby requiring the
			Conventional Bore	54	33	N	31	20	10	N	Y	\$5,995	\$1,017	\$763,153		by the bore pit and span pite. It also would inder that double the dutation of the orbsaing. The open on the property. Using a conventional bore crossing method to avoid/minimize this minor temporary it
Norfolk	ŀ076	S-G13	Dry-Ditch Open-Cut	42	-	N	57	36	107	N	N	\$5,995	\$1,350	\$64,762	Conventional Bore	Orangefin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.
			Conventional Bore	42	26	N	57	36	107	N	N	\$5,995	\$1,350	\$364,042		
Norfolk	ŀ077	S-D7, W-MM17	Dry-Ditch Open-Cut	39	-	N	36	20	21	N	N	\$11,990	\$5,437	\$74,900	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to the small (nine-feet wide) intermittent UN would require a relatively deep bore pit ecceeding 20 feet on the edge of a short but steep slope, then space occupied by the bore pit and spoil pile. This crossing is in close proximity to a residence, and a compounding the noise, aesthetic, and other impacts on nearby persons. The open-cut method reduc
			Conventional Bore	39	25	N	36	20	21	Ν	N	\$11,990	\$1,054	\$352,092		residents. The open cut method would reduce the construction duration near several private drinking this minor temporary impact would be unreasonably expensive.
Norfolk	I-078	S-D3	Dry-Ditch Open-Cut	43	-	N	28	16	0	N	Y	\$5,995	\$4,725	\$76,496	- Conventional Bore	Orangelin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.
			Conventional Bore	43	16	N	28	16	0	N	Y	\$5,995	\$4,725	\$205,831		
Norfolk	ŀ079	S-D4	Dry-Ditch Open-Cut	62	-	N	35	20	10	N	N	\$5,995	\$5,895	\$85,538	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small (six-feet wide) intermittent UNT to would require a relatively deep bore pit of nearly 40 feet, thereby requiring the excavation of an interim jiel. Using a conventional bore crossing method to avoid/minimize this minor temporary impact would match with the state of the sta
			Conventional Bore	62	38	N	35	20	10	N	N	\$5,995	\$1,017	\$877,203		
Norfolk	1-080	S-D2, W-D3	Dry-Ditch Open-Cut	54	-	N	41	21	96	N	N	\$11,990	\$1,125	\$115,259	Conventional Bore	Orangelin madrom habitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.
			Conventional Bore	54	19	N	41	21	96	N	N	\$11,990	\$1,125	\$253,146		
Norfolk	I-081	S-D1-EPH	Dry-Ditch Open-Cut	82	-	N	28	19	0	N	Y	\$5,995	\$906	\$102,533	Dry-Ditch Open-Cut	Avoiding/minimizing this minor impact through a conventional bore would require a relatively deep to dramatically increasing the space occupied by the bore pit and spoil pile. The stream banks at the cro construction. Instream work will be necessary to permanently restore and stabilize the banks, which sediment loads in the stream. That work can be done efficiently and effectively after completion of an would be unreasonably expensive to use a tranchies crossing to avoid only a fraction of the aquatic to use the stream.
			Conventional Bore	55	29	N	28	19	0	N	Y	\$5,995	\$297	\$503,913		The man nut method would result in a termorery impart to the small (six-leat wide) intermittent I INT
Norfolk	1-082	S-G11	Conventional Bore	55	33	N	35	16	0	N	· ·	\$5,995	\$1,017	\$765.991	Dry-Ditch Open-Cut	Intergener abstrated was close in a close of a strategie of a index to contain close according allow according a strategies and a transformation according a strategies and a transformation according allow according allow according according a strategies according according a strategies according a
			Dry-Ditch Open-Cut	44		N	24	14	10	N	N	\$11,990	\$5,358	\$62,574		
Norfolk	I-083	S-G9, W-B5	Conventional Bore	44	20	N	24	14	10	N	N	\$11,990	\$1,043	\$320,598	Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to the small (four-feet wide) intermitten UNI would require a relatively deep bore by texceeding Q3 feat on the edge of a short stope, thereby requir occupied by the bore pit and spoil pile. It also would increase the duration of the crossing by one wee would be unreasonably expensive.
			Dry-Ditch Open-Cut	41	-	N	24	16	0	N	Y	\$5,995	\$2,295	\$50,990		The man nut method would result in a temporary impart to the small (four feat wide) intermittent INNet
Norfolk	I-084A	S-G8	Conventional Bore	41	21	N	24	16	0	N	Y	\$5,995	\$1,017	\$315,198	Dry-Ditch Open-Cut	The dependent needed according to the proceeding of the dependence
			Dry-Ditch Open-Cut	48	-	N	26	22	0	N	Y	\$5,995	\$6,953	\$67,548		The man rut method would result in a terrorrary innovation to the small frie feet wide) 1977 to towards
Norfolk	I-084B	S-Q15	Conventional Bore	48	25	N	26	22	0	N	Y	\$5,995	\$1,017	\$371,602	Dry-Ditch Open-Cut	The spen scanled would result in a temporary impact to the small (sor-teet woor) UNI to Jonnien relatively deep bore pit exceeding 20 elect, threely requiring the excavation of an interim ramp and be would increase the duration of the crossing from 5 to 17 days. Using a conventional bore crossing me
			Dry-Ditch Open-Cut	44	-	N	28	21	0	N	Y	\$5,995	\$4,815	315 \$62,118		
Norfolk	I-085	S-A6	Conventional Bore	44	22	N	28	21	0	N	Y	\$5,995	\$4,815	\$336,644	Conventional Bore	cvaragemi maxim natitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.

sion Rationale
nimized by use of the conventional bore method. A minor temporary impact associated with
Avoiding/minimizing this minor impact through a conventional bore would require a excavation of an interim ramp and bench and dramatically increasing the space occupied un method would reduce the construction duration near several private drinking water wells spact would be unreasonably expensive.
nimized by use of the conventional bore method. A minor temporary impact associated with
to Jonnikin Creek. Avoiding/minimizing this minor impact through a conventional bore by requiring the excavation of an interim ramp and bench and dramatically increasing the trenchesc crossing of this location would take more than twice as long to complete – as constructed nutration to minimize advection due to construction activities on the affected water wells on the property. Using a conventional bore crossing method to avoid/minimize
nimized by use of the conventional bore method. A minor temporary impact associated with
Jonnikin Creek. Avoiding minimizing these minor impacts through a conventional bore ramp and bench and dramatically increasing the space occupied by the bore pit and spoil be unreasonably expensive.
nimized by use of the conventional bore method. A minor temporary impact associated with
e pit of nearly 30 feet, thereby requiring the excavation of an interim ramp and bench and sing location are rapidly exoting due to natural conditions unrelated to pipeline ill provide grateer protection for the pipeline and have the benefit of reducing long-term per-cut crossing. Therefore, temporary stream impacts are unavoidable at this location. It mpact to this UNT to Jonnikin Creek.
o Jonikin Creek. Avoiding/minimizing this minor impact through a conventional bore would pand bench and dramatically increasing the space occupied by the bore pit and spoil pile. more than twice as long to complete – compounding the noise, aesthetic, and other no use to construct activities on the alteriated residents. The open out method would reduce all bore crossing method to avoid/minimize this minor temporary impact would be
to Jonnikin Creek. Avoiding/minimizing this minor impact through a conventional bore og the excavation of an interim ramp and banch and dramatically increasing the space L Using a conventional bore crossing method to avoid/minimize this minor temporary impact
to Jonnikin Creek. Avoiding/minimizing this minor impact through a conventional bore m ramp and bench and dramatically increasing the space occupied by the bore pit and spoil cossing method to avoid/minimize this minor temporary impact would be unreasonably
breek. Avoiding/minimizing this minor impact through a conventional bore would require a ch and dramatically increasing the space occupied by the bore pit and spoil pile. It also hod to avoid/minimize this minor temporary impact would be unreasonably expensive.
nimized by use of the conventional bore method. A minor temporary impact associated with

			Evaluation Factors													
g Crossing Method Dec	Proposed Crossing Method	Updated Total Cost	Post-Crossing Mitigation Cost	Resource Monitoring Costs	Sufficient Stockpile Storage Available	Karst Terrain Present	Maximum Winch Hill Length (feet)	e Maximum Averag Slope (%)	Maximum Steep Slope (%)	Deep Stream	Pit Depth	Crossing Length	Crossing Methods Evaluated	Waterbodies Being Crossed	ict Crossing #	USACE Dist
. Orangelin madrum habitat may be present in this stream. The direct aquatic impact will be avoided/m	Convertional Porc	\$126,579	\$5,085	\$5,995	N	N	96	19	42	N	-	65	Dry-Ditch Open-Cut	5.07	1096	Masfalls
⁹ the bore to maintain access will be required.	 Conventional Bore 	\$282,328	\$5,085	\$5,995	N	N	96	19	42	N	19	65	Conventional Bore	S-C7	1-086	Nortolk
Orangefin madiom habitat may be present in this stream. The direct aquatic impact will be avoided/m	- Conventional Bore	\$174,179	\$9,000	\$11,990	N	N	115	27	34	N	-	126	Dry-Ditch Open-Cut	S-C4. S-C3	1-087	Norfolk
the bore to maintain access will be required.		\$625,212	\$9,000	\$11,990	N	N	115	27	34	N	27	126	Conventional Bore			
The stream banks at the crossing location are rapidly eroding due to natural conditions unrelated to p banks, which will provide greater protection for the pipeline and have the benefit of reducing long-terr direction of the one one-ord more than the the strength at this force	– Dry-Ditch Open-Cu	\$209,566	\$6,314	\$11,990	N	N	21	25	33	N	-	173	Dry-Ditch Open-Cut	S-H13, W-H5	1-088	Norfolk
Compression of an open-cut closeling. Therefore, temporary shearn improve at the unarroutedure at this roce		\$1,143,541	\$1,152	\$11,990	N	N	21	25	33	N	35	173	Conventional Bore			
The open cut method would result in a temporary impact to the small (six-feet wide) UNT to Harpen C ut relatively deep bore pit exceeding 30 feet, hereby requiring the excavation of an interim ramp and be	– Dry-Ditch Open-Cu	\$75,346	\$5,400	\$5,995	Y	N	0	23	30	N	-	60	Dry-Ditch Open-Cut	S-G6	1-089	Norfolk
would more than double the duration of the crossing. Using a conventional bore crossing method to a		\$798,450	\$1,017	\$5,995	Y	N	0	23	30	N	34	60	Conventional Bore			
The open cut method would result in a temporary impact to the small (six-feet wide) UNT to Harpen C ut relatively deep bore pit exceeding 30 feet, thereby requiring the excavation of an interim ramp and be would increase the duration of the creasing from A to 10 days. Liet on conventional bore creasion on the state of the sta	– Dry-Ditch Open-Cu	\$63,210	\$1,213	\$5,995	Y	N	0	17	26	N	-	50	Dry-Ditch Open-Cut	S-G5	1-090	Norfolk
		\$385,711	\$315	\$5,995	Y	N	0	17	26	N	26	50	Conventional Bore			
Orangefin madiom habitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.	Conventional Bore	\$177,606	\$4,140	\$5,995	Y	N	0	18	30	N	-	74	Dry-Ditch Open-Cut	S-G4	I-091	Norfolk
		\$804,766	\$4,140	\$5,995	Y	N	0	18	30	N	32	74	Conventional Bore			
a Orangelin madiom habitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.	Conventional Bore	\$69,280	\$1,350	\$5,995	Y	N	0	17	31	N	-	39	Dry-Ditch Open-Cut	S-G3	1-092	Norfolk
		\$300,720	\$1,350	\$5,995	Y	N	0	17	31	N	20	39	Conventional Bore			
Orangefin madiom habitat may be present in this stream. The direct aquatic impact will be avoided/m the bore to maintain access will be required.	 Conventional Bore 	\$83,023	\$1,350	\$5,995	Y	N	0	11	18	N	-	52	Dry-Ditch Open-Cut	S-CC16	1-093	Norfolk
		\$227,998	\$1,350	\$5,995	Y	N	0	11	18	N	16	52	Conventional Bore			
There are no significant constraints on available crossing methods or significant environmental impactures of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$119,573	\$2,475	\$11,990	Y	N	0	18	25	N	-	110	Dry-Ditch Open-Cut	S-CC13, S-CC14	1-094	Norfolk
		\$61.642	\$1.350	\$11,990	Y	N	0	14	20	N	-	39	Drv-Ditch Open-Cut			
There are no significant constraints on available crossing methods or significant environmental impace set of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$210,801	\$1,350	\$11,990	Y	N	0	14	20	N	19	39	Conventional Bore	S-MM8, W-MM5	1-095	Norfolk
		\$52,174	\$1,035	\$5,995	Y	N	0	14	18	N	-	33	Dry-Ditch Open-Cut			
³ There are no significant constraints on available crossing methods or significant environmental impare use of the conventional bore method. A minor temporary impact associated with the bore to maintain	 Conventional Bore 	\$182,896	\$1,035	\$5,995	Y	N	0	14	18	N	18	33	Conventional Bore	S-CC15	1-096	Norfolk
		\$146,024	\$5,040	\$11,990	N	N	10	11	32	N	-	78	Dry-Ditch Open-Cut			
There are no significant constraints on available crossing methods or significant environmental impace use of the conventional bore method. A minor temporary impact associated with the bore to maintain	Conventional Bore	\$302,336	\$5,040	\$11,990	N	N	10	11	32	N	14	78	Conventional Bore	S-CC8, S-CC5	1-097	Norfolk
The coen cut method would result in a temporary impact to the small /six/bast wisks). INT to Chorner		\$60,148	\$5,468	\$5,995	N	N	21	26	45	N	-	42	Dry-Ditch Open-Cut			
of a relatively deep bore pit exceeding 30 feet, thereby requiring the exceeding of an interim range and t would increase the duration of the crossing from 4 to 10 days. Using a conventional bore crossing me	Dry-Ditch Open-Cu	\$765,635	\$1,017	\$5,995	N	N	21	26	45	N	35	42	Conventional Bore	S-CC9	1-098	Norfolk
4	1	1	1		1	1	1	1	1	+	1	4	1	1		I

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imized by use of the conventional bore method. A minor temporary impact associated with	
nimized by use of the conventional bore method. A minor temporary impact associated with	
peline construction. Instream work will be necessary to permanently restore and stabilize the sediment loads in the stream. That work can be done efficiently and effectively after ion. Lastly, it would be unreasonably expensive to use a trenchless crossing to avoid the	
est. Avoiding/minimizing this minor impact through a conventional bore would require a ch and dramatically increasing the space occupied by the bore pit and spoil pile. It also oldminimize this minor temporary impact would be unreasonably expensive.	
ext. Avoiding/minimizing this minor impact through a conventional bore would require a ch and dramatically increasing the space occupied by the bore pit and spoil pile. It also hod to avoid/minimize this minor temporary impact would be unreasonably expensive.	
imized by use of the conventional bore method. A minor temporary impact associated with	
imized by use of the conventional bore method. A minor temporary impact associated with	
imized by use of the conventional bore method. A minor temporary impact associated with	
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by coceass will be required.	
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.	
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by cccess will be required.	
s relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.	
ne Creek. Avoiding/ininimizing this minor impact through a conventional bore would require anch and dramatically increasing the space occupied by the bore pit and spoi pice. It also hold to avoid/ininimize this minor temporary impact would be unreasonably expensive.	

								Eva	luation Factors								
USACE District	Crossing #	Waterbodies Being Crossed	Crossing Methods Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci	
			Dry-Ditch Open-Cut	38	-	N	38	20	21	N	N	\$5,995	\$5,265	\$69,986		The open cut method would result in a temporary impact to the small (nine-feet wide) intermittent UNT	
Norfolk	1-099	S-CC10	Conventional Bore	38	32	N	38	20	21	N	N	\$5,995	\$1,017	\$699,475	Dry-Ditch Open-Cut	would require a relatively deep bore pit exceeding 30 leet, thereby requiring the excavation of an inter- lie. It also would increase the duration of the crossing from 4 to 10 days. The open cut method would conventional bore crossing method to avoid/minimize this minor temporary impact would be unreason	
			Dry-Ditch Open-Cut	42	-	N	44	19	0	N	Y	\$5,995	\$5,873	\$71,906		The open cut method would result in a temporary impact to the small (nine-feet wide) UNT to Cherrys	
Norfolk	ŀ100	S-CC11	Conventional Bore	42	27	N	44	19	0	N	Y	\$5,995	\$1,017	\$372,844	- Dry-Ditch Open-Cut	require a relatively deep porce pror nearly 30 teet on the edge or a shortout steep stope, thereby require occupied by the bore pit and spoil pit it. also would increase the duration of the crossing from 4 to 10 water well on the property. Using a conventional bore crossing method to avoid/minimize this minor te	
			Dry-Ditch Open-Cut	35	-	N	44	26	52	N	N	\$5,995	\$58	\$89,614			
Norfolk	I-101A	W-MM9	Conventional Bore	35	18	N	44	26	52	N	N	\$5,995	\$58	\$187,595	- Conventional Bore	There are no significant consistents or available cossing memores or significant environmental inpact use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	
		W-MM8-PEQ W-MM8	Dry-Ditch Open-Cut	161	-	N	20	8	32	N	Y	\$11,990	\$5,834	\$190,024		The open cut method would result in a temporary impact to the small intermittent UNT to Cherrystone impacts through a conventional bore would require a relatively deep bore pit of nearly 40 feet, thereby	
Norfolk	I-101B	PEM, S-CC1	Conventional Bore	161	38	N	20	8	32	N	Y	\$11,990	\$1,152	\$1,164,294	- Dry-Ditch Open-Cut	I space occupied by the bore pit and spoil pile. It also would increase the duration of the crossing from- dinking water well on the property. Because the pipeline ROW must remain free of woody vegetation, crossing method to avoid/minimize these minor temporary impacts would be unreasonably expensive.	
No. 7-11	1400		Dry-Ditch Open-Cut	38	-	N	40	21	0	N	Y	\$5,995	\$1,755	\$64,038		The open cut method would result in a temporary impact to the small (eight-feet wide) UNT to Cherry require a relatively deep bore pit of nearly 30 feet on the edge, thereby requiring the excavation of an i	
NOTOIK	1-102	S-CC3	Conventional Bore	38	30	N	40	21	0	N	Y	\$5,995	\$1,017	\$662,937	- Dry-Ditch Open-Cut	spoil pile. It also would increase the duration of the crossing from 4 to 10 days. The open cut me Jsing a conventional bore crossing method to avoid/minimize this minor temporary impact woul	
Norfolk	1102	5. Df	Dry-Ditch Open-Cut	47	-	N	12	10	0	N	Y	\$5,995	\$1,350	\$64,135	Convertional Born	There are no significant constraints on available crossing methods or significant environmental impac	
NUTUR	F103	5-P5	Conventional Bore	47	11	N	12	10	0	N	Y	\$5,995	\$1,350	\$190,971	Conventional Bore	use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	
Norfolk	L104	S.1135.EPH	Dry-Ditch Open-Cut	32	-	N	23	16	0	N	Y	\$5,995	\$11,543	\$54,432	Dry Ditch Open Cut	The open cut method would result in a temporary impact to the small (five-feet wide) UNT to Pole Brit	
THOMOIR	1104	0 100 2111	Conventional Bore	32	23	N	23	16	0	N	Y	\$5,995	\$1,017	\$307,925	bry bran open out	crossing method to avoid/minimize this minor temporary impact would be unreasonably expensive.	
Norfolk	F102	S-04	Dry-Ditch Open-Cut	48	-	N	22	7	0	N	Y	\$5,995	\$1,350	\$63,946	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac	
			Conventional Bore	48	19	N	22	7	0	N	Y	\$5,995	\$1,350	\$230,348		use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	
Norfolk	I-106A	S-02	Dry-Ditch Open-Cut	51	-	N	17	15	0	N	Y	\$5,995	\$3,960	\$133,159	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impac	
			Conventional Bore	51	16	N	17	15	0	N	Y	\$5,995	\$3,960	\$227,770		use of the conventional bore method. A minor temporary impact associated with the bore to maintain a	
			Dry-Ditch Open-Cut	319	-	N	17	6	0	N	Y	\$11,990	\$2,835	\$268,446		This crossing presents multiple challenges that limit the available options and necessitated the develor the excavation of an interim ramp and bench and dramatically increases the space occupied by the bo	
Norfolk	I-106B	W-Q2, S-Q3	Guided Conventional Bore	319	26	N	17	6	0	N	Y	\$11,990	\$1,152	\$724,170	Dry-Ditch Open-Cut	L private drinking water wells on the property. Attempting a conventional bore would extend the duration which also would increase the total genenhouse gas emissions associated with this crossing by 15 tim crossing method at this location outweigh the minimized temporary impact to Pole Bridge Branch.	
			Dry-Ditch Open-Cut	55	-	N	10	8	0	N	Y	\$5,995	\$79	\$44,574		The open cut method would result in a small temporary impact to a PEM wetland. Avoiding/minimizing	
Norfolk	ŀ107	W-Q1	Conventional Bore	55	16	N	10	8	0	N	Y	\$5,995	\$79	\$235,240	- Dry-Ditch Open-Cut	I from 4 to 43 days. The open cut method would reduce the construction duration near a private drinkin this minor temporary impact would be unreasonably expensive.	
		_	Dry-Ditch Open-Cut	55	-	N	42	19	0	N	Y	\$5,995	\$2,070	\$88,089		The open cut method would result in a temporary impact to the small (five-feet wide) intermittent UNT would require a relatively deep hore nit of party of feet thereby requiring the average for a feet intermittent of the inter	
Norfolk	ŀ-108	S-86	Conventional Bore	55	36	N	42	19	0	N	Y	\$5,995	\$1,017	\$820,799	- Ury-Ditch Open-Cut	pile. It also would increase the duration of the crossing from 4 to 11 days. The open cut method would conventional bore crossing method to avoid/minimize this minor temporary impact would be unreason	

sion Rationale
Ito Cherrystone Creek. Avaiding/minimizing this minor impact through a conventional bore m ramp and bench and dramatically increasing the space occupied by the bore pit and spail reduce the construction duration near a private drinking water well on the property. Using a ably expensive.
tone Creek. Avoiding/minimizing this minor impact through a conventional bore would ring the excavation of an interim ramp and bench and dramatically increasing the space days. The open or unethord would reduce the construction duration near a private drinking mporary impact would be unreasonably expensive.
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
Creek and two adjacent wetland features (PEM and PFO). Avoiding/minimizing these minor requiring the excavation of an interim range and banch and dramatically increasing the to 60 days. The open our method world valce the construction duration near a private a conversion impact is unavoidable with any crossing method. Using a conventional bore
stone Creek. Avoiding/minimizing this minor impact through a conventional bore would nterim ramp and bench and dramatically increasing the space occupied by the bore pit and would reduce the construction duration near a private drinking water well on the property. nreasonably expensive.
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
lige Branch. Avoiding/minimizing this minor impact through a conventional bore would unton duration near a private dimking water well on the propenty. Using a conventional bore
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
pment of a site-specific solution. A bore pit depth exceeding 20 feet at this location requires re pit and spot pile. The open cut method also reduces the construction duration near of this crossing for a days for an open cut to 80 days for a guided conventional bore – es. Furthermore, the other significant environmental impacts associated with a trenchless
g this minor impact through a conventional bore would increase the duration of the crossing g water well on the property. Using a conventional bore crossing method to avoid minimize
to Pole Bridge Branch. Avoiding/iminimizing this minor impact through a conventional bore ramp and bench and dramatagi increasing the space accupied by the bore pit and spoil network the construction durated in neural private drinking water well on the property. Using a ably expensive.

				Evaluation Factors														
USACE District Crossing #	Waterbodies Being Crossed	bodies Being Crossed Evaluated	Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Dec			
Nasfalla	1400	5.00	Dry-Ditch Open-Cut	43	-	N	31	16	0	N	Y	\$5,995	\$4,545	\$56,754		The open cut method would result in a temporary impact to the small (five-feet wide) intermittent UNT would require a relatively deep bore pit of nearly 30 feet, thereby requiring the excavation of an interim pile. It also would increase the duration of the crossing from 4 to 44 days. The open cut method woul conventional bore crossing method to avoid/minimize this minor temporary impact would be unreaso		
WORK	Norfolk I-109 S-B8	3-00	Conventional Bore	43	29	N	31	16	0	Ν	Y	\$5,995	\$1,017	\$393,951	Diy-bitti Open-Gu			
Norfolk	F110	S-B9	Dry-Ditch Open-Cut	41	-	N	19	13	0	Ν	Y	\$5,995	\$5,265	\$64,486	Dry-Ditch Open-Cur	The open cut method would result in a temporary impact to the small (seven-feet wide) UNT to Pole B require a relatively deep bore pit exceeding 20 feet, thereby requiring the excavation of an interim ram Using a conventional bore crossing method to avoid/minimize this minor temporary impact would be u		
			Conventional Bore	41	22	N	19	13	0	N	Y	\$5,995	\$1,017	\$324,332	biy bian open ou			
Norfolk	F111	S-DD4	Dry-Ditch Open-Cut	230	-	N	9	5	o	Ν	Y	\$5,995	\$9,923	\$229,418	- Dry-Ditch Open-Cut	The pipeline has already been installed under an adjacent railroad. There is no feasible way to lie the Furthermore, the railroad bore encountered difficult conditions, which indicates that completing anothe		
			Conventional Bore	230	17	N	9	5	0	Ν	Y	\$5,995	\$1,017	\$737,393				
Norfolk	i-111A	S-DD4	Dry-Ditch Open-Cut	33	-	N	23	13	0	Ν	Y	\$5,995	\$4,523	\$86,118	Conventional Rem	There are no significant constraints on available crossing methods or significant environmental impac use of the conventional bore method. A minor temporary impact associated with the bore to maintain a		
			Conventional Bore	33	15	N	23	13	0	Ν	Y	\$5,995	\$4,523	\$172,681				
Norfolk	ŀ112	S-KL27	Dry-Ditch Open-Cut	33	-	N	12	7	0	Ν	Y	\$5,995	\$5,670	\$38,697	Dry-Ditch Open-Cu	The open cut method would result in a temporary impact to the small (one-foot wide) UNT to Mill Cre method to avoid/minimize this minor temporary impact would be unreasonably expensive.		
			Conventional Bore	33	15	N	12	7	0	N	Y	\$5,995	\$1,017	\$169,176				
Norfolk	ŀ113	S-C1	Dry-Ditch Open-Cut	61	-	N	38	11	0	Ν	Y	\$5,995	\$6,210	\$77,054	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to the small intermittent Mill Creek. Avoiding bore pit exceeding 30 feet with an excavator operating from a bench within the pit, at the edge of shot excavation of an interim ramp and bench, thereby dramatically increasing the space occupied by the		
			Conventional Bore	61	31	N	38	11	0	Ν	Y	\$5,995	\$1,017	\$746,480		minor temporary impact would be unreasonably expensive.		
Norfolk	ŀ-114	S-G2, W-G2	Dry-Ditch Open-Cut	122	-	N	35	16	11	Ν	Y	\$11,990	\$682	\$123,682	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impar use of the conventional bore method. A minor temporary impact associated with the bore to maintain		
			Conventional Bore	122	21	N	35	16	11	Ν	Y	\$11,990	\$682	\$550,734				
Norfolk	ŀ115	S-82	Dry-Ditch Open-Cut	40	-	N	21	12	0	Ν	Y	\$5,995	\$315	\$52,325	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impage of the crowpetional hore method. A minor temporary innact associated with the hore to maintain		
			Conventional Bore	40	18	N	21	12	0	Ν	Y	\$5,995	\$315	\$202,042				
Norfolk	Norfolk I-116	S-H55	Dry-Ditch Open-Cut	40	-	N	13	8	0	Ν	Y	\$5,995	\$1,650	\$46,595	 Conventional Bore 	There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain a		
			Conventional Bore	40	16	N	13	8	0	Ν	Y	\$5,995	\$1,650	\$194,242				
Norfolk	ŀ117	S-H54	Dry-Ditch Open-Cut	56	-	N	15	9	0	Ν	Y	\$5,995	\$1,215	\$95,895	Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impact use of the conventional bore method. A minor temporary impact associated with the bore to maintain		
			Conventional Bore	56	16	N	15	9	0	Ν	Y	\$5,995	\$1,215	\$239,215				
Norfolk	i-118	S-H5, W-H1, W-H2, S-	Dry-Ditch Open-Cut	835	-	N	22	7	0	Ν	Y	\$29,975	\$10,992	\$657,474	– Dry-Ditch Open-Cu	Due a close cluster of wetlands that would be crossed in one undertaking, this crossing is unusually That crossing would method would extend the duration of this crossing from seven days for an open at with the crossing by nearly 1.900%). The open cut method would reduce the construction duration no to avoid/minimize these minor temporary impacts two a small (6-toot wide) intermittent stream, small expensive.		
		H3, W-H3	Direct Pipe	835	0	N	22	7	0	N	Y	\$29,975	\$2,439	\$6,712,414				
Norfolk	ŀ119	S-001, W-MM3	Dry-Ditch Open-Cut	59	-	N	35	20	10	Ν	N	\$11,990	\$5,670	\$76,591	- Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small intermittent UNT to Little Cherrys, conventional bore would require a relatively deep bore pit of nearly 30 feet, with equipment operating duration of the crossing and the relevant greenhouse gas emissions. The open cut method work the Lastly, using a conventional bore crossing method to avoid/minimize this minor temporary impact wo		
			Conventional Bore	59	27	N	35	20	10	Ν	N	\$11,990	\$1,017	\$427,085				
Norfolk	F120	S-002	Dry-Ditch Open-Cut	37	-	N	40	22	0	Ν	Y	\$5,995	\$4,500	\$54,912	– Dry-Ditch Open-Cut	The open cut method would result in a temporary impact to a small intermittent UNT to Little Cherrys a relatively deen bree nit exceeding 30 feet with an exceeder operation from a bench within the nit a		
			Conventional Bore	37	31	N	40	22	0	Ν	Y	\$5,995	\$1,017	\$678,368		Furthermore, using a conventional bore crossing method to avoid/minimize this minor temporary		
Norfolk	ŀ121	S-EF26, W-IJ22-PFO,	Dry-Ditch Open-Cut	405	-	N	18	9	0	N	Y	\$11,990	\$1,291	\$371,093	- Conventional Bore	There are no significant constraints on available crossing methods or significant environmental impar		
Norfolk I-121		W-IJ22-PEM	W-IJ22-PEM	W-IJ22-PEM	Conventional Bore	405	19	N	18	9	0	N	Y	\$11,990	\$1,291	\$1,249,443		use of the conventional bore method. A minor temporary impact associated with the bore to maintain

sion Rationale
to Pole Bridge Branch. Avoiding/minimizing this minor impact through a conventional bore ramp and bench and dramatically increasing the space occupied by the bore pit and spoil reduce the construction duration near a private drinking water well on the property. Using a ably expensive.
ridge Branch. Avoiding/minimizing this minor impact through a conventional bore would p and bench and diamatically increasing the space occupied by the bore pit and spoil pile. nreasonably expensive.
two sections of pipe together if a trenchlass method is used to install this crossing. In crossing at this location has a higher degree of potential failure.
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
k. It also would double the duration of the crossing. Using a conventional bore crossing
minimizing this minor impact through a conventional bore would require a relatively deep but steep slope, and nearly triple the duration of the crossing. It also would require the orce pit and spoil pile. Using a conventional bore crossing method to avoid/minimize this
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by cceass will be required.
is relevant to the available methods. The direct aquatic impact will be avoided/minimized by cceass will be required.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by cceass will be required.
ing at over 800 (net. The direct pipe method would be necessary to cross these features, ut to 98 days for the trenchless method (increasing greenhouse gas emissions associated ar multiple private antimiting water wells on the property. Usad 2 pricet Pipe consign method 3-toot wide) parennial stream, and two small PEM welfands would be unreasonably
one Creek and an adjacent PSS wetland. Avoiding/minimizing this minor impact through a within a bore pit at the edge of short but steep slope, as well as more than quadruping the cet the construction duration near multiple private drinking water wells on the property. Id be unreasonably expensive.
one Creek. Avoiding/minimizing this minor impact through a conventional bore would require the edge of short but steep slope, and more than double the duration of the crossing. ct would be unreasonably expensive.
Is relevant to the available methods. The direct aquatic impact will be avoided/minimized by ccess will be required.

		Waterbodies Being Crossed	Crossing Methods Evaluated	Evaluation Factors												
USACE District	t Crossing #			Crossing Length	Pit Depth	Deep Stream	Maximum Steep Slope (%)	Maximum Average Slope (%)	Maximum Winch Hill Length (feet)	Karst Terrain Present	Sufficient Stockpile Storage Available	Resource Monitoring Costs	Post-Crossing Mitigation Cost	Updated Total Cost	Proposed Crossing Method	Crossing Method Deci
Norfolk	L122	5-H44	Dry-Ditch Open-Cut	68	-	N	10	8	0	N	Y	\$5,995	\$2,228	\$95,225	 Conventional Bore 	There are no significant constraints on available crossing methods or significant environmental impac use of the conventional bore method. A minor temporary impact associated with the bore to maintain a
NUTUR	NUTUR P122	3-1144	Conventional Bore	68	17	N	10	8	0	N	Y	\$5,995	\$2,228	\$278,850		
Norfolk	L123	S 1142	Dry-Ditch Open-Cut	43	-	N	20	8	0	N	Y	\$5,995	\$1,350	\$75,945	 Conventional Bore 	There are no significant constraints on available crossing methods or significant environmental impac use of the conventional bore method. A minor temporary impact associated with the bore to maintain a
- Choice	1120	341M2	Conventional Bore	43	23	N	20	8	0	N	Y	\$5,995	\$1,350	\$339,476		
Norfolk I-12	1124	WEE	Dry-Ditch Open-Cut	155	-	N	5	3	30	N	N	\$5,995	\$0	\$114,495	– Dry-Ditch Open-Cut	In forested wetlands, a 30-foot corridor generally must be maintained free of trees. Accordingly, conv at significant environmental consequences at this location. This crossing is in close proximity to a reside compounding the noise, aesthetic, and other impacts on nearby residents. The longer-duration bore
	F124	**-EP6	Conventional Bore	155	13	N	5	3	30	N	N	\$5,995	\$0	\$505,258		

UNT: Unnamed Tributary

sion Rationale
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
ts relevant to the available methods. The direct aquatic impact will be avoided/minimized by access will be required.
rsion impacts to this welland are unavoidable. The conventional bore method also entails noe, and a trenchless crossing of this location would take nearly four weeks to complete – Iso nearly quadruples the greenhouse gas emissions associated with the crossing.