High Gradient Bioassessment Stream Visit Sheet

BOON PROGRAM: PROJECT: G141890.0 TIME Start: 2:00 (24hr) Finish: CANOPY COVER: STREAM Fully Exposed (0-25%) TYPE:
15/1 TIME Start: 2:00 (24hr) Finish: CANOPY COVER:: STREAM
(24hr) Finish: CANOPY COVER:: STREAM
Fully Exposed (0-25%) TYPE:
Partially Exposed (25-50%) Perennia
Partially Shaded (50-75%) Ephemer Fully Shaded (75-100%) Intermitt
Construction
Léad Collector: Lead Collector:
Dead Concetor.
ization
Pool 25 % Reach Total
20
10
20
35
15
0
31

RBP High Gradient Habitat

Habitat	Condition Category											
Parameter	Optimal	Suboptimal	Marginal	Poor								
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0								
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.								
2.Embeddedness Score 13	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.								
3.Velocity/ Depth Regime Score 13	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).								
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.								
5.Channel Flow Status Score 5	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.								
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.								
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.								
Left/Right Bank	10 . 9	8 7 6	5 4 3	2 1 0								
8.Bank Stability LB 6 RB 6	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems, <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.								
9. Vegetative Protection 7 LB 7B 7	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.								
10. Riparian Vegetative Zone Width LB 6 RB 6	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.								

Total Score

NOTES/COMMENTS:

High Gradient Bioassessment Stream Visit Sheet

	113.41		III DIUA	ssessment St				
STREAM NAME: SKY	CDK-01	0		LOCATION:	BIGBON	IE, KY	Tppocp (**	
STATION #: N/A				COUNTY: BC	OONE	6	PROJECT:	^{1:} G141890.03
ENVESTIGATORS:	OK, RFL			DATE: 10/15/	46	TIME (24hr)		30 PM
Verify Site LAT/LONG vs	GPS	YES INO MN/		10/15/ each	15		Finish:	
Station		Downstre		Upstream	n 185		OPY COVER: cposed (0-25%)	
LAT 38.887878				g - 1		▶ Partially	Exposed (25-2) Shaded (50-7)	50%) Perennial
LONG -84.756212		-			Mag		naded (75-100%	
Has there been a scouring rain in the last 14 days? INSTREAM FEATURE AND STREAM FEATURE AND INSTREAM INS	Stead Inter Clear Clour Clour	ry rain dy rain mittent showers r/sunny dy HYDRAUL STRUCTUR Dams Name Bridge Abutr Island Waterfalls Other: ment Used: %Sat HC Other Other Tim ate Other:	Surfa Deep Oil W Land Z Resid RES ments DEEP DOIL W RES Metals DEEP Sep: Metals	Disposal dential STREAM FLOW Dry Pooled Low High Normal pH(S.U Collection Verific Visual Assessm Seine	Const Comm Indust Row RIP Omin Tres S DIPS JUGI	ARIAN VEC nate Type: ess Herbar asses Shrae of Strata chrub Taxa ACUS SP. ANS Cond. Lead Lead Lead Lead Lead Lead Lead Lead	Forest Pastur Silvic Urban GETATION ceous bs Dom. Collector: Collector: Collector: Collector: Collector:	channelization
Duplicate Samples Tak	en:							
			Substra	te Characteriz	ation			
Substrate Est. P.C.	Riffle_	0_%	R	tun 75%	I	ool 15	_%	Reach Total
Silt/Clay (<0.06 mm)	STATE OF	N sain in the					主要是	30
Sand (0.06 – 2 mm)	11 /8 20 / 12							30
Gravel (2-64 mm)		4						30
Cobble (64 – 256 mm)								10
Boulders (>256 mm)			y yak					0
Bedrock			ř				elektra.	0
NOTES/COMMEN 50' REACH USED.	ITS:			_ I	and owner	F SAMP	□ Dry □	Too deep/Impounded

RBP High Gradient Habitat

Habitat	RBP High Gradient Habitat Condition Category											
Parameter	Optimal	Suboptimal	Poor									
SCORE	20 19 18 17 16	15 14 13 12 11	Marginal 10 9 8 7 6	5 4 3 2 1 0								
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.								
2.Embeddedness Score 2	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.								
3.Velocity/ Depth Regime Score 2	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).								
4. Sediment Deposition Score 12	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.								
5.Channel Flow Status Score 16	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.								
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.								
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.								
Left/Right Bank	10 9	8 7 . 6	5 4 3	2 1 0								
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.								
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.								
10. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.								

Total Score

NOTES/COMMENTS:

High Gradient Bioassessment Stream Visit Sheet

	0104		ingii Gradici	It Dioa	ssessment st					
STREAM	I NAME: SKY-			877710	LOCATION:	SIGBUI	NE,	PROGRAM	[:	
STATIO		14			COUNTY: BO	OON		PROJECT:	G141890	.0
	IGATORS: CD		YES INO MIN/A		DATE: 10/15/	1	TIME (24hr)	Start: 2:30		
venty Sit	te LAT/LONG VS	JPS 📙	TES LINO MINIA	Rea	ach		CANOL	Finish: PY COVER::	er.	REAM
	Station 38.88909		Downstres	ım	Upstream -	0	☐ Fully Exp	oosed (0-25%)) T	YPE:
LAT	0	Manual San	-		A MR		Partially	5%) Ep	rennial hemera	
LONG	-84.7489	, EP	•	T OCAT	THE POSTER OF	D. A. TEVIDA	THE STATE OF THE PARTY OF THE P	ded (75-100%		termitter
Has there a scourin in the las days?	e been	Stead Internal Clear Cloud	y rain ly rain mittent showers //sunny	Surface Deep Oil W	/ells Disposal	Const	truction mercial trial	Forest Pastur Silvice Urban	e/Grazing	
Stream V Maximur Reach Le Riffl (No	Vidth S	5 ft 0 ft 2 m	HYDRAULI STRUCTUR Dams Bridge Abutm Island Waterfalls Other: CUL	ES nents	STREAM FLOW Dry Pooled Low High Normal	Domi Tree/S FRAXIN	nate Type: ees Herbace asses Shrub er of strata Shrub Taxa IUS AMERICAN IIGRA, CUPRES	eous os Dom.	CHAN ALTERA Dredgin Channe	TIONS Ig lization
P-CHEM		Instru	ment Used:		THE IS		Da	te Calibrated:	11-31-1-3	
Temp(°C	D.C). (mg/l)	%Satu	ıration	pH(S.U	.)	Cond	· ·	Turb.	
					Collection Verific		111111111111111111111111111111111111111	Hung West		
Algae			HC Other	THE RES	☐ Visual Assessm	ent	Lead C	Collector:		
Fish Habitat		Seine	ate Other:	e: BPEF_	Seine			Collector:		- 11
Inverteb						3 - 3		Collector:	- 1	
				Ve	g Banks San	dN	facrophytes	Other	_)	
Tissue:	No. of Sa	mples col	lectedS	p:			Lead C	Collector:		
Water Cl			alk Nutrients				Lead C	Collector:		
Dunlica	Herbi		Pesticides Ortho	P Oth	er:					
Dupiica	te Samples Tak	cii.								
				Y 2 4 4	- Cl	.4		25 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
Cubatant	e MEst. P.C.	Riffle			te Characteriza		Pool 0	%	Reach To	4-1
		Killie	<u>U 70</u>	- A	uii		001	70 E A		itai
187-19	/ (<0.06 mm)			103		L WC			30	
De la constant	06 – 2 mm)								25	
Gravel (2	2-64 mm)							Tac a	30	li e
Cobble ((64 – 256 mm)					65.4			15	1100
Boulders	s (>256 mm)					1			0	
Bedrock									0	
NOT	ES/COMMEN	TS:				1,0 = 0	LXV97700		DO UNIVERSE	EWE BY
50' F	REACH				SIT	E NO	T SAMP	LED:		
						and owne	er denial	Dry 🗆	Too deep/Im	pounded
							und/Secluded	Unsafe		
						Other (ind	icate under cor	mments)		

RBP High Gradient Habitat

Habitat		Condition	Category	NAME OF THE PARTY.	
Parameter	Optimal	Suboptimal	Marginal	Poor	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
2.Embeddedness Score 12	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
3.Velocity/ Depth Regime Score N/A	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).	
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
5.Channel Flow Status Score N/A	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel, or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Left/Right Bank	10 9	8 7 6	5 4 3.	2 1 0	
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable, many eroded areas; "raw" areas frequent along straight sections and bends, obvious bank sloughing; 60- 100% of bank has erosional scars.	
9. Vegetative Protection 5 LB	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
10. Riparian Vegetative Zone Width LB 6:	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	

Total Score

NOTES/COMMENTS:

High Gradient Bioassessment Stream Visit Sheet LOCATION: BIGBONE, STREAM NAME: SKY-PROGRAM: PROJECT: G141890.0 N/A STATION #: COUNTY: BOON INVESTIGATORS: CDK, Start: 3:30 TIME DATE: 10/15/1 (24hr) Verify Site LAT/LONG vs GPS ☐ YES ☐ NO MN/A Finish: Reach CANOPY COVER:: STREAM Station Downstream Upstream Fully Exposed (0-25%) TYPE: Partially Exposed (25-50%)
Partially Shaded (50-75%) LAT 38.87939 X Perennial ☐ Ephemeral -84.70139 ☐ Fully Shaded (75-100%) Intermittent LONG LOCAL WATERSHED FEATUREES (Predominant Surrounding Land Use): WEATHER Past 24 hours Construction
Commercial
Industrial
Row Crops Has there been Heavy rain ☐ Surface Mining ☐ Forest a scouring rain Deep Mining ☐ Pasture/Grazing Steady rain in the last 14 Oil Wells
Land Dispo Silviculture
Urban Runoff/Storm Sewers Intermittent showers days? Clear/sunny Land Disposal Yes No Cloudy RIPARIAN VEGETATION **INSTREAM FEATURES** Dominate Type:
☐ Trees Herbaceous
☐ Grasses Shrubs HYDRAULIC Stream Width 0.33 ft STREAM FLOW **STRUCTURES** Maximum Depth CHANNEL ☐ Dry Reach Length 15.2 m Dams ALTERATIONS Pooled
Low
High ☐ Dredging **Bridge Abutments** Number of strata 2 Dom. Riffle/Run/Pool Sequence Tree/Shrub Taxa
SALIX NIGRA, SOLIDAGO Island Channelization (No. Sampled in Reach) (Full Partial) Waterfalls ☐ Normal CANADENSIS, DIPSACUS 2 Riffle 1 Run 0 Pool Other: CULVER P-CHEM Instrument Used: Date Calibrated: D.O. (mg/l) pH(S.U.)_ Temp(°C) %Saturation_ Cond. Turb. Sample Collection Verification Algae Sample: QualMHC Other ☐ Visual Assessment Lead Collector: Fish □BPEF □ Seine □ Other Time: BPEF Seine Lead Collector: Habitat ☐ RBP ☐ Substrate ☐ Other: Lead Collector: Invertebrates ☐ 1m² ☐ Qual ☐ Other: Lead Collector: 20 Jab (#Jabs: Cobble Snags Veg. Banks Macrophytes Other Tissue: No. of Samples collected Lead Collector:

Substrate Characterization									
Substrate XEst. P.C.	Riffle 75 %	Run 25 %	Pool 0 %	Reach Total					
Silt/Clay (<0.06 mm)				25					
Sand (0.06 – 2 mm)				15					
Gravel (2-64 mm)				20					
Cobble (64 – 256 mm)				35					
Boulders (>256 mm)				0					
Bedrock				0					

☐ Acid/Alk ☐ Bulk ☐ Nutrients ☐ Metals ☐ Low Hg

☐ Herbicides ☐ Pesticides ☐ Ortho P ☐ Other:

50' REACH

Water Chem

Duplicate Samples Taken:

SITE NOT SAME	LED:	
☐ Land owner denial	□ Dry	☐Too deep/Impounded
☐ Site not found/Secluded	□υ	Insafe
Other (indicate under co	mments)	

Lead Collector:

RBP High Gradient Habitat

Habitat	Condition Category											
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SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0								
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2.Embeddedness Score 7	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.								
3.Velocity/ Depth Regime Score 6	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).								
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.								
5.Channel Flow Status Score 9	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.								
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.								
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.								
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0								
8.Bank Stability LB 8 RB 8	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.								
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.								
10. Riparian Vegetative Zone Width LB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.								

Total Score

NOTES/COMMENTS:

50' REACH

to a screen see and the

High Gradient Bioassessment Stream Visit Sheet LOCATION: BIGBONE, STREAM NAME: SKY-PROGRAM: PROJECT: G141890.0 N/A STATION #: COUNTY: BOON INVESTIGATORS: CDK, Start: 4:15 TIME DATE: 10/15/1 (24hr) Verify Site LAT/LONG vs GPS ☐YES ☐NO 💆 N/A Finish: Reach **CANOPY COVER:**: STREAM Station Downstream Upstream Fully Exposed (0-25%) TYPE: 38.89736 Perennial Ephemeral LAT Partially Exposed (25-50%) Partially Shaded (50-75%) -84.66256 ☐ Fully Shaded (75-100%) Intermittent LONG LOCAL WATERSHED FEATUREES (Predominant Surrounding Land Use): WEATHER Past 24 hours Has there been ☐ Surface Mining
☐ Deep Mining ☐ Construction Forest
Pasture/Grazing Heavy rain a scouring rain Steady rain Commercial in the last 14 Oil Wells
Land Disposal ☐ Industrial ☐ Silviculture
☐ Urban Runoff/Storm Sewers Intermittent showers days? Row Crops Clear/sunny Yes No X Residential Cloudy **RIPARIAN VEGETATION INSTREAM FEATURES** Dominate Type:

☐ Trees☐ Herbaceous _ft HYDRAULIC Stream Width STREAM FLOW Maximum Depth ft **STRUCTURES** CHANNEL Dry
Pooled
Low
High 15.2 m ☐ Grasses ☐ Shrubs Reach Length Dams ALTERATIONS **Bridge Abutments** Number of strata 2 Dom. ☐ Dredging Riffle/Run/Pool Sequence Tree/Shrub Taxa
PLATANUS
OCCIDENTALIS, Island Channelization (No. Sampled in Reach) Waterfalls (Full Partial) ☐ Normal 2 Riffle 1 Run 1 Pool Other: P-CHEM Instrument Used: Date Calibrated: Temp(°C) D.O. (mg/l)_ %Saturation_ pH(S.U.)_ Cond. Turb. Sample Collection Verification Algae Sample: QualMHC Other ☐ Visual Assessment Lead Collector: Fish □BPEF □ Seine □ Other Time: BPEF Seine Lead Collector: Habitat ☐ RBP ☐ Substrate ☐ Other: Lead Collector: Invertebrates ☐ 1m² ☐ Qual ☐ Other: Lead Collector: 20 Jab (#Jabs: Cobble Snags Veg. Banks Macrophytes Tissue: No. of Samples collected Lead Collector: ☐ Acid/Alk ☐ Bulk ☐ Nutrients ☐ Metals ☐ Low Hg Water Chem Lead Collector:

Substrate Characterization										
Substrate X Est. □P.C.	Riffle 15 %	Run 50 %	Pool 35 %	Reach Total						
Silt/Clay (<0.06 mm)										
Sand (0.06 – 2 mm)				2						
Gravel (2-64 mm)										
Cobble (64 – 256 mm)										
Boulders (>256 mm)				10						
Bedrock	Elyander en									

SITE NOT SAMPLED:

Other (indicate under comments)

☐ Dry

Unsafe

Too deep/Impounded

Land owner denial

☐ Site not found/Secluded

☐ Herbicides ☐ Pesticides ☐ Ortho P ☐ Other:

Duplicate Samples Taken:

RBP High Gradient Habitat

Substrate/ Available Cover Score 6 2.Embeddedness Score 14 3.Velocity/ Depth Regime Score 13 4. Sediment Deposition Score 15 5.Channel Flow Status Score 16 6.Channel Alteration	Optimal 20 19 18 17 16 Greater than 70% of substrate favorable for epifaunal colonization and fish cover;	Suboptimal 15 14 13 12 11 40-70% mix of stable habitat;	Marginal 10 9 8 7 6	Poor 5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover 6 Score 2.Embeddedness Score 14 3.Velocity/ Depth Regime Score 13 4. Sediment Deposition Score 15 5.Channel Flow Status Score 16 6.Channel Alteration	Greater than 70% of substrate favorable for epifaunal	40-70% mix of stable habitat;	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover 6 Score 2.Embeddedness Score 14 3.Velocity/ Depth Regime Score 13 4. Sediment Deposition Score 15 5.Channel Flow Status Score 16 6.Channel Alteration	Greater than 70% of substrate favorable for epifaunal	40-70% mix of stable habitat;	The second secon	The second secon
Score 14 3.Velocity/ Depth Regime Score 13 4. Sediment Deposition Score 15 5.Channel Flow Status Score 16 6.Channel Alteration	mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
3.Velocity/ Depth Regime Score 13 4. Sediment Deposition Score 15 5.Channel Flow Status Score 16 6.Channel Alteration	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
4. Sediment Deposition Score 15 5. Channel Flow Status Score 16 6. Channel Alteration	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
5.Channel Flow Status Score 16 6.Channel Alteration	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Alteration	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	Channelization or dredging absent or minimal; stream with normal pattern.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7 6	5 . 4 3	2 1 0
LB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
LB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 3 RB 3	Width of riparian zone >18	Width of riparian zone 12-18		Width of riparian zone <6

Total Score

NOTES/COMMENTS:

STREAM NAME	: SKY-				LOCATION:	BIGBO	NE,		
	N/A				COUNTY: BO		P	ROGRAM: PROJECT:	G141890.0
INVESTIGATO	RS: CD	ζ,			DATE: 10/16		TIME S	tart: 8:50	111111111111111111111111111111111111111
Verify Site LAT/L	ONG vs G	PS 🗆	YES INO M	A	DATE: 10/10		(24hr) F	inish:	
	Station		Downstre		ach Upstream	n	CANOPY	COVER:	STREAM
LAT 38	.88882						Fully Expos	posed (25-50	
LONG -84	4.68538		913-		-		☐ Partially Sh☐ Fully Shade		
WEATHER		ast 24 hou	ırs	LOCAL	WATERSHED F	EATURE	ES (<u>Predominar</u>	t Surroundin	g Land Use):
Has there been a scouring rain		1 Stead	y rain y rain		ice Mining Mining	☐ Const		Forest Pasture	Grazing
in the last 14 days?		Interr	nittent showers	Oil V	Vells	☐ Indus		☐ Silvicul	
Yes No		Cloud	/sunny i y	Resid	Disposal lential	□ Kow (Crops	Urban F	cunon/Storm Sewe
INSTREAM Stream Width	FEATUR 1	ES 2 ft	HYDRAUL	IC	Math Hi	Domi	ARIAN VEGET nate Type:	TATION	
Maximum Depth	15.	.83 ft	STRUCTUR	ES	STREAM FLOW	☐ Tn	ees Herbaceo	us	CHANNEL ALTERATION
Reach Length Riffle/Run/Po			Dams Bridge Abuti	nents	Pooled Low	Numb	asses Shrubs er of strata 1	Dom.	☐ Dredging
(No. Sample			☐ Island ☐ Waterfalls		High Normal		Shrub Taxa SICARIA		Channelization
0 Riffle 1	_Run _ 1	_Pool	Other:		☐ Normal		GISETA		
P-CHEM		Instru	ment Used:	1187 11	Mad Lug		Date	Calibrated:	
Temp(°C)	D.O.	(mg/l)	%Sat	uration	pH(S.U	.)	Cond	Tı	urb
		14.		Sample C	Collection Verific	ation			
			HC Other		☐ Visual Assessm	ent	Lead Col	lector:	
	BPEF [ne: BPEF	Seine		Lead Col		Y V
	RBP L		te Other:				Lead Col		
	711			sVe	eg. BanksSar	ndN		Other	
Tissue:	No. of San	nples coll	ected S	p:			Lead Col	lector:	
Water Chem	☐ Acid/A	lk 🔲 Bu	lk Nutrients	Metals [Low Hg		Lead Col	lector:	
D II 4 C			esticides Orth	o P 🗌 Oth	ier:				
Duplicate Samp	pies Take	n:							
						en jaren			
Substrate XEst.	ПРС	Riffle			te Characteriz	1	Pool 70 %		Reach Total
Silt/Clay (<0.06								And Comes	60
Sand (0.06 – 2 m							January W		5
Gravel (2-64 mn							2018		10
Cobble (64 – 25		11.3	nas			8			15
Boulders (>256	85735						Variable of the second		10
Bedrock				7.07				tell fine	0
	BAR ATTE	rc.							•
NOTES/CO		15:			CITT	TE NIO	T CARADI	ED.	
50' REACH							Γ SAMPL		
					D 1	and owne	r denial	Dry 🗆 1	Too deep/Impounde
						Site not for	and/Secluded	Unsafe	
							cate under comn		

RBP High Gradient Habitat

Habitat	TANGER EN PROPERTY OF	Condition	Category	British St. Commen
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2.Embeddedness Score 11	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/ Depth Regime Score 7	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel Flow Status Score 13	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration Score 5	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of Riffles (or bends) Score	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles, poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7 6	5 4 3	2 1. 0
8.Bank Stability LB 2 RB 3	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
9. Vegetative Protection 2 LB	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 2	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.

Total Score

NOTES/COMMENTS:

50' REACH USED. HEAVY GRAZING WITHIN

High Gradient Bioassessment Stream Visit Sheet LOCATION: BIGBONE, STREAM NAME: SKY-PROGRAM: PROJECT: G141890.0 N/A STATION #: **COUNTY: BOON** INVESTIGATORS: CDK, Start: 9:30 TIME DATE: 10/16/1 (24hr) Verify Site LAT/LONG vs GPS ☐ YES ☐ NO 💆 N/A Finish: Reach **CANOPY COVER:**: STREAM Station Downstream Upstream Fully Exposed (0-25%)
Partially Exposed (25-50%)
Partially Shaded (50-75%) TYPE: 38.89908 LAT X Perennial ☐ Ephemeral -84.6531 ☐ Fully Shaded (75-100%) ☐ Intermittent LONG LOCAL WATERSHED FEATUREES (Predominant Surrounding Land Use): WEATHER Past 24 hours Forest
Pasture/Grazing Has there been ☐ Surface Mining ☐ Construction Heavy rain a scouring rain Deep Mining Commercial Steady rain in the last 14 Industrial
Row Crops ☐ Silviculture ☐ Urban Runoff/Storm Sewers Oil Wells Intermittent showers days? Clear/sunny Land Disposal ☐ Yes No X Residential Cloudy INSTREAM FEATURES eam Width 30 RIPARIAN VEGETATION Dominate Type: HYDRAULIC Stream Width ft STREAM FLOW 0.5 ft ☐ Trees ☐ Herbaceous ☐ Grasses ☐ Shrubs Maximum Depth STRUCTURES CHANNEL ☐ Dry Reach Length 15.2 m Dams ALTERATIONS Pooled Dredging
Channelization **Bridge Abutments** Number of strata 1 Riffle/Run/Pool Sequence Low Island Tree/Shrub Taxa SETARIA PUMILA, (No. Sampled in Reach) ☐ High Waterfalls (X)Full Partial) ☐ Normal TARAXICUM OFFICIANALE O Riffle 1 Run 1 Pool Other: P-CHEM Instrument Used: Date Calibrated: Temp(°C)_ D.O. (mg/l)_ %Saturation_ pH(S.U.)_ Cond. Turb. Sample Collection Verification Algae Sample: QualMHC Other ☐ Visual Assessment Lead Collector: Fish □BPEF □ Seine □ Other Time: BPEF Seine Lead Collector: Habitat RBP Substrate Other: Lead Collector: ☐ 1m² ☐ Qual ☐ Other: Invertebrates Lead Collector: 20 Jab (#Jabs: Cobble Snags Veg. Banks Macrophytes Tissue: No. of Samples collected Lead Collector: ☐ Acid/Alk ☐ Bulk ☐ Nutrients ☐ Metals ☐ Low Hg Water Chem Lead Collector: ☐ Herbicides ☐ Pesticides ☐ Ortho P ☐ Other:

Substrate Characterization						
Substrate Est. P.C.	Riffle 65 %	Run 25 %	Pool 10 %	Reach Total		
Silt/Clay (<0.06 mm)				20		
Sand (0.06 – 2 mm)				10		
Gravel (2-64 mm)				25		
Cobble (64 – 256 mm)				35		
Boulders (>256 mm)				10		
Bedrock				0		

SITE NOT SAMPLED:

Other (indicate under comments)

☐ Dry

Unsafe

Too deep/Impounded

Land owner denial

☐ Site not found/Secluded

Duplicate Samples Taken:

RBP High Gradient Habitat

Habitat		RBP High Gradient	Category	
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2.Embeddedness Score 7	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/ Depth Regime Score 9	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel Flow Status Score 9	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent, ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat, distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles, poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0
8.Bank Stability LB 8 RB 8	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 4	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.

Total Score

NOTES/COMMENTS:

50' REACH

mer on to

High Gradient Bioassessment Stream Visit Sheet

STREAM NAME: SH	Y-			LOCATION:			CONTRACTOR			
NIZA					31		PROGRAM	G141890.0		
STATION #: N/P INVESTIGATORS:				COUNTY: BO		TIME	Start: 10:0			
Verify Site LAT/LONG		YES □NO 💆N/	'A	DATE: 10/16/	/1	(24hr)	Finish:			
Sto	tion	Downstre		ach Upstrean		CANO	PY COVER:	STREAM		
LAT 38.8983		- Downstre	саш	- Opstream		Fully Ex	posed (0-25% Exposed (25-	TYPE: Description of the property of the prope		
LONG -84.6508	5	-		- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		Partially Shaded (50-75%) Ephemo				
WEATHER Now		ours	LOCAL	WATERSHED F	EATURE					
TT Ab b	☐ Hea	vy rain	☐ Surfa	ce Mining	Const	ruction	Forest			
in the last 14		ady rain ermittent showers	☐ Deep ☐ Oil W	Vells	☑ Comn		☐ Silvic			
days? ☐ Yes⊠ No	Cle Clo	ar/sunny udv	☐ Land ☐ Resid	Disposal lential	Row	Crops	☐ Urban	Runoff/Storm Sewer		
INSTREAM FEA	TURES				A STATE SANDON OR	ARIAN VEC	ETATION			
Stream Width Maximum Depth	30 ft 1 ft	HYDRAUL STRUCTUE	RES	STREAM FLOW		nate Type: ees⊠ Herbac	eous	CHANNEL		
	15.2 m	Dams Bridge Abut	monte	Dry Pooled		asses Shruer of strata		ALTERATIONS Dredging		
Riffle/Run/Pool Se (No. Sampled in l		☐ Island		☐ Low ☐ High	Tree/S	hrub Taxa		X Channelization		
0 Riffle 1 Run	1 Pool	☐ Waterfalls ☐ Other:		Normal	SOLIDA	NUS OCCIDEI AGO CANADE	NSIS,			
P-CHEM	8 12 7	ument Used:			GLEDI	TSIA TRIACAN	THOS ate Calibrated:	CHICAGO		
Temp(°C)			turation	pH(S II)			Turb.		
		30-1-5-1		Collection Verific				The state of the s		
Algae Sam	ole: Ouall	MHC Other		☐ Visual Assessm		Lead	Collector:			
	PEF Sein		ne: BPEF			Lead	Collector:			
Habitat R	BP 🔲 Subst	rate Other:		Callina III			Collector:			
	m² 🔲 Qual					Lead	Collector:			
		CobbleSnag		g. BanksSan	<u>d</u> M	lacrophytes_		_)		
	•		Sp:	1, 20 , 1		Lead		<u> </u>		
	SIL NEW MERCH	Bulk Nutrients Pesticides Orth				Lead	Collector:			
Duplicate Samples	- AL P	Testicides Ortin	01 🗀 🗸							
	Harri A. S.		Substrat	te Characteriza	ation			AND THE REST		
Substrate XEst. P	C. Riffle		The state of the s	un <u>15</u> %	T	ool 85	%	Reach Total		
Silt/Clay (<0.06 mm)			A W. S. III				100	15		
Sand (0.06 – 2 mm)					1 - 19			10		
Gravel (2-64 mm)							167	5		
Cobble (64 – 256 mn	1)					W.		35		
Boulders (>256 mm)								0		
Bedrock								35		
NOTES/COMM	ENTS:		L Jakon		T WALUA	ON BUILDING	gelocker totally			
50' REACH				SIT	E NO	Г SAMP	LED:			
					and owne	rdenia1 Γ	□ Dry □	Too deep/Impounded		
				L S	lite not for	ind/Secluded	Unsaf			
					Other (indi	cate under co	mments)			

RBP High Gradient Habitat

Habitat	RBP High Gradient Habitat Condition Category												
Parameter	Optimal	Suboptimal	Marginal	Poor									
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0									
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.									
2.Embeddedness Score 16	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.									
3.Velocity/ Depth Regime Score 4	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).									
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.									
5.Channel Flow Status Score 16	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.									
6.Channel Alteration Score 4	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.									
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.									
Left/Right Bank	10. 9	8 7 6	5 4 3	2 1 0									
8.Bank Stability LB 3 RB 3	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing, 60-100% of bank has erosional scars.									
9. Vegetative Protection 4 LB RB 4	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation, disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.									
10. Riparian Vegetative Zone Width LB 2	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.									

Total Score

NOTES/COMMENTS:

STREAM NAI	ME: SKY-				LOCATION:	BIGBO	NE,			
STATION #:	N/A	1903		t, etc.	COUNTY: BO			PROGRAI PROJECT	M: : G14	1890.0
INVESTIGAT	ors: CD	K,			DATE: 10/16		TIME	Start: 10		K = 1 7 F
Verify Site LAT	T/LONG vs	GPS 🗆	YES NO N/			Nik Ht	(24hr)	Finish:		
	Station		Downstre	Res am	Upstrear	n		OPY COVER		STREAM TYPE:
LAT 3	8.89519						☐ Partiall	y Exposed (25	-50%)	Perennial
LONG 5	34.64805			48.11	The Control			y Shaded (50-) haded (75-100		☐ Ephemeral ☐ Intermitten
WEATHER Has there been a scouring rain in the last 14 days? Yes No	8 1	Stead Inter	y rain ly rain mittent showers r/sunny	Surface Deep Oil W Land	'ells Disposal	EATURE Const Comm	ruction nercial trial	Fore:	st ure/Graz culture	
INSTREA Stream Width Maximum Dep Reach Length Riffle/Run (No. Sam	th 15/Pool Seque	RES 12 ft J.5 ft i.2 m nce ch) 1 Pool	HYDRAUL STRUCTUR Dams Bridge Abutr Island Waterfalls Other:	nents	STREAM FLOW Dry Pooled Low High Normal	Domin Tree/S FRA	nate Type: ees Herba asses Shr eer of strata thrub Taxa (INUS RICANA	ubs Dom.	NA NA	CHANNEL LTERATIONS Dredging Channelization Full Partial)
P-CHEM Temp(°C)	DC		ment Used: %Sat	uration	nH(S I)			Date Calibrated	100	
10p(c)		. (mg/1)		HILL IN	ollection Verific					
Algae	Sample:	☐ QualM	HC Other		Visual Assessm		Lead	Collector:		
Fish	BPEF	Seine	Other Tim	ne: BPEF	Seine	T We	Lead	Collector:	1	
Habitat	RBP	☐ Substra	ate Other:				Lead	Collector:		
Invertebrates		Qual [Other: CobbleSnag	sVe	g. BanksSar	nd M	Lead acrophytes_	Collector: Other)	
Tissue:		N. 3 . 1 N. N	lectedS	•		(6) (-i)	Lead	Collector:		
Water Chem	☐ Herbi	icides 🔲 I	alk Nutrients Cesticides Ortho				Lead	Collector:		
Duplicate Sa	mples Tak	en:								
				Substrat	e Characteriz	ation				
Substrate 🖾 E	st. P.C.	Riffle_	25 %	R	un 50 %	F	ool 15	5_%	Re	ach Total
Silt/Clay (<0.	06 mm)					#1 ≥1	profession and the second			
Sand (0.06 – 2	2 mm)									10
Gravel (2-64 i	mm)						1 3 17			
Cobble (64 – :	256 mm)	Y I		7 IN						
Boulders (>25	66 mm)									15
Bedrock						144		177		
NOTES/C 50' REAC		TS:				and owne		□ Dry □		eep/Impoun de d
						Site not for	ınd/Seclude	d DUnsa	fe	
					П	When (indi	cate under c	ommonto)		

RBP High Gradient Habitat

Habitat		RBP High Gradient	Category	of tenantial areas
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2.Embeddedness Score 12	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/ Depth Regime Score 9	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel Flow Status Score 9	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel, or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration Score 6	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of Riffles (or bends) Score	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat, distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7. 6	5 4 3	2 1 0
8.Bank Stability LB 3 RB 5	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
9. Vegetative Protection 4 LB	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common, less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation, disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.

Total Score

NOTES/COMMENTS:

STREAM NAM	E: SKY-				LOCATION:	BIGBON	NE,		
STATION #:	N/A				COUNTY: BO	100		PROGRAM PROJECT:	G141890.0
INVESTIGATO	ORS: CD	K,			DATE: 10/16		TIME	Start: 11:0	
Verify Site LAT	LONG vs (GPS 🔲	YES □NO 🗖N	'A	DATE: 10/10		(24hr)	Finish:	
	Station		Downstr		each Upstream	n		PY COVER:	STREAM
LAT 3	8.88984						Partially	cosed (0-25%) Exposed (25-5	0%) Perennial
LONG -	34.64017				W. V. (1)	0.		Shaded (50-75 ided (75-100%	
WEATHER Has there been a scouring rain in the last 14 days? Yes No INSTREAN Stream Width Maximum Dept Reach Length Riffle/Run/ (No. Samp O Riffle P-CHEM	A FEATUR In	Stead Interrection of Clear Cloud ESS Manager	y rain y rain y rain nittent showers /sunny dy HYDRAUI STRUCTUI Dams Bridge Abut Island Waterfalls Other: CUI ment Used: %Sa HC Other Other Other te Other:	Surfice Deep Oil V Land Resident Reside	STREAM FLOW Dry Pooled Low High Normal PH(S.U. Collection Verific Visual Assessm Seine Low Hg Low Hg	RIP. Dominication Tree/S TYPP NIGF CAN.	ARIAN VEG nate Type: ees Herbace asses Shrub er of strata 2 thrub Taxa dA LATIFOL A, SOLIDA ADENSIS Da Cond. Lead C	Forest Pasture Silvice Urban ETATION COUS Dom. LIA, SALIX GO te Calibrated: Collector: Collector: Collector: Collector:	CHANNEL ALTERATION Dredging Channelization (Full Partial)
				Substra	te Characteriz	ation			
Substrate Es	t. □P.C.	Riffle_	0_%		Run_ 75_%		ool 25	%	Reach Total
Silt/Clay (<0.0	6 mm)						7 11/1		60
Sand (0.06 – 2	mm)						TANKE I	17-9	10
Gravel (2-64 m	nm)		A STATE OF THE STATE OF						15
Cobble (64 – 2	56 mm)	1 N = 1	We Show	The system	TYPE WY		N REJECT		15
Boulders (>250	6 mm)					1			0
		Sugar)							0
Bedrock NOTES/Co		TS:			SIT	E NO	г samp	LED:	0

RBP High Gradient Habitat

Habitat		Condition	Category	presentation of the
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2.Embeddedness Score 4	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/ Depth Regime Score 6	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast- shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel Flow Status Score 8	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration Score 7	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	8 7 6	5 4 3	2 1 0
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
9. Vegetative Protection 7 LB	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 5	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.

Total Score

NOTES/COMMENTS:

STREAM NAME:				LOCATION:					
	V/A	T 1972 1 1		COUNTY: BO		D	ROGRAM:	6141890.0	
STATION #: [3	180		YIL .		ROJECT: C		
Verify Site LAT/LC		YES NO NA		DATE: 10/16	/1	(24hr)	inish:		
	Station	Downstrea		each Upstream			COVER::	STREAM	
	9012	- Downstre	THE	-		Fully Exposed (0-25%) Partially Exposed (25-50%) Perer			
LONG -84.6	2415		-19	-		☐ Partially Sha ☐ Fully Shade			
Has there been a scouring rain in the last 14 days? INSTREAM F Stream Width Maximum Depth Reach Length Riffle/Run/Poc (No. Sampled 1 Riffle 1 P-CHEM Temp(°C) Algae S Fish [Habitat [Invertebrates [Tissue: N	Stead Interded Cloud EATURES 7 ft 0.25 ft 15.2 m ol Sequence in Reach) Run 1 Pool Instru D.O. (mg/l) Sample: QualM BPEF Seine RBP Substra 1 m² Qual Cloud 20 Jab (#Jabs: Cloud) Acid/Alk Bu Herbicides I	y rain ly rain ly rain mittent showers r/sunny dy HYDRAULI STRUCTUR Dams Bridge Abutm Island Waterfalls Other: CUL ment Used: WSSatu HC Other Other Time ate Other: Cobble Snags	Surfa Deep Deep Deep Deep Deep Deep Deep Dee	Disposal dential STREAM FLOW Dry Pooled Low High Normal pH(S.U Collection Verific Visual Assessm Seine	Const Comr Indus Row RIP Domin Tree/S CON HEL	ARIAN VEGET mate Type: ees Herbaceou asses Shrubs er of strata 1 Shrub Taxa IIUM MACUL IANTHUS SF Cond. Lead Coll Lead Coll Lead Coll Lead Coll	Forest Pasture/6 Silvicult Urban R ATION S Dom. ATUM, Calibrated: Tu ector: ector: ector: ector: ector: ector: ector:	Grazing ure unoff/Storm Sewer CHANNEL ALTERATION: Dredging Channelization (XFull Partial)	
Dupiicate Sampi	es l'aren.								
			Substra	te Characteriz	ation				
Substrate Est. [P.C. Riffle_	35 %	R	tun_50 %	J	Pool 15 %		Reach Total	
Silt/Clay (<0.06 n	nm)	NEW THE PARTY						35	
Sand (0.06 – 2 mr	n)							15	
Gravel (2-64 mm)			3 17 5 17 17 18					15	
Cobble (64 – 256	mm)							35	
Boulders (>256 m	nm)							0	
Bedrock	ROTE OF A						STE EAT	0	
NOTES/COM 50' REACH	MENTS:				and owner	F SAMPLI or denial □ und/Secluded cate under comm	Dry □T	oo deep/Impounde	

RBP High Gradient Habitat

Habitat		RBP High Gradient Condition		
Parameter	Optimal	Suboptimal	Marginal	Poor
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover, mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2.Embeddedness Score 4	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3.Velocity/ Depth Regime Score 4	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
5.Channel Flow Status Score 7	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
6.Channel Alteration Score 5	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
Left/Right Bank	10 9	. 8 7 6	5 4 3	2 1 0
8.Bank Stability LB 5 RB 5	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60- 100% of bank has erosional scars.
9. Vegetative Protection 5 LB. RB 5	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
10. Riparian Vegetative Zone Width LB 3	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.

Total Score

NOTES/COMMENTS:

LOCATION: E COUNTY: BO DATE: 10/16/ ch Upstream WATERSHED FI e Mining dining ells Disposal intial TREAM FLOW Dry Pooled Low High Normal pH(S.U. collection Verifica	EATUREES (Properties of Street) RIPARIAN Dominate Ty Grasses Tree/Shrub T LONICER/AMERICAL SP	ME S hr) F CANOPY llly Expositially Expositially Shade edominant N VEGET pe: lerbaceou] Shrubs rata 1 axa axB, FINA, SOL	Forest Pasture/Gi Silvicultus Urban Rus FATION Dom. PAXINUS	STREAM TYPE:) Perennial Ephemera Intermitter Land Use):
DATE: 10/16/ ch Upstream - WATERSHED FI e Mining dining ells Disposal ntial TREAM FLOW Dry Pooled Low High Normal pH(S.U.	EATUREES (Properties of the commercial of the co	ME S hr) F CANOPY llly Expositially Expositially Shade edominant N VEGET pe: lerbaceou] Shrubs rata 1 axa axB, FINA, SOL	ration Tation Tation	STREAM TYPE: Perennial Ephemeral Intermitter Land Use): razing re noff/Storm Sewers CHANNEL ALTERATIONS Dredging Channelization
WATERSHED FI e Mining dining dills Disposal ntial TREAM FLOW Dry Pooled Low High Normal	EATUREES (PT PR	CANOPY AND EXPOSITION	COVER:: sed (0-25%) posed (25-50%) aded (50-75%) d (75-100%) It Surrounding I Pasture/Gr Silvicultur Urban Rur FATION IS Dom. RAXINUS	TYPE: Perennial Ephemera Intermitter Land Use): razing re noff/Storm Sewers CHANNEL ALTERATIONS Dredging Channelization
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WATERSHED FI e Mining dining sills Disposal ntial TREAM FLOW Dry Pooled Low High Normal	EATUREES (Properties of the properties of the pr	N VEGET pe: Herbaceou Shrubs rata 1 axa A SP., FI NA, SOL	sed (0-25%) posed (25-50% aded (50-75%) d (75-100%) at Surrounding I	TYPE: Perennial Ephemera Intermitter Land Use): razing re noff/Storm Sewers CHANNEL ALTERATIONS Dredging Channelization
WATERSHED FI e Mining dining disposal ntial TREAM FLOW Dry Pooled Low High Normal pH(S.U.	EATUREES (Pr. Construction Commercial Mindustrial Row Crops RIPARIAN Dominate Ty. Grasses Number of st. Tree/Shrub TLONICER/AMERICAL SP.	N VEGET pe: lerbaceou Shrubs rata ASP., FI NA, SOL	aded (50-75%) ad (75-100%) at Surrounding I	Ephemera Intermitted Land Use): razing re noff/Storm Sewers CHANNEL ALTERATIONS Dredging Channelization
WATERSHED FI e Mining dining disposal ntial TREAM FLOW Dry Pooled Low High Normal pH(S.U.	EATUREES (Pr Construction Commercial Industrial Row Crops RIPARIAL Dominate Ty Grasses Number of st Tree/Shrub T LONICER/AMERICAL SP	N VEGET pe: Herbaceou] Shrubs rata 1 axa a SP., FI	TATION Dom. RAXINUS	Land Use): razing re noff/Storm Sewers CHANNEL ALTERATIONS Dredging Channelization
e Mining	Construction Commercial Industrial Row Crops RIPARIA Dominate Ty Grasses Number of st Tree/Shrub T LONICER/ AMERICAL SP	N VEGET pe: Herbaceou I Shrubs rata 1 axa A SP., FI	Forest Pasture/Gi Silvicultus Urban Rus FATION IS Dom. PAXINUS	channel Dredging Channelization
Dry Pooled Low High Normal pH(S.U.	Dominate Ty Trees 1 Grasses Number of st Tree/Shrub 1 LONICER/ AMERICAL SP	pe: Herbaceou] Shrubs rata 1 axa A SP., FI	Dom.	ALTERATIONS Dredging Channelization
			Calibrated:	
Mection Verifics	0 2 2	ond	Turb)
Visual Assessme		I and Cal	lector:	
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RBP High Gradient Habitat

		RBP High Gradient	Habitat		
Habitat		Category			
Parameter	Optimal	Suboptimal	Marginal	Poor	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
1.Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover, mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
2.Embeddedness Score 8	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
3.Velocity/ Depth Regime Score 3	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Sow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow- deep).	
4. Sediment Deposition Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.		Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
5.Channel Flow Status Score 2	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
7.Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.	
Left/Right Bank	10 9	8 7 6	5 . 4 3	2 1 0	
8.Bank Stability LB 7 RB 7	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
9. Vegetative Protection 3 LB RB 3	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent, more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
10. Riparian Vegetative Zone Width LB 2 RB 2	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	

Total Score

NOTES/COMMENTS:

APPENDIX B Descriptions of Soils Found Within the Project Study Area

Soil Unit Symbol	Soil Unit Name	% in 20-Foot Corridor	Acres	Hydric
AsB	Ashton silt loam, 2 to 6 percent slopes (occasionally flooded)	0.08%	0.02	No
Во	Boonesboro silt loam (0 to 4 percent slopes, occasionally flooded)	0.91%	0.22	No
BrC	Brashear silty clay loam, 6 to 12 percent slopes	0.74%	0.18	No
BsD3	Brashear silty clay, 12 to 20 percent slopes, severely eroded	1.44%	0.35	No
CyF	Cynthiana flaggy silty clay loam, 20 to 50 percent slopes	1.42%	0.35	No
EdE2	Eden silty clay loam, 20 to 35 percent slopes, eroded	10.28%	2.53	No
Eg	Egam silty clay loam, (woolper 0 to 4 percent slopes)	1.54%	0.38	No
FcC	Faywood silty clay loam, 6 to 12 percent slopes	2.68%	0.66	No
FcD	Faywood silty clay loam, 12 to 20 percent slopes	15.57%	3.83	No
FdD3	Faywood silty clay, 12 to 20 percent slopes, severely eroded	6.00%	1.47	No
JeB	Jessup silt loam, 2 to 6 percent slopes	1.08%	0.27	No
JeC	Jessup silt loam, 6 to 12 percent slopes	1.17%	0.29	No
LkB	Licking silt loam, 2 to 6 percent slopes	1.06%	0.26	No
LIC	Licking silty clay loam, 6 to 12 percent slopes	2.78%	0.68	· No
LID	Licking silty clay loam, 12 to 20 percent slopes	2.22%	0.55	No
Ln	Lindside silt loam (0 to 3 percent slopes, occasionally flooded)	0.58%	0.14	No
Nk	Newark silt loam (0 to 2 percent slopes, occasionally flooded)	0.01%	0.00	No
NIB	Nicholson silt loam, 2 to 6 percent slopes	6.24%	1.53	No
NIC	Nicholson silt loam, 6 to 12 percent slopes	1.73%	0.43	No
No	Nolin silt loam (0 to 2 percent slopes, occasionally flooded)	30.50%	7.50	Yes
RsB	Rossmoyne silt loam, 0 to 6 percent slopes	6.11%	1.50	No
RsC	Rossmoyne silt loam, 6 to 12 percent slopes	4.07%	1.00	No
W	Water	0.23%	0.06	No
WoC	Woolper silty clay loam, 6 to 12 percent slopes	1.57%	0.39	No

Site Number	Latitude	Cowardin of Ac		Estimated Amount of Aquatic Resource in Project Area (acre)	Estimated Amount of Aquatic Resource in Project Area (linear ft.)	Class of Aquatic Resource		
W004	38.8857	-84.7270	PEM	0.003	-	Non-Section 10 – Wetland		
W005	38.8858	-84.7240	PEM	0.004		Non-Section 10 – Wetland		
W006	38.8858	-84.7229	PEM	0.006	-	Non-Section 10 – Wetland		
W007	38.8789	-84.6998	PEM	0.031	_	Non-Section 10 – Wetland		
W008	38.8792	-84.6990 ·	PEM	0.055		Non-Section 10 – Wetland		
W009	38.8898	-84.6401	PSS	0.045	-	Non-Section 10 – Wetland		
W010	38.8894	-84.6287	PEM	0.016	-	Non-Section 10 – Wetland		
W011	38.8894	-84.6279	PEM	0.032		Non-Section 10 – Wetland		
W013	38.8891	-84.6151	PEM	0.029		Non-Section 10 – Wetland		
Total Wetland	S			0.22				
S001	38.8886 -84.7516		38.8886 -84.7516 Inter	38.8886 -84.7516 Int	Intermittent		28	Non-Section 10 – Non-Wetland
S003	38.8882	-84.7428	Intermittent		27	Non-Section 10 – Non-Wetland		
S004	38.8871	-84.7410	Intermittent	-	28	Non-Section 10 – Non-Wetland		
S005	38.8862	-84.7393	Intermittent	<u>-</u>	28	Non-Section 10 – Non-Wetland		
S006	38.8861	-84.7389	Ephemeral		37	Non-Section 10 Non-Wetland		
S008	38.8838	-84.7342	Intermittent	-	33	Non-Section 10 – Non-Wetland		
S009	38.8838	-84.7327	Intermittent	_	18	Non-Section 10 – Non-Wetland		
S010	38.8849	8849 -84.7299 Ephemeral — 0 roadside drainage		Non-Section 10 – Non-Wetland				
S011	38.8854	-84.7285	Ephemeral	<u>-</u>	91	Non-Section 10 – Non-Wetland		
S012	38.8858	-84.7239	Intermittent		10	Non-Section 10 – Non-Wetland		

Site Number	Latitude	Longitude	Cowardin Code ^a /Flow Regime	Estimated Amount of Aquatic Resource in Project Area (acre)	Estimated Amount of Aquatic Resource in Project Area (linear ft.)	Class of Aquatic Resource
S013	38.8858	-84.7252	Ephemeral		8	Non-Section 10 – Non-Wetland
S016	38.8845	-84.7164	Ephemeral	-	50	Non-Section 10 – Non-Wetland
S017	38.8845	-84.7164	Perennial		32	Non-Section 10 – Non-Wetland
S018	38.8840	-84.7139	Ephemeral		5	Non-Section 10 – Non-Wetland
S019	38.8837	-84.7129	Ephemeral		8	Non-Section 10 – Non-Wetland
S020	38.8831	-84.7109	Ephemeral	<u> </u>	30	Non-Section 10 – Non-Wetland
S021	38.8831	-84.7107	Ephemeral	<u>-</u>	30	Non-Section 10 – Non-Wetland
S022	38.8837	-84.7127	Ephemeral	-	15	Non-Section 10 Non-Wetland
S023	38.8804	-84.7044	Perennial		35	Non-Section 10 – Non-Wetland
5024	38.8795	-84.7017	Ephemeral roadside drainage		138	Non-Section 10 – Non-Wetland
\$025	38.8791	-84.7005	Intermittent	-	166	Non-Section 10 – Non-Wetland
S026	38.8788	-84.6998	Ephemeral	_	11	Non-Section 10 – Non-Wetland
S027	38.8789	-84.6999	Ephemeral	-	15	Non-Section 10 – Non-Wetland
S028	38.8791	-84.6991	Perennial	-	31	Non-Section 10 – Non-Wetland
S029	38.8791	-84.6990	Ephemeral	<u>_</u>	2	Non-Section 10 – Non-Wetland
S030	38.8791	-84.6991	Ephemeral	<u>-</u>	29	Non-Section 10 – Non-Wetland
S031	38.8859	-84.6924	Intermittent	-	105	Non-Section 10 – Non-Wetland
S032	38.8872	-84.6895	Ephemeral	_	25	Non-Section 10 Non-Wetland
S033	38.8937	-84.6734	Intermittent	-	8	Non-Section 10 – Non-Wetland
S035	38.9008	-84.6501	Ephemeral		17	Non-Section 10

Site Number	umber Latitude Longitude Code ³/Flow Regime		Code ^a /Flow	Estimated Amount of Aquatic Resource in Project Area (acre)	Estimated Amount of Aquatic Resource in Project Area (linear ft.)	Class of Aquatic Resource	
S036	38.9008	-84.6501	Ephemeral	-	34	Non-Section 10 – Non-Wetland	
S037	38.9041	-84.6454	Intermittent	-	31	Non-Section 10 - Non-Wetland	
S038	38.8888 -84.6301 Ephemeral 82 roadside drainage		Non-Section 10 – Non-Wetland				
5041	38.8883	-84.6147	Ephemeral	-	1	Non-Section 10 – Non-Wetland	
S044	38.8891	-84.6152	Perennial	_	65	Non-Section 10 – Non-Wetland	
S045	38.8885	-84.6150	Ephemeral		34	Non-Section 10 – Non-Wetland	
S046	38.8887	-84.6151	Intermittent	-	33	Non-Section 10 – Non-Wetland	
SKY-CDK-001	38.8830	-84.7106	Ephemeral		34	Non-Section 10 – Non-Wetland	
SKY-CDK-004	38.8837	-84.7127	Ephemeral		40	Non-Section 10 – Non-Wetland	
SKY-CDK-005	38.8845	-84.7162	84.7162 Ephemeral — · 51 roadside drainage		51	Non-Section 10 – Non-Wetland	
SKY-CDK-006	38.8850	-84.7297	Perennial	- 59		Non-Section 10 – Non-Wetland	
SKY-CDK-007	38.8847	-84.7364	Perennial	_	36	Non-Section 10 - Non-Wetland	
SKY-CDK-008	38.8882	-84.7552	Perennial	-	23	Non-Section 10 - Non-Wetland	
SKY-CDK-009	38.8878	-84.7569	Ephemeral roadside drainage	-	296	Non-Section 10 – Non-Wetland	
SKY-CDK-010	38.8879	-84.7562	Perennial	-	26	Non-Section 10 – Non-Wetland	
SKY-CDK-011	38.8889	-84.7489	Intermittent	-	27	Non-Section 10 – Non-Wetland	
SKY-CDK-012	38.8794	-84.7014	Perennial		72	Non-Section 10 – Non-Wetland	
SKY-CDK-013	38.8974	-84.6626	Perennial		30	Non-Section 10 – Non-Wetland	
SKY-CDK-014	38.8938	-84.6733	Perennial	<u> </u>	13.	Non-Section 10 – Non-Wetland	

Site Number	Latitude	Longitude	Cowardin Code ^a /Flow Regime	ow of Aquatic Resource Aquatic Resource		Class of Aquatic Resource
SKY-CDK-015	38.8793	-84.6989	Intermittent	- 58	58	Non-Section 10 – Non-Wetland
SKY-CDK-016	38.8889	-84.6854	Perennial		33	Non-Section 10 – Non-Wetland
SKY-CDK-017	38.8992	-84.6531	Perennial		30	Non-Section 10 – Non-Wetland
SKY-CDK-018	38.8985	-84.6509	Perennial		143	Non-Section 10 – Non-Wetland
SKY-CDK-019	38.9062	-84.6423	Ephemeral		33	Non-Section 10 – Non-Wetland
SKY-CDK-020	38.8953	-84.6480	Perennial	_	46	Non-Section 10 – Non-Wetland
SKY-CDK-021	38.8914	-84.6431	Ephemeral	-	33	Non-Section 10 – Non-Wetland
SKY-CDK-022	38.8899	-84.6401	Perennial		35 .	Non-Section 10 – Non-Wetland
SKY-CDK-023	38.8878	-84.6329	Ephemeral		30	Non-Section 10 – Non-Wetland
SKY-CDK-024	38.8896	-84.6269	Intermittent	-	. 32	Non-Section 10 – Non-Wetland
SKY-CDK-025	38.8898	-84.6258	Ephemeral	-	36	Non-Section 10 – Non-Wetland
SKY-CDK-026	38.8902	-84.6242	Perennial	-	31	Non-Section 10 Non-Wetland
SKY-CDK-027	38.8902	-84.6236	Perennial	-	43	Non-Section 10 – Non-Wetland
Total Streams					2,630	

^a PEM = Palustrine Emergent; PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested. These are based on the professional judgment of CH2M HILL.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A.	REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL
	DETERMINATION (JD): April 18, 2016

Ь.	Mr. Stephen Lane, Duke Energy	N REQUESTING PRELIMINARY JD: Mr. Mike Frank, CH2M HILL Engineers, Inc.
	139 East 4th Street	400 E. Business Way Suite 400
	Cincinnati, OH 45202	Cincinnati, OH 45241
C.	DISTRICT OFFICE, FILE NAME, AN	ND NUMBER: TBD

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION: (USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

DIFFERENT SITE	:S)		
State: KY	County/parish/boroug	gh: Boone City:	
Center coordinate	s of site (lat/long in degree	decimal format): Lat.	0
Pick List, Long.	° Pick List. Lat: 38.886	5595 Long: -84.690560	
	Universal Transverse I	Mercator:	
Name of nearest v	vaterbody: See attached t	able.	
Identify (estimate)	amount of waters in the re	eview area:	
Non-wetland wa	aters: 2,630 linear feet:	width (ft) and/or	acres.
Cowardin Clas Stream Flow:	s: See attached table. See attached table.		
Wetlands: 0.22	acres.		
Cowardin Clas	s: See attached table.		
Name of any wate waters:	r bodies on the site that ha	ave been identified as	Section 10
Tidal: NA			
Non-Tidal: N/A	1		

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

Office (Desk) Determi	nation. Date:	
Field Determination.	Date(s):	

- 1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.
- In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of iurisdictional waters: (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there "may be" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SI	JPPORTING DATA. Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below): X Maps, plans, plots or plat submitted by or on behalf of the
	applicant/consultant: .
	 ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant. ☑ Office concurs with data sheets/delineation report. ☑ Office does not concur with data sheets/delineation report.
	☐ Data sheets prepared by the Corps:
	 ☑ U.S. Geological Survey Hydrologic Atlas: ☑ USGS NHD data. ☑ USGS 8 and 12 digit HUC maps.
	X U.S. Geological Survey map(s). Cite scale & quad name: Rising Sun, Union, Independence
	X USDA Natural Resources Conservation Service Soil Survey. Citation: Natural Resource Conservation Service (NRCS) Web Soil Survey. 2013. Boone County Soils. http:// websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed April 7, 2016.
	☑ National wetlands inventory map(s). Cite name:
	☐ State/Local wetland inventory map(s):
	FEMA/FIRM maps:
	☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
	X Photographs: X Aerial (Name & Date):
	or ☐ Other (Name & Date):
	Previous determination(s). File no. and date of response letter:
	Other information (please specify):
16	PORTANT NOTE: The information recorded on this form has not ecessarily been verified by the Corps and should not be relied upon for ter jurisdictional determinations.
₹6	gnature and date of gulatory Project Manager EQUIRED) Signature and date of person requesting preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

Table 2 Impact Summary for Wetland Crossings

				Length of Crossing at Centerline (feet) ^b	Wetland I	mpacts ^c
Wetland ID	Cowardin Classification ^a	Latitude	Longitude		Construction	Operation
W004	PEM	38.885708	-84.726986	0	0.003	0.00
W005	PEM	38.885822	-84.724037	0	0.004	0.00
W006	PEM	38.885752	-84.722876	0	0.006	0.00
W007	PEM	38.878859	-84.699792	0	0.031	0.00
W008	PEM	38.879244	-84.698957	81	0.055	0.00
W009	PSS	38.889845	-84.640052	69	0.045	0.045
W010	PEM	38.889389	-84.62865	0	0.016	0.00
W011	PEM	38.889431	-84.627939	7	0.032	0.00
W013	PEM	38.889094	-84.615142	44	0.029	0.00
Totals				202	0.22	0.05

a PEM - Palustrine Emergent; PSS - Palustrine Scrub Shrub; PFO - Palustrine Forested

b A length of crossing at centerline equal to zero indicates that a wetland is not crossed by the Project centerline, but is within the construction right-of-way (workspace).

c Construction acreage of wetland impacts is based on a 30-foot wide construction corridor. There is no operational impact to PEM wetlands, because there is no planned change in the pre- and post-construction vegetation cover type.

Table 1

Waterbody ID	Waterbody Name	Flow Regime	Top of Bank Width (feet)	Average OHWM Width (feet)	Quality Rating (RBP)	Length within 30' Construction Workspace (linear feet) ¹	Crossing Method / Comments	TNW Connection	Latitude	Longitude
S001	UNT to Big Bone Creek	Intermittent	4	3.5	Poor	28	Open Cut	Ohio River	38.888648	-84.751589
S003	UNT to Big Bone Creek	Intermittent	6 .	3	Poor	27	Open Cut	Ohio River	38.888194	-84.742755
S004	UNT to Big Bone Creek	Intermittent	8	4	Poor	28	Open Cut	Ohio River	38.887106	-84.740995
S005	UNT to Big Bone Creek	Intermittent	5	4	Poor	28	Open Cut	Ohio River	38.886221	-84.739258
S006	UNT to Big Bone Creek	Ephemeral	2	North 1 to	E-1074	37	Open Cut	Ohio River	38.886054	-84.738946
S008	UNT to Big Bone Creek	Intermittent	4	3	Poor	33	Open Cut	Ohio River	38.883806	-84.734229
S009	UNT to Big Bone Creek	Intermittent	3	2	Poor	18	Open Cut	Ohio River	38.883848	-84.732743
S010	UNT to Big Bone Creek	Ephemeral roadside drainage	2	1	Poor	0	HDD Bore in conjunction with Big Bone Creek	Ohio River	38.88485	-84.729948
S011	UNT to Big Bone Creek	Ephemeral	4	3	Nec 18	91	Open Cut	Ohio River	38.88538	-84.728482
S012	UNT to Big Bone Creek	Intermittent	2.5	2	Poor	10	Open Cut	Ohio River	38.885814	-84.723852
S013	UNT to Big Bone Creek	Ephemeral	4	3		8	Open Cut	Ohio River	38.885824	-84.725235
S016	UNT to Big Bone Creek	Ephemeral	3	2	327-61	50	Open Cut	Ohio River	38.88448	-84.716437
S017	UNT to Big Bone Creek	Perennial	10	8	Poor	32	Open Cut	Ohio River	38.884484	-84.716351
S018	UNT to Big Bone Creek	Ephemeral	3	2	7.26	5	Open Cut	Ohio River	38.883974	-84.71394
S019	UNT to Big Bone Creek	Ephemeral	2	A 10 10 10 10 10 10 10 10 10 10 10 10 10	- N	8	Open Cut	Ohio River	38.883721	-84.712932
S020	UNT to Big Bone Creek	Ephemeral	2	1 1	F-1-1-2	30	Open Cut	Ohio River	38.883149	-84.710867
S021	UNT to Big Bone Creek	Ephemeral	3	2	A TOTAL	30	Open Cut	Ohio River	38.883099	-84.71069
S022	UNT to Big Bone Creek	Ephemeral	2	1	Table 18	15	Open Cut	Ohio River	38.8837	-84.712677
S023	UNT to Beaver Branch	Perennial	4	3		35	Open Cut	Ohio River	38.880417	-84.704449
S024	UNT to Beaver Branch	Ephemeral roadside drainage	2	1	3 - 68	138	Open Cut	Ohio River	38.879475	-84.70174
S025	UNT to Beaver Branch	Intermittent	4	3	Poor	166	Open Cut; pipeline will not be installed paralell to stream within the stream's jurisdictional area; much of stream is near edge of work space.	Ohio River	38.879072	-84.70048
S026	UNT to Beaver Branch	Ephemeral	1.5	Date 1 Section		11	Open Cut	Ohio River	38.878827	-84.699772
S027	UNT to Beaver Branch	Ephemeral	1.5	1	17.00	15	Open Cut	Ohio River	38.878877	-84.699924
S028	UNT to Beaver Branch	Perennial	15	9	Poor	31	Open Cut	Ohio River	38.879076	-84.699109
S029	UNT to Beaver Branch	Ephemeral	3	2		2	Open Cut	Ohio River	38.879131	-84.698998
S030	UNT to Beaver Branch	Ephemeral	2	1		29	Open Cut	Ohio River	38.879131	-84.699113
S031	UNT to Beaver Branch	Intermittent	6	5	Poor	105	Open Cut	Ohio River	38.885909	-84.692433
S032	UNT to Mud Lick Creek	Ephemeral	3	2	13	25	Open Cut	Ohio River	38.887165	-84.689459
S033	UNT to Mud Lick Creek	Intermittent	7	6	Poor	8	Open Cut	Ohio River	38.893733	-84.673369
S035	UNT to Mud Lick Creek	Ephemeral	2	1	La Transi	17	Open Cut	Ohio River	38.900786	-84.650065
S036	UNT to Mud Lick Creek	Ephemeral	2	1	No.	34	Open Cut	Ohio River	38.900811	-84.650081
S037	UNT to Mud Lick Creek	Intermittent	3	2	Poor	31	Open Cut	Ohio River	38.904096	-84.645433
S038	UNT to Mud Lick Creek	Ephemeral roadside (a portion)	3	1.5	i - inc	82	Open Cut	Ohio River	38.888835	-84.630148
S041	UNT to Mud Lick Creek	Ephemeral	2			1 1	Open Cut	Ohio River	38.888275	-84.614664
S044	UNT to Mud Lick Creek	Perennial	3	2	Poor	65	Open Cut	Ohio River	38.889085	-84.615166
S045	UNT to Mud Lick Creek	Ephemeral	2	1		34	Open Cut	Ohio River	38.888522	-84.615012
S046	UNT to Mud Lick Creek	Intermittent	2	01.041	Poor	33	Open Cut	Ohio River	38.888731	-84.615091
SKY-CDK-001	UNT to Big Bone Creek	Ephemeral	3	1.5	B21-178	34	Open Cut	Ohio River	38.883047	-84.710558
SKY-CDK-004	UNT to Big Bone Creek	Ephemeral	3.5	3	KUT 5A	40	Open Cut	Ohio River	38.883661	-84.712715
SKY-CDK-005	UNT to Big Bone Creek	Ephemeral roadside drainage	5	4		51	Open Cut	Ohio River	38.884474	-84.71623

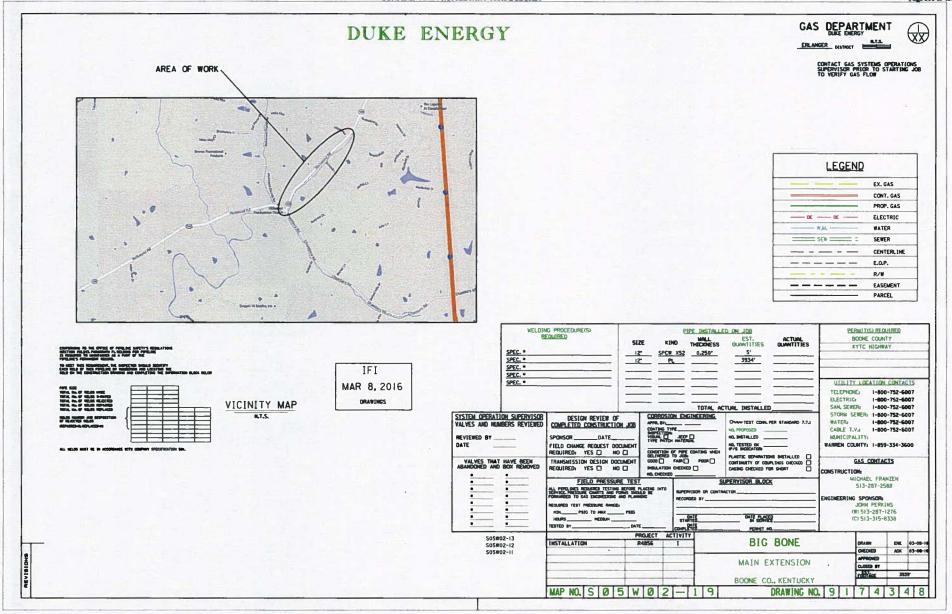
Table 1
Impact Summary for Waterbody Crossings

Waterbody ID	Waterbody Name	Flow Regime	Top of Bank Width (feet)		Quality Rating (RBP)	Length within 30' Construction Workspace (linear feet) ¹	Crossing Method / Comments	TNW Connection	Latitude	Longitude
SKY-CDK-006	Big Bone Creek (KY OSRW) ²	Perennial	120	50	Fair	59	HDD Bore	Ohio River	38.884966	-84.729662
SKY-CDK-007	UNT to Big Bone Creek	Perennial	10	8	Poor	36	Open Cut	Ohio River	38.884692	-84.736427
SKY-CDK-008	Gum Branch	Perennial	50	20	Poor	23	. HDD Bore	Ohio River	38.888249	-84.755236
SKY-CDK-009	UNT to Gum Branch	Epherneral roadside drainage	3	0.33		296	Open cut. Pipeline will not be installed paralell to stream within the stream's jurisdictional area. Pipeline trench will be within the road or along edge of pavement.	Ohio River	38.887815	-84.756859
SKY-CDK-010	UNT to Gum Branch	Perennial	10	5	Poor	26	Open Cut	Ohio River	38.887871	-84.75621
SKY-CDK-011	UNT to Big Bone Creek	Intermittent	9	7 200	Poor	27	Open Cut	Ohio River	38.888879	-84.748893
SKY-CDK-012	Beaver Branch	Perennial	9	7	Poor	72	Open Cut	Ohio River	38.879352	-84.701436
SKY-CDK-013	UNT to Mud Lick Creek	Perennial	14	13	Poor	30	Open Cut	Ohio River	38.897422	-84.662598
SKY-CDK-014	UNT to Mud Lick Creek	Perennial	6 .	5	Poor	13	Open Cut	Ohio River	38.893772	-84.673271
SKY-CDK-015	UNT to Beaver Branch	Intermittent	3.5	3	Poor	58	Open Cut	Ohio River	38.879312	-84.698893
SKY-CDK-016	UNT to Mud Lick Creek	Perennial	11	10	Poor	33	Open Cut	Ohio River	38.888883	-84.685416
SKY-CDK-017	Mud Lick Creek	Perennial	14	10	Poor	30	HDD Bore	Ohio River	38.899227	-84.653121
SKY-CDK-018	UNT to Mud Lick Creek	Perennial	20	10	Poor	143	Open Cut	Ohio River	38.898454	-84.650902
SKY-CDK-019	UNT to Mud Lick Creek	Ephemeral	4	3		33	Open Cut	Ohio River	38.906236	-84.642276
SKY-CDK-020	UNT to Mud Lick Creek	Perennial	7	6	Poor	46	Open Cut	Ohio River	38.895255	-84.648025
SKY-CDK-021	UNT to Mud Lick Creek	Ephemeral	4	3		33	Open Cut	Ohio River	38.891389	-84.643068
SKY-CDK-022	UNT to Mud Lick Creek	Perennial	10	8	Poor	35	Open Cut	Ohio River	38.889876	-84.640097
SKY-CDK-023	UNT to Mud Lick Creek	Ephemeral	2	1	4 POST	30	Open Cut	Ohio River	38.887824	-84.632885
SKY-CDK-024	UNT to Mud Lick Creek	Intermittent	8	6	Poor	32	Open Cut	Ohio River	38.8896	-84.62685
SKY-CDK-025	UNT to Mud Lick Creek	Ephemeral	5	4	MATTE	36	Open Cut	Ohio River	38.889815	-84.625822
SKY-CDK-026	UNT to Mud Lick Creek	Perennial	7.00	6	Poor	31	Open Cut	Ohio River	38.89017	-84.624154
SKY-CDK-027	UNT to Mud Lick Creek	Perennial	10	5	Poor	43	Open Cut	Ohio River	38.890222	-84:623559
Total						2,630				

¹ Includes planned areas that will be impacted by construction assuming a 30-foot wide comidor for work space. Additional work space, access, and staging areas not yet identified.

Note: Without the jurisdictional roadside drainages, approximatly 2,063 LF of stream is located within the planned construction right-of-way. Not all stream reaches will be temporary impacted as many are located near the edge of the right-of-way.

² OSRW - Designated by KDOW as Outstanding State Water Resource



CONSTRUCTION NOTES

GAS DEPARTMENT



- 1. TARGET START DATE: 03-01-17

 TARGET FINISH DATE: 11-30-17
- 2. THE WINNING BIDDER MUST INSTALL THE MAIN IN ACCORDANCE WITH THE SPECIFIED BID INSTALLATION METHOD UNLESS AN ALTERNATIVE METHOD IS SUBMITTED TO AND APPROVED BY THE DUKE ENERGY DESIGN ENGINEER. ANY CHANGES IN INSTALLATION METHOD SHALL NOT INCREASE THE COST OF THE PROJECT TO DUKE. NOR SHALL PAYMENT BE MADE FOR RESTORATION NOT PERFORMED.
- 3. RESTRICTED HOURS, TRAFFIC CONTROL OR OTHER RESTRICTIONS IMPOSED BY THE PERMITTING AGENCY ARE THE SOLE RESPONSIBILITY OF THE BIDDERS AND NO EXTRAS WILL BE PAID BY DUKE ENERGY.
- 4. EXTRA DEPTH WILL BE PAID FOR DIRECT BURY INSTALLATIONS WHEN EXCAVATIONS ARE GREATER THAN 5-FEET TOTAL DEPTH AND DEPTH IS GREATER THAN 2-FEET OVER THE PLANNED EXCAVATION DEPTH.
- 5. ROCK EXCAVATION WILL BE PAID PER GD-150. THE DUKE ENERGY INSPECTOR AND THE CONTRACTOR MUST AGREE ON THE ACTUAL AMOUNT OF ROCK BEFORE BACKFILLING THE TRENCH IN DIRECT BURY INSTALLATIONS. NO ROCK EXCAVATION WILL BE PAID FOR DIRECTIONAL DRILLING INSTALLATIONS.
- 6. TIE-IN WORK WILL BE GIVEN TO THE WINNING CONTRACTOR AT THE DISCRETION OF DUKE ENERGY. DUKE ENERGY RETAINS THE RIGHT TO HAVE DUKE ENERGY CREWS PERFORM TIE-IN WORK.
- 7. ALL WORK MUST BE DONE IN ACCORDANCE WITH THE "SPECIFICATIONS FOR THE 2010 GAS MAIN REPLACEMENT, RELOCATION, AND EXTENSION PROJECTS' AND THE MOST CURRENT VERSION OF GD-150.
- 8. TIE-IN MAINS MUST BE ADEQUATELY EXPOSED FOR PROPER LINE-UP.
- 9. OFFSETS WILL BE PAID IF TWO (2) UNPLANNED ELBOWS ARE USED FOR THE AVOIDANCE OF AN UNFORESEEN OBSTACLE IN EITHER THE HORIZONTAL OR VERTICAL DIRECTION.
- 10. OUT OF BALANCED BIDS WILL BE REJECTED AND NOT CONSIDERED BY DUKE ENERGY.

MARCH 8, 2016

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CONFIDENTIAL PROPRIETARY TRADE SECRET

GAS DEPARTMENT

ERLANGE DEFINET

KLANGER

OFFINET

CALANGER

OFFINET

SHOISIABM

MARCH 8, 2016

ARE BEING FILED UNDER PAGES 319 THROUGH 323 EXHIBIT 2(d) PUBLIC SEAL