MEMORANDUM

TO: Mr. Franz Ingelfinger, Restoration Ecologist

Massachusetts Department of Fish and Game, Division of Ecological Restoration

FROM: Neal Price, Senior Hydrogeologist

DATE: September 12 2014

RE: 2014 Hydrologic Data Update Report - Cold Brook, Harwich, Massachusetts

Horsley Witten Group, Inc. (HW) is pleased to provide the Massachusetts Department of Fish and Game, Division of Ecological Restoration (DER) with this summary report of hydrologic data collection and assessment conducted in the spring and summer of 2014 at the Cold Brook restoration site in Harwich, Massachusetts (the Site). HW previously conducted a baseline evaluation of the Site in 2012. The goals of this 2014 study were to supplement data collected during the 2012 evaluation and advance understanding of Site hydrology through the collection of stream discharge information, installation of additional groundwater monitoring wells, and elevation survey of significant features. Ultimately, the study will aid in the restoration of natural processes to the Cold Brook system.

Field Activities

On May 22, 2014, HW staff installed two additional shallow monitoring wells and three stream gauging stations at the Site. DER Restoration Ecologist Franz Ingelfinger was on-Site and accompanied HW during the field activities. The locations of these new monitoring wells and stream gauging stations, as well as monitoring wells installed in 2012, are shown on Figure 1. Photographs of the new, 2014 monitoring wells and stream gauging stations are included in Appendix A. All new monitoring equipment, as well as other site features requested to be surveyed by DER, were surveyed using a combination of RTK GPS technology and traditional Total Station survey methodologies over several field days in May and June of 2014. Survey deliverables were previously provided to DER under separate cover.

Monitoring wells were constructed of two-inch inner diameter pvc with 0.10" slot screen, and were installed by advancing a soil auger inside of a four-inch pvc outer casing through the subsurface soil until the water table was encountered. The two inch well pvc well casing was then advanced into the water table with a safety hammer, the four-inch outer casing was removed, and the borehole was backfilled with the auger cuttings. Monitoring well HW-10 was installed in an exterior basement bulkhead at 35 Belle Brook Lane and monitoring well HW-11

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was installed in a low-lying wooded area north of the bogs (Figure 1). DER water level loggers were subsequently installed in both monitoring wells. Relevant survey data for the 2014 monitoring wells are summarized in Table 1.

Stream gauging station SG-1, the most upstream gauging location, was established in the main stem channel of Cold Brook at the upstream side of a concrete weir box located approximately 200 feet east of Bank Street. Water level measurements at SG-1 are measured down from the center hole (painted orange) of an iron bar crossing the concrete weir box (see photograph in Appendix A). SG-1 receives flow crossing Bank Street from Grassy Pond, flow released from the Signet bogs to the southwest, and flow entering Cold Brook from Site bogs to the north through a 15-inch corrugated metal pipe (CMP) (Figure 1). A DER water level logger was installed in the main stem of Cold Brook in-between SG-1 and the 15-inch CMP inlet to the Brook. Relevant survey data for stream gauging stations are summarized in Table 1.

Stream gauging station SG-2 was established approximately 30 feet downstream (east) of a large metal culvert structure in the center of the bogs (Figure 1), and was marked on either side of the stream channel with oak stakes. Water level measurements at SG-2 are measured down from an orange paint mark at the river flow-right side of the culvert top, just upstream of SG-2 (see photograph in Appendix A).

Stream gauging station SG-3, the most downstream gauging location, was established at the upstream (north) end of a large metal culvert located at the northern end of a tailwater recovery pond (Figure 1). Water level measurements at SG-3 are measured down from an orange paint mark at the river flow-right corner of the weir structure, directly at the SG-3 location, upstream end of the culvert (see photograph in Appendix A). This location was chosen due to the large amount of organic material in the bottom of the downstream tailwater recovery pond and the slow flow in the tailwater recover pond, which would have made accurate streamflow measurements impossible.

Table 1. Survey Data for 2014-Installed Monitoring Stations

Station Name	Station Type	MP Elevation	Well Stickup	Well Depth	DTW(ft)
		(ft NAVD 88)	Height (ft)	(ft)	(May 22, 2014)
HW-10	Well	5.70	0.13	5.23	2.09
HW-11	Well	6.79	0.29	5.20	2.20
SG-1	Streamflow	7.35	NA	NA	3.57
SG-2	Streamflow	6.90	NA	NA	5.25
SG-3	Streamflow	5.90	NA	NA	4.71

Notes:

MP – Measurement Point DTW – Depth to Water Mr. Franz Ingelfinger September 12, 2014 Page 3 of 5

Streamflow measurements were collected at each gauging station with a Marsh McBirney Model 2000 digital flowmeter on eight occasions: May 22, June 4, and June 18, July 7, July 16, July 22, August 6, and August 19, 2014. To ensure representative flow measurements during stream gauging, each cross section is divided into uniform segments and velocity measurements are collected in the middle of each segment. Flow measurements from each cross section are then added together to determine the total discharge. Flow measurement data sheets are included in Appendix B. Flow was also estimated at the 15-inch inner diameter corrugated metal pipe (CMP) discharging into Cold Brook approximately 25 feet upstream of the HW SG-1 location by measuring the depth of water in the pipe and calculating flow using established pipe flow equations (Apprendix B). All flow measurements are summarized in Table 2, below, moving upstream to downstream from left to right across the table.

Table 2. Calculated Stream Discharge

Location	Culvert Above SG-1		Statio	n SG-1	Statio	n SG-2	Statio	n SG-3
Date	CFS	MGD	CFS	MGD	CFS	MGD	CFS	MGD
5/22/2014	0.0497	0.0321	0.242	0.156	0.878	0.567	1.540	0.995
6/4/2014	0.0497	0.0321	0.150	0.097	0.606	0.392	1.550	1.002
6/18/2014	0.0497	0.0321	0.175	0.113	0.657	0.424	1.487	0.961
7/7/2014	0.0497	0.0321	0.130	0.084	0.600	0.387	1.650	1.066
7/16/2014	0.0497	0.0321	0.140	0.090	0.473	0.305	1.497	0.967
7/22/2014	0.0269	0.0174	0.095	0.062	0.462	0.299	1.173	0.758
8/6/2014	0.0025	0.0016	0.072	0.047	0.344	0.222	1.031	0.666
8/19/2014	0.0006	0.0004	0.118	0.076	0.379	0.245	1.133	0.732

Notes:

CFS - Cubic feet per second

MGD - Millions of gallons per day

Streamflow Data Evaluation

Rating curves were developed for each stream gauging site to develop a mathematical equation relating the stream discharge to the stream stage, based on the eight flow measurement dates collected over the summer of 2014. The stages presented in the rating curves are elevations (NGVD88 feet) calculated by subtracting measured depths to water from the surveyed elevations of the measuring points. The rating curves presented here can be refined as new data are collected and, ultimately, can be used to estimate flow based upon stage measurements alone. The rating curves, regression equations, and correlation coefficients for each station to date are presented in Appendix B. The regression equation for each station is a logarithmic equation, as is common for many streamflow sites. The regression equations for each station, along with their correlation coefficients, are summarized in Table 3.

Table 3. Streamflow Regression Equations and Correlation Coefficients

Station Name	Regression Equation	Correlation Coefficient
SG-1	y = 0.0773ln(x) + 3.9039	0.60
SG-2	y = 0.1526ln(x) + 1.7364	0.45
SG-3	y = 0.5541ln(x) + 0.9253	0.76

The correlation coefficients can be considered a measure of strength of fit; i.e., how well does one variable (in this case, stage) predict another variable (in this case, flow). A value of one indicates a perfect fit and a value of zero indicates no correlation. At Cold Brook, the correlation coefficients indicate mostly a moderate strength of correlation, with SG-3 having the best correlation and SG-2 having the worst.

The strength of correlation at all sites likely suffers from the fact that all flow measurements were collected over a relatively short window in the summer of 2014 characterized by relatively consistent "summer-season" hydrology. Without much natural variation in flow or stage, relatively small measurement or equipment errors end up playing a larger role than they would for a data record comprised of greater natural variability.

Correlation coefficients also generally tend to increase in a downstream direction along with total discharge. This is because low flow velocities are nearer to the accuracy limits of the velocity flow meter and, therefore, a larger portion of the observed variation tends to be caused by instrument accuracy limitations. This is particularly true for Station SG-1 where both the stage values and velocity readings were very low over the measurement period. This expected upstream to downstream improvement of correlation based upon increasing flow does not hold true for Station SG-2 which has the lowest correlation of the three stations. This could be because Station SG-2 is the only station of the three not located in a hard, controlled structure. Shifting sandbars and vegetation may decrease the correlation at this site.

Table 4 details the observed pattern of increasing flow across the site from upstream to downstream. The stream channel distance between SG2 and SG3 (1,260 feet) is only approximately 25% longer than the stream channel distance between SG1 and SG2 (930 feet) yet the observed average flow increase between SG2 and SG3 (.833 cfs) is more than double the observed flow increase between SG1 and SG2 (.410 cfs). The average flow change normalized per length of stream channel between SG2 and SG3 (3.49 cfs per mile of stream length) is approximately 66% greater than the same normalized change between SG1 and SG2. One possible explanation for the proportionally greater increase in streamflow moving downstream across the site is the limiting role on the watershed played by Bank Street, shortly upstream of SG1. Most of the watershed upstream of SG1 contributes to Grassy Pond, upstream of Bank Street and SG1. Flow out of Grassy Pond across Bank Street is controlled by a

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weir structure on private property to which we did not have access. Since that weir likely artificially holds back water upstream of Bank Street, the effective watershed to SG-1 is therefore, relatively small. Moving further downstream across the site, the effective natural watershed areas to SG2 and then SG3 become proportionally larger than that of SG1.

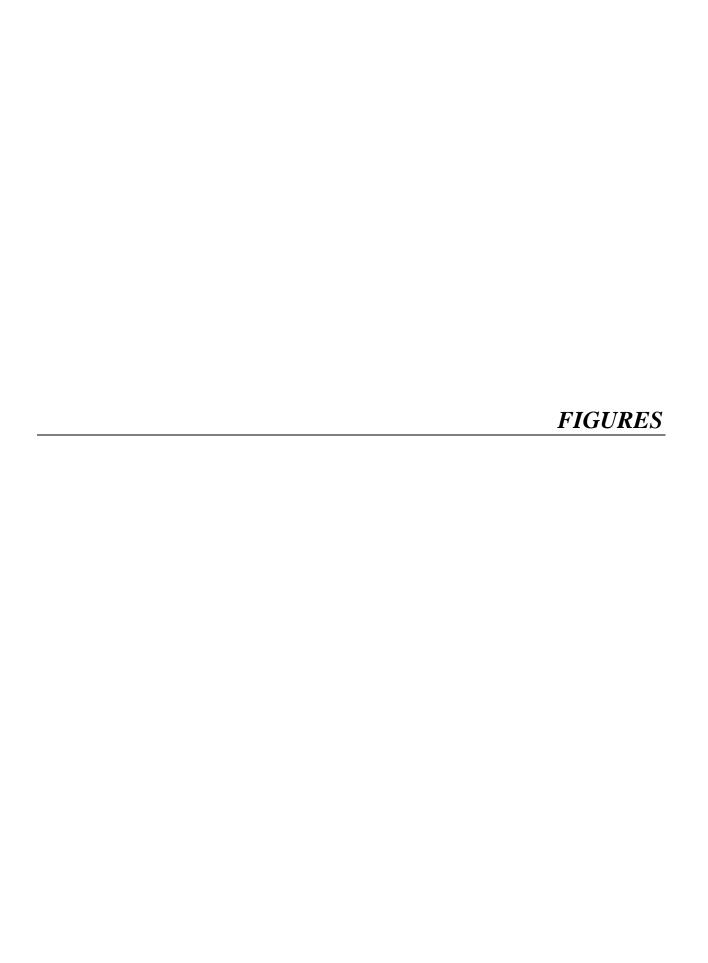
Table 4. Streamflow Change Across Site

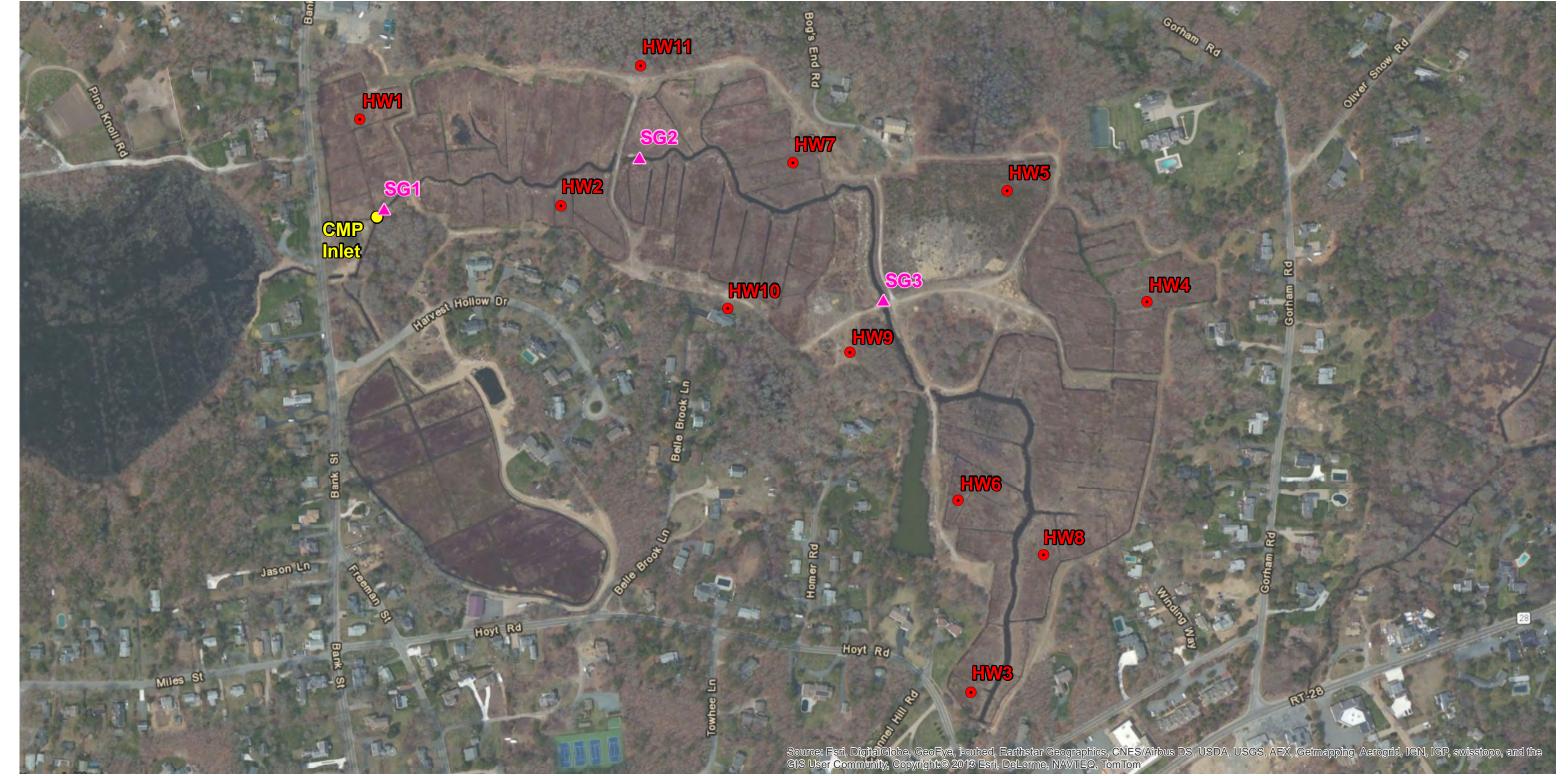
Date	SG1	SG2	SG3	Flow Change	Flow Change	Flow Change	Flow Change
	(CFS)	(CFS)	(CFS)	SG1-SG2	SG1-SG2	SG2-SG3	SG2-SG3
				(CFS)	(CFS/mile)	(CFS)	(CFS/mile)
5/22/2014	0.242	0.878	1.540	0.636	3.61	0.662	2.77
6/4/2014	0.150	0.606	1.550	0.456	2.59	0.944	3.96
6/18/2014	0.175	0.657	1.487	0.482	2.74	0.83	3.48
7/7/2014	0.130	0.600	1.650	0.47	2.67	1.05	4.40
7/16/2014	0.140	0.473	1.497	0.333	1.89	1.024	4.29
7/22/2014	0.095	0.462	1.173	0.367	2.08	0.711	2.98
8/6/2014	0.072	0.344	1.031	0.272	1.54	0.687	2.88
8/19/2014	0.118	0.379	1.133	0.261	1.48	0.754	3.16
AVERAGE	0.140	0.550	1.383	0.410	2.33	0.833	3.49

Notes:

Stream Distance from SG-1 to SG2 is 930 feet, and from SG2 to SG3 is 1,260 feet CFS = cubic feet per second

That upstream to downstream change of effective watershed size is further supported by the streamflow and precipitation data shown in Figure 2. Figure 2 shows SG2 and, particularly, SG3 responding to the most significant precipitation events (as recorded at the Chatham Airport), while SG1 does not respond at all. The flow record for SG1 is nearly constant with only a slight downward trend as the summer progresses. One potential explanation for this pattern is also the limiting watershed factor created by the Bank Street weir structure. If little of the approximately 1.6-inch rain event on July fourth topped over the Bank Street weir, the watershed contributing to SG1 would be very small and no significant flow increase two days following the storm would be expected. SG-3, with its proportionally larger natural watershed area, would likely continue to exhibit increased flow rates for a longer time after the rain event ended.





Path: H:\Projects\2012\12061 COM DER Cold Brook Restoration\GIS\Maps\Staff_Gauges.mxd

1" = 300 feet

Legend

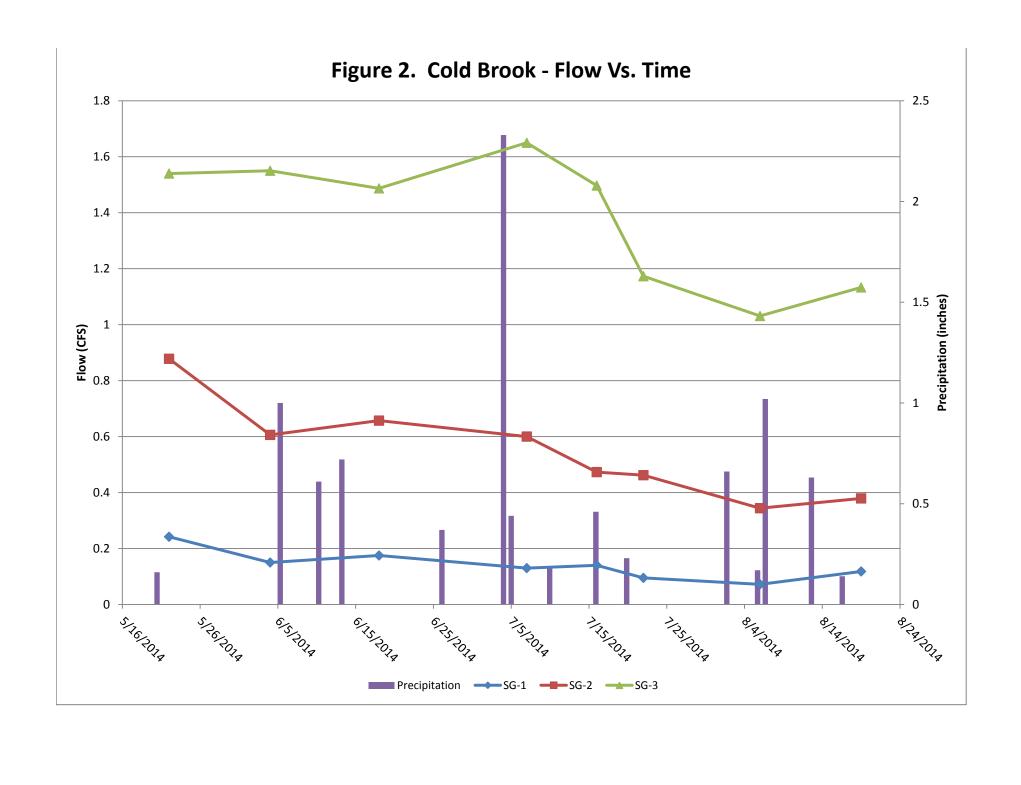
- Monitoring Well
- Stream Gauging Station
- CMP Inlet (15" diameter)

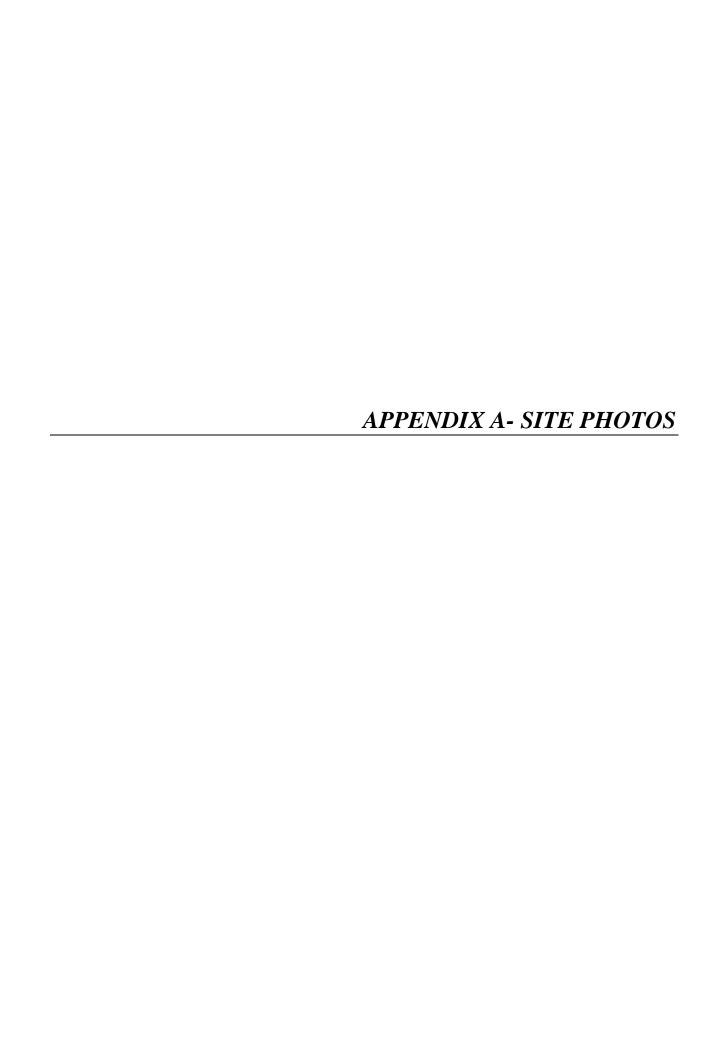


Monitoring Well & Stream Gauging Locations Cold Brook Harwich, MA

Date: 8/29/2014

Figure 1







Culvert above SG1





SG2 Stage Measurement Point



Streamflow Station SG2



Streamflow Station SG3



Monitoring Well HW10



Monitoring Well HW11



Station Number		HW SG-1				Date	5/22/2014
Location		Concrete V	Veir Box - approx	c. 200 east of	Bank Street	Operator	GWTH
	_					Time	12:45
G:					n middle of metal bar a	cross weir structure)	
	0.1'	depth of w	ater in 16" culve	rt			
				_			
Section	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge cfs		
1.0	0.625	0.20	0.00	0.13	0.000		
2.0	0.5	0.20	0.38	0.10	0.038		
3.0	0.5	0.20	0.00	0.10	0.000		
4.0	0.5	0.20	0.49	0.10	0.049		
5.0	0.5	0.20	0.48	0.10	0.048		
6.0	0.5	0.20	0.47	0.10	0.047		
7.0	0.5	0.20	0.47	0.10	0.047		
8.0	0.625	0.20	0.10	0.13	0.013		
					0.242 efe		
					0.242 cfs 0.156 mgd		
Station Number		HW SG-1			0.20084	Date	6/4/2014
ocation			Veir Box - approx	200 east of	Bank Street	Operator	ACS
			Ten Box approx	200 0000	Jan. Vi. Cot	Time	1:15
G:	3 57'	(distance t	o water surface r	measured from	n middle of metal bar a		2.20
			ater in 16" culve		ir inidale of metal bar a	ici oss wen structure,	
	1						
Section	Width	Depth	Velocity	Area	Discharge		
	ft	ft	ft/second	ft^2	<u>cfs</u>		
1.0	0.625	0.125	0.25	0.08	0.020		
2.0 3.0	0.5 0.5	0.125 0.125	0.39 0.39	0.06 0.06	0.024 0.024		
4.0	0.5	0.125	0.39	0.06	0.024		
5.0	0.5	0.125	0.40	0.06	0.028		
6.0	0.5	0.125	0.38	0.06	0.024		
7.0	0.5	0.125	0.09	0.06	0.006		
8.0	0.625	0.125	0.00	0.08	0.000		
					0.150 cfs		
					0.097 mgd		
Station Number		HW/SG-1			ū	Date	6/18/201/
		HW SG-1	Veir Boy - annroy	200 east of	-	Date Operator	6/18/2014 ACS
Station Number Location			Veir Box - approx	x. 200 east of	-	Operator	ACS
Location		Concrete V			Bank Street	Operator Time	
	3.51'	Concrete V (distance t	o water surface r	neasured fror	-	Operator Time	ACS
Location	3.51' 0.1'	Concrete V (distance t depth of w		neasured fror	Bank Street n middle of metal bar a	Operator Time	ACS
ocation	3.51' 0.1'	Concrete V (distance t depth of w Depth	o water surface r ater in 16" culve Velocity	measured fror rt Area	Bank Street n middle of metal bar a Discharge	Operator Time	ACS
Cocation GG: Section	3.51' 0.1' Width	Concrete V (distance t depth of w Depth ft	o water surface r rater in 16" culve Velocity ft/second	measured fror rt Area ft^2	Bank Street n middle of metal bar a Discharge cfs	Operator Time	ACS
Section 1.0	3.51' 0.1' Width ft 0.625	Concrete V (distance t depth of w Depth ft 0.15	o water surface rater in 16" culve Velocity ft/second 0.27	measured from rt Area ft^2 0.09	Bank Street n middle of metal bar a Discharge cfs 0.025	Operator Time	ACS
Section 1.0 2.0	3.51' 0.1' Width ft 0.625 0.5	Concrete V (distance t depth of w Depth ft 0.15 0.15	o water surface rater in 16" culve Velocity ft/second 0.27 0.40	measured from rt Area ft^2 0.09 0.08	Bank Street n middle of metal bar a Discharge cfs 0.025 0.030	Operator Time	ACS
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Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number ocation	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.10 Width	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 Concrete V (distance t depth of w	velocity Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface reater in 16" culve	measured from the state of the	Bank Street m middle of metal bar a Discharge cfs 0.025 0.030 0.029 0.026 0.029 0.021 0.015 0.000 0.175 cfs 0.113 mgd Bank Street m middle of metal bar a	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number cocation GG: Section	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 Concrete V (distance t depth of w	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r rater in 16" culve Velocity ft/second	measured from tt Area ft^2 0.09 0.08 0.08 0.08 0.08 0.08 0.09 c. 200 east of measured from tt Area ft^2	Bank Street m middle of metal bar a Discharge Cfs 0.025 0.030 0.029 0.026 0.029 0.021 0.015 0.000 0.175 Cfs mgd Bank Street m middle of metal bar a Discharge Cfs	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number occation G: Section 1.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.4 0.5 0.5	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r ater in 16" culve Velocity ft/second 0.16	### Area ### 10.09 0.08	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number ocation G: Section 1.0 2.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.625 Width ft 0.625 0.5	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.16 0.29	### Area ### 10.09 0.08 0.08 0.08 0.08 0.08 0.09 4. 200 east of measured from the sured f	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number Ocation 1.0 2.0 3.0 3.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.625	Concrete V (distance t depth of w Depth	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.16 0.29 0.37	measured from the street of th	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.625	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface reter in 16" culve	measured from the fit and the	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number ocation 6G: Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.625	Concrete V (distance t depth of w Depth	velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface rater in 16" culve velocity ft/second 0.16 0.29 0.37 0.40 0.47	measured from the first section of the first sectio	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Station Number .ocation 6G: Section 1.0 2.0 3.0 4.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.625	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface reter in 16" culve	measured from the fit and the	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.625 Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.16 0.29 0.37 0.40 0.47 0.45	measured from the fit of the fit	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.625	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r ater in 16" culve Velocity ft/second 0.16 0.29 0.37 0.40 0.47 0.45 0.42	measured from the fit of the fit	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS
Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0	3.51' 0.1' Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.625	Concrete V (distance t depth of w Depth ft 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	veir Box - approx o water surface r tater in 16" culve Velocity ft/second 0.27 0.40 0.38 0.35 0.38 0.28 0.20 0.00 Veir Box - approx o water surface r ater in 16" culve Velocity ft/second 0.16 0.29 0.37 0.40 0.47 0.45 0.42	measured from the fit of the fit	Discharge	Operator Time cross weir structure) Date Operator Time	ACS 11:30 7/7/2014 ACS

Station Number		HW SG-1				Date	7/16/2014
Station Number Location			Veir Box - approx	(, 200 east of I	Bank Street	Operator	7/10/2014 ACS
Location		concrete v	reli box approx	. 200 cast of t	Darik Street	Time	10:15
SG:	3.60	(distance te	o water surface r	neasured fron	n middle of metal bar ac		
			ater in 16" culve			,	
Section	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge		
1.0	0.625	0.10	0.38	0.06	cfs 0.024		
2.0	0.5	0.10	0.17	0.05	0.009		
3.0	0.5	0.10	0.36	0.05	0.018		
4.0	0.5	0.10	0.37	0.05	0.019		
5.0	0.5	0.10	0.45	0.05	0.023		
6.0	0.5	0.10	0.21	0.05	0.011		
7.0	0.5	0.10	0.36	0.05	0.018		
8.0	0.625	0.10	0.32	0.06	0.020		
					0.140 cfs		
					0.090 mgd		
Station Number		HW SG-1				Date	7/22/2014
Location		Concrete V	Veir Box - approx	. 200 east of E	Bank Street	Operator	ACS
	_					Time	13:00
SG:	3'7.4"	(distance to	o water surface r	neasured fron	n middle of metal bar ac	ross weir structure)	
	0.08	depth of w	ater in 16" culve	rt			
Section	Width	Depth	Velocity	Area	Discharge		
Jection	ft	ft	ft/second	ft^2	cfs		
1.0	0.625	0.10	0.32	0.06	0.020		
2.0	0.5	0.10	0.32	0.05	0.016		
3.0	0.5	0.10	0.24	0.05	0.012		
4.0	0.5	0.10	0.27	0.05	0.014		
5.0	0.5	0.10	0.22	0.05	0.011		
6.0	0.5	0.10	0.16	0.05	0.008		
7.0 8.0	0.5 0.625	0.10 0.10	0.11 0.15	0.05 0.06	0.006 0.009		
8.0	0.023	0.10	0.15	0.00	0.009		
					0.095 cfs		
					0.062 mgd		
Station Number		HW SG-1				Date	8/6/2014
Location		Concrete v	Veir Box - approx	200 east of t	Bank Street	Operator	ACS
SG:	ייס דיכ	(distance t	o water curface r	managerad from	n middle of metal bar ac	Time	13:15
30.			ater in 16" culve		ii iiiluule oi iiletai bai at	ioss well structure)	
	0.00	шерин он и					
Section	Width	Depth	Velocity	Area	Discharge		
1.0	0.625	ft	ft/second	ft^2	<u>cfs</u>		
1.0 2.0	0.625	0.10	0.31	0.06	0.019		
2.0		0.05		U U3	0.010		
	0.5	0.05 0.05	0.38	0.03 0.03	0.010 0.011		
3.0 4.0		0.05 0.05 0.05		0.03 0.03 0.03	0.010 0.011 0.009		
3.0	0.5 0.5	0.05	0.38 0.44	0.03	0.011		
3.0 4.0 5.0 6.0	0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27	0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007		
3.0 4.0 5.0 6.0 7.0	0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17	0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004		
3.0 4.0 5.0 6.0	0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27	0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007		
3.0 4.0 5.0 6.0 7.0	0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17	0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004		
3.0 4.0 5.0 6.0 7.0 8.0	0.5 0.5 0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17	0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002		
3.0 4.0 5.0 6.0 7.0 8.0 Station Number	0.5 0.5 0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06	0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd	Date	
3.0 4.0 5.0 6.0 7.0 8.0 Station Number	0.5 0.5 0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17	0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd	Operator	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location	0.5 0.5 0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06	0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd	Operator Time	
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location	0.5 0.5 0.5 0.5 0.5 0.5 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 HW SG-1 Concrete W	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx	0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location	0.5 0.5 0.5 0.5 0.5 0.5 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 HW SG-1 Concrete W	0.38 0.44 0.37 0.41 0.27 0.17 0.06	0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location	0.5 0.5 0.5 0.5 0.5 0.5 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 HW SG-1 Concrete W	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx	0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG:	0.5 0.5 0.5 0.5 0.5 0.625 3'8" 0.01	0.05 0.05 0.05 0.05 0.05 0.05 0.05 HW SG-1 Concrete W (distance to depth of we depth of we depth ft	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface r ater in 16" culver	0.03 0.03 0.03 0.03 0.03 0.03 c. 200 east of E	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd Bank Street m middle of metal bar acc Discharge cfs	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section	0.5 0.5 0.5 0.5 0.5 0.5 0.625 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface r ater in 16" culver Velocity ft/second 0.25	0.03 0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd Bank Street m middle of metal bar acc Discharge cfs 0.016	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0	0.5 0.5 0.5 0.5 0.5 0.5 0.625 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface r ater in 16" culver Velocity ft/second 0.25 0.35	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd Bank Street m middle of metal bar acc Discharge cfs 0.016 0.018	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0	0.5 0.5 0.5 0.5 0.5 0.5 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface rater in 16" culver Velocity ft/second 0.25 0.35 0.30	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.04 4. 200 east of E	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd Bank Street m middle of metal bar acc pischarge cfs 0.016 0.018 0.015	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0 4.0	0.5 0.5 0.5 0.5 0.5 0.5 0.625	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface rater in 16" culver Velocity ft/second 0.25 0.35 0.30 0.27	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.04 c. 200 east of E measured from the second of the se	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd Bank Street m middle of metal bar ac Discharge cfs 0.016 0.018 0.015 0.014	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0 4.0 5.0	0.5 0.5 0.5 0.5 0.5 0.5 0.625 3'8" 0.01 width ft 0.625 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface rater in 16" culver Velocity ft/second 0.25 0.35 0.30 0.27 0.28	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.05 0.06 0.06 0.05 0.05 0.05	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs mgd Bank Street m middle of metal bar ac Discharge cfs 0.016 0.018 0.015 0.014 0.014	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0 4.0 5.0 6.0	0.5 0.5 0.5 0.5 0.5 0.625 3'8" 0.01 Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface r ater in 16" culver Velocity ft/second 0.25 0.35 0.30 0.27 0.28 0.33	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs mgd Bank Street m middle of metal bar ac Discharge cfs 0.016 0.018 0.015 0.014 0.014 0.017	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0 4.0 5.0	0.5 0.5 0.5 0.5 0.5 0.5 0.625 3'8" 0.01 width ft 0.625 0.5 0.5 0.5 0.5	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface rater in 16" culver Velocity ft/second 0.25 0.35 0.30 0.27 0.28	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.05 0.06 0.06 0.05 0.05 0.05	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs mgd Bank Street m middle of metal bar ac Discharge cfs 0.016 0.018 0.015 0.014 0.014	Operator Time	
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0	0.5 0.5 0.5 0.5 0.5 0.625 Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface nater in 16" culver Velocity ft/second 0.25 0.35 0.30 0.27 0.28 0.33 0.16	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs 0.047 mgd Bank Street m middle of metal bar acc cfs 0.016 0.018 0.015 0.014 0.014 0.017 0.008 0.018 0.018	Operator Time	ACS
3.0 4.0 5.0 6.0 7.0 8.0 Station Number Location SG: Section 1.0 2.0 3.0 4.0 5.0 6.0 7.0	0.5 0.5 0.5 0.5 0.5 0.625 Width ft 0.625 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.38 0.44 0.37 0.41 0.27 0.17 0.06 Veir Box - approx o water surface nater in 16" culver Velocity ft/second 0.25 0.35 0.30 0.27 0.28 0.33 0.16	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.011 0.009 0.010 0.007 0.004 0.002 0.072 cfs mgd Bank Street m middle of metal bar ac Discharge cfs 0.016 0.018 0.015 0.014 0.017 0.008	Operator Time	ACS

Station Number Location		HW SG-2 Downstream	n of culvert				Date Operator Time	5/22/2014 GWTH 1:30
SG:	0.2	depth of wat	water surface from ter in culvert ulvert (feet per seco)		ime	1.50
Tape Distance	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge cfs			
0.75	0.5	0.00	0.00	0.00	0.000			
1.25 1.75	0.5 0.5	0.00 0.10	0.00	0.00 0.05	0.000 0.000			
2.25 2.75	0.5 0.5	0.25 0.40	0.23 0.40	0.13 0.20	0.029 0.080			
3.25	0.5	0.40	0.35	0.20	0.070			
3.75	0.5	0.45	0.37	0.23	0.083			
4.25 4.75	0.5 0.5	0.45 0.50	0.38 0.40	0.23 0.25	0.086 0.100			
5.25	0.5	0.50	0.33	0.25	0.083			
5.75 6.25	0.5 0.5	0.50 0.50	0.23 0.45	0.25 0.25	0.058 0.113			
6.75	0.5	0.40	0.35	0.20	0.070			
7.25 7.75	0.5 0.5	0.40 0.30	0.24 0.25	0.20 0.15	0.048 0.038			
8.25	0.5	0.30	0.15	0.15	0.023			
8.75	0.5	0.25	0.00	0.13 0.00	0.000			
9.25 9.75	0.5 0.5	0.00	0.00	0.00	0.000			
					0.878			
Station Number		HW SG-2		_	0.567	mga	Date	6/4/2014
Location		Downstream	of culvert				Operator Time	ACS 14:00
SG:	0.25	depth of wat	water surface from ter in culvert ulvert (feet per seco)		Time	14.00
Tape Distance	Width	Depth	Velocity	Area	Discharge			
ft	ft	ft	ft/second	ft^2	cfs			
0.75 1.25	0.5 0.5	0.10 0.20	0.00	0.05 0.10	0.000			
1.75	0.5	0.30	0.02	0.15	0.003			
2.25 2.75	0.5 0.5	0.50 0.50	0.18 0.17	0.25 0.25	0.045 0.043			
3.25	0.5	0.50	0.17	0.25	0.048			
3.75 4.25	0.5 0.5	0.60 0.60	0.17 0.21	0.30 0.30	0.051 0.063			
4.25 4.75	0.5	0.65	0.21	0.30	0.063			
5.25	0.5	0.60	0.22	0.30	0.066			
5.75 6.25	0.5 0.5	0.60 0.60	0.26 0.27	0.30 0.30	0.078 0.081			
6.75	0.5	0.50	0.12	0.25	0.030			
7.25 7.75	0.5 0.5	0.50 0.45	0.10 0.07	0.25 0.23	0.025 0.016			
8.25	0.5	0.40	0.00	0.20	0.000			
8.75	0.5	0.35	0.00	0.18	0.000			
9.25 9.75	0.5 0.5	0.00	0.00	0.00	0.000			
					0.606 0.392			
Station Number		HW SG-2			0.332	iligu	Date	6/18/2014
Location								
i -		Downstream	of culvert				Operator	ACS
SG:	5.19' 0.2'	(distance to depth of wat	water surface from)		Operator Time	ACS 12:30
SG:	5.19' 0.2' not collected	(distance to depth of wat velocity in co	water surface from ter in culvert	nd)				
SG: Tape Distance ft	5.19' 0.2' not collected Width	(distance to depth of wat velocity in co Depth ft	water surface from ter in culvert ulvert (feet per seco Velocity ft/second	and) Area ft^2	Discharge cfs			
Tape Distance ft 0.75	5.19' 0.2' not collected Width ft 0.5	(distance to depth of wat velocity in co Depth ft 0.10	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00	Area ft^2 0.05	Discharge cfs 0.000			
Tape Distance ft 0.75 1.25 1.75	5.19' 0.2' not collected Width ft 0.5 0.5 0.5	(distance to depth of war velocity in co	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.08	Area ft^2 0.05 0.08 0.13	Discharge cfs 0.000 0.000 0.010			
Tape Distance ft 0.75 1.25 1.75 2.25	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5	(distance to depth of wat velocity in cu Depth ft 0.10 0.15 0.25 0.55	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.08 0.30	Area ft^2 0.05 0.08 0.13 0.28	Discharge cfs 0.000 0.000 0.010 0.083			
Tape Distance ft 0.75 1.25 1.75	5.19' 0.2' not collected Width ft 0.5 0.5 0.5	(distance to depth of war velocity in co	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.08	Area ft^2 0.05 0.08 0.13	Discharge cfs 0.000 0.000 0.010 0.083 0.058 0.055			
Tape Distance ft 0.75 1.25 2.25 2.75 3.25 3.75	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wat velocity in cu Depth ft	water surface from ter in culvert ulvert (feet per second 0.00 0.00 0.08 0.30 0.21 0.20 0.21	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.28	Discharge cfs 0.000 0.000 0.010 0.083 0.058 0.055 0.058			
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.25 4.25 4.75	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of war velocity in control of the control of th	water surface from ter in culvert sulvert (feet per seco	nnd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.28 0.28 0.25 0.25	0.000 0.000 0.010 0.083 0.058 0.058 0.058 0.048 0.053			
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.25 4.75 5.25	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	distance to depth of war velocity in cu	water surface from ter in culvert surface from ter in culvert (feet per second fit/second 0.00 0.00 0.00 0.00 0.00 0.21 0.20 0.21 0.19 0.21 0.21 0.21 0.21 0.21 0.21 0.21 0.21	nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.28 0.25 0.25 0.25	Discharge cfs 0.000 0.000 0.010 0.083 0.058 0.055 0.058 0.048 0.053 0.053 0.072			
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.25 4.25 4.75	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of war velocity in control of the control of th	water surface from ter in culvert sulvert (feet per seco	nnd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.28 0.28 0.25 0.25	0.000 0.000 0.010 0.083 0.058 0.058 0.058 0.048 0.053			
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25	5.1.9' 0.2' not collected width ft 0.5' 0.5' 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wat velocity in cu Pepth ft 0.10 0.15 0.55 0.55 0.55 0.55 0.50 0.55 0.60 0.50 0.5	water surface from ter in culvert alvert (feet per second from the feet	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge			
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.25 4.75 5.25 5.75 6.25 6.75 7.25	5.1g ¹ not collected Width 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	(distance to depth of wat velocity in cu Depth ft 0.15 0.25 0.55 0.55 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	water surface from ter in culvert freet per second freet	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge			
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wat velocity in cu	water surface from ter in culvert freet per second from the from the freet per second freet	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.00 0.15	Discharge cfs			
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75	5.19' 0.2' not collected Width for the following	(distance to depth of wat velocity in cu	water surface from ter in culvert surface from ter in culvert sulvert (feet per second fr/second 0.00 0.00 0.00 0.00 0.00 0.01 0.20 0.21 0.20 0.21 0.26 0.20 0.23 0.28 0.02 0.23 0.28 0.02 0.13 0.03 0.00 0.00	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge cfs			
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wat velocity in cu	water surface from ter in culvert freet per second from the from the freet per second freet	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.00 0.15	Discharge cfs			
SG: Tape Distance ft 0.75 1.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 7.75 8.25 8.75 9.25	5.1g¹ not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of war velocity in cu per th	water surface from ter in culvert alvert (feet per second from the feet	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.20 0.20 0.15 0.15 0.03	Discharge cfs			
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 6.75 6.25 6.75 7.25 8.25 9.75 8.25 9.75 8.25 9.75 8.25 9.75	5.19' 0.2' not collected Width f. 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.55 0.50 0.50 0.5	water surface from ter in culvert alvert (feet per second fit/second 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.21 0.2	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.20 0.20 0.15 0.15 0.03	Discharge cfs		Time	7/7/2014
SG: Tape Distance ft 0.75 1.25 1.75 2.25 3.75 4.25 5.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 9.25	5.19' 0.2' not collected Width f. 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.50 0.50 0.50 0.50 0.5	water surface from ter in culvert alvert (feet per second fit/second 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.21 0.2	Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.20 0.20 0.15 0.15 0.03	Discharge cfs		Time	12:30
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 6.75 6.25 6.75 7.25 8.25 9.75 8.25 9.75 8.25 9.75 8.25 9.75	5.19' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.50 0.50 0.50 0.5	water surface from ter in culvert alvert (feet per second for full feet per second feet per sec	nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.25 9.25 9.75 Station Number Location	5.19' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.50 0.50 0.50 0.5	water surface from ter in culvert surface from ter in culvert freet per second freeze from the freeze freez	nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 9.25 9.75 Sattion Number Location SG:	5.19' 0.2' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.55 0.55 0.55 0.55 0.50 0.50	water surface from ter in culvert freet per second Velocity	nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.00 0.00	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 6.25 6.75 8.25 9.75 8.25 9.75 Station Number Location SG:	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.55 0.55 0.55 0.55 0.55 0.50 0.50	water surface from ter in culvert sulvert (feet per second 0.00 0.00 0.00 0.00 0.01 0.21 0.20 0.21 0.26 0.20 0.23 0.28 0.02 0.13 0.00 0.00 0.00 0.00 0.00 0.00 0.00	nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.20 0.15 0.10 0.03 0.00 measuring point, and) Area	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.28 2.75 8.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 1.25 1.25 1.75	5.19' 0.2' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.50 0.50 0.50 0.5	water surface from ter in culvert surface from ter in culvert freet per second Velocity	measuring point; masuring point;	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 2.75 3.25 5.75 6.25 6.75 7.25 7.75 8.25 9.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25	5.19' 0.2' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.50 0.50 0.50 0.5	water surface from ter in culvert fresh per second (1.00 to 1.00 to 1.	measuring point and base of the control of the cont	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 2.75 3.25 2.75 3.25 3.75	5.19' 0.2' not collected Width ft S.0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu	water surface from ter in culvert surface from ter in culvert surface from ter in culvert surface from 0.00 0.00 0.00 0.00 0.01 0.21 0.20 0.21 0.26 0.20 0.23 0.28 0.02 0.23 0.00 0.00 0.00 0.00 0.00 0.00	measuring point (ind) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.20 0.15 0.03 0.00 Area ft^2 0.05 0.10 0.15 0.33 0.30 0.30	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 5.75 5.25 5.75 5.25 5.77 8.25 8.75 9.25 9.25 9.75 SG: Tape Distance ft 0.75 1.75 2.25 5.75 9.25 9.25 9.25 9.25 9.25 9.25 9.25 9.2	5.19' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.50 0.50 0.50 0.50 0.5	water surface from ter in culvert freet per second free from culvert freet per second free freet per second	measuring point, and) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.20 0.20 0.20 0.15 0.15 0.03 0.00 Area ft^2 0.05 0.10 0.15 0.03 0.30 0.30 0.30 0.30 0.30 0.30	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 9.75 8.25 9.75 8.25 8.75 9.25 9.75 SG: Tape Distance ft 0.75 1.25 1.75 2.25 3.25 4.75 4.25 4.75 4.25 4.75	5.19' 0.2' not collected Width ft S.0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.55 0.55 0.55 0.55 0.55 0.55 0.55 0.50	water surface from ter in culvert surface from ter in culvert surface from ter in culvert surface from 0.00 0.00 0.00 0.00 0.01 0.21 0.20 0.21 0.26 0.20 0.23 0.28 0.02 0.23 0.00 0.00 0.00 0.00 0.00 0.00	measuring point (nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.00 0.15 0.15 0.01 0.15 0.03 0.00 Area ft^2 0.05 0.00 0.00 0.00 Area ft^2 0.05 0.10 0.15 0.30 0.30 0.30 0.30 0.30 0.30 0.30 0.30	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 2.25 3.75 4.25 3.75 4.25 5.75 6.25 6.75 7.25 7.72 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.25 8.25 8.25 8.25 8.25 8.25 8.2	5.19' 0.2' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.50 0.50 0.50 0.5	water surface from ter in culvert surface from ter in culvert freet per second Velocity	measuring point; and) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.20 0.15 0.15 0.15 0.15 0.15 0.03 0.00 Area ft^2 0.05 0.10 0.10 0.10 0.10 0.10 0.10 0.10	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 3.75 4.25 3.75 4.25 5.75 6.25 6.75 7.25 7.75 8.25 9.27 8.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 1.75 2.25 3.25 4.75 4.25 4.75 4.25 4.75 4.25 4.75	5.19' 0.2' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.55 0.55 0.55 0.55 0.55 0.55 0.55 0.50	water surface from ter in culvert freet per second	measuring point (nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.00 0.15 0.15 0.01 0.15 0.03 0.00 Area ft^2 0.05 0.00 0.00 0.00 Area ft^2 0.05 0.10 0.15 0.30 0.30 0.30 0.30 0.30 0.30 0.30 0.30	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 2.75 3.25 3.75 4.25 4.74 4.75 5.25 5.75 6.25 6.75 6.25 6.75 6.25 6.75	5.19' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft	water surface from ter in culvert surface from ter in culvert freet per second	measuring point (nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 9.25 9.75 8.75 8.25 8.75 9.25 9.25 9.25 9.75 SG: Tape Distance ft 0.75 1.25 2.75 3.25 3.75 4.25 3.75 4.25 3.75 5.26 5.75 5.26 5.75 5.27 5.25 5.75 5.25 5.75 5.25 5.75 5.25 5.75 5.25 5.77 5.25 5.77 5.25 5.77 5.25 5.77 5.25 5.77 5.25 5.77 5.25 5.77 5.25 5.77 5.25	5.19' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	(distance to depth of war velocity in cu Depth ft 0.10 0.15 0.55 0.55 0.55 0.50 0.50 0.50	water surface from ter in culvert levent free per second free	measuring point (md) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.20 0.00 0.15 0.15 0.01 0.15 0.03 0.00 Area ft^2 0.05 0.10 0.15 0.03 0.30 0.25	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 2.75 3.25 3.75 4.25 4.74 4.75 5.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75 6.25 6.75	5.19' not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wal velocity in cu Depth ft	water surface from ter in culvert surface from ter in culvert freet per second	measuring point (nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 2.25 3.75 4.25 4.75 5.25 5.77 8.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 9.77 9.77 9.77 9.77 9.77 9.77 9.77 9.7	5.19' not collected Width f	(distance to depth of wal velocity in cu Depth ft 0.10 0.15 0.25 0.55 0.55 0.55 0.55 0.50 0.50 0.5	water surface from ter in culvert surface from ter in culvert freet per second Velocity	measuring point; and) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.25 0.20 0.15 0.15 0.15 0.15 0.03 0.00 Area ft^2 0.05 0.10 0.10 0.10 0.10 0.10 0.10 0.10	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.75 8.25 8.75 8.25 8.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 8.25 8.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25	5.19' 0.2' not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.55 0.55 0.55 0.50 0.50 0.50	water surface from ter in culvert freet per second 0.00 0.00 0.08 0.30 0.21 0.20 0.21 0.25 0.20 0.23 0.28 0.02 0.33 0.00 0.00 0.00 0.00 0.00 0.00	measuring point (mid) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.25 0.20 0.10 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.30	Discharge cfs		Time Date Operator	7/7/2014 ACS
SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 9.25 8.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 2.75 3.25 2.75 3.25 3.25 3.75 4.25 7.75 5.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.25 9.25 9.25	5.19' not collected width ft 6.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0	(distance to depth of wait velocity in cu Depth ft 0.10 0.15 0.55	water surface from ter in culvert from the control of culvert from the culvert from	measuring point (nd) Area ft^2 0.05 0.08 0.13 0.28 0.28 0.28 0.25 0.20 0.15 0.15 0.05 0.20 0.20 0.20 0.20 0.30	Discharge cfs	mgd	Time Date Operator	12:30 7/7/2014 ACS

Station Number		HW SG-2					Date	7/16/2014
Location		Downstream					Operator Time	ACS 11:00
SG:	0.30	depth of wat	water surface from ter in culvert ulvert (feet per seco		t)			
Tape Distance	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge cfs			
0.75	0.5	0.00	0.00	0.00	0.000			
1.25 1.75	0.5 0.5	0.10 0.20	0.00 0.05	0.05 0.10	0.000 0.005			
2.25	0.5	0.50	0.21	0.25	0.053			
2.75 3.25	0.5 0.5	0.50 0.50	0.26 0.09	0.25 0.25	0.065 0.023			
3.75	0.5	0.50	0.13	0.25	0.033			
4.25 4.75	0.5 0.5	0.50 0.50	0.27 0.16	0.25 0.25	0.068 0.040			
5.25	0.5	0.50	0.22	0.25	0.055			
5.75 6.25	0.5 0.5	0.50 0.50	0.17 0.19	0.25 0.25	0.043 0.048			
6.75	0.5	0.50	0.13	0.25	0.033			
7.25	0.5	0.40	0.02	0.20	0.004			
7.75 8.25	0.5 0.5	0.40 0.30	0.03	0.20 0.15	0.006 0.000			
8.75	0.5	0.20	0.00	0.10	0.000			
9.25 9.75	0.5 0.5	0.00	0.00	0.00	0.000			
					0.473 cfs 0.305 m			
Station Number Location		HW SG-2 Downstream	of culvert		0.303 111	gu	Date Operator	7/22/2014 ACS
SG:	5.35 ?	(distance to depth of wat	water surface from ter in culvert ulvert (feet per secc		t)		Time	13:30
Tape Distance	Width	Depth	Velocity	Area	Discharge			
ft	ft	ft	ft/second	ft^2	cfs			
0.75 1.25	0.5 0.5	0.00	0.00	0.00	0.000			
1.75	0.5	0.10	0.00	0.05	0.000			
2.25 2.75	0.5 0.5	0.50 0.40	0.17 0.33	0.25 0.20	0.043 0.066			
3.25	0.5	0.40	0.12	0.20	0.024			
3.75 4.25	0.5 0.5	0.40 0.40	0.09 0.27	0.20 0.20	0.018 0.054			
4.25	0.5	0.40	0.22	0.20	0.054			
5.25	0.5	0.50	0.28	0.25	0.070			
5.75 6.25	0.5 0.5	0.50 0.40	0.21 0.21	0.25 0.20	0.053 0.042			
6.75	0.5	0.40	0.09	0.20	0.018			
7.25 7.75	0.5 0.5	0.30 0.30	0.09 0.08	0.15 0.15	0.014 0.012			
8.25	0.5	0.20	0.00	0.10	0.000			
8.75 9.25	0.5 0.5	0.20 0.00	0.00	0.10 0.00	0.000			
9.75	0.5	0.00	0.00	0.00	0.000 0.000 0.462 cfs			
					0.299 m	ed		
Station Number		HW SG-2			0.233		Date	8/6/2014
Station Number Location		HW SG-2 Downstream	n of culvert		0.233	•	Date Operator Time	8/6/2014 ACS 13:45
	5.32 0.25	Downstream (distance to depth of wat	n of culvert water surface from ter in culvert ulvert (feet per secc				Operator	ACS
Location SG: Tape Distance ft	5.32 0.25 not collected Width	Downstream (distance to depth of wat velocity in cu	water surface from ter in culvert ulvert (feet per secc Velocity ft/second	ond) Area ft^2	t) Discharge cfs		Operator	ACS
Location SG: Tape Distance ft 0.75	5.32 0.25 not collected Width ft 0.5	Downstream (distance to depth of wat velocity in cu Depth ft 0.00	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00	Area ft^2 0.00	Discharge cfs 0.000		Operator	ACS
Location SG: Tape Distance ft 0.75 1.25 1.75	5.32 0.25 not collected Width ft 0.5 0.5 0.5	Oownstream (distance to depth of wat velocity in cu Depth	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.00	Area ft^2 0.00 0.13 0.05	Discharge cfs 0.000 0.000 0.000		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5	Downstream (distance to depth of wat velocity in cu Depth ft 0.00 0.25 0.10 0.50	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.00 0.12	Area ft^2 0.00 0.13 0.05 0.25	Discharge		Operator	ACS
Location SG: Tape Distance ft 0.75 1.25 1.75	5.32 0.25 not collected Width ft 0.5 0.5 0.5	Oownstream (distance to depth of wat velocity in cu Depth	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.00	Area ft^2 0.00 0.13 0.05	Discharge cfs 0.000 0.000 0.030 0.050 0.035		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of war velocity in control of the co	water surface from ter in culvert ulvert (feet per second fit/second 0.00 0.00 0.00 0.12 0.20 0.14 0.17	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.25 0.20	Discharge cfs 0.000 0.000 0.000 0.035 0.035 0.034		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of wai velocity in cu Depth ft 0.00 0.25 0.10 0.50 0.50 0.50 0.40 0.40 0.50	water surface from ter in culvert ulvert (feet per seco Velocity ft/second 0.00 0.00 0.00 0.12 0.20 0.14	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.20 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.035 0.035 0.034 0.044 0.048		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of wat velocity in cu Depth ft 0.00 0.25 0.10 0.50 0.50 0.40 0.40 0.50 0.50 0.50	water surface from ter in culvert ulvert (feet per second ft/second 0.00 0.00 0.12 0.20 0.14 0.17 0.22 0.19 0.17 0.17 0.17 0.17 0.17 0.17 0.17 0.17	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.25 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.030 0.050 0.035 0.034 0.044 0.048		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.25 4.75	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of wai velocity in cu Depth ft 0.00 0.25 0.10 0.50 0.50 0.50 0.40 0.40 0.50	water surface from ter in culvert surface from ter in culvert (feet per second fr/second 0.00 0.00 0.00 0.00 0.12 0.20 0.14 0.17 0.22 0.19 0.19	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.20 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.035 0.035 0.034 0.044 0.048		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of war velocity in cu Depth ft 0.00 0.25 0.10 0.50 0.50 0.40 0.40 0.50 0.40 0.40 0.50 0.40 0.4	water surface from ter in culvert sulvert (feet per sect Velocity ft/second 0.00 0.00 0.00 0.12 0.20 0.14 0.17 0.22 0.19 0.15 0.06 0.03	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.25 0.25 0.20 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.050 0.035 0.034 0.044 0.048 0.043 0.030 0.012 0.005		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.25	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of wal velocity in cu Depth ft 0.00 0.25 0.10 0.50 0.50 0.40 0.40 0.50 0.40 0.30 0.30 0.30	water surface from ter in culvert feet per second feet in culvert fleet per second fifther feet per second fifther fitther fifther fifther fifther fi	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.25 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.030 0.050 0.034 0.044 0.048 0.043 0.030 0.012 0.005 0.005 0.005 0.005 0.005 0.005		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 5.75 6.25 6.75 7.25 7.25 8.25	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of wat velocity in cu Pepth ft 0.00 0.25 0.50 0.50 0.50 0.40 0.40 0.50 0.50 0.40 0.4	water surface from ter in culvert freet per second freet	Area fr2 0.00 0.13 0.05 0.25 0.25 0.25 0.20 0.20 0.20 0.20	Discharge cfs 0.000 0.000 0.000 0.030 0.034 0.044 0.048 0.030 0.030 0.030 0.030 0.030 0.030 0.030 0.00		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.75 6.25 6.75 7.25 7.25 8.25 8.75	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of war velocity in company to the co	water surface from ter in culvert (feet per sect Velocity ft/second 0.00 0.00 0.00 0.12 0.20 0.14 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.03 0.06 0.01 0.00 0.01 0.00 0.01 0.00 0.01 0.00 0.00 0.01 0.00 0.0	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.25 0.25 0.20 0.20 0.25 0.20 0.20 0.15 0.15 0.15 0.15 0.15 0.15 0.13 0.10 0.13	Discharge cfs 0.000 0.000 0.000 0.030 0.050 0.035 0.034 0.044 0.043 0.030 0.012 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.000 0.001 0.000 0.001 0.000		Operator	ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 5.75 6.25 6.75 7.25 7.25 8.25	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of wat velocity in cu Depth	water surface from ter in culvert freet per second freet	Area fr2 0.00 0.13 0.05 0.25 0.25 0.25 0.20 0.20 0.20 0.20	Discharge		Operator	ACS
Tape Distance ft 0,75 1,25 1,75 2,25 2,75 3,25 3,75 4,25 4,75 5,25 5,75 6,25 6,75 7,25 7,75 8,25 8,75 9,25 9,75	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	(distance to depth of war velocity in c	water surface from ter in culvert surface from ter in culvert freet per sect Velocity ft/second 0.00 0.00 0.00 0.00 0.01 0.14 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.03 0.03 0.03 0.00 0.00 0.00	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.25 0.20 0.20 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.000 0.035 0.034 0.044 0.048 0.030 0.012 0.005 0.00		Operator	ACS 13:45
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 5.75 6.25 6.75 7.22 7.75 8.25 8.75 9.25	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of war velocity in c. Depth ft 0.00 0.25 0.50 0.50 0.50 0.40 0.40 0.30 0.30 0.30 0.25 0.20 0.00 0.00	water surface from ter in culvert surface from ter in culvert freet per sect Velocity ft/second 0.00 0.00 0.00 0.00 0.01 0.14 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.03 0.03 0.03 0.00 0.00 0.00	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.25 0.20 0.20 0.25 0.25	Discharge cfs 0.000 0.000 0.000 0.000 0.001 0.000 0.000 0.001 0.000000		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance ft 0,75 1,25 1,75 2,25 2,75 3,25 3,75 4,25 4,75 5,25 5,75 6,25 6,75 7,25 7,75 8,25 8,75 9,25 9,75	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Continue	water surface from ter in culvert surface from ter in culvert freet per sect Velocity ft/second 0.00 0.00 0.00 0.00 0.01 0.14 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.03 0.03 0.03 0.00 0.00 0.00	Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.25 0.25 0.20 0.	Discharge cfs 0.000 0.000 0.000 0.030 0.035 0.034 0.044 0.043 0.030 0.012 0.005 0.005 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.022 m		Operator Time	ACS 13:45
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	(distance to depth of war velocity in c	water surface from ter in culvert (feet per sect Velocity ft/second 0.00 0.00 0.01 0.20 0.20 0.14 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.03 0.06 0.01 0.00 0.00 0.00 0.00 0.00 0.00	Area 1/2 0.00 0.00 0.13 0.05 0.25 0.25 0.20 0.25 0.25 0.25 0.20 0.25 0.20 0.25 0.20 0.25 0.20 0.25 0.20 0.20 0.25 0.20 0.2	Discharge cfs 0.000 0.000 0.000 0.034 0.044 0.043 0.032 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.005 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 5.75 6.25 6.75 7.22 7.75 8.25 9.75 9.25 9.75	5.32 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of war velocity in colors 100	water surface from ter in culvert ter in culvert ter in culvert year freet per second ter in culvert freet per second ter in culvert freet per second 0.00 0.00 0.00 0.00 0.00 0.01 0.01 0.0	Area ft^2 0.00 0.00 0.13 0.15 0.25 0.25 0.25 0.20 0.20 0.25 0.25 0.2	Discharge cfs 0.000 0.000 0.000 0.034 0.044 0.043 0.035 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance f:	0.52 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of war velocity in c. Depth	water surface from ter in culvert freet per second freet	Area ft^2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Discharge cfs 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 5.75 6.25 6.75 6.25 6.75 9.25 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 9.25 8.75 8.25 8.75 9.25 8.75	0.532 not collected Width 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Downstream (distance to depth of war velocity in c. Depth ft 0.00 0.25 0.50 0.50 0.50 0.50 0.40 0.40 0.30 0.30 0.25 0.20 0.00 0.00 0.00 0.00 0.00 0.0	water surface from ter in culvert (feet per sect velocity ft/second 0.00 0.00 0.12 0.20 0.14 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.06 0.01 0.00 0.00 0.00 0.00 0.00 0.00	Area ft*2	Discharge cfs 0.000 0.000 0.000 0.030 0.035 0.035 0.034 0.044 0.043 0.030 0.012 0.005 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 5.75 6.25 6.75 7.25 7.75 8.25 9.75 8.25 9.75 8.25 8.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75 9.25 9.75	5.32 0.25 not collected width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of war velocity in cu open to the control of the co	water surface from ter in culvert livert (feet per sect velocity ft/second 0.00 0.00 0.00 0.01 0.17 0.22 0.19 0.17 0.15 0.06 0.03 0.06 0.01 0.00 0.00 0.00 0.00 0.00 0.00	measuring poin measuring poin Area ft^2 0.00 0.03 0.05 0.25 0.25 0.20 0.20 0.20 0.20 0.25 0.25	Discharge cfs 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.25 3.25 3.25 3.25 3.25 3.25 3.2	5.32 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	Company	water surface from ter in culvert (feet per sect velocity ft/second 0.00 0.00 0.12 0.20 0.14 0.17 0.15 0.06 0.03 0.03 0.06 0.01 0.00 0.00 0.00 0.00 0.00 0.00	measuring poin measuring poin measuring poin Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.25 0.20 0.20	Discharge cfs 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance (t) (1,25	0.532 0.25 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.	(distance to depth of war velocity in c. Depth ft. 0.00 0.50 0.50 0.50 0.50 0.50 0.50 0.	water surface from ter in culvert surface from ter in culvert (feet per sect velocity ft/second 0.00 0.00 0.00 0.01 0.12 0.22 0.19 0.17 0.15 0.06 0.03 0.06 0.01 0.00 0.00 0.00 0.00 0.00 0.00	measuring poin ond) Area ft^2 0.00 0.13 0.05 0.25 0.20 0.20 0.20 0.25 0.20	Discharge cfs 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 5.25 5.77 6.25 6.75 7.25 7.75 8.25 8.75 9.25 9.75 SG: Station Number Location SG: Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 4.75 4.25 4.75 4.25 4.75 4.25 4.75 4.25	0.532 not collected Width ft 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Downstream (distance to depth of war velocity in c.	water surface from ter in culvert freet per second freet	measuring poin Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.20 0.15 0.15 0.13 0.10 0.00 0.00 Area ft^2 0.00 0.00 0.00 Area ft^2 0.00 0.00 0.00 0.00	Discharge cfs 0.000 0.00		Operator Time	ACS 13:45 8/19/2014 ACS
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Tape Distance ft 0.75 1.25 1.75 2.25 2.75 3.25 3.75 4.25 4.75 5.25 5.75 6.25 6.75 7.25 7.75 8.25 8.75 8.25 8.75 9.25 9.75 Station Number Location SG: Tape Distance ft 0.75 1.25 2.75 2.25 2.75 4.25 2.75 4.25 2.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25 8.75 8.25	5.32 0.25 not collected width ft	Continue	water surface from ter in culvert livert (feet per sect velocity ft/second 0.00 0.00 0.17 0.17 0.15 0.06 0.01 0.00 0.00 0.00 0.00 0.00 0.00	measuring poin ond) Area ft^2 0.00 0.13 0.05 0.25 0.25 0.20 0.20 0.20 0.20 0.20	Discharge cfs 0.000 0.00	i gd	Operator Time	ACS 13:45

Station Number Location		HW SG-3 Metal Wei	r Box - upstream	side at tailwa	ter recovery pond	Date Operator Time	5/22/2014 GWTH 14:15
SG:	4.65'	(distance t	o water surface f	rom measurir	ng point)		11.13
Section	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge cfs		
1.0	0.5	0.20	0.66	0.10	0.066		
2.0	0.5	0.50	0.95	0.25	0.238		
3.0	0.5	0.70	0.90	0.35	0.315		
4.0	0.5	0.75	0.53	0.38	0.199		
5.0	0.5	0.70	1.10	0.35	0.385		
6.0	0.5	0.50	0.90	0.35	0.225		
7.0	0.5	0.30	0.90	0.25	0.225		
7.10	0.0	0.50	0.75	0.13	1.540 cfs		
					0.995 mgd		
Station Number Location		HW SG-3 Metal Wei	Date Operator Time	6/4/2014 ACS 14:50			
SG:	4.71'	(distance to	o water surface f	rom measurir	ng point)		
Section	Width	Depth	Velocity	Area	Discharge		
	ft	ft	ft/second	ft^2	cfs		
1.0	0.5	0.10	0.60	0.05	0.030		
2.0	0.5	0.45	1.02	0.23	0.230		
3.0	0.5	0.70	1.03	0.35	0.361		
4.0	0.5	0.80	0.66	0.40	0.264		
5.0	0.5	0.70	1.10	0.35	0.385		
6.0	0.5	0.45	0.85	0.23	0.191		
7.0	0.5	0.20	0.90	0.10	0.090		
					1.550 cfs 1.002 mgd		
Station Number		HW SG-3			1.002 mgu	Date	6/18/2014
Location			r Box - upstream	side at tailwa	ter recovery pond	Operator	ACS
SG:	4.72'	(distance to	o water surface f	rom measurir	ng point)	Time	13:30
Section	Width	Depth	Velocity ft/second	Area ft^2	Discharge		
1.0	ft	ft	· · · · · · · · · · · · · · · · · · ·		cts		
1.0	0.5	0.10	0.90	0.05	0.045		
2.0	0.5	0.40	1.29	0.20	0.258		
3.0	0.5	0.70	1.04	0.35	0.364		
4.0	0.5	0.80	0.27	0.40	0.108		
5.0	0.5	0.70	1.26	0.35	0.441		
6.0	0.5	0.40	1.17	0.20	0.234		
7.0	0.5	0.10	0.74	0.05	0.037		
					1.487 cfs 0.961 mgd		
Station Number		HW SG-3				Date	7/7/2014
Location			r Box - upstream	side at tailwa	ter recovery pond	Operator	ACS
SG:	4.76	(distance t	o water surface f	rom measurir	ng point)	Time	15:00
Section	Width	Depth	Velocity	Area	Discharge		
	ft	ft	ft/second	ft^2	cfs		
1.0	0.5	0.15	0.78	0.08	0.059		
2.0	0.5	0.40	1.00	0.20	0.200		
3.0	0.5	0.70	1.16	0.35	0.406		
4.0	0.5	0.80	0.65	0.40	0.260		
5.0	0.5	0.70	1.24	0.40	0.434		
6.0 7.0	0.5 0.5	0.45 0.15	1.02 0.82	0.23 0.08	0.230 0.062		
7.0	0.5	0.13	3.02	0.00			
					1.650 cfs 1.066 mgd		

Station Number Location		HW SG-3 Metal Wei	r Box - upstream	side at tailwa	ter recovery pond	Date Operator Time	7/16/2014 ACS 12:00
SG:	4.80	(distance to	o water surface f	rom measurir	ng point)		
Section	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge cfs		
1.0	0.5	0.20	0.86	0.10	0.086		
2.0	0.5	0.45	0.93	0.23	0.209		
3.0	0.5	0.60	1.06	0.30	0.318		
4.0	0.5	0.75	0.52	0.38	0.195		
5.0	0.5	0.60	1.17	0.30	0.351		
6.0	0.5	0.50	0.91	0.25	0.228		
7.0	0.5	0.30	1.10	0.25	0.228		
					1.497 cfs		
Station Number		HW SG-3			0.967 mgd	Date	7/22/2014
Location		Metal Wei	Operator Time	ACS 14:30			
SG:	4.91	(distance to	o water surface f	rom measurir	ng point)		
Section	Width	Depth	Velocity	Area	Discharge		
	ft	ft	ft/second	ft^2	cfs		
1.0	0.5	0.00	0.00	0.00	0.000		
2.0	0.5	0.10	0.96	0.05	0.048		
3.0	0.5	0.50	1.17	0.25	0.293		
4.0	0.5	0.60	0.80	0.30	0.240		
5.0	0.5	0.60	1.24	0.30	0.372		
6.0	0.5	0.40	0.99	0.20	0.198		
7.0	0.5	0.10	0.44	0.05	0.022		
					1.173 cfs 0.758 mgd		
Station Number		HW SG-3				Date	8/6/2014
Location		Metal Wei	r Box - upstream	side at tailwa	ter recovery pond	Operator Time	ACS 14:30
SG:	4.91	(distance t	o water surface f	rom measurir	ng point)		
Section	Width ft	Depth ft	Velocity ft/second	Area ft^2	Discharge cfs		
1.0	0.5						
1.0		0.00	0.00	0.00	0.000		
2.0	0.5	0.20	0.57	0.10	0.057		
3.0	0.5	0.50	1.16	0.25	0.290		
4.0	0.5	0.60	0.87	0.30	0.261		
5.0	0.5	0.50	0.99	0.25	0.248		
6.0	0.5	0.30	1.02	0.15	0.153		
7.0	0.5	0.10	0.44	0.05	0.022		
					1.031 cfs 0.666 mgd		
Station Number		HW SG-3				Date	8/19/2014
Location			r Box - upstream	side at tailwa	ter recovery pond	Operator Time	ACS 15:00
SG:	4.96	(distance t	o water surface f	rom measurir	ng point)	Time	13.00
Section	Width	Depth	Velocity	Area	Discharge		
	ft	ft	ft/second	ft^2	cfs		
1.0	0.5	0.00	0.00	0.00	0.000		
2.0	0.5	0.20	0.66	0.10	0.066		
3.0	0.5	0.50	1.33	0.25	0.333		
4.0	0.5	0.60	0.80	0.30	0.240		
5.0	0.5	0.50	1.14	0.25	0.285		
6.0	0.5	0.35	0.98	0.23	0.172		
7.0	0.5	0.33	0.76	0.18	0.038		
					1.133 cfs		
					0.732 mgd		

SG-1 UPSTREAM CULVERT

Date	Water Height	d/D	R/D	R	V (ft/sec)	Area/D^2	Area (ft^2)	Q (cfs)
5/22/2014	0.100	0.080	0.0513	0.0641	1.0821	0.0294	0.0459	0.049711
6/4/2014	0.100	0.080	0.0513	0.0641	1.0821	0.0294	0.0459	0.049711
6/18/2014	0.100	0.080	0.0513	0.0641	1.0821	0.0294	0.0459	0.049711
7/7/2014	0.100	0.080	0.0513	0.0641	1.0821	0.0294	0.0459	0.049711
7/16/2014	0.100	0.080	0.0513	0.0641	1.0821	0.0294	0.0459	0.049711
7/22/2014	0.075	0.060	0.0389	0.0486	0.8998	0.0192	0.0300	0.026995
8/6/2014	0.025	0.020	0.0132	0.0165	0.4378	0.0037	0.0058	0.002531
8/19/2014	0.010	0.008	0.0066	0.0083	0.2758	0.0013	0.0020	0.00056

 $v = k_n / n R^{2/3} S^{1/2}$ D=1.25v = cross-sectional average velocity (ft/s, m/s)k = 1.4861.486 $k_n = 1.486$ for English units and $k_n = 1.0$ for SI unitsn = 0.022A = cross sectional area of flow (ft², m²)S = 0.01

n = Manning coefficient of roughness

R = hydraulic radius (ft, m)

S = slope of pipe (ft/ft, m/m)

