ALTA ENVIRONMENTAL

1155 Sportfisher Dr., Suite 202, Oceanside, CA 92054

NV5.com O.760-237-2700 F. 562-495-5877

December 3, 2020

Rebekah C. Guill
Senior Flood Control Planner
Watershed Monitoring Section Manager
Riverside County Flood Control and Water Conservation District
1955 Market Street
Riverside, CA 92501

Subject: Wilson Creek Technical Memorandum Interim Final

Dear Ms. Guill,

Alta Environmental, LP, an NV5 Company (Alta|NV5) is pleased to provide the Riverside County Flood Control and Water Conservation District (District) with this technical memorandum presenting the results of the Wilson Creek flow simulation modeling effort, which was conducted to identify storm events that have the potential to create flow at the Wilson Creek Long-term Receiving Water Station (Wilson Creek Station). This technical memorandum also includes a summary of the field efforts conducted during the 2019-2020 wet season, including visual observations and photo-documentation of each of the Visited Not Sampled (VNS) events when no runoff response was observed at the Wilson Creek Station.

The results of the Wilson Creek flow simulation modeling were used to develop a site-specific mobilization criteria to maximize the ability for the District to conduct sampling when wet weather flows occur at the Wilson Creek Station. The District also installed remote cameras to remotely confirm the presence or absence of flow at the Wilson Creek Station. The mobilization criteria presented in this technical memorandum is recommended to effectively target storm events throughout the 2020-2021 wet season that have the potential to create flow in Wilson Creek.

Methodology

Alta|NV5 used historical United States Geological Survey (USGS) data, USGS Streamflow Statistics and Spatial Analysis Tools for Water-Resources Applications (StreamStats), and hydrologic modeling to predict the duration, intensity, and total rainfall required to produce sufficient flow for sampling at the Wilson Creek Station. The Wilson Creek Station details are provided in Table 1.

Table 1. Monitoring Station

Station Type	Station No.	Site Description	Latitude	Longitude
Long-term Receiving Water Station	902WLC650	Wilson Creek	33.48736	-116.91659

Alta|NV5 utilized a United States Army Corps of Engineers Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) 4.2 model for the Wilson Creek Station drainage basin following procedures established by the Riverside County Flood Control and Water Conservation District (District) Hydrology Manual. The model inputs were obtained from USGS StreamStats, United States Department of Agriculture (USDA) Web Soil Survey, and available studies in the Santa Margarita River Watershed Management Area (SMR WMA). The Wilson Creek Station drainage basin delineation, basin characteristics, and estimates of streamflow statistics were obtained from StreamStats, and the Wilson Creek Station was used as the basin outlet. The District's HEC-HMS pre-processor was used to obtain the lag time, effective rainfall and s-graph. The input parameters for preparing the model for the Wilson Creek Station drainage basin included the following:

- Drainage area (square miles)
- Length of longest flow path (feet)
- Length along longest watercourse measured upstream to a point opposite the centroid of the area – Lca (feet)
- Manning's roughness coefficient (n)
- Impervious area (percent, %)
- Land cover area (acres)
- Elevation difference (feet)
- Corps lag time (hours)
- Soil group/Cover type

The USDA Web Soil Survey was used to obtain the soil group for estimating the average adjusted soil loss rate and the USDA Web Soil Survey polygons were used to assess the hydrologic soil groups (HSGs) in the study basin, which is consistent with other studies in the SMR WMA (Table 2). HSG D is the dominant category in the study area accounting for 52 % of the area, followed by HSG A with 29% of the area (Figure 1). The District's HEC-HMS preprocessor was used to estimate the soil loss rate for the primary land use within the Wilson Creek Station drainage basin. The the cover type option selected was Chaparral, Broadleaf and the land use option selected was

natural or agricultural area for all hydrologic soil types (Table 3). The USDA Web Soil Survey data can be found here:

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627

Table 2. Hydrologic Soil Group Distribution

Hydrologic Soil Group	Area (acres)	Percent of Study Area
A (Low runoff potential when thoroughly wet. Soils typically have less than 10% clay and more than 90% sand or gravel and have gravel or sand textures.)	23,958.0	29%
B (Moderately low runoff potential when thoroughly wet. Soils typically have 10% - 20% clay and 50% - 90% sand and have loamy sand or sandy loam textures.)	7,547.8	9%
C (Moderately high runoff potential when thoroughly wet. Soils typically have 20% - 40% clay and less than 50% sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures.)	8,303.5	10%
D (High runoff potential when thoroughly wet. Soils typically have greater than 40% clay, less than 50% sand, and have clayey textures.)	42,622.7	52%

The HEC-HMS model created for the Wilson Creek Station drainage basin was set up with the simple surface method, simple canopy, and user-specified s-graph. A range of storm sizes were compared to determine when precipitation overcomes initial abstraction, based on point precipitation frequency estimates with 90% confidence intervals in inches. Precipitation frequency estimates were obtained from the Temecula National Weather Service (NWS) weather station (Site 217). The precipitation range varied from a 2-year peak flood event with a 24-hour precipitation of 2.89 inches to a 500-year peak flood event with a 24-hour precipitation of 9.38 inches. Precipitation data in the Upper SMR WMA near the Wilson Creek Station drainage basin is sparse, limiting certainty in the model. The effective rainfall for a 5-minute interval and s-graph ordinates were obtained with the District's HEC-HMS Preprocessor and entered into the model. Modeled hydrographs were developed for each model run using two meteorological models for the point precipitation frequency estimates, including the user-specified hyetograph and Soil Conservation Service (SCS) storm Type 1 for the 2-year through the 500-year 24-hour precipitation events. A total of sixteen model runs representing each design storm processed for the 2-year through the 500-year 24-hour precipitation events were created for the two meteorological models. Examples are provided in Figure 2 and Figure 3 (5-year peak flood example), which include the modeled precipitation hydrographs, basin outflow hydrographs, and flow statistics results with the estimated peak discharge.

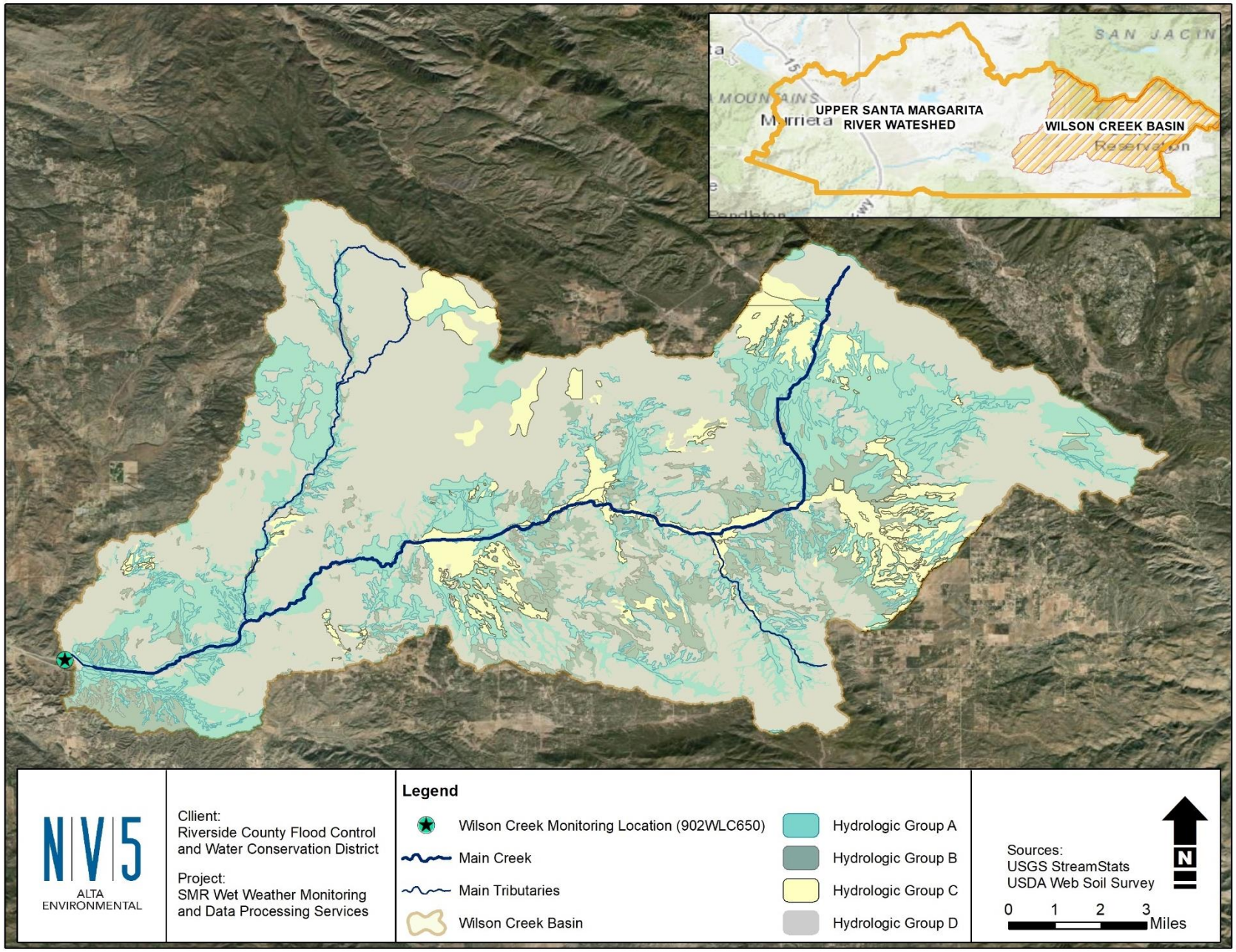


Figure 1. Wilson Creek Station Drainage Basin Hydrologic Soil Groups.

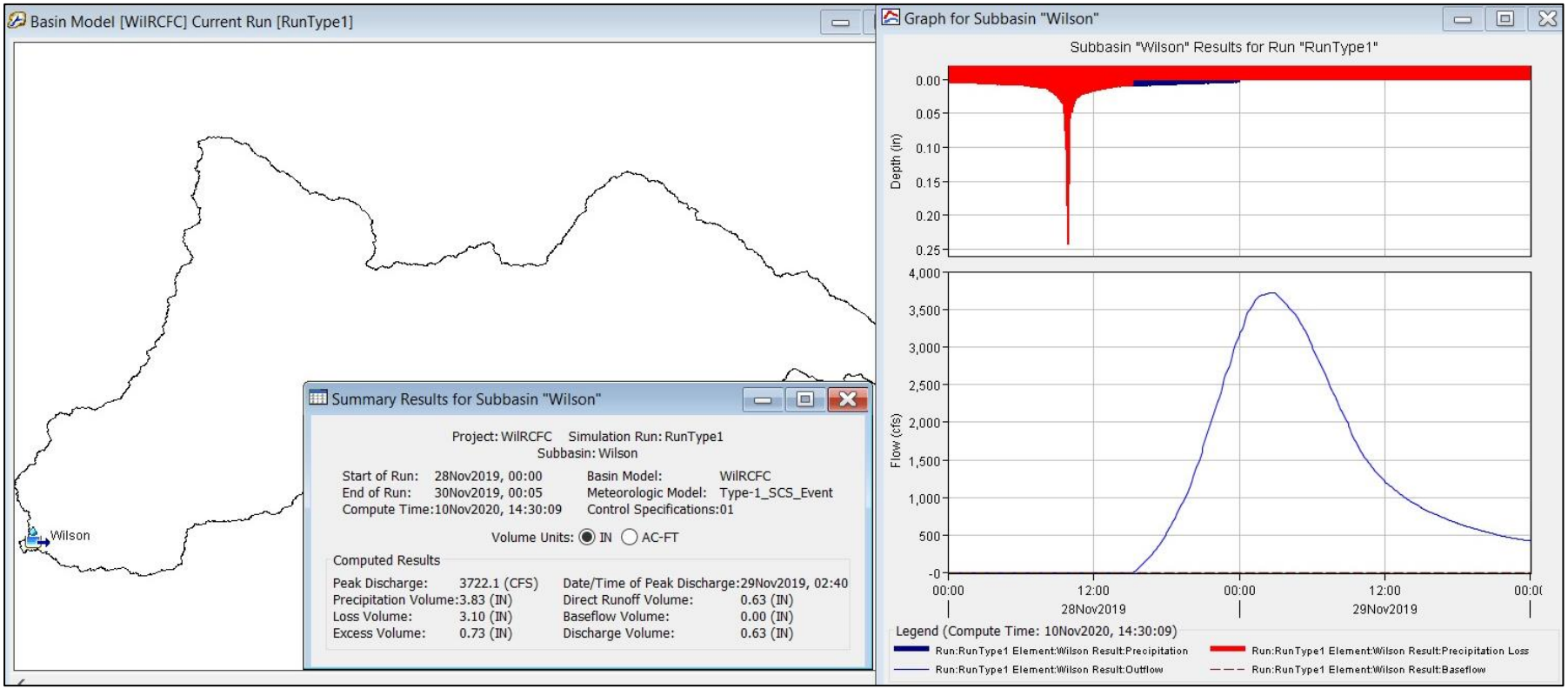


Figure 2. Example HEC-HMS Output of 5-Year Peak Flood (Method for processing precipitation: Type 1-SCS Storm)

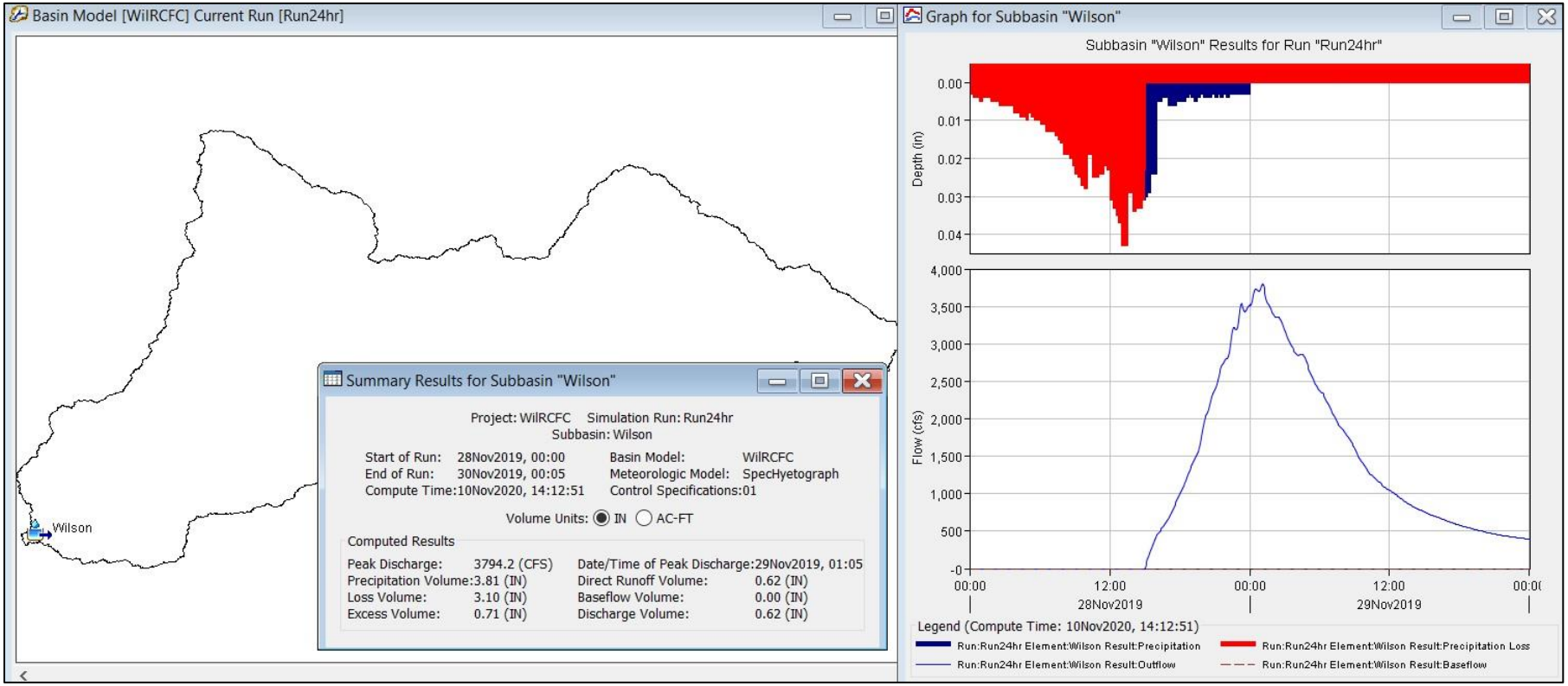


Figure 3. Example HEC-HMS Output of 5-Year Peak Flood (Method for processing precipitation: Specified Hyetograph)

Results

The results of the HEC-HMS model created for the Wilson Creek Station drainage basin were compared to the USGS StreamStats estimated peak flow statistics for the 2-year through the 500-year peak flood values, as summarized in Table 3. The HEC-HMS modeling results indicate that a storm event with a 24-hour precipitation total of 2.89 inches (2-year peak flood) will not create surface flows at the Wilson Creek Station. The differences in flow statistics for the 2-year peak flood between the USGS StreamStats and the HEC-HMS model may be due to the estimated peak flow statistics from USGS StreamStats not accounting for infiltration loss from soil conditions near the Wilson Creek Station. The USGS StreamStats estimated peak flow statistics rely on a regionalization process, which involves use of regression analysis to relate streamflow statistics computed for a cluster of stream gauges within or near a region of study to basin characteristics measured for the stations. The StreamStats report is provided in Attachment 1.

Table 3. Wilson Creek Station Drainage Basin Modeling Results

StreamStats		Point Precipitation (in.)	Rainfall Intensity (in./hr.)	HEC-HMS Model	
Peak Flood	Flow (cfs)	24-hr.	24-hr.	Type 1 - SCS Storm (cfs)	24-hr Specified Hyetograph (cfs)
2 Year Peak Flood	757	2.89	0.120	0	0
5 Year Peak Flood	3,000	3.83	0.159	3,722	3,794
10 Year Peak Flood	5,680	4.6	0.192	6,632	8,051
25 Year Peak Flood	10,300	5.65	0.236	10,714	13,666
50 Year Peak Flood	14,900	6.48	0.270	14,572	17,719
100 Year Peak Flood	20,200	7.32	0.305	19,386	22,034
200 Year Peak Flood	26,700	8.19	0.341	24,512	26,340
500 Year Peak Flood	35,600	9.38	0.391	30,833	31,899

in. = inches
hr. = hour
cfs = cubic feet per second

The HEC-HMS modeling results indicate that a storm event with a 24-hour precipitation total of 3.5 inches will create surface flows at the Wilson Creek Station sufficient to conduct sampling (Table 4). The HEC-HMS modeling results for the Wilson Creek Station drainage basin for storm events with 24-hour precipitation totals between 3.0 and 4.5 inches are summarized in Table 4. These results were used to develop a site-specific mobilization criteria described in the final section of this technical memorandum.

Table 4. Modeled Peak Flow for 24-hr Precipitation Events

24-hr Precipitation (in.)	Modeled Peak Flow (cfs)
3.0	0
3.5	2,281
4.0	4,401
4.5	6,274

in. = inches
hr. = hour
cfs = cubic feet per second

2019-2020 Wet Weather Monitoring Summary

A total of five Visited Not Sampled (VNS) events were conducted at the Wilson Creek Station during the 2019-2020 wet season, from October 1, 2019 through April 30, 2020. Automated sampling and continuous flow monitoring equipment was installed at the Wilson Creek Station prior to- and during each of the five wet weather events. No runoff response was observed or recorded during any of the monitored events of the 2019-2020 wet season. A summary of the VNS events is provided in Table 5 and the field data sheets are provided in Attachment 2.

Table 5. Summary of 2019-2020 Monitoring

Station	Dates	Sampled	Total Rainfall (inches)
Wilson Creek 902WLC650	November 20-21, 2019	VNS	0.85
	November 27-29, 2019	VNS	2.30
	December 4-5, 2019	VNS	1.28
	March 10-11, 2020	VNS	1.47[1]
	April 6-10, 2020	VNS	5.36

1. Total rainfall from March 10-23, 2020 was 4.11 inches, no surface water flows observed by field crews and continuous flow monitoring equipment from March 10-23, 2020.

Photo-Documentation Summary

No surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment during the wet weather event from November 20-21, 2019, resulting in a VNS event. The total precipitation from the Temecula NWS weather station was 0.85 inches.

Figure 4. Wilson Creek Channel on 11/21/2019 (looking upstream)

No surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment during the wet weather event from November 27-

29, 2019, resulting in a VNS event. The total precipitation from the Temecula NWS weather station was 2.30 inches. The 24-hour precipitation on November 29, 2019 was 1.79 inches.

Figure 5. Wilson Creek Channel on 11/29/2019 (looking downstream)

No surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment during the wet weather event from December 4-5, 2019, resulting in a VNS event. The total precipitation from the Temecula NWS weather station was 1.28 inches.

Figure 6. Wilson Creek Sampling Equipment on 12/5/2019

No surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment during the wet weather event from March 10-11, 2020, resulting in a VNS event. The total precipitation from the Temecula NWS weather station

was 1.47 inches. Following the VNS event from March 10-11, 2020, the continuous flow monitoring equipment remained installed through March 23, 2020. No surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment during the series of wet weather events from March 10-23, 2020, despite total precipitation from the Temecula NWS weather station of 4.11 inches. The 24-hour precipitation on March 10, 2020 was 1.21 inches.

Figure 7. Wilson Creek Channel on 3/11/2020 (looking downstream)

No surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment during the wet weather event from April 6-10, 2020, resulting in a VNS event. The total precipitation from the Temecula NWS weather station (Site 217) was 5.36 inches. The 24-hour precipitation on April 10, 2020 was 1.76 inches.

Figure 8. Wilson Creek Channel on 4/10/2020 (looking upstream)

Remote Imagery Monitoring

Alta|NV5 installed two cameras with cellular capabilities to collect remote imagery. The remote imagery will allow the District to confirm the presence or absence of flow at the Wilson Creek monitoring station (902WLC650) and at the road crossing of Wilson Creek at Sage Road, which is approximately 2,500 feet upstream of the existing monitoring station. Throughout the 2020-2021 wet season, from October 1, 2020 through April 30, 2021, Alta|NV5 will maintain the remote cameras and provide access to the imagery on the web. Photographs will be automatically taken at 30-minute or one-hour intervals and uploaded to a web page once per day, where the project team can review the imagery remotely. The remote imagery will maximize the ability to plan field sampling efforts when flow is confirmed in Wilson Creek. Alta|NV5 will update this Technical Memorandum with the visual observations and photo-documentation of each successful sampling events and /or VNS events throughout the 2020-2021 wet season, including the remote imagery used to support mobilization efforts. Examples of the remote camera images are provided in Figure 9 and Figure 10.

Figure 9. Remote Camera Image of Wilson Creek Station

Figure 10. Remote Camera Image of Wilson Creek at Sage Road

Summary and Recommended Mobilization Criteria

The District mobilized for five storm events at the Wilson Creek Station over the course of the 2019-2020 wet season. However, no surface water flows were observed in Wilson Creek by field crews and no flows were recorded with the continuous flow monitoring equipment, resulting in a total of five VNS events. The three largest storm events that resulted in VNS events included the following rainfall totals:

- 2.30 inches were recorded from November 27-29, 2019 with a 24-hour precipitation of 1.79 inches on November 29, 2019
- 4.11 inches were recorded from March 10-23, 2020 with a 24-hour precipitation of 1.21 on March 10, 2020.
- 5.36 inches were recorded from April 6-10, 2020 with a 24-hour precipitation of 1.76 inches on April 10, 2020

Based on the absence of surface flows observed at the Wilson Creek Station during the 2019-2020 wet season, the District conducted the Wilson Creek flow simulation modeling effort to identify storm events that have the potential to create flow at the Wilson Creek Station. The HEC-HMS modeling results indicate that a storm event with a 24-hour precipitation total with 3.5 inches has the potential to create surface flows at the Wilson Creek Station sufficient to conduct sampling. The modeling results confirm the absence of flow observed during the 2019-2020 wet season, including the absence of surface flows observed throughout two storm events with 24-hour precipitation totals greater than 1.7 inches.

To maximize the ability for the District to conduct sampling efforts when surface flow occurs at the Wilson Creek Station, the District developed the following mobilization criteria using results of the Wilson Creek flow simulation modeling. The District also installed remote cameras to allow the District to remotely confirm the presence or absence of flow at the Wilson Creek Station and at a location 2,500 feet upstream. Throughout the 2020-2021 wet season, the District is recommending the use of the following mobilization criteria to target storm events with 24-hour precipitation totals that have the potential to create flow in Wilson Creek (Table 6). To remain conservative, the mobilization criteria commences with an event forecast to meet a 24-hour precipitation total of greater than or equal to 2.0 inches.

Table 6. Storm Mobilization Criteria

24-hour Precipitation Forecast (inches)	Mobilization Activities
< 2.0	Do not mobilize. Monitor rainfall totals and review remote imagery throughout the storm.
≥ 2.0 and < 3.0	Field crews are on standby to sample. Monitor rainfall totals and review remote imagery throughout the storm. Mobilize field crews for sampling if 24-hour rainfall totals > 2.5 inches are observed.
≥ 3.0	Mobilize staff for potential sampling.

Please do not hesitate to contact me should you have any questions or concerns regarding this Wilson Creek Technical Memorandum.

For and on behalf of Alta|NV5.

Garth R. Engelhorn
Water Resources Sr. Consultant/Project Manager

Attachments

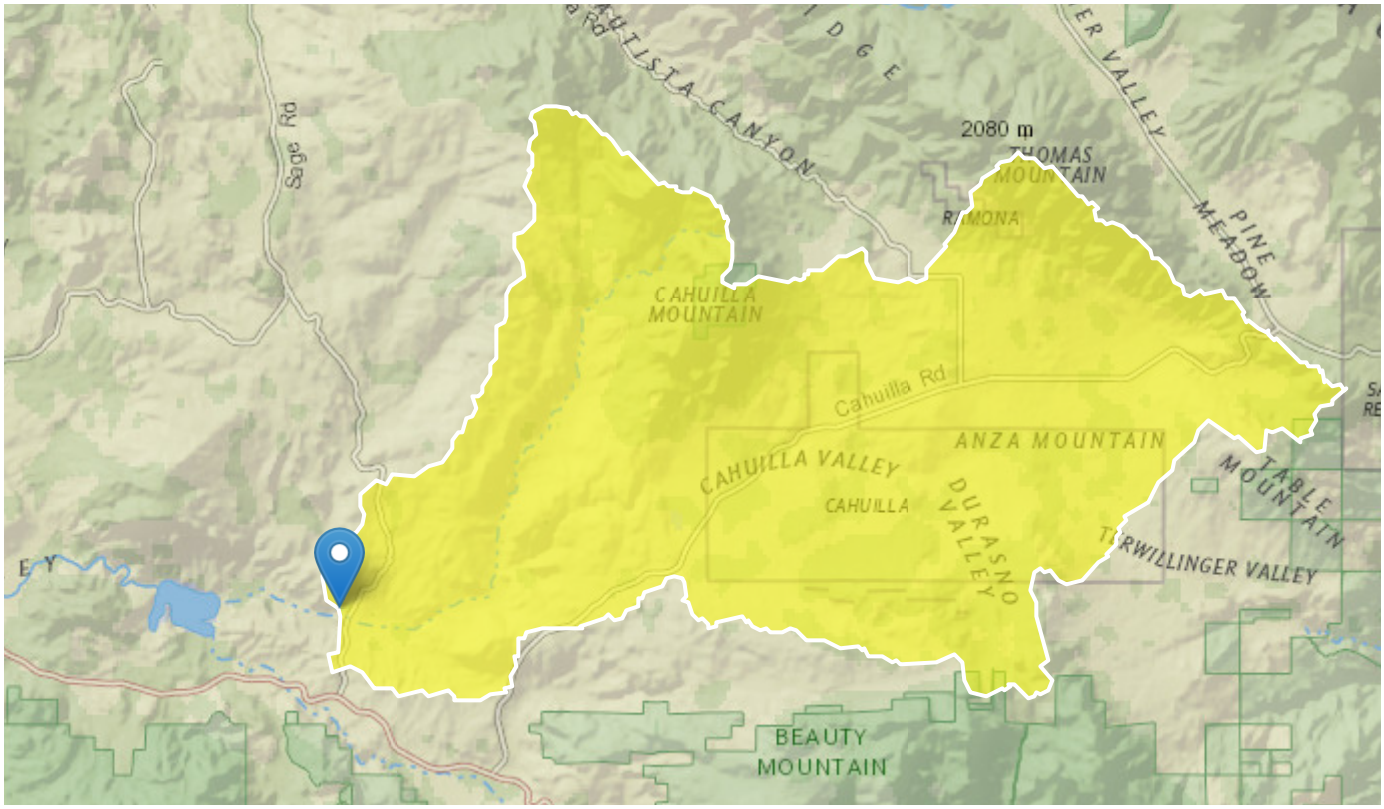
Attachment 1 – StreamStats Report

Attachment 2 – VNS Field Data Sheets

Attachment 1 – StreamStats Report

StreamStats Report

Region ID: CA
Workspace ID: CA20200728015103368000
Clicked Point (Latitude, Longitude): 33.48928, -116.91457
Time: 2020-07-27 18:51:21 -0700



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BASINPERIM	Perimeter of the drainage basin as defined in SIR 2004-5262	89.1	miles
BSLDEM30M	Mean basin slope computed from 30 m DEM	13.7	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	-1899268.5	meters
CENTROIDY	Basin centroid vertical (y) location in state plane units	1371778.5	meters
DRNAREA	Area that drains to a point on a stream	128.8	square miles

Parameter Code	Parameter Description	Value	Unit
EL6000	Percent of area above 6000 ft	0.4	percent
ELEV	Mean Basin Elevation	3735	feet
ELEVMAX	Maximum basin elevation	6818	feet
FOREST	Percentage of area covered by forest	4.63	percent
JANMAXTMP	Mean Maximum January Temperature	57.56	degrees F
JANMINTMP	Mean Minimum January Temperature	33.97	degrees F
LAKEAREA	Percentage of Lakes and Ponds	0.0696	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	4.9	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	0.3	percent
LFPLENGTH	Length of longest flow path	25	miles
MINBELEV	Minimum basin elevation	1619	feet
OUTLETELEV	Elevation of the stream outlet in thousands of feet above NAVD88.	1620	feet
PRECIP	Mean Annual Precipitation	15.9	inches
RELIEF	Maximum - minimum elevation	5199	feet
RELRELF	Basin relief divided by basin perimeter	58.3	feet per mi

Peak-Flow Statistics Parameters[2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	128.8	square miles	0.04	850
PRECIP	Mean Annual Precipitation	15.9	inches	10	45

Peak-Flow Statistics Flow Report[2012 5113 Region 5 South Coast]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp

Statistic	Value	Unit	PIl	PIu	SEp
2 Year Peak Flood	757	ft^3/s	139	4130	134
5 Year Peak Flood	3000	ft^3/s	897	10100	83.1
10 Year Peak Flood	5680	ft^3/s	2130	15200	64
25 Year Peak Flood	10300	ft^3/s	4570	23400	51.5
50 Year Peak Flood	14900	ft^3/s	6990	31800	47.6
100 Year Peak Flood	20200	ft^3/s	9460	43300	47.2
200 Year Peak Flood	26700	ft^3/s	12300	57700	47.7
500 Year Peak Flood	35600	ft^3/s	15700	81000	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

Application Version: 4.3.11

Attachment 2 – VNS Field Data Sheets

RIVERSIDE COUNTY
WATERSHED PROTECTION

FIELD DATA SHEET

STATION ID:	902WLC650	**SAMPLE DATE:**	11/21/2019
STATION NAME:	Wilson Creek		
PROJECT NAME:	SMR RW Wet (2018 WQIP)	**Within:**	Aguanga
CONVEYANCE TYPE:	Natural Channel	**Station Type:**	Receiving Water
Lat: -116.91659	**Long:** -33.4873639	**Outfall Owner:**	
Lead Sampler	Garth Engelhorn		
Support Sampler(s)	Austin Kay		
Sampling Agency:	Cons Alta Environmental		

SAMPLE INFORMATION	**SAMPLED?** NO	**VNS TIME:**	09:30
EVENT CATEGORY:	Wet	**Other Efforts:**	
Event Number:	1		

SAMPLE ID:	**# of Bottles:**	**Date:**	**Time:**
1920-W-650-1121-VNS	0	11/21/2019	09:30

STREAM FLOW

Dry: yes **Ponded:** no
Rising Groundwater: no
Connects to Surface Receiving Water:
Dry weather event u/s influence:

FIELD PARAMETERS Time Measured: 00:00:00

Meter:
Serial Number:
Calibration Date:
Water Temp (°C):
pH:
EC (mS/cm):
Turbidity (NTU):
DO (mg/L):
Salinity (PSS):
Other:

FLOW ESTIMATION:

Circular Pipe?
USGS Gauge?

Width (ft):
Avg Depth (ft):
Velocity (m/s):
Q (cfs) = 0

SITE CONDITIONS

Precipitation:
Is there >72 hrs since prior rainfall event?
Storm Start Time: 11/19/19
Storm End Time: 11/22/19
Total Rainfall Estimate (in): 0.85"
Odor: **Floatables:**
Color: **Settleables:**
Clarity: **Vegetation:**
Trash: **Staining:**
Source:
Sheen Present:

COMPOSITE Samples:

Grab or Automatic:
Type of Composite:
Number of Hours:
Minutes between Samples:
Number of Aliquots:

Time: **Flow (cfs):**

Notes & Observations

AUTHORIZATION

The name(s) listed below have reviewed the above data and certify that it is true and correct to the best of their knowledge.
Garth Engelhorn

Figure 1. Wilson Creek 902WLC650 Sampling Equipment

Figure 2. Wilson Creek 902WLC650 Channel

RIVERSIDE COUNTY
WATERSHED PROTECTION

FIELD DATA SHEET

STATION ID:	902WLC650			**SAMPLE DATE:**	11/29/2019
STATION NAME:	Wilson Creek				
PROJECT NAME:	SMR RW Wet (2018 WQIP)			**Within:**	Aguanga
CONVEYANCE TYPE:	Natural Channel			**Station Type:**	Receiving Water
	Lat: -116.91659	**Long:** -33.4873639		**Outfall Owner:**	
Lead Sampler	Garth Engelhorn				
Support Sampler(s)	Austin Kay				
Sampling Agency:	Cons	Alta Environmental			
SAMPLE INFORMATION		**SAMPLED?**	NO	**VNS TIME:**	12:07
EVENT CATEGORY:	Wet			**Other Efforts:**	
Event Number:	1				

SAMPLE ID:	**# of Bottles:**	**Date:**	**Time:**
1920-W-650-1129-VNS	0	11/29/2019	12:07

STREAM FLOW

Dry:	yes	**Ponded:**	no
Rising Groundwater:	no		
Connects to Surface Receiving Water:			
Dry weather event u/s influence:			

FIELD PARAMETERS Time Measured: 00:00:00

Meter:	
Serial Number:	
Calibration Date:	
Water Temp (°C):	
pH:	
EC (mS/cm):	
Turbidity (NTU):	
DO (mg/L):	
Salinity (PSS):	
Other:	

FLOW ESTIMATION:

Circular Pipe?
USGS Gauge?

Width (ft):
Avg Depth (ft):
Velocity (m/s):
Q (cfs) = 0

SITE CONDITIONS

Precipitation:	
Is there >72 hrs since prior rainfall event?	
Storm Start Time:	11/27/19
Storm End Time:	11/30/19
Total Rainfall Estimate (in):	2.30"
Odor:	**Floatables:**
Color:	**Settleables:**
Clarity:	**Vegetation:**
Trash:	**Staining:**
Source:	
Sheen Present:	

COMPOSITE Samples:

Grab or Automatic:	
Type of Composite:	
Number of Hours:	
Minutes between Samples:	
Number of Aliquots:	

Time: **Flow (cfs):**

Notes & Observations

AUTHORIZATION

The name(s) listed below have reviewed the above data and certify that it is true and correct to the best of their knowledge.

Garth Engelhorn

Figure 1. Wilson Creek 902WLC650 Sampling Equipment (11/27-29/2019)

Figure 2. Wilson Creek 902WLC650 Sampling Equipment (12/4-5/2019)

RIVERSIDE COUNTY
WATERSHED PROTECTION

FIELD DATA SHEET

STATION ID:	902WLC650	**SAMPLE DATE:**	12/05/2019
STATION NAME:	Wilson Creek		
PROJECT NAME:	SMR RW Wet (2018 WQIP)	**Within:**	Aguanga
CONVEYANCE TYPE:	Natural Channel	**Station Type:**	Receiving Water
Lat: -116.91659	**Long:** -33.4873639	**Outfall Owner:**	
Lead Sampler	Garth Engelhorn		
Support Sampler(s)	Austin Kay		
Sampling Agency:	Cons Alta Environmental		

SAMPLE INFORMATION	**SAMPLED?** NO	**VNS TIME:**	09:13
EVENT CATEGORY:	Wet	**Other Efforts:**	
Event Number:	1		

SAMPLE ID:	**# of Bottles:**	**Date:**	**Time:**
1920-W-650-1205-VNS	0	12/05/2019	09:13

STREAM FLOW

Dry:	yes	**Ponded:**	no
Rising Groundwater:	no		
Connects to Surface Receiving Water:			
Dry weather event u/s influence:			

FIELD PARAMETERS Time Measured: 00:00:00

Meter:	
Serial Number:	
Calibration Date:	
Water Temp (°C):	
pH:	
EC (mS/cm):	
Turbidity (NTU):	
DO (mg/L):	
Salinity (PSS):	
Other:	

FLOW ESTIMATION:

Circular Pipe?	
USGS Gauge?	
Width (ft):	
Avg Depth (ft):	
Velocity (m/s):	

Q (cfs) = 0

SITE CONDITIONS

Precipitation:	
Is there >72 hrs since prior rainfall event?	
Storm Start Time:	12/4/19
Storm End Time:	12/6/19
Total Rainfall Estimate (in):	1.28
Odor:	**Floatables:**
Color:	**Settleables:**
Clarity:	**Vegetation:**
Trash:	**Staining:**
Source:	
Sheen Present:	

COMPOSITE Samples:

Grab or Automatic:	
Type of Composite:	
Number of Hours:	
Minutes between Samples:	
Number of Aliquots:	

Time: **Flow (cfs):**

Notes & Observations

AUTHORIZATION

The name(s) listed below have reviewed the above data and certify that it is true and correct to the best of their knowledge.

Garth Engelhorn

Figure 1. Wilson Creek 902WLC650 Sampling Equipment (11/27-29/2019)

Figure 2. Wilson Creek 902WLC650 Sampling Equipment (12/4-5/2019)

RIVERSIDE COUNTY
WATERSHED PROTECTION

FIELD DATA SHEET

STATION ID:	902WLC650	**SAMPLE DATE:**	03/10/2020
STATION NAME:	Wilson Creek		
PROJECT NAME:	SMR RW Wet (2018 WQIP)	**Within:**	Aguanga
CONVEYANCE TYPE:	Natural Channel	**Station Type:**	Receiving Water
Lat: -116.91659	**Long:** -33.4873639	**Outfall Owner:**	
Lead Sampler	Garth Engelhorn		
Support Sampler(s)			
Sampling Agency:	Cons Alta Environmental		

SAMPLE INFORMATION		**SAMPLED?**	NO	**VNS TIME:**	15:02
EVENT CATEGORY:	Wet			**Other Efforts:**	
Event Number:	1				

SAMPLE ID:	**# of Bottles:**	**Date:**	**Time:**
1920-W-650-0310-VNS	0	03/10/2020	15:02

STREAM FLOW

Dry:	yes	**Ponded:**	no
Rising Groundwater:	no		
Connects to Surface Receiving Water:			
Dry weather event u/s influence:			

FIELD PARAMETERS Time Measured: 00:00:00

Meter:	
Serial Number:	
Calibration Date:	
Water Temp (°C):	
pH:	
EC (mS/cm):	
Turbidity (NTU):	
DO (mg/L):	
Salinity (PSS):	
Other:	

FLOW ESTIMATION:

Circular Pipe?	
USGS Gauge?	
Width (ft):	
Avg Depth (ft):	
Velocity (m/s):	

Q (cfs) = 0

SITE CONDITIONS

Precipitation:	
Is there >72 hrs since prior rainfall event?	
Storm Start Time:	03/10/2020
Storm End Time:	03/11/2020
Total Rainfall Estimate (in):	1.47
Odor:	**Floatables:**
Color:	**Settleables:**
Clarity:	**Vegetation:**
Trash:	**Staining:**
Source:	
Sheen Present:	

COMPOSITE Samples:

Grab or Automatic:	
Type of Composite:	
Number of Hours:	
Minutes between Samples:	
Number of Aliquots:	

Time:	**Flow (cfs):**

Notes & Observations

Following this VNS event flow monitoring equipment was left onsite and logging through 3/23/20. Despite a total of 4.05 inches recorded between 3/10-3/23, no runoff response was observed.

AUTHORIZATION

The name(s) listed below have reviewed the above data and certify that it is true and correct to the best of their knowledge.

Garth Engelhorn

RIVERSIDE COUNTY
WATERSHED PROTECTION

FIELD DATA SHEET

STATION ID:	902WLC650	**SAMPLE DATE:**	04/08/2020
STATION NAME:	Wilson Creek		
PROJECT NAME:	SMR RW Wet (2018 WQIP)	**Within:**	Aguanga
CONVEYANCE TYPE:	Natural Channel	**Station Type:**	Receiving Water
Lat:	-116.91659 **Long:** -33.4873639	**Outfall Owner:**	
Lead Sampler	Austin Kay		
Support Sampler(s)			
Sampling Agency:	Cons Alta Environmental		

SAMPLE INFORMATION		**SAMPLED?**	NO	**VNS TIME:**	11:23
EVENT CATEGORY:	Wet			**Other Efforts:**	
Event Number:	1				

SAMPLE ID:	**# of Bottles:**	**Date:**	**Time:**
1920-W-650-0408-VNS	0	04/08/2020	11:23

STREAM FLOW

Dry:	yes	**Ponded:**	no
Rising Groundwater:	no		
Connects to Surface Receiving Water:			
Dry weather event u/s influence:			

FIELD PARAMETERS Time Measured: 00:00:00

Meter:	
Serial Number:	
Calibration Date:	
Water Temp (°C):	
pH:	
EC (mS/cm):	
Turbidity (NTU):	
DO (mg/L):	
Salinity (PSS):	
Other:	

FLOW ESTIMATION:

Circular Pipe?	
USGS Gauge?	
Width (ft):	
Avg Depth (ft):	
Velocity (m/s):	
Q (cfs) =	0

SITE CONDITIONS

Precipitation:			
Is there >72 hrs since prior rainfall event?			
Storm Start Time:	4/6/2020		
Storm End Time:	4/9/2020		
Total Rainfall Estimate (in):	2.54		
Odor:		**Floatables:**	
Color:		**Settleables:**	
Clarity:		**Vegetation:**	
Trash:		**Staining:**	
Source:			
Sheen Present:			

COMPOSITE Samples:

Grab or Automatic:	
Type of Composite:	
Number of Hours:	
Minutes between Samples:	
Number of Aliquots:	

Time: **Flow (cfs):**

Notes & Observations

AUTHORIZATION

The name(s) listed below have reviewed the above data and certify that it is true and correct to the best of their knowledge.

Austin Kay