Tier 2 Arlington Area Bacteria and Flow Source Investigation

Technical Memorandum

Prepared for:

SAWPA MSAR TMDL Task Force

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ACRONYMS AND ABBREVIATIONS

303(d) list	Clean Water Act Section 303(d) list of water quality impaired segments
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
CBRP	Riverside County Comprehensive Bacteria Reduction Plan
CCTV	closed-circuit television
CWA	Clean Water Act
DNQ	quantification limit
E. coli	*Escherichia coli*
EPA	United States Environmental Protection Agency
GIS	geographic information system
gpm	gallons per minute
HF183	human marker
mg/L	milligrams per liter
mL	milliliters
MPN/100mL	most probable number per 100 milliliters
MS4	municipal separate storm sewer system
MSAR	Middle Santa Ana River
MST	microbial source tracking
SARWQCB	Santa Ana Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SCCWRP	Southern California Coastal Water Research Project
TMDL	Total Maximum Daily Load
TSS	total suspended solids

1.0   Purpose

Santa Ana River Reach 3 is on the Clean Water Act (CWA) 303(d) list of water quality impaired segments (303(d) list) because of elevated indicator bacteria concentrations (Santa Ana Regional Water Quality Control Board [SARWQCB], 2005a) and has also been subject to the Middle Santa Ana River (MSAR) Bacteria Indicator Total Maximum Daily Load (TMDL), Resolution R8-2005-0001, since its approval by the United States Environmental Protection Agency (EPA) in 2006 (SARWQCB, 2005b). To comply with the requirements of the MSAR Bacteria Indicator TMDL, an MSAR Watershed TMDL Task Force (Task Force; Santa Ana Watershed Project Authority [SAWPA], 2013) was formed by urban and agricultural dischargers to implement routine TMDL compliance monitoring and upstream source investigations in the MSAR (SAWPA, 2016).

Upstream source investigations are triggered based on routine monitoring data and follow a tiered approach. Tier 1 source investigations and preliminary follow up work performed by the City of Riverside (2016) identified the Arlington Area as a potential contributor to downstream bacteria exceedances. The City of Riverside's preliminary work also found elevated *Escherichia coli* (*E.coli*) and evidence of dry weather flows from nearby agricultural land uses. The differentiation between flow and bacteria sources by land use is important with respect to the regulations in the TMDL and source control or implementation actions. For these reasons, the MSAR Watershed TMDL Task Force selected the Arlington Area[1] for a Tier 2 Bacteria Source Investigation. This investigation supports the MSAR and Riverside County Comprehensive Bacteria Reduction Plan (CBRP) Framework, which is designed to address controllable urban sources of bacteria by Municipal Separate Storm Sewer System (MS4) Permittees only (SAWPA, 2013). Step 1 of the CBRP Framework is to identify, prioritize, and evaluate MS4 dry weather flow sources and then consider appropriate best management practices (BMPs) in Steps 2 and 3 (SAWPA, 2013).

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) completed a preliminary bacteria and flow source investigation in the Arlington Area on behalf of the Task Force. The investigation sought to answer the following study questions:

- What is the status of dry weather flow leaving the Monroe Retention Basin?

- What are the predominant sources of dry weather flow in the Arlington Area?

- What are the magnitude and sources of *E. coli* in observed dry weather flow?

- Are the observed *E. coli* from human sources?

This technical memorandum summarizes the Tier 2 investigations of bacterial contamination and dry weather flow in the Arlington Area, and includes a brief review of the study approach, summary of monitoring data, key findings, and next steps.

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[1] The Arlington Area is located in the City of Riverside. Land uses are predominantly agricultural and urban.

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2.0   Study Approach

This study was designed to provide a snapshot of late dry season conditions in the Arlington Area, and to provide a preliminary assessment of the spatial and temporal extent of bacteria and flow sources. Study goals include distinguishing contributions from agricultural and mixed land uses and identifying persistent and intermittent[2] sources of bacteria and flow and prioritizing areas for potential BMPs or additional source investigation as-needed. With regard to bacteria source identification, human sources are considered highest priority, because animal sources are generally of lower risk to human health (Soller et al., 2010). Table 1 summarizes the study approach for the Tier 2 source investigation.

Table 1. Study Approach

Study Question	Data Analysis
What are the predominant sources of dry weather flow in the Arlington Area?	• Estimate flow at each site monitored. • Estimate the relative contributions from different land uses by comparing flow from the predominantly agriculture land use sites with the flow from the three main points of discharge that include both the agricultural and urban land uses. • Perform a field survey to track sources of observed flows.
What are the magnitude and sources of *E. coli* in the observed dry weather flow?	• Characterize the spatial extent of bacteria throughout the Arlington Area. • Use water quality data, visual observations, and flow data in the context of the bacteria source inventory to develop a profile of the three distinct subdrainage areas within the Arlington Area.
What is the status of dry weather flow leaving the Monroe Retention Basin?	• Estimate dry weather flows discharging to the basin using continuous flow data from the three sites in the Monroe Retention Basin. • Confirm the status of flows leaving the Monroe Retention Basin and the status of flows reaching the Santa Ana River (at T1-ANZA).
Are *E. coli* from human sources?	• Use HF183 data to identify known versus suspected presence of human sources. • Assess HF183 data in the context of documented bacteria sources.
Any recommendations?	• Expand the source inventory to support prioritization of sources. • Prioritize the three subdrainage areas (and locations within each) for further investigation, and provide recommendations for next phase of field investigations. Recommendations may include testing archived samples for additional MST markers.

Notes:
HF183 = human marker; MST = microbial source tracking

Based on the MS4, the Arlington Area was subdivided into three distinct subdrainage areas, (eastern [ARL-1], central [ARL-2], and western [ARL-3]). Each of these three subdrainage areas represents mixed land uses from both residential/commercial and agricultural land uses. Monitoring locations were established at a major storm drain outfall at the base of these three subdrainage areas at the point of discharge to the Monroe Retention Basin. Additionally, based on geographic information system (GIS) analysis and field reconnaissance, monitoring locations were selected to isolate inputs from predominantly agricultural land use within each subdrainage area. Lastly, one monitoring location was selected within the Gage Canal to characterize irrigation

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[2] Persistent sources are present in all three monitored events, whereas intermittent sources are recorded one or two events of the three.

source water prior to its application to agricultural land uses and to support evaluation of water quality into context of the source water.

Continuous dry weather flow monitoring was a critical component of the study design. Continuous flow was collected for a four-week period to generate a profile at the base of each the three subdrainage areas within the late dry season. The flow data are a key factor in determining which drainage area is contributing the most dry weather flow to Monroe Retention Basin and may be a higher priority for follow-up investigations. These data can be used to identify patterns of dry weather flow, including peaks when inspections or investigations should be targeted.

Three monitoring events were used to distinguish persistent from intermittent flows and levels of bacteria. When flow was present at an identified monitoring location, visual conditions and field measurements were recorded and a sample was collected and analyzed for analytical parameters, including total suspended solids (TSS), *E.coli* and a human microbial source tracking (MST) marker.

Figure 1 presents a schematic of the study area and the three distinct subdrainage areas within the Arlington Area.
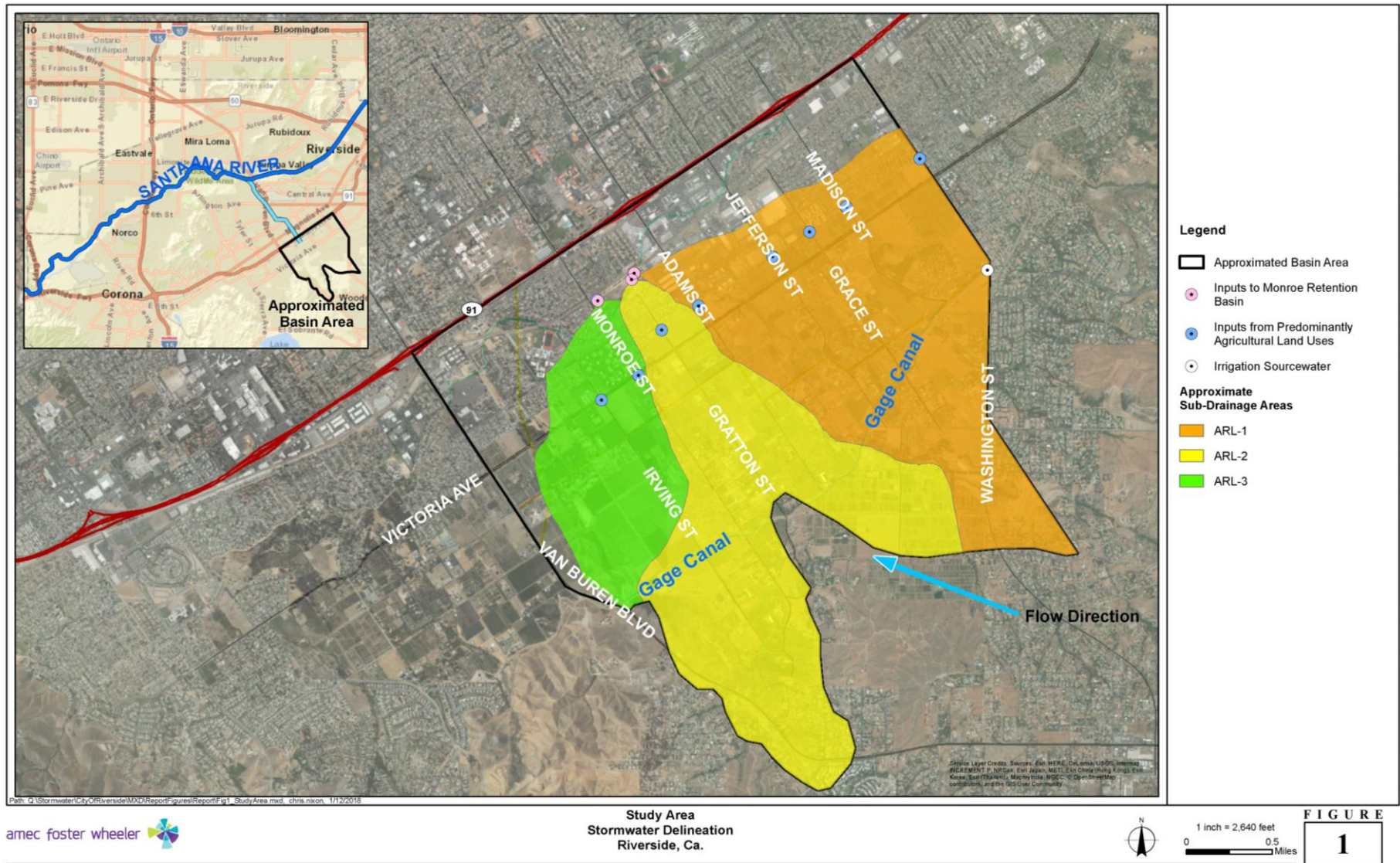
Figure 1. Study Area

Note: Drainage areas are approximate.

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3.0   Monitoring Results

This section summarizes monitoring activities and data generated during the Tier 2 investigation. Bacteria and flow source inventories per subdrainage area are provided in Attachment A. Field data forms and representative photographs are provided in Attachment B. Analytical laboratory reports are provided in Attachment C. Flow estimates and hydrographs are provided in Attachment D. The Study Plan is provided in Attachment E.

The Tier 2 investigation was conducted primarily in September 2017. Field visual surveys were also conducted on August 18, 2017, and October 2, 2017, to identify potential sources of bacteria within each drainage area and to identify areas where flows and sources were absent. These observations were compiled on maps of the individual watersheds and are provided in Attachment A. Three dry weather monitoring events were conducted on September 11, 13, and 18, 2017 in accordance with the Study Plan (SAWPA, 2017) requirements (antecedent dry period of 7 days with no measureable rainfall). Visual observations were completed during each event to record bacteria (e.g., presence of domestic animals, vegetation/debris) and flow (e.g. residential over-irrigation, grove irrigation) sources. In addition to general visual survey for flow and bacteria sources, flows observed at monitoring locations were followed within the public right-of-way to their origins via street-level tracking. A summary of monitored events is provided in Table 2.

Table 2. Monitored Events

Drainage Area	Site Type	Site Names	Monitored Events 9/11/17 (n)	Monitored Events 9/13/17 (n)	Monitored Events 9/18/17 (n)
NA	Control Site	Gage Irrigation Canal (GIC)	Flowing (1)	Flowing (1)	Flowing (1)
Eastern	Agricultural (Ag) Land Use	Adams Street (ADA)	Dry	Dry	Dry
Eastern	Agricultural (Ag) Land Use	Jefferson Street (JEF)	Dry	Dry	Dry
Eastern	Agricultural (Ag) Land Use	Grace Street (GRC)	Flowing (1)	Dry	Dry
Eastern	Agricultural (Ag) Land Use	Madison Street (MAD)	Dry	Dry	Dry
Eastern	Agricultural (Ag) Land Use	Washington Street (WAS)	Ponded (1)	Dry	Dry
Eastern	Mixed (Ag and Urban) Land Use	ARL-1	Flowing (1)	Flowing (1)	Flowing (1)
Central	Ag Land Use	Gratton Street (GRA)	Flowing (1)	Flowing (1)	Flowing (1)
Central	Mixed Land Use	ARL-2	Flowing (1)	Flowing (1)	Flowing (1)
Western	Ag Land Use	Irving Street (IRV)	Flowing (1)	Dry	Dry
Western	Ag Land Use	Monroe Street (MON)	Flowing (1)	Dry	Dry
Western	Mixed Land Use	ARL-3	Flowing (1)	Flowing (1)	Flowing (1)
Arlington Area	Monroe Basin Outlet	OUT	Flowing SNR	Flowing SNR	Flowing SNR
Anza	Discharge point of Anza Channel	ANZA	Flowing SNR	Flowing SNR	Flowing SNR

Notes:
n= number of samples collected when water was present; NA = not applicable; SNR = sample not required.

A total of 21 water quality samples were collected during the three dry weather monitoring events. Three samples were collected from the Gage Irrigation Canal to assess water quality of grove irrigation water prior to application. Nine samples were collected from the eight agricultural land use sites. Nine samples were collected from the three mixed land use sites. All samples were submitted to Babcock Laboratories[3] within holding times for analysis of TSS, *E. coli*, and HF183[4] (human marker). Key flow and bacteria results by subdrainage area are provided in Sections 3.1 through 3.3 and in Figure 2.

3.1   Western Subdrainage Area (ARL-1)

ARL-1 had continuous flow during the study period. ARL-1 had the lowest flow rates (mean flow 14.1 gallons per minute [gpm]) of the three inputs to Monroe Retention Basin. Of the five agricultural land use sites identified within this subdrainage area, only two sites flowed[5] during one monitored event during the study period. Field crews were not able to confirm the flows were from agricultural parcels or uses. For one of the observed instances of flow at an agricultural site, the flow source was suspected to be recent residential irrigation. Based on the study period, the agricultural sites were deemed not to be the main source of dry weather flows to ARL-1. Visual surveys did not record evidence of surface flows within the urban land use during the sampling period. Further investigation within the subsurface MS4 system is needed to determine other potential sources of the dry weather flows. Agricultural flows captured by this investigation may be under-representing typical contributions during the dry season. This drainage area in particular may benefit from more targeted sampling based on the grove irrigation schedule and monitoring over the entire dry season.

Four of five samples in the ARL-1 subdrainage had *E. coli* concentrations above the SSM: one of two samples from agricultural sites, and three of three samples from mixed land use sites. *E. coli* concentrations ranged from 210-1600 MPN/100mL and were the lowest of the three subdrainage areas. No quantifiable HF183 marker was detected in samples from agricultural sites. One of three samples at the mixed land use monitoring location had quantifiable HF183 marker (133 copies/100mL). Field crews observed domestic animals, trash, organics[6], and birds at monitoring locations in this subdrainage area. Table 3 provides key sampling results for the ARL-1 subdrainage. Figure 2 provides water quality and flow condition data for the ARL-1 subdrainage.

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[3] For analysis of HF183, Babcock Laboratories processed and archived samples on dry ice within holding times per the Study Plan, and then shipped samples to Source Molecular for additional DNA analysis (HF183).

[4] HF183 is a human-associated microbial source tracking (MST) marker.

[5] One sample was collected from ponded water (recent flow).

[6] Organics include vegetative debris, algae or similar materials.

Table 3. Profile of Flow and Bacteria in the Eastern Subdrainage Area (ARL-1)

Flow	Bacteria	Data Gaps
• Persistent flow at Monroe Retention Basin • 2 of 5 Ag sites had contributing to MS4 during 1 of 3 events • 3 of 5 Ag sites had no flow	• 4 of 5 samples exceed *E. coli* SSM. • When Ag sites flow, they contribute *E. coli* to the MS4 • One sample from mixed land use had quantifiable HF183 • Observed organics, domestic animals, birds, and trash	• Source of dry weather flows in urban land use • Agricultural flow contributions during scheduled grove irrigation

ARL-1

Ponded Residential Irrigation
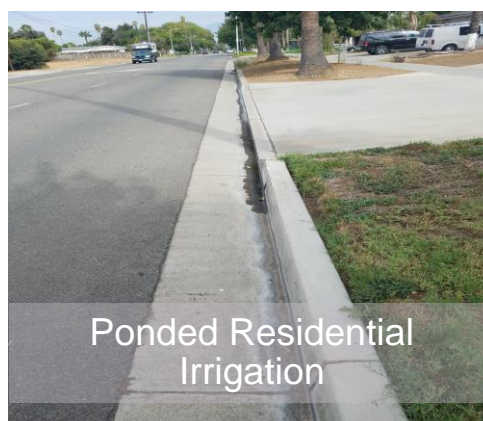
3.2   Central Drainage Area (ARL-2)

ARL-2 had continuous flow during the study period. Flows were generally highest (mean flow 100.3 gpm) of the three inputs to Monroe Retention Basin. One agricultural land use site was identified at Gratton Street within this subdrainage area, which flowed during three of three monitoring events at a rate ranging from 32.8 to 41 gpm. Field crews confirmed the flows were from grove irrigation for two of three monitored events; for the third event, grove irrigation was suspected but not able to be confirmed. These findings were consistent with the City of Riverside's previous field reconnaissance. The agricultural site is a dominant source of dry weather flows to ARL-2. Visual surveys were recorded evidence of surface flows within the MS4 area during the sampling period.   Further investigation within the subsurface MS4 system are needed to determine other potential sources of the dry weather flows.

Five of six samples in the ARL-2 subdrainage had *E. coli* concentrations above the SSM: two of three samples from agricultural sites, and three of three samples from mixed land use sites. No quantifiable HF183 marker was detected in samples from agricultural sites. One of three samples at the T2-ARL-2 monitoring location had a quantifiable HF183 marker (226 copies/100mL). Field crews observed domestic animals, trash, and birds at monitoring locations in this subdrainage area. Table 4 provides key sampling results for the ARL-2 subdrainage. Figure 2 provides water quality and flow condition data for the ARL-2 subdrainage.

Table 4. Profile of Flow and Bacteria in the Central Subdrainage Area (ARL-2)

Flow	Bacteria	Data Gaps
• Persistent flow at Monroe Retention Basin • Persistent flow at Ag site • Ag site is considered a dominant source of flow	• 5 of 6 samples exceed *E. coli* SSM. • When Ag sites flow, they contribute *E. coli* to the MS4. • One sample from mixed land use had quantifiable HF183 • Observed domestic animals, birds, and trash	• Sources of dry weather flows in urban land use

ARL-GRT

Grove Irrigation

3.3   Western Drainage Area (ARL-3)

ARL-3 had continuous flow during the study period. Flows were higher than ARL-1 but lower than ARL-3 (mean flow 31.4 gpm). Two agricultural land use sites at Irving and Monroe Streets within this subdrainage area had intermittent flows (each flowed during two of three events) during the study period. The agricultural sites are a dominant source of dry weather flows to ARL-3: for example, the second monitored event on 9/13/17 had the highest flow rates at the input to Monroe Retention Basin when both upstream agricultural sites were flowing. Visual surveys did not record evidence of surface flows within the urban land uses during the sampling period.   Further investigation within the subsurface MS4 system are needed to determine other potential sources of the dry weather flows.

Six of seven samples in the ARL-3 subdrainage had *E. coli* concentrations above the SSM: three of four samples from agricultural sites, and three of three samples from mixed land use sites. Of all three subdrainage areas, *E. coli* concentrations were highest (75->24,000 MPN/100mL) in ARL-3. However, ARL-3 was the only subdrainage area with no quantifiable HF183 in any in samples from either agricultural sites or mixed land use sites. Field crews observed domestic animals, trash, organics, chickens, and birds at monitoring locations in this subdrainage area. Table 5 provides key sampling results for the ARL-3 subdrainage. Figure 2 provides water quality and flow condition data for the ARL-3 subdrainage.

Table 5. Profile of Flow and Bacteria in the Western Subdrainage Area (ARL-3)

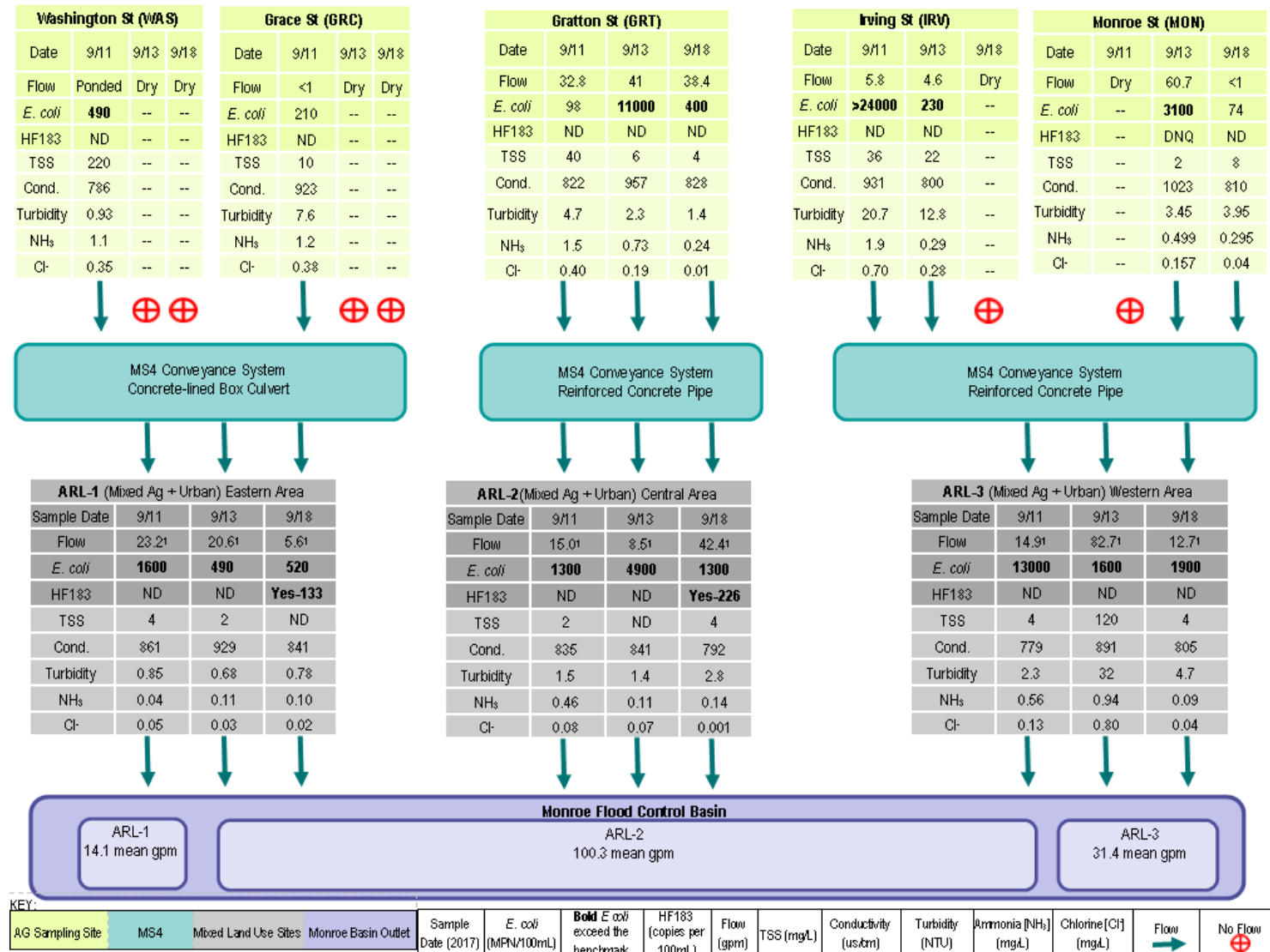| Flow	Bacteria	Data Gaps
• Persistent flow at ARL-3 • Intermittent flow (2 of 3 events) at both Ag sites, confirmed as grove irrigation • Ag sites considered a dominant source of flow	• 6 of 7 samples exceed *E. coli* SSM. • When Ag sites flow, they contribute *E. coli* to the MS4 • No quantifiable HF183 in drainage area despite highest levels of *E. coli* of all subdrainages • Observed organics, domestic animals, birds, chickens, and trash	• Source of dry weather flows in urban land use

ARL-3

Monroe Street
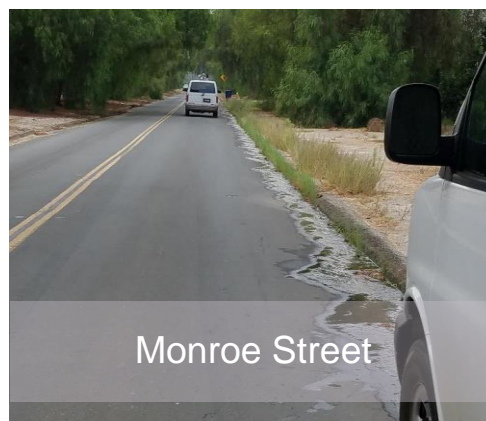
Figure 2 presents the water quality and flow conditions for each site that had observed flow during the study period and depicts the relationship between the agricultural and mixed land use sites per subdrainage area.

Washington St (WAS)

Date	9/11	9/13	9/18
Flow	Ponded	Dry	Dry
E. coli	490	--	--
HF183	ND	--	--
TSS	220	--	--
Cond.	786	--	--
Turbidity	0.93	--	--
NH3	1.1	--	--
Cl-	0.35	--	--

Grace St (GRC)

Date	9/11	9/13	9/18
Flow	<1	Dry	Dry
E. coli	210	--	--
HF183	ND	--	--
TSS	10	--	--
Cond.	923	--	--
Turbidity	7.6	--	--
NH3	1.2	--	--
Cl-	0.38	--	--

Gratton St (GRT)

Date	9/11	9/13	9/18
Flow	32.8	41	38.4
E. coli	98	11000	400
HF183	ND	ND	ND
TSS	40	6	4
Cond.	822	957	828
Turbidity	4.7	2.3	1.4
NH3	1.5	0.73	0.24
Cl-	0.40	0.19	0.01

Irving St (IRV)

Date	9/11	9/13	9/18
Flow	5.8	4.6	Dry
E. coli	>24000	230	--
HF183	ND	ND	--
TSS	36	22	--
Cond.	931	800	--
Turbidity	20.7	12.8	--
NH3	1.9	0.29	--
Cl-	0.70	0.28	--

Monroe St (MON)

Date	9/11	9/13	9/18
Flow	Dry	60.7	<1
E. coli	--	3100	74
HF183	--	DNQ	ND
TSS	--	2	8
Cond.	--	1023	810
Turbidity	--	3.45	3.95
NH3	--	0.499	0.295
Cl-	--	0.157	0.04

MS4 Conveyance System — Concrete-lined Box Culvert

MS4 Conveyance System — Reinforced Concrete Pipe

MS4 Conveyance System — Reinforced Concrete Pipe

ARL-1 (Mixed Ag + Urban) Eastern Area

Sample Date	9/11	9/13	9/18
Flow	23.21	20.61	5.61
E. coli	1600	490	520
HF183	ND	ND	Yes-133
TSS	4	2	ND
Cond.	861	929	841
Turbidity	0.85	0.68	0.78
NH3	0.04	0.11	0.10
Cl-	0.05	0.03	0.02

ARL-2 (Mixed Ag + Urban) Central Area

Sample Date	9/11	9/13	9/18
Flow	15.01	8.51	42.41
E. coli	1300	4900	1300
HF183	ND	ND	Yes-226
TSS	2	ND	4
Cond.	835	841	792
Turbidity	1.5	1.4	2.8
NH3	0.46	0.11	0.14
Cl-	0.08	0.07	0.001

ARL-3 (Mixed Ag + Urban) Western Area

Sample Date	9/11	9/13	9/18
Flow	14.91	82.71	12.71
E. coli	13000	1600	1900
HF183	ND	ND	ND
TSS	4	120	4
Cond.	779	891	805
Turbidity	2.3	32	4.7
NH3	0.56	0.94	0.09
Cl-	0.13	0.80	0.04

Monroe Flood Control Basin

ARL-1 — 14.1 mean gpm
ARL-2 — 100.3 mean gpm
ARL-3 — 31.4 mean gpm

KEY:
AG Sampling Site | MS4 | Mixed Land Use Sites | Monroe Basin Outlet

| Sample Date (2017) | E. coli (MPN/100mL) | Bold E. coli exceed the benchmark | HF183 (copies per 100mL) | Flow (gpm) | TSS (mg/L) | Conductivity (us/cm) | Turbidity (NTU) | Ammonia [NH3] (mg/L) | Chlorine [Cl] (mg/L) | Flow → | No Flow ⊕ |

Notes: DNQ = detected but not quantifiable (detected below the reporting limit); ND = not detected
1. Instantaneous flow rate associated with time of upstream instantaneous flow estimate. See Table D-1 for more information.

Figure 2. Summary of Results and Flow by Site

3.4   Analysis and Discussion

As described in Table 2 and Sections 3.1 through 3.4, the three inputs to Monroe Retention Basin had continuous flow for the duration of the study period. Flow rates at ARL-2 were generally highest (mean flow 100.3 gpm), followed by ARL-3 (mean flow 31.4 gpm). Flow rates at ARL-1 (mean flow 14.1 gpm) were much lower than flow rates at ARL-2 and ARL-3. Sampling events at the three inputs to Monroe Retention Basin captured a representative range of flow conditions. At ARL2, where flows were generally highest, flows at time of sample collection ranged from 4.3 to 176.5 gpm. Flows at time of sample collection for ARL-1 and ARL-3 were 7.4 to 24.4 gpm and 2.3 to 226.3 gpm, respectively. Attachment D provides the estimated flows associated with each sample collected.

Of the nine samples collected at mixed land use sites (inputs to Monroe Retention Basin, downstream of both urban and agricultural land uses), seven samples were affected by active flows from upstream agricultural sites at the time of sample collection. Two of these seven samples were also affected by active or recent residential over-irrigation at the time of sample collection. Active upstream sources of flow could not be identified for two samples.

Instantaneous flows were estimated at upstream agricultural sites; if a site had flow during all three events, the flow was considered persistent. If a site had flow during two or fewer events, then the flow was considered intermittent. Of the eight agricultural land use sites visited, one site had persistent flow, four sites had intermittent flows, and three sites had no flow during the monitored events. To evaluate relative contributions of flow from agricultural land uses, the downstream instantaneous flow rate associated with the time of the flow estimate at the upstream location was extracted from the continuous flow data record. Additional detail is provided in Attachment D. A summary of flow rates by site is provided in Table 6.

Table 6. Summary of Flow Data

| Inputs to Monroe Retention Basin	Flow Rates at Time of Upstream Sample Collection[1] (gpm)			Upstream Agricultural Sites	Flow Rates at Time of Sample Collection[1] (gpm)		
	9/11/17	9/13/17	9/18/17		9/11/17	9/13/17	9/18/17
T2-ARL-1	23.2	20.6	5.6	ARL-1-ADA	Dry		
				ARL-1-JEF	Dry		
				ARL-1-GRC	<1[2]	Dry	Dry
				ARL-1-MAD	Dry		
				ARL-1-WAS	0[3]	Dry	Dry
T2-ARL-2	15.0	8.5[4]	42.4	ARL-2-GRT	32.8	41.0	38.4
T2-ARL-3	14.9	82.7	12.7	ARL-3-IRV	5.8	4.6	Dry
				ARL-3-MON	Dry	60.7	<1[2]

Notes:
1. Time of sample and flow estimate collection differs by site; therefore, instantaneous upstream and downstream flow values are not directly comparable. To enable comparison, a representative time point for flow rates at downstream sample locations was determined based on upstream sample collection times and an assumed 10-15 minute flow travel time. Table D-1 provides more information.
2. Trickle flow observed.
3. Ponded water observed. Suspected to be from recent residential over-irrigation
4. Active residential over-irrigation observed in urban land use at time of sample collection.

Of the nine instances of flow (or recent flow) observed at the five agricultural input monitoring locations with intermittent or persistent flows, six of the sources were tracked to their origin and were confirmed as grove irrigation (Attachment A). Two samples had unidentified sources; grove irrigation was suspected because of the quantity of flow and general origin, but could not be confirmed in the field because the private property was inaccessible (Attachment A). One sample (ponded) was suspected to have originated from residential over-irrigation, based on evidence of recent flow (Attachment A). In the urban land use area between the agricultural inputs and the Monroe Retention Basin, residential over-irrigation was observed to be actively contributing to downstream sites during one instance. Preliminary assessment of relative contributions from different source types to the Monroe Retention Basin is summarized in Figure 5.

As summarized in Figure 5, flows at upstream agricultural inputs were often attributable to agricultural grove irrigation. The intermittent nature of irrigation sources of flow, compared with the persistent nature of flow at downstream inputs to the Monroe Retention Basin, suggests that some flow may be originating from sources yet to be characterized, such as residential irrigation, additional illicit discharges, groundwater, or illicit connections. Additional data are needed. However, when flows from agricultural inputs (grove irrigation) were actively occurring, they did contribute most of the flow observed at the downstream input to the Monroe Retention Basin for the ARL-2 and ARL-3 subdrainage areas, which represent the majority of flow to the Monroe Retention Basin.
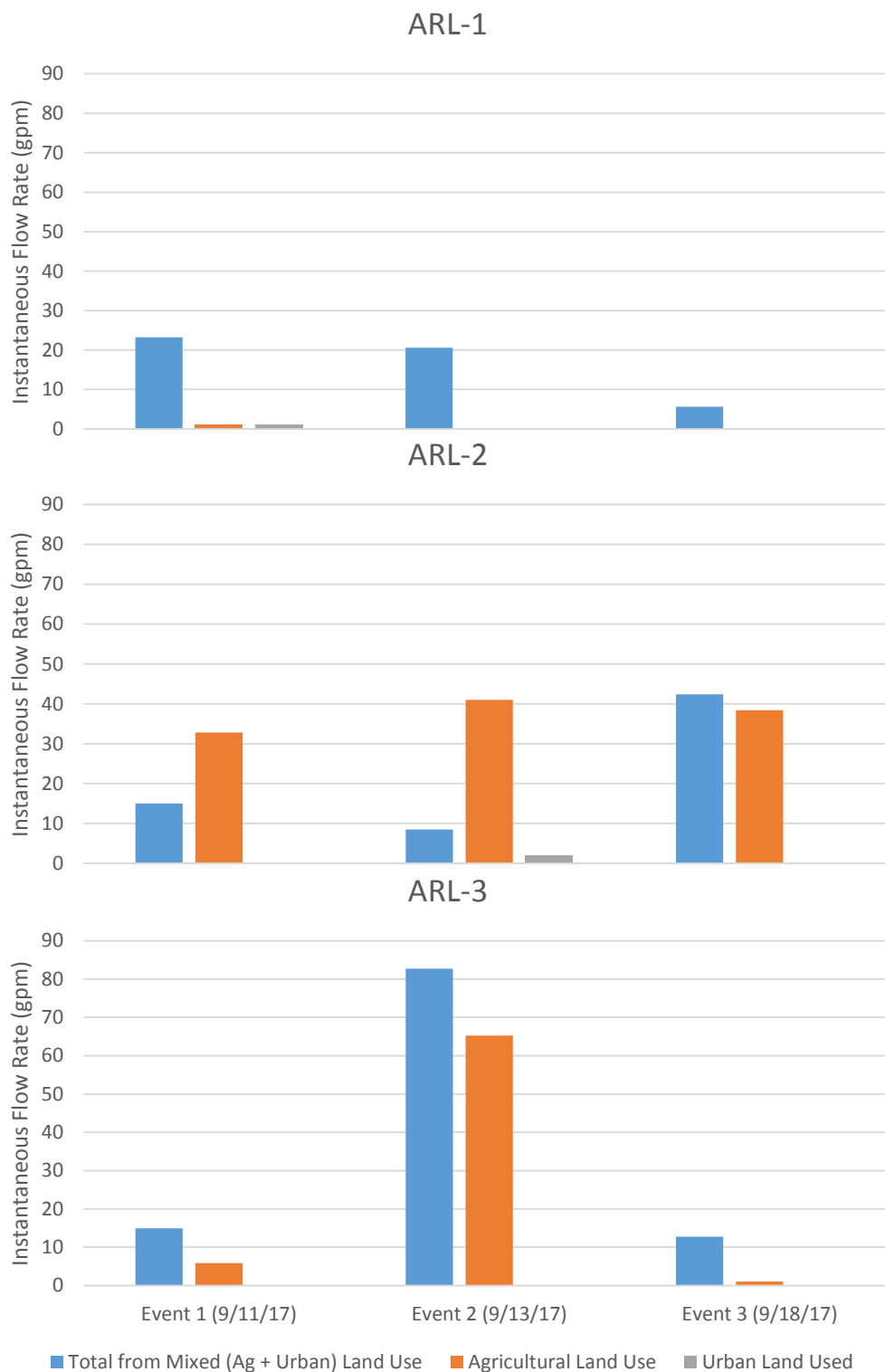
Note: Where agricultural instantaneous flow rates exceed mixed land use instantaneous flow rates, this does not necessarily represent infiltration, detention, or evaporation. Rather, the flow rate may attenuate as the flow moves downstream. Cumulative flow comparisons from paired continuous flow data collection will provide more quantitative and accurate comparisons.

**Figure 5. Flow Comparison by Land Use**

Field water quality measurements were typically within normal environmental ranges. Several samples from agricultural input sites had elevated ammonia concentrations (>1 milligram per liter [mg/L]) during the September 11, 2017, monitoring event. However, the elevated values were likely attributable to elevated ammonia concentrations in source irrigation water that day: a value of 1.502 mg/L was observed in a sample from the Gage Irrigation Canal, and flows at the agricultural locations were caused by active grove irrigation. No samples had ammonia concentrations greater than 2 mg/L. Elevated free chlorine (>0.3 mg/L) was also observed in some samples. Elevated chlorine in samples from mixed land uses may be reflective of inputs from residential over-irrigation. However, elevated chlorine was also observed in some agricultural inputs. The agricultural inputs with elevated chlorine were field verified as coming from grove irrigation. Elevated chlorine was not present in the grove irrigation source water from Gage Canal. These data suggest that chlorine may be introduced during application of water to groves, or that potable water may be being used for grove irrigation. Attachment B provides the field water quality measurements associated with each sample collected.

Similar to findings from the City of Riverside's field reconnaissance (City of Riverside, 2016), *E. coli* concentrations were variable, but generally increased as flows moved from the upper, predominantly agricultural land uses to the lower, mixed land uses of the Arlington Area, and both agricultural and urban land uses contributed *E. coli* to dry weather flows. None of the source irrigation water from the Gage Canal had *E. coli* concentrations above the single-sample maximum[7] (SSM) of 212 organisms per 100 milliliters (organisms/100mL). The majority of agricultural sites (six of nine samples), had *E. coli* concentrations above the SSM. All samples from mixed land use sites (T2-ARL-1, T2-ARL-2, T2-ARL-3) had detected *E. coli* concentrations above the SSM. Figure 3 provides box plots of *E. coli* concentrations by site type. Increases in *E. coli* concentrations as flows moved from upstream locations to downstream locations indicate additional inputs; because of the short travel times within the small subdrainage areas, evaporation is not considered to be a significant factor.

HF183 was not detected in most (19 of 21) samples. Two samples with HF183 were low level (133-266 copies per 100mL) and recorded at mixed land use sites. For reference, HF183 concentrations in raw municipal sewage are typically greater than one million (>10^6) copies/100mL. These low level detections may indicate the presence of a human source in the urban land use portion of the drainage area (e.g. leaking sewer infrastructure), or a false detection due to a cross-reaction from an animal source (e.g. chicken or dog). Because low-level human signals still have the potential for public health significance (SCCWRP, 2017), it is appropriate to investigate these low-level detections as a conservative measure. No agricultural sites had quantifiable HF183. Attachment C provides *E. coli* and HF183 concentrations associated with each sample collected. Figure 4 provides a summary of HF183 results by site type.

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[7] TMDL compliance targets for *E. coli* state that not more than 10% of the samples exceed 212 organisms/100mL for any 30-day period (SARWQCB, 2005b). For the purposes of this Tier 2 source investigation, 212 organisms/100mL was used an a single-sample maximum.
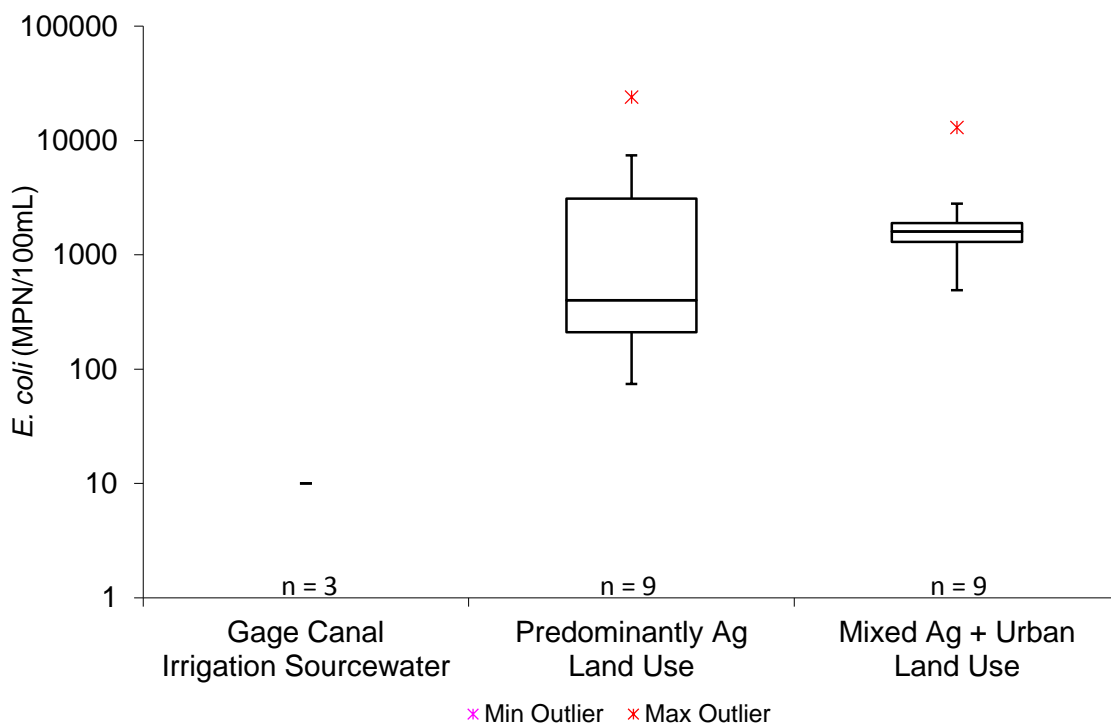
Note: The box represents the interquartile range (IQR). The ends of the whiskers are set at 1.5*IQR above the third quartile and below the first quartile. Outliers are outside of this range.
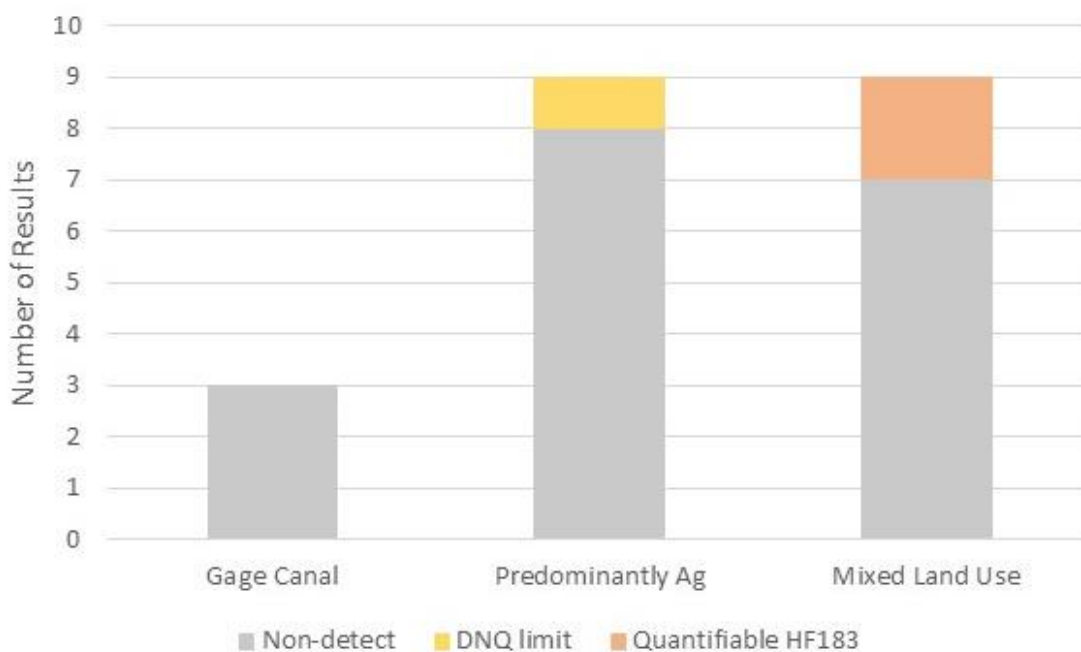
Figure 3. *E. coli* Concentrations by Land Use Type

Figure 4. Summary of HF183 Results by Land Use Type

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4.0 Key Findings

Key findings in the context of the study questions are as follows:

What is the status of dry weather flow leaving the Monroe Retention Basin?

- Dry weather flow is continuous both into and out of the Monroe Retention Basin.

- Continuous flow data collected at the three storm drain inputs to the basin indicate persistent flow at all inputs.

  o Flow volumes at T2-ARL-1 are much lower than flow volumes at either T2-ARL-2 or T2-ARL-3.

- Visual observations at the basin outlet and the T1-ANZA monitoring location indicate persistent flow leaving the basin and reaching the Santa Ana River (see Table 2).

What are the predominant sources of dry weather flow in the Arlington Area?

- Based on instantaneous flow estimates and visual observations, when flow is present, agricultural discharges contribute most of the flow reaching the Monroe Retention Basin. Magnitude of flow in each subdrainage area corresponded with the occurrence of flow at agricultural inputs; the subdrainage areas where flow from agricultural inputs is most frequent (ARL-2 and ARL-3) have flow rates typically two to six times higher than at ARL-1, where agricultural flows were observed at one of five inputs during one event.

- However, persistence of flow at the outfall was not always attributable to active agricultural irrigation.

  o Other flow sources (e.g., residential over-irrigation) are present and contribute flow to the storm drain.

  o The persistence of flow may also suggest other sources not observed during the street-level survey (e.g., illicit discharges, groundwater, illicit connections).

What are the magnitude and sources of E. coli in the observed dry weather flow?

- *E. coli* was quantified in all dry weather flows sampled within the Arlington Area.

- *E. coli* does not originate from the Gage Irrigation Canal.

- *E. coli* concentrations were elevated in flows from agricultural land uses as well as mixed (urban and agricultural) land uses. Magnitudes generally increased in flow moving from upstream to downstream locations (accumulation of sources).

- Multiple potential human and nonhuman sources of bacteria were observed in the drainage area. Sewer lines, septic systems, grove irrigation, livestock, domestic animals, wildlife, trash, and vegetation/sediment were observed in all subdrainage areas (Attachment A). Portable toilets were observed in ARL-1 only, and residential over-irrigation was observed in ARL-2 and ARL-3 only. These sources were observed, but not assessed as actively impacting dry weather flows.

Is the observed E. coli from human sources?

- The majority of samples do not contain *E. coli* from human sources.

  o HF183 was not quantified in 19 of the 21 samples

  o Human sources are not contributing to flows originating from the agricultural inputs based on the general absence of detectable HF183.

  o Human sources were observed in flows originating from the mixed land use inputs, but concentrations were relatively low.

- Human sources may potentially contribute to flows from mixed land use inputs but require additional confirmation. For the two samples in which HF183 was quantified:

  o Detections were in one (of two) samples from each of two different mixed land use monitoring locations, indicating that potential human contamination is episodic and not persistent.

  o Concentrations in both samples were <300 copies/mL.

    ▪ For reference, raw municipal wastewater typically contains 10^6 copies/100mL.

4.1   Limitations of Data

The following limitations apply to the data collected for this investigation:

- The investigation took place during approximately one month in the late dry season and may not be representative of year-round conditions.

- Sampling was not coordinated directly with the grove irrigation schedule.

- Instantaneous flow estimates represent point-in-time conditions and do not provide a comprehensive assessment of relative contribution.

- Monitoring data was not collected within the MS4 system (only at either end).

- Flow leaving the Monroe Retention Basin co-mingles with other dry weather inputs before reaching the Santa Ana River. It is unknown how much of the flow leaving the basin ultimately reaches the Santa Ana/River.

- Low-level, intermittent detections of a single human marker do not provide sufficient information to establish risk to human health. Per the California Source Identification Manual, the HF183 marker is the *"best starting point for detecting human fecal material because it provides the best combination of sensitivity and specificity. However, although it performs highest among other markers on sensitivity, it has been shown to occasionally detect ("cross-react" with) chicken or dog feces. If those sources pose a concern in the watershed, or if managers simply desire to add certainty about the results, HF183 can be paired with HumM2."* (Southern California Coastal Water Research Project [SCCWRP], 2013.

- Because low-level concentrations may still be risk-relevant (SCCWRP, 2017) due to aged or diluted sources, confirmation of potential human sources is desired.

What are the predominant sources of dry weather flow in the Arlington Area? *All three subdrainage areas have continuous flow to Monroe Retention Basin. Agricultural sites are major contributors of dry weather flow, particularly in ARL-2 and ARL-3. Other sources need further investigation.*

Dry weather flow is continuous into/out of the Monroe Basin from all three subdrainage areas (ARL-1, -2, and -3)

ARL-2 was the biggest contributor ARL-1 contributed the least

Ag sites are contributing to flows in ARL-2 and ARL-3

Other sources of flow are present and contributing to persistent flows at ARL-1, -2, and -3

What are the magnitude and sources of *E. coli* in the observed dry weather flow? *E.coli are elevated in majority of samples. Agricultural sites are a source of E.coli. Other sources need further investigation.*

Elevated in all 21 samples collected

Concentrations were generally higher at Mixed land use sites (ARL-1, ARL-2, and Arl-3) than Ag sites

Ag sites are contributing *E. coli*

Other sources observed include domestic animals, livestock, wildlife, trash

Are *E. coli* from human sources? *Potentially but need confirmation testing.*

HF183 was not quantified in 19 of 21 samples

Not quantified in any samples from Ag sites

HF183 was quantified in 2 Mixed land use samples from 2 different sites

HF183 was not persistent at any site

Figure 6. Summary of Key Findings

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5.0   Next Steps

Based on findings to date, Amec Foster Wheeler recommends the following next steps to address identified sources of flow, increase understanding of bacteria sources, and enhance the current study design to quantify identified and suspected flow sources.

This study has confirmed that dry weather flow from the MS4 is continuous both into and out of the Monroe Retention Basin. This study also confirmed that grove irrigation from agricultural land uses is contributing flow and bacteria to the MS4 system in the Arlington Area, though grove irrigation is not the sole contributor. Controlling or reducing flows both in upstream agricultural land uses and downstream urban land uses will help reduce bacteria loads to/from the Monroe Retention Basin. There are options to reduce dry weather flows through implementation of management and structural BMPs. Table 7 presents BMP recommendations for the Arlington Area.

Table 7. BMP Recommendations

BMP Implementation in Agricultural Land Uses	BMP Implementation in Urban Land Uses
Implement retention or infiltration BMPs on agricultural parcels where grove irrigation was confirmed to be contributing dry weather flow and elevated bacteria concentrations to the MS4	Implement infiltration BMPs at Monroe Retention Basin Retrofit Monroe Retention Basin to perform dry weather retention
Increase inspection of right of ways and notify parcel owners of runoff	Increase residential and commercial inspections

This study identified a comprehensive list of sites to capture potential dry weather flows from agricultural land uses. However, there were agricultural sites that did not flow during the study period or only intermittently. To characterize flows at each agricultural site throughout the dry season, then additional targeted monitoring is needed. Additionally, some sources of flow remain unknown. Table 8 presents recommendations to target and further investigate flow sources to Monroe Retention Basin.

Table 8. Identify Sources of Flow

Flows from Ag Sources	Flows from Other Sources
Targeted sampling based on grove irrigation schedule	Visual observations during dry season at varying times of day.
Increase monitored events and inspect sites throughout the dry season	Survey of storm drains to investigate illicit connections or groundwater infiltration
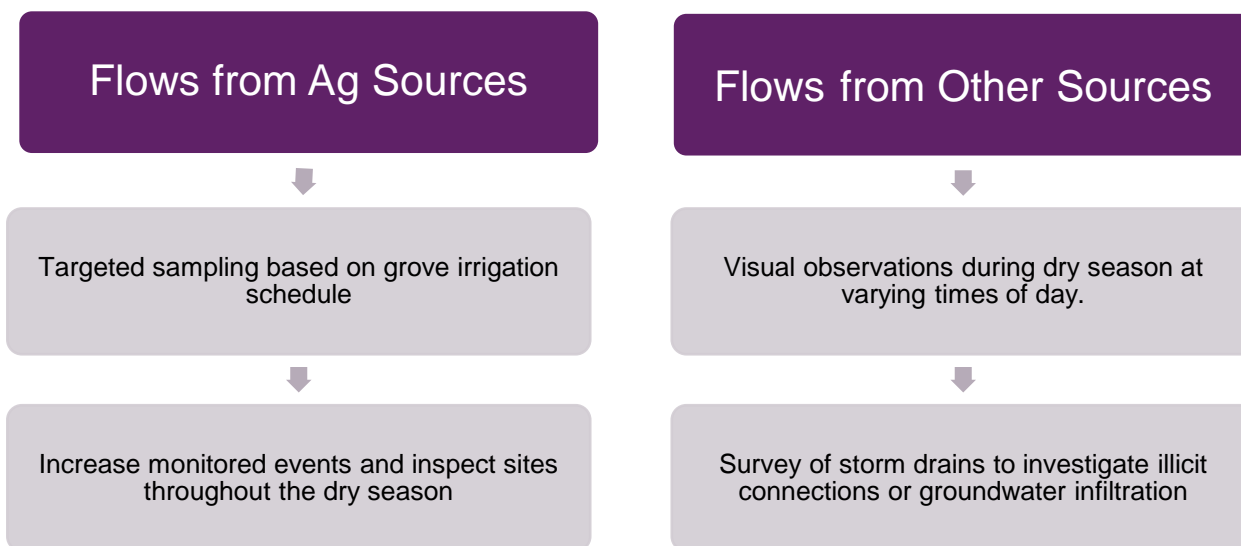
This study was the first step in characterizing the contribution of flow from agricultural sources to the downstream MS4. This initial study design paired continuous flow data from the MS4 inputs to Monroe Retention Basin with instantaneous flow estimates at the agricultural sites. To refine the analysis of contributions from agricultural sites, continuous flow data should be collected to enable the comparison of cumulative flow volumes. Similarly, if the Task Force wants to better understand the contribution from the Monroe Retention Basin to the T1-ANZA site and ultimately Santa Ana River, then paired continuous flow data and tracer studies should be performed to verify continuous flow status and confirm hydrologic connectivity.

Multiple potential human and nonhuman sources of bacteria were observed in the drainage area. Sewer lines, septic systems, grove irrigation, livestock, domestic animals, wildlife, trash, and vegetation/sediment are present in all subdrainage areas (Attachment A). These sources were not assessed as actively impacting dry weather flows. This study determined that additional monitoring is needed to characterize urban sources. Based on the data, prioritize drainage basins for further source investigation including visual surveys and water quality. Within each drainage basin, add monitoring locations within the urban land use including MS4 catch basins representing residential and commercial land uses. For the next phase of investigation, reduce the water quality that is being recorded at each site for cost savings to *E.coli*, HF183 (depending on drainage area and Tier 2 results), ammonia, conductivity, and flow.

This study assessed whether *E. coli* was originating from human sources. The HF183 human MST marker was used to screen for human sources. The HF183 marker is recommended by the California Source ID Manual (SCCWRP, 2013) as the most sensitive and specific human MST marker, and is the human marker the United States Environmental Protection Agency (USEPA) is developed a standard method for. The HF183 is conservative in that it has the potential to cross-react with dog or chicken feces in a sample. Thus, to add certainty to the assessment of human sources, it is recommended that the samples be analyzed for a second human MST marker, such as HumM2 (per the California Source ID Manual) or *B. theta* (per the QAPP) to add certainty to the findings. If the human source is not detected by a second marker, it is

recommended that BMPs focus on reductions in non-human bacteria sources (such as dog waste, via outreach and "doggy bag" stations). However, if the human source is confirmed by detection with a second human marker, further source investigation is warranted. Further source investigation includes review of potential human sources and their likelihood to contribute (e.g. review of sewer overflow records, sewer repair and maintenance records, septic system status and maintenance records) and collection of additional data. These low level detections may indicate the presence of a human source in the urban land use portion of the drainage area (e.g. leaking sewer infrastructure), or a false detection due to a cross-reaction from an animal source (e.g. chicken or dog).This study identified evidence of animals within the drainage areas. To evaluate potential bacteria contributions from animals, analyze the archived samples for both chicken and dog. Table 9 presents recommendations to further investigate *E.coli,* human sources and animal sources within the Arlington Area.

Table 9. Continue Bacteria Source Investigation

E.coli Sources	Confirm Presence of Human	Test for Animal Markers
Prioritize the three drainage basins for follow-up investigation.	Two samples with measureable HF183 to be analyzed for a second human MST marker, such as HumM2.	Analyze archived samples for whole drainage area for chicken and/or dog
Add monitoring locations within urban land use including MS4 catch basins. Conduct visual surveys and water quality monitoring.	If confirmed, conduct source investigation in individual drainage area(s) for potential sources of human contamination.	Assess presence and magnitude
Increase visual inspections of residential and commercial properties.	If not confirmed, prioritize other recommendations.	Provide additional recommendations

6.0   References

City of Riverside. 2016. Letter written by Michael Roberts to Mr. Ken Theisen. Monitoring of Agricultural Areas within the City of Riverside Greenbelt. Dated Nov 4, 2016.

Santa Ana Regional Water Quality Control Board (SARWQCB). 2005a. Staff Report on Bacteria Indicator Total Maximum Daily Loads in Middle Santa Ana River. February 3, 2005.

SARWQCB. 2005b. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Bacteria Indicator Total Maximum Daily Loads (TMDLs) for Middle Santa Ana River Watershed Waterbodies. Regional Board Resolution R8-2005-0001.

Santa Ana Watershed Project Authority (SAWPA). 2013. San Bernardino County Stormwater Program, County of Riverside, Cities of Chino Hills, Upland, Montclair, Ontario, Rancho Cucamonga, Rialto, Chino, Fontana, Norco, Corona, Riverside, Pomona, and Claremont. 2013. Middle Santa Ana River Bacteria Indicator TMDL Implementation Report. Prepared by CDM Smith, February 2013.

SAWPA. 2016. Santa Ana River Watershed Bacteria Monitoring Program Quality Assurance Project Plan (QAPP). Prepared by CDM Smith, February 2016.

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Soller et al. 2010. Estimated human health risks from exposure to recreational waters impacted by human and non-human sources of faecal contamination. Water Research. 44:4674-4691.

Southern California Coastal Water Research Project (SCCWRP). 2013. The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches. Technical Report 804. December.

SCCWRP. 2017. Southern California Bight 2013 Regional Monitoring Program: Shoreline Microbiology. Volume IX. Technical Report 1005. September.

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Attachment A:
Bacteria and Flow Source Inventories

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For this investigation, a source inventory is a list of potential sources that may contribute flow, *E. coli*, and/or HF183 in the Arlington Area. For each of the three subdrainage areas, source inventories were developed to help interpret monitoring data and to prioritize follow-up investigative activities. Source inventories are intended to be updated as needed to capture additional monitoring data.

The following data were used to develop preliminary source inventories prior to field activities:

- Desktop analysis of infrastructure (sewer, septic, recycled water, storm drain) and land use

- Field surveys (both pre-data collection and as part of monitoring activities)

- Review of historical data

- Correspondence with key stakeholders

Source inventories were then updated to reflect field data collection. Source inventories by subdrainage area are provided in Table A-1. Results of flow source tracking specific to collected samples are provided in Table A-2. Detailed map-based source inventories for the Arlington Area are provided in Figures A-1 through A-3.

Table A-1. Potential Sources of Bacteria and Flow in the Arlington Area

Source	Potential Bacteria Source?		Potential Flow Source?	Present in Arlington Area?	Observation/Verification		
	E. coli	HF183			T2-ARL-1	T2-ARL-2	T2-ARL-3
Sewer Infrastructure	Yes	Yes	Yes	Yes	Not assessed		
Recycled Water Infrastructure	No	Yes[1]	Yes	No	Does not impact Arlington Area[5]		
Septic Systems	Yes	Yes	Yes	Yes	Not assessed		
Potable Water Infrastructure	No	No	Yes	Yes	Not assessed		
Rising Groundwater	Yes	Yes[2]	Yes	Unknown	Not assessed		
Residential/Commercial Over-irrigation	Yes	No[3]	Yes	Yes	Not Observed	Observed	Observed
Agricultural Over-irrigation	Yes	No[3]	Yes	Yes	Observed		
Washing	Yes	No	Yes	Unknown	Not observed		
Livestock	Yes	No	No	Yes	Observed (horses and chickens)		
Portable Toilets	Yes	Yes	Yes	Yes	Observed	Not Observed	Not Observed
Illicit Discharges	Yes	Yes	Yes	Unknown	Observed outside of the Arlington drainage area		
Illicit Connections	Yes	Yes	Yes	Unknown	Not assessed		
Vegetation/Sediment	Yes	No	No	Yes	Observed		
Domestic Animals	Yes	No[4]	No	Yes	Observed (dogs)		
Wildlife	Yes	No	No	Yes	Observed (birds)		
Trash	Yes	Yes	No	Yes	Observed		

Notes:
1. Recycled water does not contain fecal indicator bacteria (FIB) but may contain human marker (Southern California Coastal Water Research Project [SCCWRP], 2017).
2. If contaminated by leaking sewer infrastructure or septic systems.
3. Fertilizer containing human biosolids has the potential to contribute based on origin, but has not been explicitly assessed.
4. There is potential for cross-reactivity of the HF183 marker with dog waste (SCCWRP, 2013).
5. Per personal communications with Brenda Meyer at Western Municipal Water District on 8/8/2017.
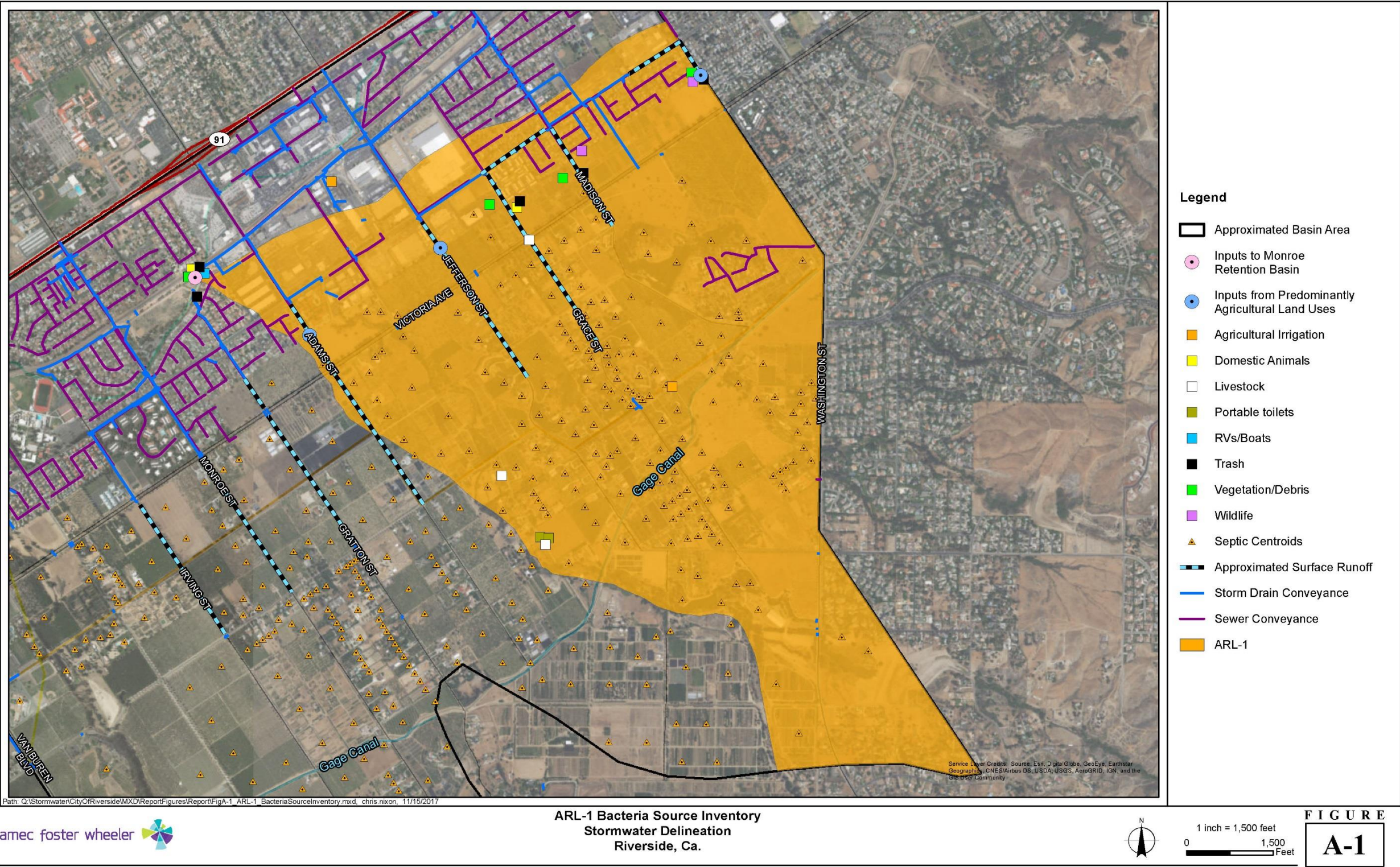
Table A-2. Key Flow Observations

	Site Type	Site ID	Key Visual Observations		
			9/11/17	9/13/17	9/18/17
Upstream to Downstream	Irrigation Source Water	T2-ARL-GIC	Flowing	Flowing	Flowing
	Agricultural Inputs	T2-ARL-3-IRV	Flowing Confirmed Grove Irrigation	Flowing Confirmed Grove Irrigation	No Flow
		T2-ARL-3-MON	No Flow	Flowing Confirmed Grove Irrigation	Flowing Confirmed Grove Irrigation
		T2-ARL-2-GRT	Flowing Suspected Grove Irrigation	Flowing Confirmed Grove Irrigation	Flowing Confirmed Grove Irrigation
		T2-ARL-1-ADA	No Flow	No Flow	No Flow
		T2-ARL-1-JEF	No Flow	No Flow	No Flow
		T2-ARL-1-GRC	Flowing Suspected Grove Irrigation	No Flow	No Flow
		T2-ARL-1-MAD	No Flow	No Flow	No Flow
		T2-ARL-1-WAS	Ponded Suspected Residential Over-irrigation	No Flow	No Flow
	Mixed Land Use Inputs to Monroe Retention Basin	T2-ARL-1	Flowing Active contribution from upstream agricultural site	Flowing Unknown upstream source	Flowing Unknown upstream source
		T2-ARL-2	Flowing Active contribution from upstream agricultural site	Flowing Active contribution from upstream agricultural site and urban land use (residential over-irrigation)	Flowing Active contribution from upstream agricultural site
		T2-ARL-3	Flowing Active contribution from upstream agricultural site	Flowing Active contribution from upstream agricultural site	Flowing Active contribution from upstream agricultural site
	Outlet of Monroe Retention Basin	T2-ARL-OUT	Flowing		
	Input to Santa Ana River	T1-ANZA	Flowing		

Notes:
Blue shaded cells indicate presence of ponded (light blue) or flowing (medium blue) water.

Legend

- ☐ Approximated Basin Area
- ⊙ Inputs to Monroe Retention Basin
- ⊙ Inputs from Predominantly Agricultural Land Uses
- ☐ Agricultural Irrigation
- ☐ Domestic Animals
- ☐ Livestock
- ☐ Portable toilets
- ☐ RVs/Boats
- ☐ Trash
- ☐ Vegetation/Debris
- ☐ Wildlife
- ▲ Septic Centroids
- ▣ Approximated Surface Runoff
- — Storm Drain Conveyance
- — Sewer Conveyance
- ☐ ARL-1

ARL-1 Bacteria Source Inventory
Stormwater Delineation
Riverside, Ca.

amec foster wheeler

1 inch = 1,500 feet
0   1,500
Feet

FIGURE
A-1

Path: Q:\Stormwater\CityOfRiverside\MXD\ReportFigures\Report\FigA-1_ARL-1_BacteriaSourceInventory.mxd, chris.nixon, 11/15/2017

Note:Drainage area boundaries are approximated

Figure A-1. Arlington Area ARL-1 Bacteria Source Inventory

Legend

- ▢ Approximated Basin
- ⊙ Inputs to Monroe Retention Basin
- ⊙ Inputs from Predominantly Agricultural Land Uses
- ◼ Agricultural Irrigation
- ◼ Domestic
- ◻ Livestock
- ◼ Portable toilets
- ◼ RVs/Boats
- ◼ Residential/Commercial Irrigation
- ◼ Trash
- ◼ Vegetation/Debris
- ◼ Wildlife
- ▲ Septic Centroids
- ▪▪▪ Approximated Surface Runoff
- — Storm Drain Conveyance
- — Sewer Conveyance
- ▢ ARL-2

Path: Q:\Stormwater\CityOfRiverside\MXD\ReportFigures\Report\FigA-2_ARL-2_BacteriaSourceInventory.mxd, chris.nixon, 11/15/2017

ARL-2 Bacteria Source Inventory
Stormwater Delineation
Riverside, Ca.

amec foster wheeler

1 inch = 2,000 feet
0   1,500
Feet

FIGURE
A-2

Note: Drainage area boundaries are approximated

Figure A-2. Arlington Area ARL-2 Bacteria Source Inventory

Legend

- ☐ Approximated Basin Area
- ⦾ Inputs to Monroe Retention Basin
- ⦿ Inputs from Predominantly Agricultural Land Uses
- ◼ (orange) Agricultural Irrigation
- ◼ (yellow) Domestic Animals
- ☐ Livestock
- ◼ (olive) Portable toilets
- ◼ (blue) Residential/Commercial Irrigation
- ◼ (black) Trash
- ◼ (green) Vegetation/Debris
- ◼ (magenta) Wildlife
- ▲ Septic Centroids
- ▨ Approximated Surface Runoff
- ─ Storm Drain Conveyance
- ─ Sewer Conveyance
- ▧ ARL-3

ARL-3 Bacteria Source Inventory
Stormwater Delineation
Riverside, Ca.

amec foster wheeler

1 inch = 1,500 feet
0   1,500
Feet

FIGURE
A-3

Note: Drainage area boundaries are approximated

Figure A-3. Arlington Area ARL-3 Bacteria Source Inventory

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Attachment B:
Field Data Forms and Representative Photographs

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Figure B-1. Site T2-ARL-1

Figure B-2. Site T2-ARL-2

Figure B-3. Site T2-ARL-3

Figure B-4. Site T2-ARL-1-WAS

Figure B-5. Site T2-ARL-1-MAD

Figure B-6. Site T2-ARL-1-GRC

Figure B-7. Site T2-ARL-1-JEF

Figure B-8. Site T2-ARL-1-ADA

Figure B-9. Site T2-ARL-2-GRT

Figure B-10. Site T2-ARL-3-MON

Figure B-11. Site T2-ARL-3-IRV

Figure B-12. Site T2-ARL-GIC

Figure B-13. Site T2-ARL-OUT
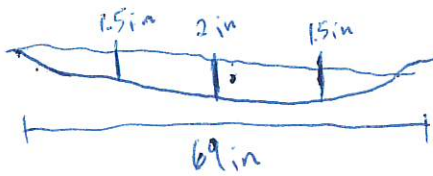

Figure B-14. Site T1-ANZA

Figure B-15. Grove Irrigation

Figure B-16. Residential Over-irrigation

Arlington Bacteria Source Investigation
FIELD DATA SHEET

ARL

Site ID: ~~TAS~~-1   **Date:** 9/11/17   **Time:** 0720

GPS Coordinates: 33.921675, -117.419419   **Sample Type(s):** grab

Field Crew: SS, LCD   **Photos Collected?** [X] Yes [] No   **Photo Count#:** 2 + video

Observed Land Use: [] Residential   [] Commercial   [] Industrial   [] Agricultural   [X] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain [] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing Tide Height: ____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [] Concrete SD   [X] Natural   [] Gutter   [] Other _Sampled at start of sand from concrete Structure_

Floatables: [] None   [X] Trash   [X] Bubbles/Foam   [] Sheen   [] Fecal Matter   [] Other _____

Odor: [X] None   [] Musty   [] Rotten Eggs   [] Chemical   [] Sewage   [] Other _____

Color: [X] None   [] Yellow   [] Brown   [] White   [] Gray   [] Other _____

Clarity: [] Opaque   [] Slightly Cloudy   [X] Clear   [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [X] Dom. Animals # 2

[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____

[X] Trash Accumulation _minimal_   [] Pet Waste   [] Wildlife # _____

[] Organic Matter   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [X] Other _pipe_ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): Sprinkle   **Flow (gpm):** 23.55

FIELD MEASUREMENTS

Temp(°C): 21.5   **pH** 8.9   **Sp Conductivity (µS/cm):** 861   **Chlorine (mg/L)** 0.047   **NH3 (ppm)** 0.380

Turbidity (NTU): 6.85

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes   [] No

Parameters Collected: [X] FIB   [X] MST/Virus   [X] Field WQ   [X] Chemistry

Sample ID: T2-ARL-1-091117

COMMENTS: Spraying water truck at top of grade used to enter sites - not spraying/impacting sites

flow not flowing evenly over weir
-topping over left side of weir
when facing pipe but not right
side - negligible flow quantity <1 gpm

1.27 fps 6.5 cm over weir
90° weir

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __ARL-1__   Date: __09/13/17__   Time: __0651__

GPS Coordinates: __33.931675, -117.419419__ Sample Type(s): __grab__

Field Crew: __LCD, SS__   Photos Collected? [✓] Yes [] No   Photo Count#: __2__

Observed Land Use: [] Residential [] Commercial [] Industrial [] Agricultural [✓] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather   [] Partly Cloudy [] Sunny [✓] Overcast [] Fog [] Rain [] Drizzle

Tide   [✓] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain   [✓] > 72 hours [] < 72 hours

Rainfall   [✓] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [✓] Concrete SD [] Natural [] Gutter [] Other _____

Floatables [] None [✓] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [✓] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [✓] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [✓] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow [✓] Food Waste/Scraps [] Birds # _____

[✓] Trash Accumulation [] Pet Waste [] Wildlife # _____

[] Organic Matter [] Landscaping [] Other _____

< 30 pieces trash

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [✓] Unknown *pipe*

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A

FLOW CONDITIONS

Flowing? [✓] Yes [] No [] N/A   [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): __0__   Flow (gpm): __29.25000203 (see calc)__

FIELD MEASUREMENTS

Temp(°C): __20.5__ pH __8.7__ Sp Conductivity (µS/cm): __929__ Chlorine (mg/L) __0.025__ NH3 (ppm) __0.109__

Turbidity (NTU): __0.68__

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [✓] Yes [] No

Parameters Collected: [✓] FIB [✓] MST/Virus [✓] Field WQ [✓] 1 Chemistry

Sample ID: __T2-ARL-1-091317__

COMMENTS:

100% 0.70" deep   0%   0.05 fps
75%   50% 50%
21"
06:51

13:13
5 cm over V weir
hobo batt. good
flow meter battery
13.7 volts

6.5 cm over V
2.5 in. over sensor
3.25 in water depth

48 in. across weir Left side of weir
1/10 in. over Left most side of weir

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ARL-1   **Date:** 9/18/17   **Time:** 0714

GPS Coordinates: 33.921675, -117.419419   **Sample Type(s):** grab

Field Crew: KD SS   **Photos Collected?** [X] Yes [] No   **Photo Count#:** 3 + 2 later (download here)

Observed Land Use: [] Residential   [] Commercial   [] Industrial   [] Agricultural   [X] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [X] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow [] Food Waste/Scraps [X] Birds # 2

[X] Trash Accumulation [] Pet Waste [] Wildlife # _____

[X] Organic Matter [] Landscaping [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [X] Other pipe   S K   [] Unknown

Active flow? (Y) N   **Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?** Y N N/A

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   **Flow (gpm):** 5.824999048 (see calc)

FIELD MEASUREMENTS

Temp(°C): 17.6 **pH** 8.9   **Sp Conductivity (µS/cm):** 841 **Chlorine (mg/L)** 0.016 **NH3 (ppm)** 0.102

Turbidity (NTU): 0.78

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: TD-ARL-1-091813

COMMENTS:

2.5 in. water depth   downloaded   - algae + oily sheen in water in natural portion after concrete

1.5 in. over sensor

4 cm over v weir   13.35

1470 mL / 4 sec   2.5 cm over weir

1 photo

battery good

- noticed absence of mosquitos

flow meter

1 photo of display

battery = 12.7 volts

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: TJ-ARL-2 **Date:** 9/11/17 **Time:** 0643

GPS Coordinates: -117.41967, 33.92114 **Sample Type(s):** grab

Field Crew: LDL, SS **Photos Collected?** [X] Yes [] No **Photo Count#:** 2

Observed Land Use: [] Residential [] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[X] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	**Tide Height:** _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [X] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [X] Dom. Animals # 2

[] Sewer Overflow [X] Food Waste/Scraps [] Birds # _____

[X] Trash Accumulation [] Pet Waste [] Wildlife # _____

[] Organic Matter [] Landscaping [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [X] Other _pipe_ S K [] Unknown

Active flow? (Y) N Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): Sprinkle **Flow (gpm):** 98.07

FIELD MEASUREMENTS

Temp(°C): 22.8 **pH** 8.8 **Sp Conductivity (µS/cm):** 835 **Chlorine (mg/L)** 0.077 **NH3 (ppm)** 0.459

Turbidity (NTU): 1.46

SAMPLE COLLECTION

[] Visited, Not Sampled Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] 1Chemistry

Sample ID: TJ-ARL-2-091117

COMMENTS: Sampled at direct runoff from weir
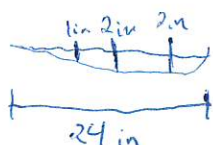
v(fps)=1.53 11.5 cm over weir

.24 in

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ARL-2   Date: 9/13/17   Time: 0638

GPS Coordinates: 33.92143, 717.419667 Sample Type(s): grab

Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: _____ 2

Observed Land Use: [] Residential   [] Commercial   [] Industrial   [] Agricultural   [X] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0.1"	[] > 0.1"			

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____		
Floatables	[] None	[X] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[] None	[] Yellow	[X] Brown light	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[] Slightly Cloudy	[X] Clear			[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[X] Dom. Animals # 2
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [X] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A   pipe

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): 5.730507 (see calc)

FIELD MEASUREMENTS

Temp(°C): 22.0   pH 8.5   Sp Conductivity (µS/cm): 841   Chlorine (mg/L) 0.072   NH3 (ppm) 0.109

Turbidity (NTU): 1.42

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes   [] No

Parameters Collected: [X] FIB   [X] MST/Virus   [X] Field WQ   [X] Chemistry

Sample ID: T2-ARL-2-091317

COMMENTS:

Mosquitos at weir   13:03

                                     9 cm over

                                     hobo battery: Good

                                     0638

3.5 cm over V
8.5 in over Hobo/sensor | fill = 2.35 L / 6.5 s
9.5 in water depth

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ARL-2   Date: 9/18/17   Time: 07:05

GPS Coordinates: 33.92143, 117.4196667   Sample Type(s): grab

Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 3

Observed Land Use: [] Residential   [] Commercial   [] Industrial   [] Agricultural   [X] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain [] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables	[] None	[X] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter [] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage [] Other _____
Color	[X] None	[] Yellow	[] Brown	[] White	[] Gray [] Other _____
Clarity		[] Opaque	[] Slightly Cloudy	[X] Clear	[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [X] Unknown pipe

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A

FLOW CONDITIONS

Flowing?   [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): [0]   Flow (gpm): 1045996.701 (see calc)

FIELD MEASUREMENTS

Temp(°C): 18.0   pH 8.7   Sp Conductivity (µS/cm): 792   Chlorine (mg/L) 0.001   NH3 (ppm) 0.138

Turbidity (NTU): 2.77

SAMPLE COLLECTION

Grab Samples Collected? [X] Yes [] No   [] Visited, Not Sampled   Reason Not Sampled: _____

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry   ran test twice both 0.001

Sample ID: T2-ARL-2-091817

COMMENTS:

13.5 cm over V-notch
13.75 in. from bottom of pipe
12.5 in. over sensor

13.5 L in 1.3 s

downloaded

13:14

8cm above weir

1 photo

battery = good

Arlington Bacteria Source Investigation
FIELD DATA SHEET

APL

Site ID: _3_   Date: _9/11/17_   Time: _0741_

GPS Coordinates: _-117.42312, 33.91935_ Sample Type(s): _grab_

Field Crew: _GS, LCD_   Photos Collected? [X] Yes [] No   Photo Count#: _3_

Observed Land Use: [] Residential   [] Commercial   [] Industrial   [] Agricultural   [X] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain [] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____		
Floatables	[] None	[X] Trash	[X] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[] None	[X] Yellow	[] Brown	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[X] Slightly Cloudy	[] Clear		[] Other _____	

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[X] Dom. Animals # _2_
[] Sewer Overflow	[X] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [X] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle   i'L fill in
Current Conditons: _0_   3.6 sec
Total Rainfall (in.): _0_   Flow (gpm): _4.4028_

FIELD MEASUREMENTS

Temp(°C): _23.7_ pH _8.7_   Sp Conductivity (μS/cm): _779_ Chlorine (mg/L) _0.127_ NH3 (ppm) _0.563_

Turbidity (NTU): _2.26_

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes   [] No

Parameters Collected: [X] FIB   [X] MST/Virus   [] Field WQ   [X] Chemistry

Sample ID: _T2-ARL-3-091117_

COMMENTS:

Used grab pole to get behind gate,
Sampled runoff directly from weir

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ARL-3   Date: 9/13/17   Time: 0717
GPS Coordinates: 33.919332, 717.423083 Sample Type(s): grab
Field Crew: WD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 37 + video + 1 @ 12:52
Observed Land Use: [X] Residential [] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____		
Floatables	[] None	[] Trash	[X] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other ____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other ____
Color	[] None	[] Yellow	[X] Brown	[] White	[] Gray	[] Other ____
Clarity	[X] Opaque	[] Slightly Cloudy	[] Clear		[] Other ____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[X] Dom. Animals # __3__
[] Sewer Overflow	[X] Food Waste/Scraps	[X] Birds # _2___3__
[X] Trash Accumulation	[X] Pet Waste (	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [X] Other ~~Pipe~~ S K   [X] Unknown
Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A   Pipe

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle   based on 15 cm gh. weir @ TOSC
Current Conditons:
Total Rainfall (in.): [0]   Flow (gpm): [190.5]

FIELD MEASUREMENTS

Temp(°C): [225] pH [8.0] Sp Conductivity (µS/cm): [891] Chlorine (mg/L) [0.715] NH3 (ppm) [0.938]

Turbidity (NTU): [31.7]

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____   by 0735 stopped flowing over weir (reduced volume)
Grab Samples Collected? [X] Yes   [] No
Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry
Sample ID: [2-ARL-3-091317]

COMMENTS:

height above V weir 15 cm (7.5 cm @ 12:48)   07:17   Flowing through notch but over edges of weir as circled
water depth - 15.5 in from bottom +@ 12:53
behind weir

13.5 in above sensor (waterdepth)

57"
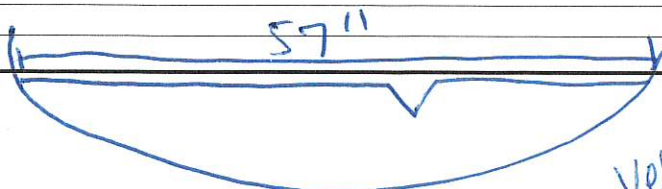
5 ft pipe

Vel = 1.14 fps at fastest flow   flowing over weir   right side
28" from edge of notch   18" from edge notch

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ARL-3   Date: 9-18-17   Time: 0733

GPS Coordinates: 33.919332, -117.423083 Sample Type(s): grab

Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 3 +1 later (download time)

Observed Land Use: [] Residential – [] Commercial [] Industrial [] Agricultural [X] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0.1"	[] > 0.1"			

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____		
Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[X] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[] Slightly Cloudy	[X] Clear		[] Other	

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[X] Birds # 5
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [X] Other pipe _____ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): 53.13

FIELD MEASUREMENTS

Temp(°C): 19.4 pH 8.7 Sp Conductivity (µS/cm): 805 Chlorine (mg/L) 0.043 NH3 (ppm) 0.088

Turbidity (NTU): 4.69

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: T2-ARL-3-091817

COMMENTS:

9 cm over V-notch

53.13 gpm

2.71 L

0.5 u sec

12 in water depth
10.5 in. over sensor

downloaded
1 picture @ 1306
-barely trickle maybe
no flow over weir

battery = good

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: WAS   Date: 9/11/17   Time: 0955
GPS Coordinates: 33.931596, 717.390637   Sample Type(s): grab
Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 8
Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather   [] Partly Cloudy [] Sunny [X] Overcast [] Fog [] Rain [] Drizzle
Tide   [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.
Last Rain [X] > 72 hours [] < 72 hours
Rainfall   [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [X] Gutter [] Other _____
Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____
Odor   [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____
Color   [] None [] Yellow [X] Brown light [] White [] Gray [] Other _____
Clarity   [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____
[] Waste Water Discharge   [] Leaking Trashcan or Dumpster [] Dom. Animals # _____
[] Sewer Overflow   [] Food Waste/Scraps   [X] Birds # 2
[] Trash Accumulation   [] Pet Waste   [] Wildlife # _____
[] Organic Matter   [X] Landscaping grass   [] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation (S) K [X] Resident. Irrig. (S) K [] Washing S K   [] Other _____ S K   [] Unknown
Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y (N) ponded

FLOW CONDITIONS

Flowing?   [] Yes [X] No [] N/A   [] Dry [] Trickle
Current Conditons: ∅
Total Rainfall (in.): ∅   Flow (gpm): N/A (ponded)

FIELD MEASUREMENTS

Temp(°C): 29.2 pH 8.0 Sp Conductivity (µS/cm): 786 Chlorine (mg/L) 0.345 NH3 (ppm) 1.090
Turbidity (NTU): 8.93

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____
Grab Samples Collected? [X] Yes [] No
Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] 1 Chemistry
Sample ID: T2-ARL-1-WAS-091117

COMMENTS: dry upstream + downstream but ponded water on east side of street in front of houses, could be irrigation from these houses, no water on west side of street

- used syringe to draw sample

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __WAS__   Date: __9/13/17__   Time: __0954__

GPS Coordinates: __33.931596, 117.39063__ Sample Type(s): __N/A__

Field Crew: __LCD, SS__   Photos Collected? [X] Yes [] No   Photo Count#: __3__

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy [X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A [] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____	
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other ___
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other N/A
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear			[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[X] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing?   [] Yes [X] No   [] N/A   [] Dry   [] Trickle

Current Conditons: ____

Total Rainfall (in.): __0__   Flow (gpm): __N/A__

FIELD MEASUREMENTS   N/A

Temp(°C):		pH		Sp Conductivity (µS/cm):		Chlorine (mg/L):		NH3 (ppm)	

Turbidity (NTU): ____

SAMPLE COLLECTION   [X] Visited, Not Sampled   Reason Not Sampled: __dry__

Grab Samples Collected?   [] Yes [X] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] l Chemistry

Sample ID: _____

COMMENTS:

dry on both sides of st
- 1 small puddle in curb on east side @
Goodview corner

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: WAS   Date: 9/18/17   Time: 0958

GPS Coordinates: 33.931596, 717.390637   Sample Type(s): none

Field Crew: LCD, SS   Photos Collected? [X] Yes   [] No   Photo Count#: 2

Observed Land Use: [X] Residential   [] Commercial   [] Industrial   [X] Agricultural   [] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0 .1"	[] > 0 .1"			

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD   [] Natural   [] Gutter   [] Other _____

Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other N/A
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear			[] Other

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation little	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter leaves	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

N/A

[] Grove Irrigation S   K   [] Resident. Irrig.   S   K   [] Washing   S   K   [] Other _____   S   K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?   Y   N

FLOW CONDITIONS

Flowing?   [] Yes   [X] No   [] N/A   [X] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): Ø   Flow (gpm): N/A

FIELD MEASUREMENTS

N/A

Temp(°C): [ ] pH [ ]   Sp Conductivity (µS/cm): [ ]   Chlorine (mg/L) [ ]   NH3 (ppm) [ ]

Turbidity (NTU): [ ]

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: Dry

Grab Samples Collected?   [] Yes   [] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] l Chemistry

Sample ID: _____

COMMENTS:

- observed lady watering property + driveway downstream of Harvest St on east side
- damp on east side of street, no puddles
- dry on west side of St

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __MAD__   Date: __9/11/17__   Time: __0948__

GPS Coordinates: __33.927462, 717.378018__ Sample Type(s): __Grab__

Field Crew: __SS, LCD__   Photos Collected? [X] Yes [] No   Photo Count#: __4__

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather [] Partly Cloudy [] Sunny [X] Overcast [] Fog [] Rain [] Drizzle

Tide [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain [X] > 72 hours [] < 72 hours

Rainfall [X] None [] < 0 .1" [] > 0 .1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables [] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [] Clear [] Other _____

> N/A

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [X] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [] Dom. Animals # _____

[] Sewer Overflow   [] Food Waste/Scraps   [X] Birds # __5__

[] Trash Accumulation   [] Pet Waste   [] Wildlife # _____

[] Organic Matter   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [] No [] N/A   [X] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): __0__   Flow (gpm): __N/A__

FIELD MEASUREMENTS   N/A

Temp(°C): [____] pH [____] Sp Conductivity (μS/cm): [____] Chlorine (mg/L) [____] NH3 (ppm) [____]

Turbidity (NTU): [____]

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: __Dry__

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] 1Chemistry

Sample ID: _____

COMMENTS:

damp are side of street, not able to sample

watering observed at nursery adjacent to monitoring location

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: **M AD** Date: **9/13/17** Time: **0948**

GPS Coordinates: **33.927462, 717.39801** Sample Type(s): **N/A**

Field Crew: **VCD, SS** Photos Collected? [X] Yes [] No Photo Count#: **4**

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather: [] Partly Cloudy [X] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide: [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain: [X] > 72 hours [] < 72 hours

Rainfall: [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables: [] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____ N/A

Odor: [] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other N/A

Color: [] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity: [] Opaque [] Slightly Cloudy [] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow [] Food Waste/Scraps [] Birds # _____

[X] Trash Accumulation [] Pet Waste [] Wildlife # _____

[] Organic Matter [X] Landscaping [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [] Unknown

Active flow? Y (N) Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [X] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): **0** Flow (gpm): **N/A**

FIELD MEASUREMENTS

N/A

Temp(°C): [ ] pH [ ] Sp Conductivity (µS/cm): [ ] Chlorine (mg/L) [ ] NH3 (ppm) [ ]

Turbidity (NTU): [ ]

SAMPLE COLLECTION

[X] Visited, Not Sampled Reason Not Sampled: **dry**

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] Chemistry

Sample ID: _____

COMMENTS:

damp in curb on east side
dry upstream + on west side of st

- observed watering on nursery potted
plants on east side

- couches on curb 2 houses downstream

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __MAD__   Date: __9/18/17__   Time: __0953__

GPS Coordinates: __33.927462, 117.398018__   Sample Type(s): __none__

Field Crew: __LCD, SS__   Photos Collected? [X] Yes [] No   Photo Count#: __3__

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather: [X] Partly Cloudy [] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide: [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain: [X] > 72 hours [] < 72 hours

Rainfall: [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other ___
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other ___
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other ___
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear			[] Other ___

_N/A_

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [] Dom. Animals # _____

[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____

[X] Trash Accumulation   [] Pet Waste   [] Wildlife # _____

[X] Organic Matter _leaves_   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A

FLOW CONDITIONS

Flowing?   [] Yes   [X] No   [] N/A   (Dry)   [] Trickle

Current Conditons:

Total Rainfall (in.): __0__   Flow (gpm): __N/A__

FIELD MEASUREMENTS

_N/A_

Temp(°C): ____ pH ____   Sp Conductivity (µS/cm): ____ Chlorine (mg/L) ____ NH3 (ppm) ____

Turbidity (NTU): ____

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: __DM__

Grab Samples Collected? [] Yes [] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] Chemistry

Sample ID: _____

COMMENTS:

- watering observed at nursery on west side of st
- damp curb (trickle size) on east side of street, dry on west side
- couches on curb observed on west side of st
- construction on Victoria westbound btwn Madison & Grace

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: GRC   **Date:** 9/11/17   **Time:** 0923

GPS Coordinates: 33.905393, 717.401923   **Sample Type(s):** grab

Field Crew: LCD, SS   **Photos Collected?** [X] Yes [X] No   **Photo Count#:** Ø → phone didn't save)

Observed Land Use: [X] Residential   [] Commercial   [] Industrial   [X] Agricultural   [] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle

Tide [X] N/A   [] Low   [] Incoming   [] High   [] Outgoing   **Tide Height:** _____ ft.

Last Rain [X] > 72 hours   [] < 72 hours

Rainfall [X] None   [] < 0 .1"   [] > 0 .1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD   [] Natural   [] Gutter   [] Other _____

Floatables [X] None   [] Trash   [] Bubbles/Foam   [] Sheen   [] Fecal Matter   [] Other _____

Odor [X] None   [] Musty   [] Rotten Eggs   [] Chemical   [] Sewage   [] Other _____

Color [] None   [] Yellow   [X] Brown light   [] White   [] Gray   [] Other _____

Clarity [] Opaque   [] Slightly Cloudy   [X] Clear   [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [X] Dom. Animals # 3

[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____

[X] Trash Accumulation some not extensive   [] Pet Waste   [] Wildlife # _____

[] Organic Matter   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation (S) K   [X] Resident. Irrig. (S) K   [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? (Y) N   **Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?** Y N

FLOW CONDITIONS

Flowing? [] Yes   [] No   [] N/A   [] Dry   [X] Trickle

Current Conditons:

Total Rainfall (in.): Ø   **Flow (gpm):** trickle - not measurable < 1 gpm

FIELD MEASUREMENTS

Temp(°C): 2?.? **pH** 8.8   **Sp Conductivity (µS/cm):** 923   **Chlorine (mg/L):** 0.377   **NH3 (ppm)** 1.201

Turbidity (NTU): 7.60

SAMPLE COLLECTION

[] Visited, Not Sampled   **Reason Not Sampled:** _____

Grab Samples Collected? [X] Yes   [] No

Parameters Collected: [X] FIB   [X] MST/Virus   [X] Field WQ   [X] Chemistry

Sample ID: TD-ARL-1-GRC-091117

COMMENTS: Used syringe to draw sample

trickle only on opposite side of street as monitoring location

Arlington Bacteria Source Investigation

FIELD DATA SHEET

Site ID: GRC   Date: 9/13/17   Time: 0945

GPS Coordinates: 33.925323, -117.401723   Sample Type(s): N/A

Field Crew: VCD SS   Photos Collected? [X] Yes [] No   Photo Count#: 4

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather | [] Partly Cloudy [X] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide | [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain | [X] > 72 hours [] < 72 hours

Rainfall | [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables | [] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other ___ N/A

Odor | [] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other ___ N/A

Color | [] None [] Yellow [] Brown [] White [] Gray [] Other ___

Clarity | [] Opaque [] Slightly Cloudy [] Clear [] Other ___

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____
[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [] Dom. Animals # _____
[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____
[X] Trash Accumulation   [] Pet Waste   [] Wildlife # _____
[] Organic Matter   [] Landscaping   [X] Other dumping (tires, cars)

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [X] No [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): N/A

FIELD MEASUREMENTS   N/A

Temp(°C): [ ] pH [ ]   Sp Conductivity (µS/cm): [ ] Chlorine (mg/L) [ ]   NH3 (ppm) [ ]

Turbidity (NTU): [ ]

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: dry

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] Chemistry

Sample ID: _____

COMMENTS:

dry on both sides of street
slightly damp on east side slightly
upstream
lots of dumped trash on west side

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: GRC   **Date:** 9/18/17   **Time:** 0950

GPS Coordinates: 33.95323, -117.401723   **Sample Type(s):** none

Field Crew: LCD SS   **Photos Collected?** [X] Yes [] No   **Photo Count#:** 2

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0.1"	[] > 0.1"			

RUNOFF CHARACTERISTICS

Substrate:	[] Concrete SD [X] Natural [] Gutter [] Other _____ N/A
Floatables	[] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____
Odor	[] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____
Color	[] None [] Yellow [] Brown [] White [] Gray [] Other _____
Clarity	[] Opaque [] Slightly Cloudy [] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[X] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[X] Other cars, tires

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [X] No [] N/A   [X] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   **Flow (gpm):** N/A

FIELD MEASUREMENTS

N/A

Temp(°C): [ ] **pH** [ ]   **Sp Conductivity (µS/cm):** [ ] **Chlorine (mg/L)** [ ]   **NH3 (ppm)** [ ]

Turbidity (NTU): [ ]

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: Dry

Grab Samples Collected? [] Yes [] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] 1 Chemistry

Sample ID: _____

COMMENTS:

dry on both sides of street + upstream

- abandoned cars + lots of trash spread all the way to Victoria

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: **JEF**   Date: **9/11/17**   Time: **0915**

GPS Coordinates: **33.923222, 717.405422** Sample Type(s): **grab**

Field Crew: **SS, LCD**   Photos Collected? [X] Yes [] No   Photo Count#: **∅**

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0.1"	[] > 0.1"			

RUNOFF CHARACTERISTICS

Substrate:	[] Concrete SD	[X] Natural	[] Gutter	[] Other _____		
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear			[] Other _____

N/A

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[X] Landscaping *palm tree fronds on ground*	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [] No [] N/A [X] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): **∅**   Flow (gpm): **N/A**

FIELD MEASUREMENTS   **N/A**

Temp(°C): ____	pH ____	Sp Conductivity (µS/cm): ____	Chlorine (mg/L) ____	NH3 (ppm) ____

Turbidity (NTU): ____

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: **Dry**

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] 1 Chemistry

Sample ID: _____

COMMENTS:

Dry, no evidence of flow same day

- no flow observed upstream

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: JEF
Date: 9/13/17 **Time:** 0940
GPS Coordinates: 33.923222, 717.405422 **Sample Type(s):** N/A
Field Crew: LCD, SS **Photos Collected?** [X] Yes [] No **Photo Count#:** 3
Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy [X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A [] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[] Concrete SD [X] Natural [] Gutter [] Other _____				
Floatables	[] None [] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other N/A
Odor	[] None [] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other N/A
Color	[] None [] Yellow	[] Brown	[] White	[] Gray	[] Other N/A
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear		[] Other ____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[X] Other Shopping cart

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [] Unknown

Active flow? Y (N) **Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?** Y N

FLOW CONDITIONS

Flowing? [] Yes [X] No [] N/A [] Dry [] Trickle
Current Conditons:
Total Rainfall (in.): 0 **Flow (gpm):** N/A

FIELD MEASUREMENTS   N/A

Temp(°C):	pH	Sp Conductivity (µS/cm):	Chlorine (mg/L):	NH3 (ppm):

Turbidity (NTU):

SAMPLE COLLECTION

[X] Visited, Not Sampled **Reason Not Sampled:** dry
Grab Samples Collected? [] Yes [X] No
Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] 1 Chemistry
Sample ID: _____

COMMENTS:

Still dry upstream @ Victoria

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: JEF   Date: 9/18/17   Time: 0947

GPS Coordinates: 33.923222, 117.40542   Sample Type(s): none

Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 4

Observed Land Use: [X] Residential [X] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0.1"	[] > 0.1"			

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other ~~WWWW~~	
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear			[] Other

(N/A)

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[X] Other Shopping cart

Flow Source (Suspected [S] or Known [K])

N/A

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [X] No [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): _____   Flow (gpm): N/A

FIELD MEASUREMENTS

N/A

Temp(°C): ___ pH ___   Sp Conductivity (µS/cm): ___ Chlorine (mg/L): ___ NH3 (ppm) ___

Turbidity (NTU): ___

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: Dry

Grab Samples Collected? [] Yes [] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] Chemistry

Sample ID: _____

COMMENTS:

dry on both sides of street, leaf litter
in curbs

Shopping cart there since
at least
9/13/18

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: _ADA_   Date: _9/11/17_   Time: _0911_

GPS Coordinates: _33.918987, 117.41285_   Sample Type(s): _grab_

Field Crew: _SS, LCD_   Photos Collected? [X] Yes [] No   Photo Count#: _0_

Observed Land Use: [X] Residential   [] Commercial   [] Industrial   [X] Agricultural   [] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD   [] Natural   [] Gutter   [] Other _____

Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _N/A_
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other ___
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear		[] Other ___

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[] Other _____

none observed

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing?   [] Yes   [] No   [] N/A   [X] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): [____]   Flow (gpm): [_N/A_]

FIELD MEASUREMENTS   _N/A_

Temp(°C): [___] pH [___] Sp Conductivity (µS/cm): [___] Chlorine (mg/L) [___] NH3 (ppm) [___]

Turbidity (NTU): [___]

SAMPLE COLLECTION   [X] Visited, Not Sampled   Reason Not Sampled: _Dry_

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] 1Chemistry

Sample ID: _____

COMMENTS: _dry channel, no evidence of same day flow_
observed flow along Victoria btwn
Adams + (1 block east)

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: **ADA**

Date: **9/13/17** Time: **0936**

GPS Coordinates: **33.918987, -117.41285** Sample Type(s): **None**

Field Crew: **VCD SS** Photos Collected? [X] Yes [] No Photo Count#: **3**

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[] Concrete SD	[X] Natural	[] Gutter	[] Other _____		
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other __N/A__
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other __N/A__
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other __N/A__
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear			[] Other __N/A__

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [X] Dom. Animals # **1**

[] Sewer Overflow [] Food Waste/Scraps [X] Birds # **2**

[X] Trash Accumulation **>40pcs** [] Pet Waste [] Wildlife # _____

[] Organic Matter [] Landscaping [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [] Unknown

Active flow? Y (N) Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [] Yes [X] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): **0** Flow (gpm): **N/A**

FIELD MEASUREMENTS   **N/A**

Temp(°C): [ ] pH [ ] Sp Conductivity (μS/cm): [ ] Chlorine (mg/L) [ ] NH3 (ppm) [ ]

Turbidity (NTU): [ ]

SAMPLE COLLECTION

[X] Visited, Not Sampled Reason Not Sampled: **dry**

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] 1Chemistry

Sample ID: _____

COMMENTS:

trash in natural Channel on east side of st

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ADA   Date: 9/18/17   Time: 0943

GPS Coordinates: 33.918987, 717.41285   Sample Type(s): none

Field Crew: LCS, SS   Photos Collected? [X] Yes [] No   Photo Count#: 2

Observed Land Use: [] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather   [X] Partly Cloudy [] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide   [X] N/A [] Low [] Incoming [] High [] Outgoing   Tide Height: _____ ft.

Last Rain   [X] > 72 hours [] < 72 hours

Rainfall   [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables   [] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other ___

Odor   [] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other N/A

Color   [] None [] Yellow [] Brown [] White [] Gray [] Other

Clarity   [] Opaque [] Slightly Cloudy [] Clear [] Other

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [] Dom. Animals # _____

[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____

[X] Trash Accumulation   [] Pet Waste   [] Wildlife # _____

[] Organic Matter   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])   N/A

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing?   [] Yes [X] No [] N/A   N/A   [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): N/A

FIELD MEASUREMENTS   N/A

Temp(°C): ____ pH ____ Sp Conductivity (µS/cm): ____ Chlorine (mg/L): ____ NH3 (ppm): ____

Turbidity (NTU): ____

SAMPLE COLLECTION   [X] Visited, Not Sampled   Reason Not Sampled: Dry

Grab Samples Collected? [] Yes [] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] Chemistry

Sample ID: _____

COMMENTS:

Damp on east side of curb ~~btwn~~ b+wn mntring point + victoria,

dry on west side + upstream of victoria

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __GRT__   Date: __9/11/17__   Time: __0848__

GPS Coordinates: __33.916906, -117.416561__ Sample Type(s): __grab__

Field Crew: __SS, LCD__   Photos Collected? [X] Yes [] No   Photo Count#: __3__

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

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ATMOSPHERIC CONDITIONS

Weather   [] Partly Cloudy [] Sunny [X] Overcast [] Fog [] Rain [] Drizzle

Tide   [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain   [X] > 72 hours [] < 72 hours

Rainfall   [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables   [] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [X] Other __suspended dirt__

Odor   [] None [] Musty [X] Rotten Eggs _light_ [] Chemical [] Sewage [] Other _____

Color   [] None [] Yellow [X] Brown _light_ [] White [] Gray [] Other _____

Clarity   [X] Opaque [] Slightly Cloudy [] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____

[X] Trash Accumulation   [] Pet Waste   [] Wildlife # _____

[X] Organic Matter   [] Landscaping   [] Other _____

deep sludge, very soft around inlet

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation (S) K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? (Y) N

FLOW CONDITIONS

Flowing?   [X] Yes [] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): __0__   Flow (gpm): __32.820785__ (see calc)

FIELD MEASUREMENTS

Temp(°C): __24.7__ pH __9.0__   Sp Conductivity (µS/cm): __822__ Chlorine (mg/L) __0.398__ NH3 (ppm) __1.51__

Turbidity (NTU): __4.69__

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] 1 Chemistry

Sample ID: __T2-ARL-2-GRT-091117__

COMMENTS:

Sludge around inlet had foul smell (sulfides) + was very wet

dump on opposite side of curb but no water to sample

0.5 0.75 1.5 0.5   0.78 fps

22 in

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __GRT__   Date: __9/13/17__   Time: __0918__

GPS Coordinates: __33.916906, 117.46506__ Sample Type(s): __grab__

Field Crew: __LCD SS__   Photos Collected? [X] Yes [] No   Photo Count#: __2__

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [] None [X] Yellow _light_ [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow   [] Food Waste/Scraps   [X] Birds # __3__

[X] Trash Accumulation   [] Pet Waste   [] Wildlife # _____

[X] Organic Matter   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation (S) K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? (Y) N

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): __0__   Flow (gpm): __41.0181846?__ (see calcs)

FIELD MEASUREMENTS
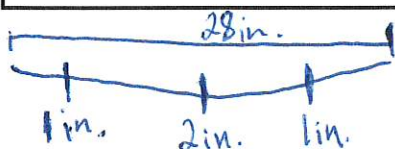
Temp(°C): __23.2__ pH __9.0__ Sp Conductivity (µS/cm): __957__ Chlorine (mg/L) __0.194__ NH3 (ppm) __0.727__

Turbidity (NTU): __2.33__

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: __T2-ARL-2-GRT-091317__

COMMENTS:

Sludge around inlet

$V = 0.47$ fps

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: GRT   Date: 9/18/17   Time: 0904

GPS Coordinates: 33.910906, -117.416561 Sample Type(s): grab

Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 3 + Dupstream of sandbags (GRTSource) 9.18.17

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables [] None [X] Trash [X] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [] None [] Musty [X] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [] None [X] Yellow light [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[X] Food Waste/Scraps	[X] Birds # 1
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? (Y) N

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): 38.40000267 (see calc)

FIELD MEASUREMENTS

Temp(°C): 20.0   pH 8.9   Sp Conductivity (µS/cm): 828 Chlorine (mg/L) 0.012 NH3 (ppm) 0.243

Turbidity (NTU): 1.37

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: T2-ARL-2-GRT-091817

COMMENTS:

- damp MMM in west side of street
- sample all from east side
- sludge around inlet

22 in.

V = 0.64 ft/s

1 in.   1.5 in.   1 in.
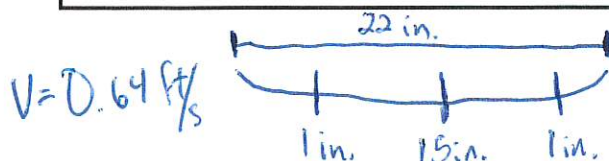
Source is pipe into channel in gutter
between GRT + Adams on
Dufferin

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: MON   **Date:** 9/11/17   **Time:** 0846

GPS Coordinates: 33.91304 -117.41887   **Sample Type(s):** Grab

Field Crew: ~~DDF~~ SS, LCD   **Photos Collected?** [X] Yes [] No   **Photo Count#:** 6

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain [] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____	
Floatables	[] None [] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _N/A_
Odor	[] None [] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _N/A_
Color	[] None [] Yellow	[] Brown	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear		[] Other _____

(handwritten margin note:) upstream no odor, brown color,

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[X] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation S (K) [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y (N)

FLOW CONDITIONS

Flowing? [] Yes [] No [] N/A   [X] Dry *at sampling point* [] Trickle

Current Conditons:

Total Rainfall (in.): 0   **Flow (gpm):** N/A

FIELD MEASUREMENTS   N/A

Temp(°C):	pH	Sp Conductivity (µS/cm):	Chlorine (mg/L):	NH3 (ppm):

Turbidity (NTU):

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: _dry_

Grab Samples Collected? [] Yes [] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] 1Chemistry

Sample ID: _____

COMMENTS: flow stops/ponded at pipe underneath driveway before gets to sampling point (1 block upstream) flow from upstream reaches a pile of sediment under pepper trees & is blocked from continuing in curb

(handwritten vertical margin note, right side:) see source notes on back

trickle on west side of street but
doesn't pass driveway upstream of
sampling point

- flowing on east side until hits
  sediment
  (block of T#R nurseries)

- at Dufferin, flow changes from
  east side of street to west
  side & comes from along
  Dufferin
  - address 2296 monroe
    - has some orange trees
      in front yard,
  - some overspray from
    2280 monroe

- irving notes on 8888 Dufferin are
  same source along Dufferin
  onto monroe

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: **MON**　　　　Date: 9/13/17　　Time: 0841

GPS Coordinates: 33.913064, 717.41887　Sample Type(s): grab

Field Crew: LCD, SS　　　Photos Collected? [X] Yes　[] No　　Photo Count#: 5

Observed Land Use: [X] Residential　[] Commercial　[] Industrial　[X] Agricultural　[] Parks　[] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[] Sunny	[X] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD　[X] Natural　[] Gutter　[] Other _____

Floatables: [X] None　[] Trash　[] Bubbles/Foam　[] Sheen　[] Fecal Matter　[] Other _____

Odor: [X] None　[] Musty　[] Rotten Eggs　[] Chemical　[] Sewage　[] Other _____

Color: [X] None　[] Yellow　[] Brown　[] White　[] Gray　[] Other _____

Clarity: [] Opaque　[] Slightly Cloudy　[X] Clear　[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage　　　[] Ag/Livestock Facility　　[] Encampments # _____

[] Waste Water Discharge　　　[] Leaking Trashcan or Dumpster　[X] Dom. Animals # 2

[] Sewer Overflow　　　　　　[] Food Waste/Scraps　　[] Birds # _____

[] Trash Accumulation　　　　[] Pet Waste　　　　　[] Wildlife # _____

[X] Organic Matter　　　　　　[] Landscaping　　　　[] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation S (K) [] Resident. Irrig. S K [] Washing S K　[] Other _____ S K　[] Unknown

Active flow? (Y) N　Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? (Y) N

FLOW CONDITIONS

Flowing?　[X] Yes　[] No　[] N/A　　[] Dry　[] Trickle

Current Conditons:

Total Rainfall (in.): 0　　　　　Flow (gpm): 20.0657185 (see calc)
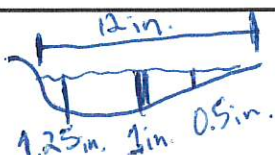
FIELD MEASUREMENTS

Temp(°C): 21.4　pH 8.0　Sp Conductivity (µS/cm): 1023　Chlorine (mg/L) 0.15　NH3 (ppm) .499
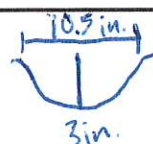
Turbidity (NTU): 3.48

SAMPLE COLLECTION

[] Visited, Not Sampled　Reason Not Sampled: _____

Grab Samples Collected? [X] Yes　[] No

Parameters Collected: [X] FIB　[X] MST/Virus　[X] Field WQ　[X] Chemistry

Sample ID: TD-ARL-3-MON-091317

COMMENTS:

Flow from Monroe Upstream

lady named Martha picked up trash ("")

V = 2.36 fps　　V = 1.2 fps

(12 in. / 1.25 in. / 1 in. / 0.5 in.)　(10.5 in. / 3 in.)

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: MON   **Date:** 9/13/17   **Time:** 0833

GPS Coordinates: 33.913064, 717.41887   **Sample Type(s):** grab

Field Crew: LCD, SS   **Photos Collected?** [X] Yes [] No   **Photo Count#:** 3

Observed Land Use: [X] Residential   [] Commercial   [] Industrial   [X] Agricultural   [] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	**Tide Height:** ____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables [X] None [X] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [X] Other organic matter

Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [X] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[X] Birds # 2 + 4 chickens at house upstream
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation S (K) [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? (Y) N   **Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?** (Y) N

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [X] Trickle

Current Conditons: 0

Total Rainfall (in.): 0   **Flow (gpm):** trickle   < 1 gpm

FIELD MEASUREMENTS

Temp(°C): 18.1 **pH** 8.4   **Sp Conductivity (μS/cm):** 810 **Chlorine (mg/L)** 0.04   **NH3 (ppm)** 0.295

Turbidity (NTU): 3.95

SAMPLE COLLECTION

[] Visited, Not Sampled   **Reason Not Sampled:** _____

Grab Samples Collected? [X] Yes   [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: TO-ARL-3-MON-091817

COMMENTS:

trickle flow

- used syringe to sample beginning of trickle + pooled water right at end of trickle
- water coming off orchard on Victoria just east of Monroe

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: IRV

GPS Coordinates: 33.910959 - 47.4225   Sample Type(s): grab

Date: 9/11/17   Time: 0828

Field Crew: ___, SS, LCD   Photos Collected? [X] Yes [] No   Photo Count#: 4

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather [] Partly Cloudy [X] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain [X] > 72 hours [] < 72 hours

Rainfall [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [] None [] Yellow [X] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow [] Food Waste/Scraps [] Birds # _____

[] Trash Accumulation [] Pet Waste [] Wildlife # _____

[X] Organic Matter [X] Landscaping [] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation (S) K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? (Y) N into pipe

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A [] Dry [] Trickle

Current Conditons: Ø

Total Rainfall (in.): Ø   Flow (gpm): 5.84415625 (see calc)

FIELD MEASUREMENTS

Temp(°C): 26.1 pH 8.8 Sp Conductivity (µS/cm): 931 Chlorine (mg/L) 0.696 NH3 (ppm) 1.862

Turbidity (NTU): 20.7

SAMPLE COLLECTION

[] Visited, Not Sampled Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: T2-ARL-3-IRV-091117

COMMENTS:

evidence of flow on both sides of road but side opposite pipe did not look wet from same day

- Source: grove irrigation runoff for blocks upstream
- address - 8888 Dufferin Ave

Sample:
v = 2.5 cfs
0.5'
8in

Source measurement:
2in
v = 0.82 cfs
11in

→ See source notes on back

drove farther upstream on Irving &
saw water coming from the
grove where the planted trees
became potted trees

obs
1) have trenches dug underneath
edge of each row of trees
so water may not make it
to curb/street

2) have concrete outlets (see
picture) where water
is coming from at end of
each row

3) water coming from ~~planted~~ potted
tree area onto/toward
trenches

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: __IRV__   Date: 9/13/17   Time: 0755

GPS Coordinates: 33.910959, 117.42257   Sample Type(s): grab

Field Crew: VCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 7

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy [X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A [] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours [] < 72 hours				
Rainfall	[X] None [] < 0.1" [] > 0.1"				

RUNOFF CHARACTERISTICS /corner Irving

Substrate:	[X] Concrete SD [X] Natural [] Gutter [] Other _____				
Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[] None	[X] Yellow light	[] Brown	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[] Slightly Cloudy	[X] Clear			[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[X] Dom. Animals # 2
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[X] Grove Irrigation S (K) [] Resident. Irrig. S K [] Washing S K   [] Other _____ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? (Y) N

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A   [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): 4.7785 8185 (see calc)

FIELD MEASUREMENTS

Temp(°C): 21.9 pH 8.8   Sp Conductivity (µS/cm): 800 Chlorine (mg/L) 0.280 NH3 (ppm) 0.289

Turbidity (NTU): 12.8

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: T2-ARL-3-IRV-091317

COMMENTS:

Sampled on opposite corner of Victoria & Irving
only trickle into same sample point as 9/11/17
- flow is from channel + curb on Irving + from
west to east on Victoria (majority)
- See Flow Source Log "IRVSource1 9.13.17"

IRV to Vic = trickle
(curb)

Vic to IRV = ½in 1½in 0.5 in at thalweg
0.49 fps

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: IPV   **Date:** 9/18/17   **Time:** 0827

GPS Coordinates: 33.910959, 117.42257   **Sample Type(s):** none

Field Crew: VCD, SS   **Photos Collected?** [X] Yes [] No   **Photo Count#:** 5

Observed Land Use: [X] Residential   [] Commercial   [] Industrial   [X] Agricultural   [] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[X] Natural	[] Gutter	[] Other _____	
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other N/A
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear		[] Other

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[X] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S   K   [] Resident. Irrig.   S   K   [] Washing S   K   [] Other _____ S   K   [] Unknown

Active flow? Y (N)   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?   Y   N

FLOW CONDITIONS

Flowing?   [] Yes   [X] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): 0   **Flow (gpm):** N/A

FIELD MEASUREMENTS

N/A

| Temp(°C): | | pH | | Sp Conductivity (µS/cm): | | Chlorine (mg/L): | | NH3 (ppm) | |

Turbidity (NTU):

SAMPLE COLLECTION

[X] Visited, Not Sampled   **Reason Not Sampled:** dry

Grab Samples Collected? [] Yes   [] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] 1 Chemistry

Sample ID: _____

COMMENTS:

damp in dirt toward west along Victoria from IPV

Slightly damp on west curb of Indy

dry on east side

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: T1 - ANZA   Date: 9/11/17   Time: 1409

GPS Coordinates: 33.95869, -117.4631   Sample Type(s): N/A

Field Crew: SS, LCD   Photos Collected? [X] Yes [] No   Photo Count#: 2

Observed Land Use: [X] Residential [X] Commercial [X] Industrial [] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy [X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter [] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage [] Other _____
Color	[] None	[] Yellow	[X] Brown dark	[] White	[] Gray [] Other _____
Clarity	[] Opaque	[X] Slightly Cloudy	[] Clear		[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[X] Other dumpster area w/ large items

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [X] Other Channel S K [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?   Y   N

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons: Ø

Total Rainfall (in.): Ø   Flow (gpm): N/A → not solid across over concrete edge

(margin note) not solid across over concrete edge

FIELD MEASUREMENTS   N/A

Temp(°C): [ ] pH [ ]   Sp Conductivity (µS/cm): [ ]   Chlorine (mg/L) [ ]   NH3 (ppm) [ ]

Turbidity (NTU): [ ]

SAMPLE COLLECTION   [X] Visited, Not Sampled   Reason Not Sampled: obs only

Grab Samples Collected? [] Yes   [] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] l Chemistry

Sample ID: _____

COMMENTS:

not quite flowing solidly over concrete edge, fast trickle, not sheet flow

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: T1 - ANZA   Date: 9/13/17   Time: 1051

GPS Coordinates: 33.958669, 717.4631   Sample Type(s): N/A

Field Crew: LCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 2

Observed Land Use: [X] Residential [X] Commercial [] Industrial [] Agricultural [X] Parks [X] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[X] Natural	[] Gutter	[] Other ~~~~~	
Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other ___
Odor	[] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other N/A
Color	[] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other
Clarity	[] Opaque	[] Slightly Cloudy	[] Clear		[] Other

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[X] Birds # 7
[X] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[X] Other dumped large trash items

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [X] Other ~~river~~ S K   [] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N   N/A

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): Ø   Flow (gpm): vis obs only

FIELD MEASUREMENTS   N/A

Temp(°C):	pH	Sp Conductivity (µS/cm):	Chlorine (mg/L):	NH3 (ppm):

Turbidity (NTU):

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: vis obs only

Grab Samples Collected? [] Yes [X] No

Parameters Collected: [] FIB [] MST/Virus [] Field WQ [] 1 Chemistry

Sample ID: _____

COMMENTS:

dumped trash along banks

flowing steady but thin sheet flow over edge of concrete structure in river

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: ANZA

Date: 9/18/17   Time: 1038

GPS Coordinates: 33.95869, 717.4(631   Sample Type(s): none

Field Crew: VCD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 1

Observed Land Use: [X] Residential [X] Commercial [] Industrial [] Agricultural [] Parks [X] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours				
Rainfall	[X] None	[] < 0.1"	[] > 0.1"			

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [X] Natural [] Gutter [] Other _____

Floatables	[] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other Unknown
Color	[] None	[] Yellow	[X] Brown	[] White	[] Gray	[] Other _____
Clarity		[] Opaque	[] Slightly Cloudy	[] Clear		[X] Other Unknown

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[X] Birds # 2
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[] Organic Matter	[] Landscaping	[X] Other river

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [X] Other _____ S K   [X] Unknown

Active flow? Y / N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons: 0

Total Rainfall (in.): 0   Flow (gpm): see notes

FIELD MEASUREMENTS   N/A

Temp(°C):	pH	Sp Conductivity (μS/cm):	Chlorine (mg/L):	NH3 (ppm)

Turbidity (NTU):

SAMPLE COLLECTION

[X] Visited, Not Sampled   Reason Not Sampled: Obs only

Grab Samples Collected? [] Yes   [] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] I Chemistry

Sample ID: _____

COMMENTS:

- Solid sheet flow over edge of concrete angle in river

- Same trash/dumping observed as 9/13/18

1

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: GIC

Date: 9/11/17   Time: 1126

GPS Coordinates: 33.922263 717.383654   Sample Type(s): grab

Field Crew: LDT SS   Photos Collected? [X] Yes [] No   Photo Count#: 2

Observed Land Use: [] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather [] Partly Cloudy [X] Sunny [] Overcast [] Fog [] Rain [] Drizzle

Tide [X] N/A [] Low [] Incoming [] High [] Outgoing Tide Height: _____ ft.

Last Rain [X] > 72 hours [] < 72 hours

Rainfall [X] None [] < 0.1" [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [X] Concrete SD [] Natural [] Gutter [] Other _____

Floatables [X] None [] Trash [] Bubbles/Foam [] Sheen [] Fecal Matter [] Other _____

Odor [X] None [] Musty [] Rotten Eggs [] Chemical [] Sewage [] Other _____

Color [X] None [] Yellow [] Brown [] White [] Gray [] Other _____

Clarity [] Opaque [] Slightly Cloudy [X] Clear [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage [] Ag/Livestock Facility [] Encampments # _____

[] Waste Water Discharge [] Leaking Trashcan or Dumpster [] Dom. Animals # _____

[] Sewer Overflow [] Food Waste/Scraps [] Birds # _____ none observed

[] Trash Accumulation [] Pet Waste [] Wildlife # _____

[] Organic Matter [] Landscaping [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [] Other _____ S K [X] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): 0   Flow (gpm): 1903.6

FIELD MEASUREMENTS

Temp(°C): 24.7 pH 8.1   Sp Conductivity (µS/cm): 982 Chlorine (mg/L) 0.197 NH3 (ppm) 1.502

Turbidity (NTU): 0.48

SAMPLE COLLECTION

[] Visited, Not Sampled Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: T2-ARL-GIC-091117

COMMENTS:

wetted perimeter
Top 130"
height 27"
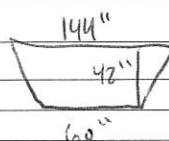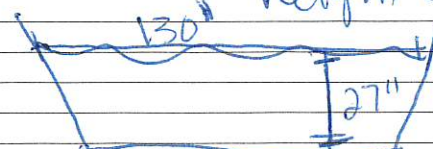
144"
42"
60"

130"
27"   0.26 fps

1903.6 gpm

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: **G I C** Date: 9/13/17 Time: 1003

GPS Coordinates: 33.922263, 717.383654 Sample Type(s): grab

Field Crew: VD SS Photos Collected? [X] Yes [] No Photo Count#: 3

Observed Land Use: [X] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[] Partly Cloudy	[X] Sunny	[] Overcast	[] Fog	[] Rain	[] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing	Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural	[] Gutter	[] Other _____		
Floatables	[X] None	[] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None	[] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[X] None	[] Yellow	[] Brown	[] White	[] Gray	[] Other _____
Clarity		[] Opaque	[] Slightly Cloudy	[X] Clear		[] Other _____

PROXIMATE BACTERIA SOURCE DATA   → empty ag field

[] Reclaimed Water Usage	[X] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter grassin channel	[X] Landscaping	[] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K [] Resident. Irrig. S K [] Washing S K [X] Other _Canal_ S K [] Unknown

Active flow? (Y) N Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N N/A

FLOW CONDITIONS

Flowing? [X] Yes [] No [] N/A [] Dry [] Trickle

Current Conditons:

Total Rainfall (in.): 0 Flow (gpm): 9129.8

FIELD MEASUREMENTS

Temp(°C): 22.3 pH 8.0 Sp Conductivity (µS/cm): 993 Chlorine (mg/L) 0.095 NH3 (ppm) 0.489

Turbidity (NTU): 0.72

SAMPLE COLLECTION

[] Visited, Not Sampled Reason Not Sampled: _____

Grab Samples Collected? [X] Yes [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: T2-ARL-GIC-091317

COMMENTS:

Flow is above brown flow lines on edges of channel
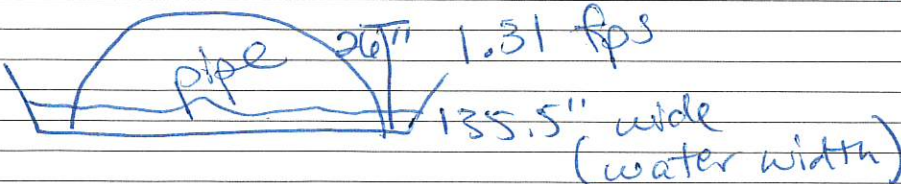
pipe 20" 1.31 fps

135.5" wide (water width)

144"

42"

60"

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: GIC   Date: 9/18/17   Time: 1010

GPS Coordinates: 33.922263, 717.383055   Sample Type(s): grab

Field Crew: UD, SS   Photos Collected? [X] Yes [] No   Photo Count#: 2

Observed Land Use: [] Residential [] Commercial [] Industrial [X] Agricultural [] Parks [] Open

ATMOSPHERIC CONDITIONS

Weather	[X] Partly Cloudy	[] Sunny	[] Overcast	[] Fog	[] Rain [] Drizzle
Tide	[X] N/A	[] Low	[] Incoming	[] High	[] Outgoing Tide Height: _____ ft.
Last Rain	[X] > 72 hours	[] < 72 hours			
Rainfall	[X] None	[] < 0.1"	[] > 0.1"		

RUNOFF CHARACTERISTICS

Substrate:	[X] Concrete SD	[] Natural [] Gutter [] Other _____			
Floatables	[X] None [] Trash	[] Bubbles/Foam	[] Sheen	[] Fecal Matter	[] Other _____
Odor	[X] None [] Musty	[] Rotten Eggs	[] Chemical	[] Sewage	[] Other _____
Color	[X] None [] Yellow	[] Brown	[] White	[] Gray	[] Other _____
Clarity	[] Opaque	[] Slightly Cloudy	[X] Clear		[] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage	[] Ag/Livestock Facility	[] Encampments # _____
[] Waste Water Discharge	[] Leaking Trashcan or Dumpster	[] Dom. Animals # _____
[] Sewer Overflow	[] Food Waste/Scraps	[] Birds # _____
[] Trash Accumulation	[] Pet Waste	[] Wildlife # _____
[X] Organic Matter	[] Landscaping	[X] Other pipe

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S K   [] Resident. Irrig. S K   [] Washing S K   [] Other _____ S K   [X] Unknown

Active flow? (Y) N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)? Y N

FLOW CONDITIONS

Flowing? [X] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditions: 0

Total Rainfall (in.): 0   Flow (gpm): 8941.6

FIELD MEASUREMENTS

Temp(°C): 2.3   pH 8.0   Sp Conductivity (µS/cm): 885   Chlorine (mg/L) 0.027   NH3 (ppm) 0.132

Turbidity (NTU): 0.61

SAMPLE COLLECTION

[] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected? [X] Yes   [] No

Parameters Collected: [X] FIB [X] MST/Virus [X] Field WQ [X] Chemistry

Sample ID: TJ-ARL-GIC-091817

COMMENTS:

long marine grass lining bottom of channel

V = 1.35 ft/s
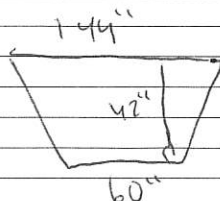
**Attachment C:
Field and Analytical Data**

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Table C-1. Analytical Results for Bacteria

Sampling Event Date	Inputs to Monroe Retention Basin	*E. coli* Concentration (MPN/100mL)	Human Marker Concentration (copies/100mL)	Upstream Agricultural Sites	*E. coli* Concentration (MPN/100mL)	Human Marker Concentration (copies/100mL)	Notes
9/11/17	ARL-1	1600	ND	ARL-1-ADA	--	--	
				ARL-1-JEF	--	--	
				ARL-1-GRC	210	ND	
				ARL-1-MAD	--	--	
				ARL-1-WAS	490[1]	ND[1]	
	ARL-2	1300	ND	ARL-2-GRT	98	ND	
	ARL-3	13000	ND	ARL-3-IRV	>24000	ND	
				ARL-3-MON	--	--	
9/13/17	ARL-1	490	ND	ARL-1-ADA	--	--	
				ARL-1-JEF	--	--	
				ARL-1-GRC	--	--	
				ARL-1-MAD	--	--	
				ARL-1-WAS	--	--	
	ARL-2	4900	ND	ARL-2-GRT	11000	ND	
	ARL-3	1600	ND	ARL-3-IRV	230	ND	
				ARL-3-MON	3100	<10	
9/18/17	ARL-1	520	133	ARL-1-ADA	--	--	
				ARL-1-JEF	--	--	
				ARL-1-GRC	--	--	
				ARL-1-MAD	--	--	
				ARL-1-WAS	--	--	
	ARL-2	1300	226	ARL-2-GRT	400	ND	
	ARL-3	1900	ND	ARL-3-IRV	--	--	
				ARL-3-MON	74	ND	

Notes: **Bolded** values are in excess of applicable water quality objectives (WQOs). Gray shaded cells = site dry

E. coli = *Escherichia coli*; J = estimated value, below limit of quantification; mL = milliliter; MPN = most probable number; ND = not detected; -- = not sampled because of lack of flow

1. Sample collected from ponded water.

Table C-2. Analytical Results for TSS

Sampling Event Date	Inputs to Monroe Retention Basin	TSS (mg/L)	Upstream Agricultural Sites	TSS (mg/L)	Notes
9/11/17	ARL-1	4	ARL-1-ADA	--	
			ARL-1-JEF	--	
			ARL-1-GRC	10	
			ARL-1-MAD	--	
			ARL-1-WAS	220[1]	Elevated TSS concentration may be associated with collection of ponded flow using sterile syringe
	ARL-2	2	ARL-2-GRT	40	
	ARL-3	4	ARL-3-IRV	36	
			ARL-3-MON	--	
9/13/17	ARL-1	2	ARL-1-ADA	--	
			ARL-1-JEF	--	
			ARL-1-GRC	--	
			ARL-1-MAD	--	
			ARL-1-WAS	--	
	ARL-2	ND	ARL-2-GRT	6	
	ARL-3	120	ARL-3-IRV	22	
			ARL-3-MON	6	
9/18/17	ARL-1	ND	ARL-1-ADA	--	
			ARL-1-JEF	--	
			ARL-1-GRC	--	
			ARL-1-MAD	--	
			ARL-1-WAS	--	
	ARL-2	4	ARL-2-GRT	4	
	ARL-3	4	ARL-3-IRV	--	
			ARL-3-MON	8	

Notes: **Bolded** values are in excess of applicable water quality objectives (WQOs). Gray shaded cells = site dry
J = estimated value, below limit of quantification; mg/L = milligrams per liter; ND = not detected; -- = not sampled because of lack of flow.
1. Sample collected from ponded water.

Table C-3. Analytical Results for Gage Irrigation Canal (Irrigation Source Water

Site ID	Sampling Event Date	TSS (mg/L)	*E. coli* Concentration (MPN/100mL)	Human Marker Concentration (copies/100mL)	Notes
T2-ARL-GIC	9/11/17	2	10	ND	None
	9/13/17	ND	10	ND	None
	9/18/17	6	ND	ND	None

Notes: **Bolded** values are in excess of applicable water quality objectives (WQOs). Gray shaded cells = site dry
J = estimated value, below limit of quantification; mg/L = milligrams per liter; ND = not detected; -- = not sampled because of lack of flow.

Table C-4. Summary of Field Water Quality Data

	Site Type	Site ID	Temp (°C)	pH	Specific Conductivity (µS/cm)	Turbidity (NTU)	Ammonia (mg/L)	Chlorine[1] (mg/L)
↑ Upstream to Downstream ↓	Irrigation Source Water	T2-ARL-GIC	21.3- 24.7	8.0-8.1	885-983	0.48- 0.72	0.132 -1.502	0.027- 0.192
	Agricultural Inputs	T2-ARL-3-IRV	21.9-26.1	8.8[3]	800-931	12.8-20.7	0.289-1.862	0.28-0.696[4]
		T2-ARL-3-MON	18.1-21.4	8.4-8.6	810-1023	3.45-3.95	0.295-0.499	0.04-0.157
		T2-ARL-2-GRT	20.0- 24.7	8.9-9.0	822-957	1.37- 4.69	0.243- 1.511	0.012-0.398[4]
		T2-ARL-1-ADA	No Flow – Not Sampled					
		T2-ARL-1-JEF	No Flow – Not Sampled					
		T2-ARL-1-GRC	26.6	8.8	923	7.6	1.201	0.377
		T2-ARL-1-MAD	No Flow – Not Sampled					
		T2-ARL-1-WAS	29.2	8.6	786	0.93	1.09	0.345
	Mixed Land Use Inputs to Monroe Retention Basin	T2-ARL-1	17.6-21.5	8.8-8.9	841-929	0.68-0.85	0.038-0.109	0.016-0.047
		T2-ARL-2	18.0-22.8	8.5-8.8	792-841	1.42-2.77	0.109-0.459	0.001-0.077
		T2-ARL-3	19.4-23.7	8.6-8.7	779-891	2.26-39.7	0.088-0.938	0.043- 0.795
	Outlet of Monroe Retention Basin	T2-ARL-OUT	NR[2]					
	Input to Santa Ana River	T1-ANZA	NR[2]					

Notes:
1. Total chlorine.
2. Not required per the Study Plan.
3. Both samples collected had pH of 8.8
4. Though chlorine values were elevated in some samples, samples with elevated chlorine were confirmed in the field as originating from grove irrigation.

Attachment D:
Flow Estimates

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Table D-1. Instantaneous Flow Estimates

Sampling Event Date	Inputs to Monroe Retention Basin	Instantaneous Flow Estimate at Time of Sample Collection[1] (gpm)	Instantaneous Flow Estimate Associated with Time of Upstream Instantaneous Flow Estimate[2] (gpm)	Upstream Agricultural Sites	Instantaneous Flow Estimate (gpm)	Sum of Instantaneous Flows from Agricultural Land Uses (gpm)	Sum of Instantaneous Flows Observed in Urban Land Uses (gpm)	Relative Contribution from Agricultural Land Uses
9/11/17	ARL-1	24.4	23.2	ARL-1-ADA	--	1[3,4]	1[5]	Minor
				ARL-1-JEF	--			
				ARL-1-GRC	Trickle (<1 gpm)			
				ARL-1-MAD	--			
				ARL-1-WAS	Ponded			
	ARL-2	104.2	15.0	ARL-2-GRT	32.8	32.8[4]	0	Major
	ARL-3	2.3	14.9	ARL-3-IRV	5.8	5.8[6]	0	Major
				ARL-3-MON	--			
9/13/17	ARL-1	23.2	20.6	ARL-1-ADA	--	0	0	None based on instantaneous observations
				ARL-1-JEF	--			
				ARL-1-GRC	--			
				ARL-1-MAD	--			
				ARL-1-WAS	--			
	ARL-2	4.3	8.5	ARL-2-GRT	41.0	41.0[6]	2[7]	Major
	ARL-3	226.3	82.7	ARL-3-IRV	4.6	65.3[6]	0	Major
				ARL-3-MON	60.7			
9/18/17	ARL-1	7.4	5.6	ARL-1-ADA	--	0	0	None based on instantaneous observations
				ARL-1-JEF	--			
				ARL-1-GRC	--			
				ARL-1-MAD	--			
				ARL-1-WAS	--			
	ARL-2	176.5	42.4	ARL-2-GRT	38.4	38.4[6]	0	Major
	ARL-3	49.8	12.7	ARL-3-IRV	--	1[3]	0	Minor
				ARL-3-MON	Trickle (<1 gpm)			

Notes:
-- = not sampled because of lack of flow
1. Instantaneous flow estimates at time of sample collection obtained from continuous flow record. Instantaneous flows estimated in the field at these sites used as calibration points for continuous flow monitoring.
2. The sampling team collected samples and flow estimates at the inputs to Monroe Retention Basin before visiting upstream agricultural sites: the difference in sample collection times was typically 1-2 hours. Therefore, instantaneous flow estimates at time of sample collection at the inputs are not directly comparable with upstream flow estimates to assess relative contribution. A representative time point was determined based on upstream sample collection times and an assumed 10-15 minute flow travel time, and the associated instantaneous flow value used for comparisons.
3. Trickle flows assumed to be 1 gpm for assessment purposes.
4. Suspected to be from agricultural over-irrigation, but not able to be field verified.
5. Ponded water observed at ARL-1-WAS suspected to be residential over-irrigation based on field observations. Assumed to be 1 gpm for assessment purposes.
6. Field verified as agricultural irrigation.
7. Two instances of recent residential over-irrigation observed. Each assumed to be 1 gpm for assessment purposes.

Orange line = Continuous flow data at T2-ARL-1; Purple dots = sum of Instantaneous flow estimates at upstream agricultural inputs.
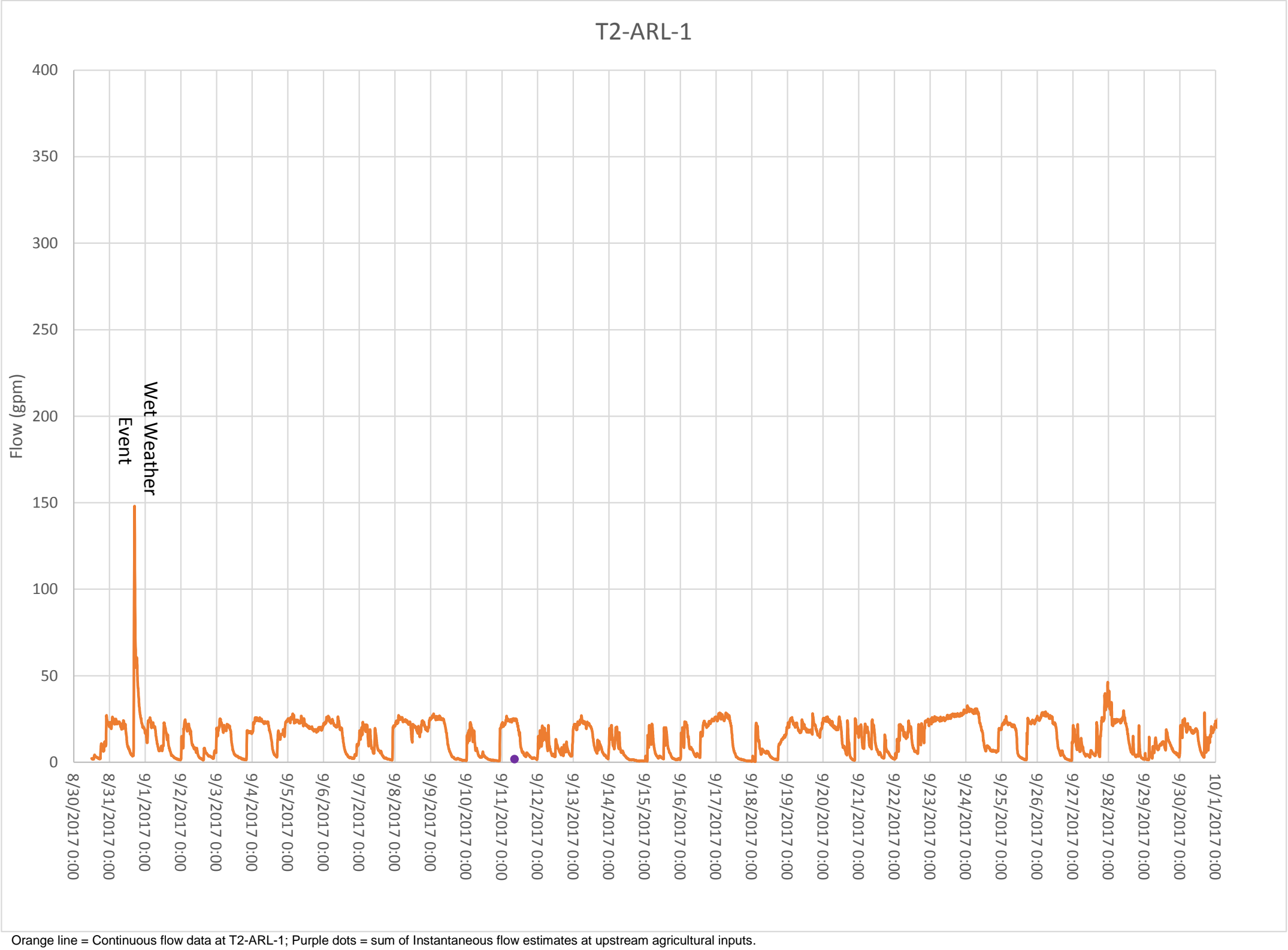
Figure D-1. Arlington Area Continuous Flow Date: Site T2-ARL-1

Orange line = Continuous flow data at T2-ARL-2; Purple dots = Instantaneous flow estimates at upstream agricultural input. Weir malfunction occurred on September 28, 2017 due to large debris from upstream.
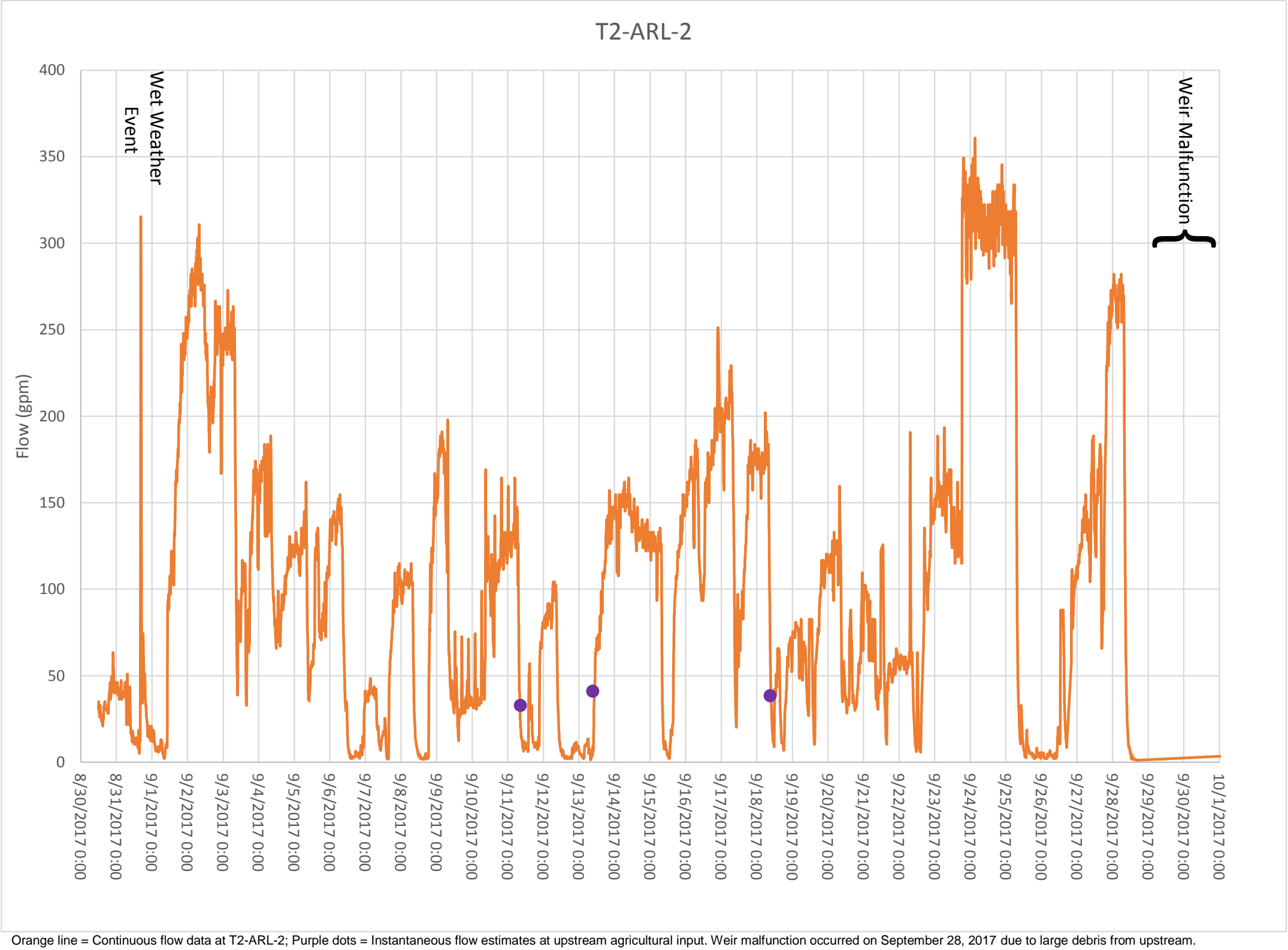
Figure D-2. Arlington Area Continuous Flow Date: Site T2-ARL-2

Orange line = Continuous flow data at T2-ARL-3; Purple dots = sum of Instantaneous flow estimates at upstream agricultural inputs
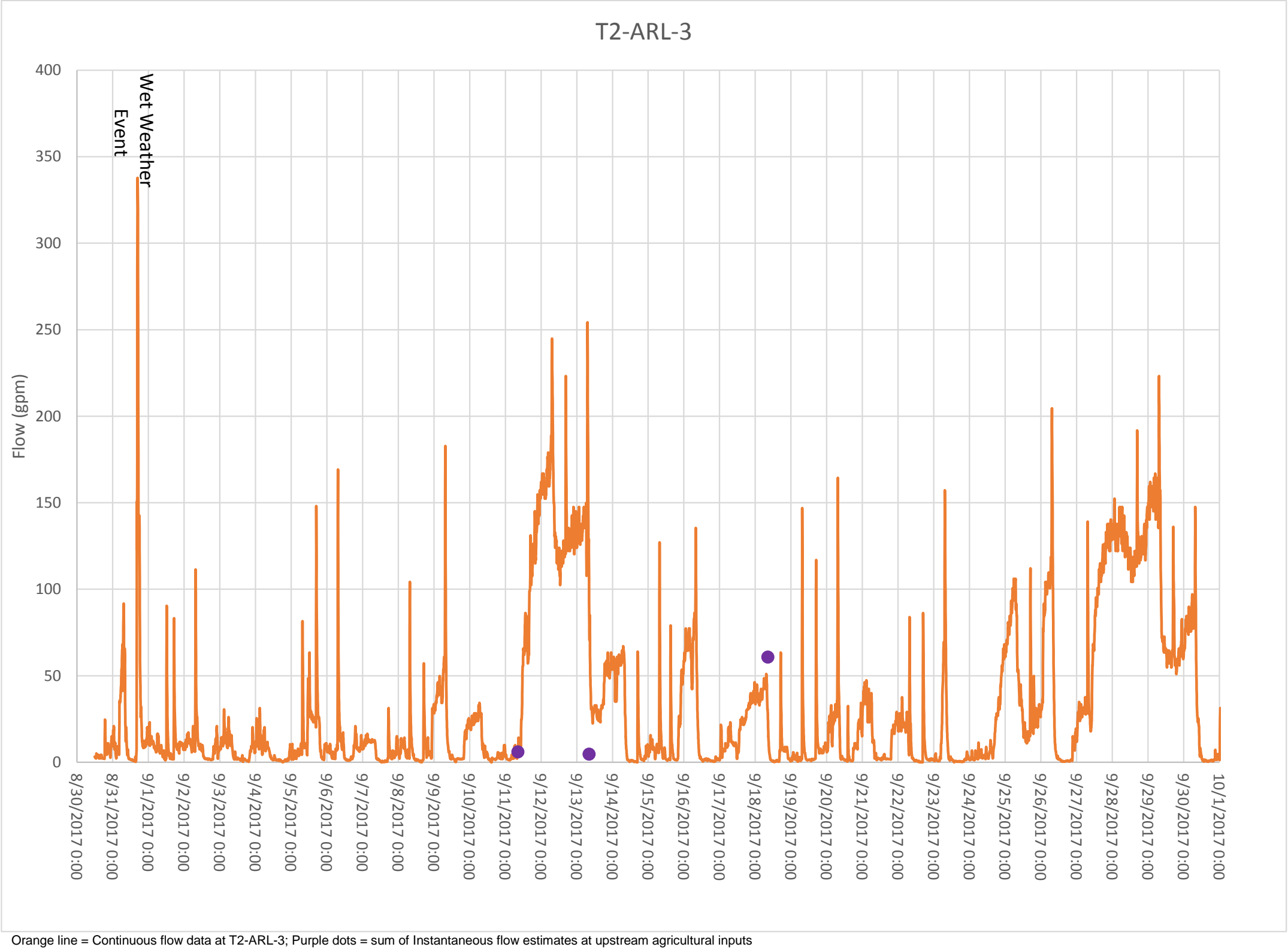
Figure D-3. Arlington Area Continuous Flow Date: Site T2-ARL-3

**Attachment E:
Study Plan**

(To be provided in PDF only)

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Santa Ana Watershed Project Authority (SAWPA)
Tier 2 Bacteria Source Investigation – Arlington Area

Study Plan

Prepared by:
Amec Foster Wheeler

August 2017

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Attachment A   Example Field Data Sheet

LIST OF ACRONYMS AND ABBREVIATIONS

µs/cm	microsiemens per centimeter
303(d) list	Clean Water Act Section 303(d) List of Water Quality Impaired Segments
Bacteria TMDL	Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Bacteria Indicator Total Maximum Daily Loads (TMDLs) for Middle Santa Ana River Watershed Waterbodies. Regional Board Resolution R8-2005-0001
C	Celsius
COC	chain of custody
CV	coefficient of variation
CWA	Clean Water Act
ddPCR	droplet digital polymerase chain reaction
E. coli	*Escherichia coli*
FDS	field data sheet
ID	identification
L	liters
LA	load allocation
mg	milligrams
mL	milliliters
MPN	most probable number
MSAR	Middle Santa Ana River
MST	microbial source tracking
NA	not applicable
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity units
QA/QC	quality assurance and quality control
QAPP	Quality Assurance Project Plan
RCFC&WCD	Riverside County Flood Control and Water Conservation District
RCP	reinforced concrete pipe
RL	reporting limit
RPD	relative percent difference
SARWQCB	Santa Ana Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
Site ID	site identifier
SM	Standard Method
TMDL	Total Maximum Daily Load
TSS	total suspended solids
WLA	wasteload allocation

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1 INTRODUCTION

Santa Ana River Reach 3 was added to the Clean Water Act (CWA) 303(d) list of water quality impaired segments (303(d) list) in 1988because of elevated indicator bacteria concentrations (Santa Ana Regional Water Quality Control Board [SARWQCB], 2005a). The SARWQCB adopted the Middle Santa Ana River (MSAR) Bacteria Indicator Total Maximum Daily Load (TMDL), Resolution R8-2005-0001 (SARWQCB, 2005b) in August 2005 as an amendment to the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) (SARWQCB, 1994). The MSAR Bacteria Indicator TMDL became effective on May 16, 2007, and specified dry season wasteload allocations (WLAs) for point source discharges and load allocations (LAs) for nonpoint source discharges for fecal coliform and *Escherichia coli* (*E. coli*) in the MSAR water bodies, including the Santa Ana River.

The MSAR Bacteria Indicator TMDL also required urban and agricultural dischargers in the area to implement a watershed-wide monitoring program, leading to formation of the MSAR Watershed TMDL Task Force (Santa Ana Watershed Project Authority [SAWPA], et al., 2013). A Quality Assurance Project Plan (QAPP) was developed and approved by SAWPA to support bacteria indicator monitoring activities, including routine TMDL compliance monitoring as well as upstream source investigations in the MSAR (SAWPA, 2016). The MSAR Watershed TMDL Task Force selected the Arlington Area for a Tier 2 Bacteria Source Investigation based on preliminary data collected in 2015.

1.1 PURPOSE

To further investigate bacteria sources in the Arlington Area, a Tier 2 Bacteria Source Investigation is being implemented. This study is designed to better understand human sources of fecal contamination and areas contributing dry weather flows. This Study Plan describes Tier 2 Bacteria Source Investigation activities to be implemented in the Arlington Area in fall 2017. These activities will be conducted in dry weather (defined as no measurable rainfall in the preceding 7 days). This Study Plan is based on study questions developed with key MSAR Bacteria Indicator TMDL stakeholders, as follows:

1. What are the predominant sources of dry weather flow in the Arlington Area?

2. What is the status of dry weather flow leaving the Monroe Retention Basin?

3. What are the magnitude and sources of *E. coli* in the observed dry weather flow?

4. Are *E. coli* from human sources?

2 PROJECT ORGANIZATION AND SCHEDULE

SAWPA is the lead agency responsible for overseeing the Tier 2 Bacteria Source Investigation in the Arlington Area and coordinating with key stakeholders. Rick Whetsel, the SAWPA Project Manager, has responsibility for overseeing the project work items. City of Riverside and Riverside County Flood Control and Water Conversation District (RCFC&WCD) are main field coordination points of contact. Consultants will conduct dry weather monitoring. Laboratory consultants will conduct constituent analysis. The primary contacts for this investigation are listed in Table 1.

Table 1. Points of Contact

CONTACT NAME	TELEPHONE NUMBER	LOCATION OF CONTACT
Key Stakeholders for Field Coordination		
Rick Whetsel, SAWPA Project Manager	951-354-4222	SAWPA
Mike Roberts	951-351-6310	City of Riverside
Kyle Gallup	951-955-8602	RCFC&WCD
Consultants		
Roshan Christoph, Project Manager	858-514-6475	Amec Foster Wheeler, San Diego
Darcy Ebentier, Project Coordinator/Field Lead	858-514-7706	Amec Foster Wheeler, San Diego
Ted Von Bitner, QA Officer	858-514-7741	Amec Foster Wheeler, San Diego
Cynthia Waddell, Laboratory Project Manager	951-653-3351	Babcock Laboratories, Inc.
James Herrin, Laboratory Project Manager	786-220-4651	Source Molecular Corporation

Amec Foster Wheeler = Amec Foster Wheeler Environment & Infrastructure, Inc.; QA = Quality Assurance;
RCFC&WCD = Riverside County Flood Control and Water Conservation District; SAWPA = Santa Ana Watershed Project Authority

2.1 SCHEDULE

Table 2 presents tentative project milestones and deadlines for the Tier 2 Bacteria Source Investigation.

Table 2. Tentative Project Milestones and Deadlines

TASK	TENTATIVE DEADLINE (2017)									
	Aug 1	Aug 9	Aug 11	Aug 18	Aug 30	Sep 7	Sep 12	Sep 30	Nov 17	Dec 22
Kickoff Meeting	■									
Desktop Analysis		■								
Field Verification			■							
Study Plan Draft		■								
Study Plan Final						■				
Flow Source Study					(Aug 30[1] to Sep 30)					
E. coli Source Study					(Sep 6[2] to Sep 15)					
Project Status Report							■			
Project Report Draft									■	
Project Report Final										■

1. Assumes SAWPA approval of flow monitoring location selection prior to Study Plan Draft.
2. Assumes SAWPA approval to initiate sample collection prior to Study Plan Final.

2.2 CONSTRAINTS

Monitoring activities for the Tier 2 Bacteria Source Investigation in the Arlington Area are subject to the following constraints:

- The study is targeted for dry weather conditions in August and September 2017. Should unseasonable rainfall be forecast, monitoring events may be rescheduled.

- Overlapping of monitoring schedules with downstream Bacteria TMDL[1] compliance monitoring may be impacted by factors that include (but are not limited to) rainfall and staff availability.

- Field teams will not mobilize during or near the Labor Day holiday.

Data collection for the Tier 2 Bacteria Source Investigation in the Arlington Area is subject to the following constraint:

- Analysis of the human-associated *Bacteroides* marker HF183 may be affected by inhibition. Inhibition occurs when the enzymatic reaction is slowed or stopped by the presence of inhibitory compounds, often large carbohydrate or humic acid molecules. As a result, inhibition may result in elevated reporting limits or false negatives. Inhibition will be mitigated to the extent feasible by using droplet digital drop polymerase chain reaction (ddPCR) technology and dilution. Matrix spikes and internal controls will be used by the laboratory to assess the level of inhibition for each sampling result.

---

[1] Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Bacteria Indicator Total Maximum Daily Loads (TMDLs) for Middle Santa Ana River Watershed Waterbodies. Regional Board Resolution R8-2005-0001

3 STUDY AREA AND SITE SELECTION

Based on data collected through 2015, high concentrations of indicator bacteria are originating in runoff from the Arlington Area of the City of Riverside and may flow downstream to the Santa Ana River via the Monroe Retention Basin. Predominant land uses within the Arlington Area are residential and agricultural. Preliminary monitoring suggests that runoff within agricultural lands in the Arlington Area has highly variable levels of bacteria indicators (City of Riverside, 2016). Elevated bacteria levels, however, did seem to be associated with irrigation runoff from nearby orchards (CDM-Smith, 2016). The irrigation water source (Gage Canal) had relatively low levels of bacteria, suggesting that bacteria input occurs after application of irrigation water to orchards (City of Riverside, 2016). Most of the flows southeast (upstream) of Victoria Avenue are transported via earthen channels on both sides of the roadway prior to entering the subsurface storm drain lines that ultimately discharge to the Monroe Retention Basin. Land uses, monitoring locations, and key drainage area details are provided in Figure 1.

3.1 SITE SELECTION

Monitoring locations were selected via desktop analysis and field verification and are provided in Tables 3 and 4. Figure 1 reflects three distinct subdrainage areas (ARL-1, ARL-2, and ARL-3) within the Arlington Area. The following factors were considered during the siting effort.

- Delineation of areas of agricultural land uses and dry weather flows from residential land uses

- Key confluences of storm drain lines

- Flow or evidence of flow was present during field visit

- If in public right-of-way, safe access and no restricted access or confined space entry

Three locations in Don Derr Park (T2-ARL-1, T2-ARL-2, T2-ARL-3) represent most of the dry weather flow that reaches the Monroe Retention Basin from the Arlington Area, from co-mingled agricultural and urban (e.g., residential, commercial) land uses. Land use was a key factor in site selection; majority of sites are selected to support assessment of flow and bacteria sources from agricultural land use. The eight locations in and around Victoria Avenue (T2-ARL-3-IRV, T2-ARL-3-MON, T2-ARL-2-GRT, T2-ARL-1-ADA, T2-ARL-1-JEF, T2-ARL-1-GRC, T2-ARL-1-MAD, T2-ARL-1-WAS) represent overland flow from predominantly agricultural land uses in the Arlington Area and include most points of entry for agriculture flow to the downstream storm drains within urban land uses in the Arlington Area. The Gage Canal (T2-ARL-GIC) location was selected as a control site to record the water quality in the Gage Canal as it enters the Arlington Area, prior to the water being used for irrigation of agricultural lands. Two additional locations (T1-ANZA and T2-ARL-OUT) will also be used to assess status of outflow from the Monroe Retention Basin to the Santa Ana River. Location T2-ARL-OUT represents the confluence of T2-ARL-1, T2-ARL-2, and T2-ARL-3 as flow exits the Monroe Retention Basin. Location T1-ANZA represents the sum of flows from both the Monroe Retention Basin and other intermediate inputs just prior to discharge to the Santa Ana River.
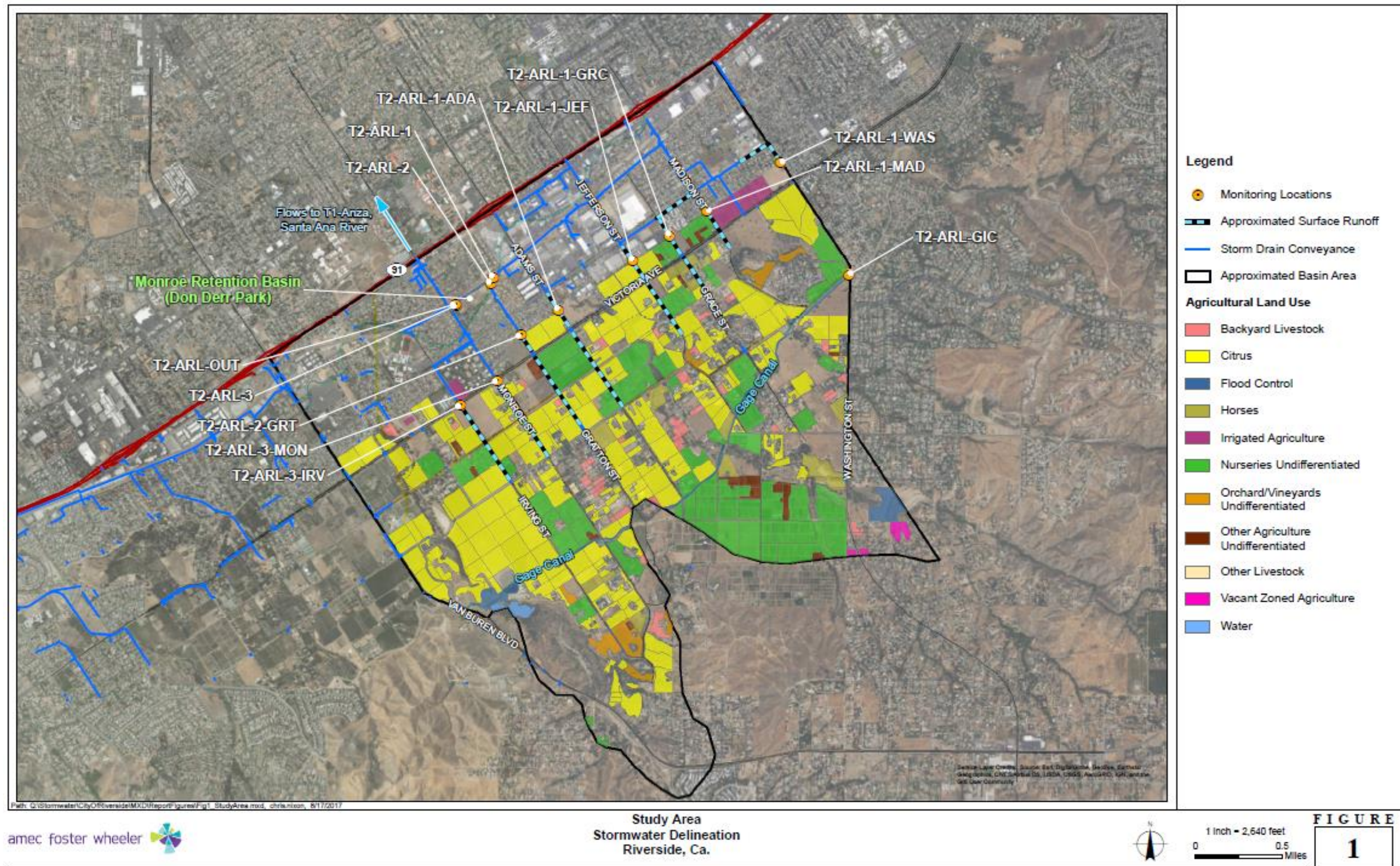
Figure 1. Tier 2 Source Investigation Monitoring Locations and Arlington Area Overview

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4 Dry Weather Flow Monitoring

Flow monitoring will be implemented to examine the extent of dry weather flow in the Arlington Area and to collect data to address study questions 1 and 2. Flow monitoring will consist of estimates of both continuous flow monitoring and instantaneous flow.

4.1 Continuous Flow Monitoring

Continuous flow data will be collected at three locations for a minimum of four weeks. The selected sites are the major outfalls discharging to the Monroe Retention Basin that convey runoff from three distinct storm water conveyances within the Arlington Area. The locations represent most of the dry weather flow from the Arlington Area that reaches the Monroe Retention Basin in Don Derr Park. The continuous flow monitoring period will occur in August and September 2017, concurrent with the *E. coli* source study monitoring activities. Data will be collected in 5-minute intervals (minimum). Continuous flow monitoring site names, locations, and equipment configurations are provided in Table 3.

Table 3. Continuous Flow Monitoring Locations and Equipment Configurations

SITE IDENTIFICATION	SITE DESCRIPTION	EQUIPMENT CONFIGURATION	LATITUDE	LONGITUDE
T2-ARL-1	Single box culvert in Don Derr Park draining eastern Arlington Area	Bubbler flow meter with Y-flume	33.921675	-117.419419
T2-ARL-2	Reinforced concrete pipe (RCP) in Don Derr Park draining central Arlington Area along Gratton Street	HOBO level logger with V-notch weir	33.921143	-117.419667
T2-ARL-3	RCP in Don Derr Park draining western Arlington Area along Irving Street and Monroe Street	HOBO level logger with V-notch weir	33.919332	-117.423083

4.2 Instantaneous Flow Estimates

Instantaneous flow rates will be estimated as part of visual observations during the *E. coli* source study monitoring activities (Section 5.3). At minimum, instantaneous flow estimates will be collected at up to 12 monitoring locations within the Arlington Area during each of three monitoring events. Instantaneous flow estimates will also be collected at the outlet where flows from the Arlington Area exit the Monroe Retention Basin (T2-ARL-OUT) as well as at the downstream T1-ANZA monitoring location (receives flows from T2-ARL-OUT and other sources) to verify the status of discharge to the Santa Ana River. Monitoring locations are provided in Table 4 and are described in detail in the Section 3. Additional flow estimates may be collected opportunistically during other site visits and field surveys. Flow estimates will be made using the visual flow estimate method described in Section 11.3.1 of the QAPP (SAWPA, 2016). Suspected or known sources of flow will also be noted when feasible, and representative photographs will be taken.

5 *E. COLI* SOURCE STUDY

A combination of visual observations and sample collection will be used to address study questions related to the magnitude and sources of *E. coli* in Arlington Area (study questions 3 and 4). Monitoring will be conducted under dry weather conditions (antecedent dry period of 7 days with no measurable rainfall). Monitoring locations are provided in Table 4.

Three dry weather monitoring events will be scheduled between August and September 2017Sampling and visual observations will be recorded at up to 12 monitoring locations in the Arlington Area during each event. A maximum of 30 samples (10 samples per event) will be collected (Section 5.3). . A minimum of three samples per site is needed to confirm the presence of microbial source tracking (MST) markers and to distinguish known versus suspected sources. Visual observations will also be recorded at the T2-ARL-OUT and T1-ANZA monitoring locations to verify the status of flows leaving the Monroe Retention Basin.

One follow-up monitoring event will be conducted as needed, based on data from the initial three monitoring events. Follow-up monitoring will consist of visual observations only and will be used to provide additional information regarding bacteria sources.

5.1 MONITORING LOCATIONS

During each event, Amec Foster Wheeler will collect visual observations at all monitoring locations (Table 4). Amec will also collect samples at the three outfalls discharging to the Monroe Retention Basin, up to six representative locations that drain the predominantly agricultural land uses, and the Gage Channel control location. Since dry weather flow conditions are unpredictable, eight representative sites of agricultural land use were included to provide alternative site options if some sites are dry during a monitoring event. After Event 1, the same sites will be targeted for sample collection during Events 2 and 3. Samples will not be collected from flows between the Monroe Retention Basin and the Santa Ana River (T2-ARL-OUT and T1-ANZA).

In the unlikely event that flow is encountered at all monitoring locations, they have been prioritized to provide maximum benefit for addressing study questions (Table 4). Sampling priorities are as follows:

- Priority 1 locations include the three outfalls discharging to the park and the Gage Canal control location. These locations will be sampled during each event.

- Priority 2 and 3 locations represent predominantly agricultural land uses in the upper Arlington drainage area. If flow is occurring at more than six of these locations, Priority 2 locations will be sampled first. Priority 3 locations, which represent a lower proportion of agricultural land use, will then be sampled in order from highest flow rate to lowest.

Table 4. Tier 2 Source Investigation Monitoring Locations

SITE IDENTIFICATION	SITE DESCRIPTION	LATITUDE	LONGITUDE	PREDOMINANT LAND USE	FLOW ESTIMATE TYPE	VISUAL OBSERVATIONS	SAMPLE COLLECTION [1]	SAMPLE COLLECTION PRIORITY
T2-ARL-1	Single box culvert in Don Derr Park draining eastern Arlington Area	33.921675	-117.419419	Mixed Urban and Agricultural	Continuous by Flow Meter	Yes	Yes	1
T2-ARL-2	RCP in Don Derr Park draining central Arlington Area along Gratton Street	33.921143	-117.419667		Continuous by Level Logger	Yes	Yes	1
T2-ARL-3	RCP in Don Derr Park draining western Arlington Area along Irving Street and Monroe Street	33.919332	-117.423083		Continuous by Level Logger	Yes	Yes	1
T2-ARL-3-IRV	Surface flow at intersection of Victoria Avenue and Irving Street	33.910959	-117.422570	Agricultural	Instantaneous by Visual Estimate	Yes	Yes	2
T2-ARL-3-MON	Surface flow at intersection of Victoria Avenue and Monroe Street	33.913064	-117.418870			Yes	Yes	2
T2-ARL-2-GRT	Surface flow on Gratton Street, south of Williamsburg Place	33.916906	-117.416561			Yes	Yes	2
T2-ARL-1-ADA	Surface flow on Adams Street, south of Baxter Way	33.918987	-117.412850			Yes	Yes	2
T2-ARL-1-JEF	Surface flow on Jefferson Street, between Lincoln Avenue and Victoria Avenue	33.923222	-117.405422			Yes	Yes	2
T2-ARL-1-GRC	Surface flow on Grace Street, between Lincoln Avenue and Victoria Avenue	33.925323	-117.401723			Yes	Yes	2
T2-ARL-1-MAD	Surface flow on Madison Street, between Lincoln Avenue and Victoria Avenue	33.927462	-117.398018			Yes	Yes	3
T2-ARL-1-WAS	Surface flow on Washington Street, between Lincoln Avenue and Victoria Avenue	33.931596	-117.390637			Yes	Yes	3
T2-ARL-GIC	Control Site, Irrigation water from Gage Canal at point of entry into Arlington Area (intersection of Washington Street and Dufferin Avenue)	33.922263	-117.383654	NA – Irrigation Source Water		Yes	Yes	1
T2-ARL-OUT	RCP conveying flows from Don Derr Park downstream to T1-ANZA	33.919389	-117.423152	Mixed Urban and Agricultural	Instantaneous by Visual Estimate	Yes	No	NA
T1-ANZA	Discharge point of Anza Channel (receives flows from Monroe Retention Basin) to Santa Ana River	33.958690	-117.463100	Mixed		Yes	No	NA

Notes: NA = not applicable; RCP = reinforced concrete pipe

1. A maximum of 10 samples will be collected per event. In the unlikely event that all 12 monitoring locations targeted for sample collection have flow, sample collection will be performed at Priority 1 locations first, followed by Priority 2 and 3 locations.

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5.2 SAMPLE COLLECTION

Samples will be collected for analysis of field and laboratory water quality parameters at a maximum of 10 locations per monitoring event, with a study maximum of 30 samples. Samples will be collected in dry weather conditions and as long as conditions are safe. Grab samples will be collected mid-stream and at the surface of the flow. Water samples will be collected before field water quality parameters, because sediment could be disturbed while collecting the field measurements. Sites selected for sample collection will avoid areas with algae or other debris. If the bottle contains a preservative, the sample bottle will not be allowed to overflow as the sample is collected. A sterilized syringe will be used to collect samples where sheet flow is occurring, or where flow must be composited into one sample because discharge is occurring at multiple locations from same parcel or drainage area. For example, many of the monitoring locations representing surface flow from agricultural land uses consist of earthen channels on either side of the road. In the event that flow is occurring on both sides of the road simultaneously, an equal-volume composite will be collected using a syringe with volumetric markings. Sample labels will be affixed to each sample bottle and the samples will be placed on ice as they are collected. Sample identifications (IDs) are recorded on FDSs, as described below. Additional details for sample collection are provided in Section 11 of the QAPP (SAWPA, 2016).

5.3 VISUAL OBSERVATIONS

Visual observations, such as color, clarity, floatables, trash, flow estimates, proximate bacteria sources, etc., are recorded on an FDS for each monitoring location for each sampling and observation event. Field staff will also make observations regarding the suspected or known sources of flow, which may include (but are not limited to) location, type, and associated land use. Representative[2] photographs will be collected. In particular, visual observations at T2-ARL-OUT will include documentation of dry weather flow from within Don Derr Park. An example FDS is provided at the end of this Study Plan. Visual observations to be collected may include, but are not limited to:

- Atmospheric conditions
- Runoff characteristics (e.g. color, odor, clarity)
- Flow status
- Estimated flow rate
- Suspected or known source of flow
- Proximate bacteria sources (presence, type, and quantity)
- Photographs

5.4 FIELD WATER QUALITY ANALYSIS

Field water quality measurements will be collected via portable water quality meters and recorded on FDS. Field water quality measurements to be collected are provided in Table 5. Details are also provided in Section 11.2 of the QAPP (SAWPA, 2016). Water quality meters will be calibrated prior to each sampling event.

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[2] In particular, representative photographs will depict current status of flow sources within each area and may include photographs on inactive sources as well as active/recent sources.

Table 5. Field Water Quality Measurements

CONSTITUENT	METHOD	ANALYTICAL RANGE
pH	Oakton® PCTestr 35	0.0 – 14.0
Temperature	Oakton® PCTestr 35	0 - 50 ˚C
Conductivity	Oakton® PCTestr 35	2,000 – 20,000 µS/cm
Turbidity	LaMotte 2020E Handheld	0.01 – 4000 NTU
Ammonia	V-2000 photometer by CHEMetrics® with CHEMets® Kit (Catalog No. K-1523)	0–14.0 mg/L
Chlorine[1]	V-2000 photometer by CHEMetrics® with CHEMets® Kit (Catalog No. K-2513)	0 – 5.0 mg/L

Notes:

C = Celsius; mg = milligrams; mL = milliliters; L = liters; NTU = nephelometric turbidity units; µS/cm = microsiemens per centimeter

1. Optional parameter

5.5   LABORATORY ANALYSIS

Samples will be analyzed by a qualified laboratory for *E. coli*, total suspended solids (TSS), and the human-associated *Bacteroides* marker HF183. Additionally, samples will be archived for future genetic testing. These archive samples may be archived for up to 1 year. Depending on sources observed during this monitoring effort, AmecFW may recommend specific samples be analyzed using animal markers in a follow up project. Samples will be collected and submitted for analysis as described in Table 6. Details for methods for analysis are provided in Section 13 of the QAPP (SAWPA, 2016).

Table 6. Laboratory Water Quality Parameters

CONSTITUENT	ANALYTICAL LABORATORY	METHOD	PROJECT REPORTING LIMIT[1]
TSS	Babcock Laboratories, Inc.	SM 2540D	1.0 mg/L
E. coli	Babcock Laboratories, Inc.	SM 9223B	10 MPN/100 mL
HF183	Source Molecular	ddPCR	100 copies/100 mL

Notes:

ddPCR = droplet digital polymerase chain reaction; L = liters; MPN = most probable number; mg = milligrams; mL = milliliters; SM = Standard Method; TSS = total suspended solids

1. Project reporting limit is the target reporting limit. Reporting limit may change on the basis of dilution required to achieve quantitative results and/or presence of inhibitory compounds.

5.6   MONITORING LOGISTICS AND QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

The Tier 2 Bacteria Source Investigation will be scheduled to overlap with ongoing Bacteria TMDL monitoring at downstream locations (e.g., WW-S4) to the extent feasible. This approach provides a spatially robust dataset and is discussed in detail in the QAPP (SAWPA, 2016).

Sampling events will be targeted to early mornings from Monday through Wednesday to allow for overnight shipments from Babcock Laboratories, Inc.to Source Molecular Corporation for analysis of HF183. Water samples will be stored on ice in the dark and will be delivered to Babcock Laboratories, Inc.within 6 hours of sample collection. Babcock Laboratories, Inc.will analyze *E. coli* by Standard Method (SM) 9223B in accordance with the QAPP. Babcock Laboratories, Inc.will also perform membrane filtration of samples for analysis of HF183 within 8 hours of sample collection. Filters will then be flash frozen and shipped on dry ice overnight per QAPP specifications to Source Molecular Corporation for HF183 marker analysis by ddPCR.

Appropriate precleaned sample containers will be used. Sample bottles and bottle caps will be protected from contact with solvents, dust, or other contaminants. New gloves will be used to collect samples at each site. All sample bottles will be prelabeled. The labels will contain the sample identification number, the project name, analyses to be performed, and blank spaces for the date, time, and sampler's initials to be completed in the field. Additionally, a chain-of-custody (COC) form will be completed and submitted with each sample.

Table 7 presents the sampling analysis, handling, and holding time requirements for the analyses to be conducted in the laboratory.

Table 7. Sample Handling and Holding Times

CONSTITUENT	ANALYTICAL LABORATORY	CONTAINER	MINIMUM VOLUME	HOLDING TIME
TSS	Babcock Laboratories, Inc.	Clean plastic	1 L	7 days at 4°C
E. coli	Babcock Laboratories, Inc.	Sterile plastic	100 mL	6 hours at 4°C
HF183	Source Molecular Corporation	Single use[1], sterile plastic	500 mL	24[2] hours at 4°C

Notes:

C = Celsius; L = liters; mL = milliliters; TSS = total suspended solids

1.   To prevent contamination by DNA not removed during typical sterilization procedures (e.g., autoclaving).

2.   Amec Foster Wheeler recommends 8 hours to prevent sample degradation.

QA/QC analysis will be conducted in the field and in the laboratories and results will be compared with data quality objectives according to requirements outlined in Sections 7, 11, and 14 of the QAPP (SAWPA, 2016). The QAPP does not require field or equipment blanks or field replicates to be collected for Tier 2 source investigations (Section 11.1.1). Table 8 presents the required QA/QC analyses.

Table 8. Quality Assurance and Quality Control Samples

QA/QC SAMPLE TYPE	CONSTITUENT	FREQUENCY OF COLLECTION	ACCEPTANCE LIMITS
Field Duplicate	NA	Not required per QAPP	NA
Field Blank	NA	Not required per QAPP	NA
Field Replicate	NA	Not required per QAPP	NA
Method Blank	TSS	1 in 20 samples or 1 per batch	Less than reporting limit
	E. coli and HF183	1 per lot minimum	No detectable amounts
Laboratory Replicate	TSS	1 in 20 samples or 1 per batch	<25% RPD[1]
	E. coli	10% of samples or 1 sample per test run	<25% RPD[2]
	HF183	10% of samples or 1 sample per test run	NA[3]
Matrix Spike[4]	TSS	1 in 20 samples or 1 per batch	80 – 120 percent recovery
Laboratory Control	*E. coli* and HF183	1 for each lot of medium received from manufacturer or prepared in laboratory	Positive results for target organisms. Negative results (<RL) for non-target organisms

Notes:

CV = coefficient of variation; NA = not applicable; QAPP = Quality Assurance Project Plan; RL = reporting limit; RPD = relative percent difference; TSS = total suspended solids;

1.   See QAPP for details regarding calculation (SAWPA, 2016).

2.   Analytical laboratory has insufficient historical data to assess precision in accordance with QAPP requirements. A per-sample assessment consistent with past Surface Water Ambient Monitoring Program (SWAMP) QA requirements will be used.

3.   Per QAPP, assessment of precision for *Bacteroides* analyses not applicable (Table 7-2).

4.   Laboratory control sample may be used in lieu of matrix spike.

6 APPROACH FOR DATA ANALYSIS AND REPORTING

This study is focused on characterizing human sources of fecal contamination and identifying areas contributing dry weather flows within the Arlington Area. The study will also provide recommendations for additional source investigation as-needed.

This study will develop a bacteria source inventory for the drainage area of interest based on GIS analysis and field data. Bacteria source inventories capture the locations and nature (persistent or intermittent) of sources in the drainage area. This is a valuable tracking tool that may be updated as new data is generated and to prioritize follow up source investigations. A minimum of three monitoring events is needed to confirm the presence of MST markers and to distinguish known versus suspected sources in context of the bacteria source inventory.

With respect to the flow source investigations, three sites were selected to capture the three main storm drain discharge points to the Monroe Retention Basin. These sites represent mixed urban and agricultural flows. The remaining sites were selected to characterize the majority of the agricultural inputs within the Arlington Basin. Monitoring data (e.g. bacteria, flow estimates) collected at these sites will be used to characterize agricultural contributions relative to the downstream mixed input sites. Data generated from this study will be analyzed to address each study question and provide recommendations for next steps as described in Table 9.

Table 9. Approach to Data Analysis

STUDY QUESTION/TASK	DATA ANALYSIS
What are the predominant sources of dry weather flow in the Arlington Area?	• Estimate flow at each site monitored. • Estimate the relative contributions from different land uses by comparing flow from the predominantly agriculture land use sites to the three main points of discharge that include both the agricultural and urban flows.
What are the magnitude and sources of *E. coli* in the observed dry weather flow?	• Characterize the spatial extent of bacteria throughout the Arlington Area • Use water quality data, visual observations, and flow data in context of the bacteria source inventory to develop a profile of the three distinct sub-drainage areas within the Arlington Area.
What is the status of dry weather flow leaving the Monroe Retention Basin?	• The continuous flow data at the three sites in Monroe basin will be used to estimate the total dry weather loads discharging from the basin. Visual flow estimates at the outlet will also be used to confirm dry weather flows are discharging from the Monroe basin and that the T1-Anza site is discharging and flow reaches the Santa Ana River.
Are *E. coli* from human sources?	• Use HF183 data to identify known versus suspected presence of human sources.
Any recommendations?	• Develop a source inventory to support prioritization of sources. • Prioritize the three drainage areas (and locations within each) for further investigation. • Determine if any archived samples should be tested for animal markers.

7 REFERENCES

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ATTACHMENT A

EXAMPLE FIELD DATA SHEET

Arlington Bacteria Source Investigation
FIELD DATA SHEET

Site ID: _____   Date: _____   Time: _____

GPS Coordinates: _____   Sample Type(s): _____

Field Crew: _____   Photos Collected?   [] Yes   [] No   Photo Count#: _____

Observed Land Use: [] Residential   [] Commercial   [] Industrial   [] Agricultural   [] Parks   [] Open

ATMOSPHERIC CONDITIONS

Weather   [] Partly Cloudy   [] Sunny   [] Overcast   [] Fog   [] Rain   [] Drizzle

Tide   [] N/A   [] Low   [] Incoming   [] High   [] Outgoing   Tide Height: _____ft.

Last Rain   [] > 72 hours   [] < 72 hours

Rainfall   [] None   [] < 0.1"   [] > 0.1"

RUNOFF CHARACTERISTICS

Substrate: [] Concrete SD   [] Natural   [] Gutter   [] Other _____

Floatables   [] None   [] Trash   [] Bubbles/Foam   [] Sheen   [] Fecal Matter   [] Other _____

Odor   [] None   [] Musty   [] Rotten Eggs   [] Chemical   [] Sewage   [] Other _____

Color   [] None   [] Yellow   [] Brown   [] White   [] Gray   [] Other _____

Clarity   [] Opaque   [] Slightly Cloudy   [] Clear   [] Other _____

PROXIMATE BACTERIA SOURCE DATA

[] Reclaimed Water Usage   [] Ag/Livestock Facility   [] Encampments # _____

[] Waste Water Discharge   [] Leaking Trashcan or Dumpster   [] Dom. Animals # _____

[] Sewer Overflow   [] Food Waste/Scraps   [] Birds # _____

[] Trash Accumulation   [] Pet Waste   [] Wildlife # _____

[] Organic Matter   [] Landscaping   [] Other _____

Flow Source (Suspected [S] or Known [K])

[] Grove Irrigation S   K   [] Resident. Irrig.   S   K   [] Washing   S   K   [] Other _____   S   K   [] Unknown

Active flow? Y   N   Reaching MS4 in Residential/Commercial Area (south of Victoria Ave)?   Y   N

FLOW CONDITIONS

Flowing?   [] Yes   [] No   [] N/A   [] Dry   [] Trickle

Current Conditons:

Total Rainfall (in.): [_____]   Flow (gpm): [_____]

FIELD MEASUREMENTS

Temp(°C): [_____] pH [_____]   Sp Conductivity (µS/cm): [_____] Chlorine (mg/L) [_____]   NH3 (ppm) [_____]

Turbidity (NTU): [_____]

SAMPLE COLLECTION   [] Visited, Not Sampled   Reason Not Sampled: _____

Grab Samples Collected?   [] Yes   [] No

Parameters Collected: [] FIB   [] MST/Virus   [] Field WQ   [] 1Chemistry

Sample ID: _____

COMMENTS: