REGIONAL WET WEATHER CHARACTERIZATION PROGRAM
ANNUAL MONITORING REPORT APPENDICES
YEAR 4
(JANUARY – DECEMBER 2021)

Appendix A

Regional Wet Weather Characterization Plan Proposal for the Fourth Term Submission and Letter of Approval from TCEQ

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

June 30, 2017

Ms. Derica Peters, Senior Planner
North Central Texas Council of Governments (NCTCOG)
P.O. Box 5888
Arlington, Texas 76005-5888

Re: Approval of the North Central Texas Regional Wet Weather Characterization Plan Proposal for the Fourth Permit Term

Dear Ms. Peters:

The Texas Commission on Environmental Quality (TCEQ) received the final revised North Central Texas Regional Wet Weather Characterization Plan Proposal for the Fourth Permit Term (Proposal) on June 12, 2017, along with your response letter. The Proposal was originally submitted to TCEQ for review via electronic mail on October 11, 2016. TCEQ and EPA reviewed the Proposal and submitted comments to NCTCOG on March 7, 2017, and further discussed our comments with NCTCOG on a telephone conference on April 11, 2017.

We appreciate the opportunity to review the Proposal and appreciate NCTCOG' efforts to update the Proposal and provide responses to EPA's and TCEQ's comments. All comments have been addressed and TCEQ approves this Proposal for the fourth permit term.

If you have any questions, you are most welcome to call me at (512) 239-4784 or Ms. Hanne Nielsen at (512) 239-6524.

Best regards,

Rebecca L. Villalba

Rebecca L. Villalba, Team Leader
Stormwater & Pretreatment Team (MC 148)
Water Quality Division

RLV/HN/fc

cc: Ms. Allison Henry, Environment and Development Planner
North Central Texas Council of Governments (NCTCOG), P.O. Box 5888
Arlington, Texas 76005-5888

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

REQUEST FOR PROPOSAL

PROJECT TITLE:

PART A: Field Collection and Analysis of Storm Water Samples

PART B: Biomonitoring Sampling and Analysis

RFP #NCT-2011-15

DEPARTMENT: Environment and Development
616 Six Flags Drive, Centerpoint Two
Arlington, Texas 76011

Date Issued: January 28, 2011
Proposal Due Date: February 28, 2011

Acceptance Period: 60 days

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1.0 REQUEST FOR PROPOSAL

1.1 WHAT IS NCTCOG?

The North Central Texas Council of Governments (NCTCOG) is a regional planning agency that serves a 16-county area surrounding the Dallas/Fort Worth Metroplex. Its 240 local government members include cities, counties, independent school districts, and special districts. NCTCOG provides services to its member governments including transportation planning, dissemination of demographic information, assistance with information systems development, environmental studies, planning for community services needs, 9-1-1 planning, emergency preparedness coordination, federally funded employment and training programs, training local government officials and providing continuing education for area police officers.

The Department of Environment and Development assists local governments as they work together to solve regional issues such as solid waste, sustainable development and efficient use of water and other natural resources. To that end, it oversees the coordination and implementation of the state's solid waste program for the region, as well as promotes the principles of Development Excellence and carries out various strategic initiatives, including support for Vision North Texas, the CLIDE Awards Program, and many others. Designated as the Water Quality Planning Agency for the region, the department supports the successful Trinity River COMMON VISION Program and provides assistance with Texas Pollutant Discharge Elimination System (TPDES) permit compliance to local entities.

1.2 PROJECT DESCRIPTION

NCTCOG's Department of Environment & Development is issuing this Request for Proposals (RFP) for technical environmental consultant assistance with a regional storm water monitoring program (regional program) of member entities for compliance with Texas Commission on Environmental Quality (TCEQ) Municipal Separate Storm Sewer System (MS4) TPDES permits for municipal storm water discharges. The regional program is being conducted in cooperation with the cities of Dallas, Fort Worth, Arlington, Garland, Irving, Plano, and Mesquite, and the Texas Department of Transportation-Dallas District and North Texas Tollway Authority (NTTA).

This request for proposals is seeking consultant assistance, not professional services as defined by the Texas Government Code Chapter 2254.002 (Professional and Consulting Services). The services provided under any contract resulting from this RFP will include most if not all of the above-named entities. However, each entity has the option to participate in this contract, depending on the outcome of the selection and contract negotiation process. Consequently, the proposal will need to include unit costs for services and provisions for making adjustments to the sampling plan if one or more entities choose not to participate.

Agencies or parties responding to this RFP, herein referred to as the **Respondents**, should note that the RFP is being offered in two parts (Parts A and B) that are related, but should be responded to separately and may be awarded separately. Respondents to the RFP that wish to submit proposals on both parts are reminded to keep their cost pricing separate so that each part can be considered separately in comparison with other submittals. Requested supporting documents and information in Part B that are duplicative with Part A can be included by reference by those who are submitting for both parts.

1.2.A REGIONAL WET WEATHER CHARACTERIZATION PROGRAM

The Regional Wet Weather Characterization Program (RWWCP) amended January 2011 (Attachment A) has been approved by TCEQ for compliance with TPDES storm water permit requirements. The RWWCP includes a general approach with several variants so it is strongly recommended that the Respondent review this document for specifics. In general, there will be up to eight entities involved in the consultant contract. The City of Fort Worth plans to use their own staff to collect and analyze both the chemical and the biological samples. Most entities will need quarterly samples to be taken from up to three locations in a single watershed each year for four sequential years. There will be a total of 96 annual samples from participating entities (i.e. this excludes Fort Worth's samples), and thus 384 total samples for the permit term. Sampling is expected to begin on January 1, 2012 and will end, December 31st, 2015. Monitoring periods will be by calendar quarters: January 1 - March 31, April 1 - June 30, July 1 - September 30 and October 1 - December 31. See attached map for locations of watersheds.

1.2.B PART A: FIELD COLLECTION OF STORM WATER SAMPLES FOR CHEMICAL ANALYSIS

Under **Part A**'s contract, the Respondent will develop a revised regional sampling protocol based on the RWWCP and the prior permit term's regional monitoring protocol (available at http://www.nctcog.org/envir/SEEclean/stormwater/program-areas/monitoring/RFP/RFP_2011.asp) and seek its approval from NCTCOG and the participating entities. The Respondent is encouraged to conduct a thorough review of the regional monitoring protocol with respect to scientific viability and practicality while developing the Part A protocol. The Respondent shall provide sample collection of storm water for field and laboratory analyses in accordance with this revised protocol. The services will also include delivery of the storm water samples to a qualified laboratory as proposed by the Respondent and agreed to by the regional program participants. The Respondent will demonstrate the availability of staff having competency with testing procedures and reporting requirements and other resources necessary to perform the described sample collection for one or more storm events at multiple predetermined locations within the participating entities' jurisdictions.

Although the watersheds to be sampled have been identified by the participating entities, exact sampling locations will need to be determined by the Respondent in consultation with the contracting entities and NCTCOG. The proposal is expected to include an approach for selecting optimal site locations. Automated sampling equipment used in the prior permit term will be made available for use by the selected Respondent. The selected Respondent will be asked to assess the status of each piece of equipment and to determine what, if anything, is needed to bring the equipment up to a mutually agreed upon standard. Each entity will be responsible for providing equipment that is in good working order. Once the equipment is found acceptable by the selected Respondent, they will be asked to maintain the equipment in similar working condition throughout the term of the contract. Costs for such routine maintenance, including replacement parts as needed, can be included in the overall costs of the contract. Replacement of defective, damaged, or nonfunctional equipment as may be necessary due to adverse weather conditions, vandalism or normal use is not considered routine maintenance and will be the responsibility of the original owner.

The collection of these samples should generally follow the procedures of TCEQ's "*Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods",* RG 415; (TCEQ, 2008) as currently amended.

Sampling will be initiated during the first flush of a storm event based on the criteria identified in the Sampling Protocol. Each sampling event will include collection of a first-flush grab sample and a time-weighted composite (minimum of four aliquots) to be analyzed per station. The first-flush grab sample or samples will be analyzed for:

- bacteria (*E. coli* and total coliform),
- oil and grease (O&G), and
- pH.

The composite sample will be analyzed for:

- 5-day Biochemical Oxygen Demand (BOD_5),
- Chemical Oxygen Demand (COD),
- Total Suspended Solids (TSS),
- Total Dissolved Solids (TDS),
- Metals: Copper, Lead, Zinc, Chromium, Arsenic
- Dissolved and Total Phosphorus,
- Total Nitrogen, and
- Carbaryl

Each sample will be collected in sufficient volume for the selected analyses.

Field data to be collected will include, but not be limited to:

- general observations of site conditions and water quality,
- antecedent dry period,
- time of rainfall event,
- time of subsequent sample collections,
- air and water temperature,
- specific conductance and
- rainfall data specific to the watershed and preferably at or near the sampling station(s).

An estimation of rainfall runoff and stream flow will also be needed in order to calculate pollutant loading. Include methodology to be used for these estimations in the Sampling Protocol. Field data will be reported along with the laboratory analytical data. Some of the sampling stations are expected to be located in remote areas and collections often have to be made under adverse weather conditions.

1.2.C <u>PART A: LABORATORY ANALYSIS OF STORM WATER SAMPLES</u>

The Respondent will provide in the proposal a recommendation of one or more preferred laboratories to conduct the analytical portion of the monitoring program, and include laboratory costs for the analysis of the storm water samples in the overall proposal. Transfer of storm water samples to this laboratory will require using proper chain-of-custody procedures. Field and laboratory analyses are expected to meet minimum regulatory requirements of the Environmental Protection Agency (EPA) and the TCEQ for storm water sampling and analyses, including quality assurance requirements. All laboratory analyses shall be performed by laboratories that have the appropriate National Environmental Laboratory Accreditation Program (NELAP) certification(s) to perform the analyses required under this contract. In addition, the laboratory should have the capability to perform the analyses within the stated data quality objectives including selected method detection limits. All data should be validated per TCEQ requirements for surface water quality data collection criteria, and the data quality objectives (DQOs) established in the Sampling Protocol.

1.2.D PART B: BIOMONITORING SAMPLING AND ANALYSIS

As listed in the regional monitoring plan, some of the participants will be required by permit to perform biomonitoring sampling and analyses in some of their watersheds. Under **Part B**'s contract, the Respondent will be asked to collect these samples, compile the data, and prepare the necessary reports The collection of these samples should be in accordance with the Sampling Protocol based on TCEQ's "*Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods",* RG 415; (TCEQ, 2008) as currently amended, for physical and chemical data, and "*Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data",* RG 416 (TCEQ, 2007*) as currently amended*. These procedures include limited field and laboratory chemical sampling and analyses, benthic macroinvertebrate community characterization using rapid bioassessment protocols (RBP), and a physical stream habitat assessment.

Field sampling should include, at a minimum, the following parameters:

- Temperature (air and water)
- Dissolved Oxygen
- pH
- Specific Conductivity
- Turbidity
- Nitrates
- Phosphates
- Bacteria: *E.coli*

The Respondent will demonstrate the availability of staff and equipment, staff competency with field collection procedures and reporting requirements, and/or other resources necessary to perform the described sample collection at multiple predetermined locations within the participating entities' jurisdictions. The frequency of collection is listed in the regional monitoring plan. Section 2.0 of the RFP includes a link to this information. Although the watersheds to be sampled have been identified by the participating entities, exact sampling locations and appropriate reference sites will need to be determined by the Respondent in consultation with the contracting entities and NCTCOG. The proposal is expected to include an approach for selecting optimal site locations. The Respondent's proposal will need to demonstrate availability and access to a laboratory or location that will be used for sorting and final assessment of the biological samples.

1.2 E DELIVERABLES

In addition to meeting TPDES permit requirements, both the NCTCOG and participating entities will be using the deliverables from this contract to support and enhance local understanding of regional water quality conditions. As such, Respondents are asked to develop each deliverable considering the end-use of all deliverables with respect to conveying information on local and regional water quality conditions to the general public and to the respective participating governing entities (e.g. City Councils, Planning Commissions, etc).

All contract deliverables will be provided in electronic format, with one draft submittal made to obtain NCTCOG and participant's comments, corrections and concerns, and one final submittal that incorporates comments as provided. A memorandum identifying resolution of comments should be provided with each final deliverable. Deliverables under this contract are anticipated to be:

PART A – FIELD COLLECTION AND ANALYSIS OF STORM WATER SAMPLES:

- **Sampling and Analyses Plan and Protocols (SAPP**): Provide a document that outlines appropriate protocols to be used, frequency, type and location of sampling, sample location documentation, and analytical laboratory methods, and data quality objectives (DQOs). Include a table summarizing sample holding times, laboratory methods to be used, and appropriate method detection limits. Include Geographic Information System (GIS)-based mapping that indicates sample locations by types, per watershed. Data validation methods and data quality assurance measures should also be outlined.
- **Annual Reports Summarizing Data (One for each Year's Sample Efforts):** Provide a general summary report that summarizes the methodology used for field and analytical efforts, and the results obtained for the watersheds sampled in that year. Provide GIS-based mapping that indicates sample locations, and analytical results per watershed sampled for each permit year report. Provide an estimate of annualized pollutant loading for the watersheds sampled, with an explanation of methodology used to perform this estimation.
- **Permit Term Summary Report (One Final Report Summarizing Sampling and Analyses for Permit Years 1 through 4):** Provide a Final Permit Term Summary Report that summarizes the methodology used for field and analytical efforts, and the collective regional results obtained for the watersheds sampled through this program. Provide GIS-based mapping that indicates sample locations, and analytical results per watershed sampled for each permit year report. Provide a trend analyses of water quality conditions identified through this permit term, with respect to available data collected during the previous term. Provide a general summary analysis of water quality with respect to the Texas Surface Water Quality Criteria as set forth in 30 TAC Section 307, as currently amended. Provide an estimate of pollutant loading across the region, with an explanation of methodology used to perform this estimation.
- **Electronic Data:** Provide an electronic data deliverable that is consistent with the TCEQ Data Reporting requirements, and that is compatible with the GIS format used by the NCTCOG GIS database.

PART B – BIOMONITORING SAMPLING AND ANALYSIS:

- **Sampling and Analyses Plan and Protocols (SAPP**): Provide a document that outlines appropriate protocols to be used, frequency, type and location of sampling, sample location documentation, and laboratory methods. Include location(s) and rationale for reference sample locations. as well as analytical laboratory methods, and data quality objectives. Include a table summarizing sample holding times, laboratory methods used along with appropriate method detection limits. Include GIS-based mapping that indicates sample locations and types per watershed, and reference sample locations. Data validation methods and data quality assurance measures should also be outlined. Include sample matrices to be used to develop the habitat assessments in accordance with guidance for Rapid Bioassessment Protocols (RBP).

- **Annual Reports Summarizing Data (One for each Year's Sample Efforts):** Provide a general summary report that summarizes the methodology used for field and analytical efforts, and the results obtained for the watersheds sampled in that permit year. Include GIS-based mapping that indicates sample locations, and analytical results per watershed sampled for each permit year. Also include tabular and graphic indication of habitat conditions for each watershed sampled for each sample period, as developed using standard RBP methods. Provide a discussion of findings relative to observed habitat conditions. Provide a general summary analysis of water quality with respect to the Texas Surface Water Quality Criteria as set forth in 30 TAC Section 307, as currently amended. Provide a general discussion of any observed anomalies such as extended drought, 100-year flood, or other heavy precipitation periods that may affect the water quality, and associated pollutant loading.
- **Permit Term Summary Report (One Final Report Summarizing Sampling and Analyses for Permit Years 1 through 4):** Provide a general summary report that summarizes the methodology used for field and analytical efforts, and the collective regional results obtained for the watersheds sampled through this program. Provide GIS-based mapping that indicates sample locations, and analytical results per watershed sampled. Also include tabular and graphic indication of habitat conditions for each watershed sampled, for each sample period, as developed using standard RBP methods. Provide a discussion of findings relative to observed habitat conditions. Provide a trend analysis of habitat conditions identified through this permit term. Provide a general summary analysis of water quality with respect to the Texas Surface Water Quality Criteria as set forth in 30 TAC Section 307, as currently amended.
- **Electronic Data:** Provide an electronic data deliverable that is consistent with the TCEQ Data Reporting requirements, and that is compatible with the GIS format used by the NCTCOG GIS database.

Changes to the deliverables may be revised upon agreement by the NCTCOG and the participating entities.

1.3 GENERAL QUALIFICATION REQUIREMENTS

A. Respondents submitting a proposal will be required to comply with provision 5159(a) of "Vernon's Annotated Civil Statute of the State of Texas" with respect to the payment of prevailing wage rates.

B. Respondents shall be responsible for obtaining any necessary licenses and permits, and for complying with any applicable federal, state, and municipal laws, codes, rules and regulations in connection with the work required by this contract.

C. Respondents shall have a minimum of 2 years experience in field collection of storm water samples. Respondents shall include with their proposal package the identification of at least three past or current clients for efforts similar in nature to the requirements of this request.

D. NCTCOG reserves the right to accept or reject any and/or all proposals or to cancel this notice at any time.

E. A response to this Request for Proposal (RFP) does not commit NCTCOG to a contract, or to pay any costs incurred in the preparation of such response.

F. Unless the Respondent specifies in its proposal, the NCTCOG may award the contract for any items/services or group of items/services in the RFP and may increase or decrease the quantity specified.

G. NCTCOG reserves the right to hold and accept any proposal for a period of sixty (60) days after the response deadline.

H. NCTCOG reserves the right to negotiate the final terms of any and all contracts with the selected Respondents and such agreements negotiated as a result of this RFP may be re-negotiated and/or amended in order to successfully meet the needs of the agency and its members.

I. NCTCOG reserves the right to waive any defect in this procurement process or to make changes to this solicitation as it deems necessary. NCTCOG will provide notifications of such changes to all Respondents recorded in the official record (Distribution Log/Receipts Record) as having received or requested an RFP.

J. NCTCOG reserves the right to contact any individual, agencies or employers listed in a proposal, to contact others who may have experience and/or knowledge of the Respondent's relevant performance and/or qualifications; and to request additional information from any and all Respondents.

K. NCTCOG reserves the right to conduct a review of records, systems, procedures, etc., of any entity selected for contracting. This may occur prior to, or subsequent to the award of a contract. Misrepresentation of the Respondent's ability to perform as stated in the proposal may result in cancellation of the contract.

L. NCTCOG reserves the right to withdraw or reduce the amount of a contract, or to cancel any contract resulting from this procurement if adequate funding is not available.

M. Respondents shall not, under penalty of law, offer or provide any gratuities, favors or anything of monetary value to any officer, member, employee or agent of NCTCOG or any of the participating member entities for the purpose of or having the effect of influencing favorable disposition toward their own proposal or any other proposal submitted hereunder.

N. No employee, officer or agent of NCTCOG or the participating member entities shall participate in the selection, award or administration of a contract if a conflict of interest, real or apparent, exists.

O. Respondents shall not engage in any activity that will restrict or eliminate competition. Violation of this provision may cause a Respondent's proposal to be rejected. This does not preclude joint ventures or subcontracts.

P. All proposals submitted must be an original work product of the Respondent. The copying, paragraphing or other use of substantial portions of the work product of others and submitted hereunder, as original work of the Respondent is not permitted. Failure to adhere to this instruction may cause the proposal(s) to be rejected.

Q. The only purpose of this RFP is to ensure uniform information in the selection of proposals and procurement of services. This RFP is not to be construed as a purchase agreement or contract, or as a commitment of any kind, nor does it commit the NCTCOG to pay for costs incurred prior to the execution of a formal contract unless such costs are specifically authorized in writing by NCTCOG.

R. The contents of a successful proposal may become a contractual obligation, if selected for award of a contract. Failure of the Respondent to accept this obligation may result in cancellation of the award. No plea of error or mistake shall be available to successful Respondent(s) as a basis for release of proposed services at stated price/cost. Any damages accruing to the NCTCOG as a result of the Respondent's failure to contract may be recovered from the Respondent.

S. A contract with the selected provider may be withheld at sole discretion if issues of contract compliance or questioned/disallowed costs exist, until such issues are satisfactorily resolved. Award of contract may be withdrawn by NCTCOG if resolution is not satisfactory to NCTCOG.

T. NCTCOG is the responsible authority for handling complaints or protests regarding the proposal selection process. This includes, but is not limited to, disputes, claims, protests of award, source evaluation or other matters of a contractual nature. Matters concerning violation of law shall be referred to such authority as may have proper jurisdiction.

U. Once the selection(s) of a Respondent(s) has been made, all Respondents to this RFP will be notified in writing of the results. Any protest regarding this process must be filed with NCTCOG in accordance with the following procedure. NCTCOG would like to have the opportunity to resolve any dispute prior to the filing of an official complaint by the protester. The protester should contact NCTCOG's Deputy Executive Director, at (817) 695-9121, P.O. Box 5888, Arlington, Texas 76005-5888, so that arrangements can be made for a conference between NCTCOG and the protester. Copies of the appeal process will be made available to the protester.

V. At all times during the term of a contract with NCTCOG, the contracted party shall procure, pay for and maintain, with approved insurance carriers, the minimum insurance requirements as required by law and shall require all subcontractors contractors performing work for which the same liabilities may apply under this contract to do likewise. The contractor may cause the insurance to be effected in whole or in part by the subcontractors under their contracts. NCTCOG reserves the right to waive or modify insurance requirements at its sole discretion.

W. Contractor covenants and agrees to indemnify and hold harmless and defend NCTCOG, its officers and employees, from and against any and all suits or claims for damages or injuries, including death, to persons or property, whether real or asserted, arising out of any negligent act or omission on the part of the contractor, its officers, agents, servants, employees, or subcontractors, and the contractor does hereby assume all liability for injuries, claims or suits for damages to persons, property, or whatever kind of character, whether real or asserted, occurring during or arising out of the performance of a contract as a result of any negligent act or omission on the part of the contractor, its officers, agents, servants, employees, or subcontractors to the extent permitted by law.

1.4 INTERPRETATION OF REQUEST FOR PROPOSAL DOCUMENTS

A written request for an interpretation of the Request for Proposal (RFP) may be made to the Department of Environment and Development, by either fax or mail or email, at any time up to seven (7) calendar days prior to the due date for the Proposals. The person submitting the request will be responsible for its prompt delivery. Upon receiving such a request, the NCTCOG will issue an interpretation of the Proposal Documents as a formal addendum to the RFP.

A Pre-Proposal Conference will be held on February 11, at 9:30 a.m. in the Tejas Room on the third floor of the NCTCOG offices at 600 Six Flags Dr., Arlington, Texas. At this time, Respondents may ask questions pertaining to the RFP but attendance at this meeting is not required. Responses to these questions will be recorded and included as an addendum to this RFP.

A copy of any addenda will be posted on the NCTCOG website at www.dfwstormwater.com. They can be faxed or emailed to interested parties upon request. All addenda must be submitted with the Respondent's Proposal. The NCTCOG will not be responsible for any other explanations or interpretations.

1.5 CONFLICTS & QUESTIONS

Should there be conflicts between the proposal documents and the final executed contract document; the final contract shall take precedence.

Questions regarding this Request for Proposal should be submitted in writing by 5:00 p.m. Wednesday, February 23 to:

Keith Kennedy
Manager of Environmental Programs
Department of Environment and Development
North Central Texas Council of Governments
616 Six Flags Drive, Centerpoint Two
Arlington, Texas 76011
kkennedy@nctcog.org

Responses to all questions will be submitted in writing to all potential respondents and posted on NCTCOG's website.

2.0 PROPOSAL SUBMITTAL

Before submitting a proposal, the Respondent is required to thoroughly examine the RFP documents and familiarize themselves with federal, state, and local laws and ordinances; and rules and regulations applicable to this requisition. Respondents should refer to Attachment A to review the details of the RWCCP. A copy of the regional monitoring protocol used for the prior Permit Term may also be obtained at:
http://www.nctcog.org/envir/SEEclean/stormwater/program-areas/monitoring/RFP/RFP_2011.asp

Each Respondent should include all items necessary to complete the project(s) to which they are submitting in their proposal (Part A and/or Part B); otherwise the entire proposal may be considered non-responsive and rejected. See detailed instructions for Statement of Work in Section 3.3 of these proposal documents. In case of ambiguity or lack of clarity, the NCTCOG reserves the right to adopt the most advantageous construction thereof to the NCTCOG or to reject the proposal.

Additional proposal documents may be obtained at the NCTCOG Department of Environment and Development, 616 Six Flags Drive, Centerpoint II, Arlington, Texas upon request. A photocopying charge may be assessed. Copies of these documents and other relevant information can also be obtained directly from the NCTCOG website at www.dfwstormwater.com.

Proposals should be printed double-sided and must be submitted in a sealed envelope, addressed to and received at the reception desk of NCTCOG, 616 Six Flags Drive, Arlington, Texas **no later than 4:00 p.m. on February 28, 2011**. The name of the Respondent and the project title must be clearly marked on the envelope and the statement "**PROPOSAL DOCUMENTS ENCLOSED, DELIVER TO DEPARTMENT OF ENVIRONMENT AND DEVELOPMENT"** placed in the lower left-hand corner of the envelope in which the documents are delivered. If the documents are placed in an envelope that is contained inside another envelope, the statement shall be placed on the outermost envelope. Any proposal documents not properly marked or not received in the proper place by 4:00 p.m., February 28, 2011 will be considered non-responsive.

In addition to this hard copy of the proposal documents, an electronic copy of all documents for consideration must be submitted on compact disc (CD) in either MS Word or Adobe pdf format.

Proposals may be withdrawn at any time before award. Written proposals are withdrawn upon receipt by the NCTCOG Project Representative of a written notice of withdrawal.

NO FAXED, EMAILED OR LATE PROPOSALS WILL BE ACCEPTED

2.1 OPENING OF PROPOSALS

The name of all Respondents submitting proposals will be read aloud at the NCTCOG office at 4:05 p.m. on February 28 2011. The location of this reading will be posted on the NCTCOG electronic calendar and is open to anyone; however, attendance by Respondents is not required. The name of all Respondents submitting proposals will subsequently be posted on the NCTCOG website by March 1, 2011. Proposals shall be handled so as to avoid the disclosure of the remainder of their contents to competing Respondents and so as to keep such contents secret during negotiations. All proposals will be made available for public inspection after the contract is awarded, but trade secrets and confidential information in the proposals will not be open to public inspection. Respondents should specifically identify all proprietary materials when submitting proposals.

2.1.A PROPOSAL EVALUATION

This RFP for consultant assistance uses a qualifications-based procurement process which includes cost considerations. Proposals will be evaluated by a committee made up of members of the participating entities, facilitated by NCTCOG staff who are non-voting members of the committee. Selections for both Part A and Part B will be based on the completeness and quality of the proposal documents and weighted as shown for the following factors:

Recommended Approach and Thoroughness of Proposal	30
Number and Qualifications of Personnel Available for Task	20
Field Collection Experience and Past Performance	20
Total Cost	15
Ability to provide Services for both Part A and Part B	10
Historically Underutilized Business (HUB)	5

Each Respondent is responsible for submitting all relevant, factual, and correct information for evaluation of the above criteria with their proposal. Failure to provide information for any of these components will be considered grounds for rejection of the proposal. The Evaluation Committee will evaluate each proposal based on the information submitted. If additional information is submitted with the proposal, the Respondent must clearly make reference to it in the appropriate location in the proposal. The top-ranked Respondents will move on to the "Finalist Interviews". Finalists will be required to make a presentation to the Evaluation Committee on the date listed below. All Respondents will be notified of their proposal's status after the scoring has been completed.

NCTCOG reserves the right to award a contract to the Respondent(s) whose proposal is considered most advantageous (price and other factors considered) to NCTCOG and its members. More than one contract may be awarded from this request if necessary.

Any proposal submitted in accordance with this RFP shall remain valid for a period of 60 calendar days from the proposal due date.

2.1.B SCHEDULE OF EVENTS

EVENT	DATE
Issue RFP	January 28, 2011
Pre-Proposal Conference	February 11, 2011
Deadline for Submission of Proposals	**February 28, 2011**
Notification of Finalists	March 18, 2011
Finalists Interview	March 28, 2011
Expected Award of Contract	April 30, 2011
Expected Contract Start Date	October 1, 2011
Expected Contract End Date	June 30, 2016

2.1.C CONTRACT PERIOD/TYPE

The successful Respondent will be awarded a 57-month Cost Reimbursement Contract starting on or about October 1, 2011 and ending on June 30, 2016.

2.1.D NEGOTIATION OF THE CONTRACT

The NCTCOG will meet with the successful Respondent and negotiate a Contract based on the Proposal Documents. The NCTCOG is not obligated to accept any exceptions made by Respondent. After the negotiations, the NCTCOG will make final changes to the Contract documents and issue them along with a Notice of Awards to the successful Contractor(s).

2.1.E AWARD OF THE CONTRACT

The NCTCOG may conduct any investigations as deemed necessary to assist in the evaluation of any proposal and to establish the responsibility, qualifications, and financial capability of the Contractor, subcontractors, and other persons who are proposed to work on the project.

The NCTCOG will send a Notice of Award letter to the successful Contractor(s) with three (3) sets of contract documents. The successful Contractor(s) must execute the Contract in each set and return all three sets to the NCTCOG within the time period specified in the notice of award letter. Upon receipt of the three sets of contract documentation, the NCTCOG will execute each set and issue one set to the successful Contractor(s).

2.1.F RESERVATIONS

The NCTCOG reserves the right to reject any or all proposals and to waive any or all informalities.

2.1.G RIGHT TO TERMINATE

The NCTCOG will reserve the right to terminate the contract if the service provided by the contractor is unsatisfactory or does not meet expectations and the contractor, once notified of the dissatisfaction, has been unwilling to make changes in a reasonable amount of time.

3.0 PROPOSAL DOCUMENTS

3.1 PROPOSAL DOCUMENT CHECKLIST

All Proposal Documents, including this Checklist, must be completed in full and submitted in a sealed envelope, in the requested order, to be considered as a responsive submittal.

Proposal Documents	Initial if Included
PROPOSAL DOCUMENT CHECK LIST	_______
ACKNOWLEDGE REQUEST FOR PROPOSAL ADDENDA	_______
PROPOSAL SUMMARY WITH COST ESTIMATE	_______
STATEMENT OF WORK	_______
QUALIFICATIONS OF RESPONDENT	_______
LIST OF SUBCONTRACTORS	_______
INSURANCE CERTIFICATES	_______
RESPONDENT'S LEGAL & COMPLIANCE HISTORY	_______
RESPONDENT'S LICENSES & CERTIFICATES	_______
CERTIFICATIONS OF RESPONDENT	_______
HISTORICALLY UNDERUTILIZED BUSINESSES CERTIFICATION (IF APPLICABLE)	_______
ELECTRONIC COPY (CD) OF PROPOSAL DOCUMENTS	_______
ATTACHMENT A – PART A COST BREAKDOWN	_______
ATTACHMENT B – PART B COST BREAKDOWN	_______

I understand that all of these items are required for my submittal to be considered responsive.

RESPONDENT:

________________________________	BY:________________________________
Company Name	(Print or type name of signatory)
________________________________	________________________________
Address	(Signature)
________________________________	________________________________
City, State, Zip	Title (print or type)

3.1.A ACKNOWLEDGEMENT OF RECEIPT OF REQUEST FOR PROPOSAL ADDENDA

Check if applicable ____

The undersigned acknowledges the receipt of the following addendum(s) to the Request for Proposals, and has attached all addenda following this page. (Add lines if necessary).

Addendum Number 1 ________________________
(Date received)

Addendum Number 2 ________________________
(Date received)

Addendum Number 3 ________________________
(Date received)

Check if applicable ____

The undersigned acknowledges the receipt of no addenda to the Request for Proposals.

RESPONDENT:

______________________________	BY:______________________________
Company Name	(Print or type name of signatory)
______________________________	______________________________
Address	(Signature)
______________________________	______________________________
City, State, Zip	Title (print or type)

3.2 PROPOSAL SUMMARY WITH COST ESTIMATE

TO THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS:

The undersigned hereby proposes to furnish all labor, materials, supplies, superintendence, and any other items or services necessary to perform field collection, laboratory analyses and reporting services for the North Central Texas Council of Governments, which includes, but is not limited to, the collection of storm water samples and/or biological specimen collections as specified in these proposal documents.

The key personnel identified in this proposal are capable of performing sample collection services, either at this location or through subcontracts.

All Proposal Documents have been submitted in one sealed envelope.

____ Addenda to the Request for Proposal have been received.

Part A: The total cost estimate for all labor, equipment (excluding automated samplers), and materials, including laboratory analysis of the storm water samples is $_________________. Unit prices are provided within the Proposal Documents.

Part B: The total cost estimate for all labor, equipment, and materials, including assessment of the biological samples is $_________________. Unit prices are provided within the Proposal Documents.

This Proposal Summary and the accompanying Proposal Documents are intended to be complete and will remain valid for sixty (60) calendar days from the due date of the submittal.

RESPONDENT:

______________________________	BY: ______________________________
(Company Name)	(Print or type name of signatory)
______________________________	______________________________
(Address)	(Signature)
______________________________	______________________________
(City, State, Zip)	Title (Print or type)
______________________________	______________________________
(Phone)	(FAX)

____
(Email)

3.3 STATEMENT OF WORK

The items listed below shall be submitted with each proposal in the order shown. Each section should be clearly labeled. Failure of a Respondent to include all listed items may result in the rejection of the proposal.

I – Overview (1-3 pages)

State the underlying philosophy of your firm in providing the requested service and the overall approach you intend to take. Describe your understanding of the relevance of this project to the participating entities and to the North Central Texas area in general.

II – Plan of Approach (5-20 pages for each part)

For Part A, include:

- Description of proposed contract team, and the role to be played by each member. Include an organizational chart
- Detailed plan of approach (including major tasks and sub-tasks) for handling multiple and distant sampling locations for stochastic storm events under strict permit requirements.
- Types of equipment and methodology.
- Chain-of-custody procedures and other protocols
- Laboratory analysis arrangements
- Detailed timeline for getting sites ready to sample by January 1, 2012.
- Description of Deliverables

For Part B, include:

- Description of proposed contract team, and the role to be played by each member. Include an organizational chart
- Detailed plan of approach (including major tasks and sub-tasks) for handling multiple sampling locations, including reference sites.
- Types of equipment and methodology.
- Laboratory-type facility arrangements for assessment of biotic community assemblages
- Detailed timeline for getting sites ready to sample by January 1, 2012.
- Description of Deliverables

III – Costs to NCTCOG (2-5 pages for each part)

PART A – FIELD COLLECTION AND ANALYSIS OF STORM WATER SAMPLES: - Provide a detailed breakdown of costs for the requested services. A suggested categorization could include: initial site preparation; lab coordination; evaluation of existing equipment and recommendations for upgrading; storm sample collection (unit and overall costs); laboratory analysis; submittal of data to NCTCOG; routine maintenance and replacement of equipment, preparation of interim and final summary reports, etc. Please complete and provide Attachment B - Cost Breakdown for Part A.

PART B – BIOMONITORING SAMPLING AND ANALYSIS: - Provide a detailed breakdown of costs for the requested services. A suggested categorization could include: site identification; sample collection (unit and overall costs); sample assessment; submittal of data to NCTCOG; procurement and replacement of field equipment, preparation of interim and final summary reports, etc. Please complete and provide Attachment C - Cost Breakdown for Part B.

IV – Prior Experience, Capacity and References (No page limit)

Provide information that documents your firm's qualifications to perform the desired work, including its ability, capacity, skill, and financial strength. Include at least three (3) references of similar projects conducted in the past 5 years or less. Include a contact name, phone number and brief description of the project completed for each reference. If submitting HUB certification documentation, include it in Section 3.10.

3.4 QUALIFICATIONS OF THE RESPONDENT

The Respondent shall provide its company name, address, telephone number(s), and email addresses for the local office as well as the headquarters.

The Respondent shall attach a copy of its current Statement of Qualifications. If subcontractors are to be utilized for any services to be provided, a current Statement of Qualifications for those companies must also be included.

The Respondent shall submit a brief résumé (one page maximum, 10 pt type minimum) of each professional person (key personnel) who will be assigned to this contract. Identify key persons by name and title, longevity with firm, and describe the primary work assigned, as well as the estimated percentage of time that each person will devote to this contract.

3.5 LIST OF SUBCONTRACTORS

Respondents shall complete the following information and submit it with the Qualifications Documents to permit the NCTCOG to more fully evaluate the subcontractor's qualifications prior to awarding the contract.

Subcontractor's Name	Subcontractor's Address	Subcontractor's Telephone No.	Subcontractor's email address	Proposed Tasks on the Project

IF NECESSARY, PROVIDE MORE SHEETS TO DESCRIBE ADDITIONAL SUBCONTRACTORS.

3.6 INSURANCE CERTIFICATES

FOR PURPOSES OF THIS REQUEST FOR QUALIFICATIONS, PLEASE ATTACH A COPY OF YOUR CURRENT INSURANCE CERTIFICATE(S) BOUND WITHIN THE QUALIFICATIONS PACKAGE.

The successful Contractor will be required by the contract to have insurance coverage at least as stringent as detailed below. Within 30 days of the contract being fully executed, the Contractor shall deliver to the NCTCOG certificates documenting this coverage. The NCTCOG may elect to have the Contractor submit its entire policy for inspection.

A. Commercial General Liability Insurance - $1,000,000 each occurrence.

B. Professional Liability Insurance: (i.e. Asbestos Abatement Consultant Professional Liability Insurance or Industrial Hygienist Errors and Ommissions Liability Insurance) $1,000,000 each ocurrence.

C. Automobile Liability Insurance –
Coverage on vehicles involved in the work performed under this contract:
$500,000 per accident on a combined single limit basis

or:

$250,000 Bodily injury/person
$500,000 Bodily injury/accident
$100,000 Property damage

Uninsured/Underinsured Motorist --
$20,000 Bodily Injury each person,
$40,000 Bodily Injury each accident;
$15,000 Property Damage each accident.

D. Worker's Compensation –
Statutory limits for Worker's Compensation plus Employer's liability at a minimum:
$500,000 each accident;
$500,000 disease - policy limit; and
$500,000 disease - each employee.

E. The following shall pertain to all applicable policies of insurance listed above:

1. Each insurance policy required by this Contract, except for Workers Compensation insurance and professional liability insurance policies shall be endorsed to include the NCTCOG, its officers, agents, employees, representatives, and volunteers as additional insured in respect to operations and activities of, or on behalf of the named insured, performed under contract with the NCTCOG.

2. Subcontractors shall be covered under the Contractor's insurance policies or they shall provide their own insurance coverage; and, in the latter case, documentation of coverage shall be submitted to the Contractor prior to the commencement of work and the Contractor shall deliver such to the NCTCOG.

3. Prior to commencing work under the contract, the Contractor shall deliver to the NCTCOG insurance certificate(s) documenting the insurance required for performance under this contract, including the required terms and clauses.

4. Each insurance policy required by this contract shall contain the following clause or reasonably equivalent terms:

“This insurance shall not be canceled, limited in scope or coverage, or non-renewed unless a thirty (30) day prior written notice has been given to the Director of Environment and Development, NCTCOG, 616 Six Flags Drive, Centerpoint Two, Arlington, Texas 76011.”

5. The insurers for all policies must be approved to do business in the State of Texas and be currently rated in terms of financial strength and solvency to the satisfaction of the Deputy Executive Director for the NCTCOG.

6. The deductible or Self-Insured Retention (SIR) affecting the required coverage must be deemed acceptable by the Deputy Executive Director for the NCTCOG; or, in lieu of traditional insurance, alternative coverage maintained through insurance pools or risk retention groups must also be approved by NCTCOG’s Deputy Executive Director.

3.7 RESPONDENT'S LEGAL AND COMPLIANCE HISTORY

The Respondent's legal and compliance history is a critical component of this Request for Proposals. Read this section with due care and respond accordingly. Failure of the Respondent to provide all the information requested and to certify the report, will result in the Respondent's submittal being declared non-responsive.

The Respondent shall attach a written report of any legal action relating to the protection of the environment brought against the:

Respondent;
Respondent's officers;
Respondent's employees; AND
Respondent's proposed subcontractors

The report shall include all legal action brought within five (5) years of the closing date of this Request for Proposal. The report shall detail the substance, status, and outcome of such legal action. This includes, without limitation, the names of the agency and/or persons bringing the action, all relevant dates, and all fines, judgments, and/or settlements.

"LEGAL ACTION" means: ANY enforcement action by the United States Environmental Protection Agency, the Occupational Safety and Health Administration, any other federal agency, the Texas Commission on Environmental Quality (including its predecessor agencies the Texas Natural Resource Conservation Commission, the Texas Water Commission and the Texas Air Control Board), the Texas Department of Health, and any other state agency, commission or department, whether in Texas or elsewhere, as a result of violations, real or alleged, of any laws, licenses, permits, judicial orders, or administrative orders, relating to the protection of the environment. In this context, enforcement action shall include without limitation, written warnings, notices of violation, consent orders or agreements, compliance orders, administrative hearings, and criminal prosecution. Legal action also means any civil litigation brought by any person relating to the protection of the environment.

"RELATING TO THE PROTECTION OF THE ENVIRONMENT" means: requirements pertaining to the manufacture, processing, distribution, use, handling, storage, transportation, reporting, records keeping, permitting, licensing, treatment, disposal, emission, discharge, spill, release, or threatened release of hazardous materials, hazardous substances, hazardous wastes, toxic substances, petroleum, industrial waste, solid waste, pollutants or contaminants into or onto the air, surface water, drinking water, groundwater, storm water, publicly owned treatment works, or land.

THE REPORT SHALL BE SIGNED AND CERTIFIED by an authorized representative of the Respondent, using the form on the following page. **The top portion of the form is to be completed if a report is attached. The bottom portion of the form is to be completed if the Respondent has no legal actions to report.**

An authorized representative of the Respondent shall mean (1) if the Respondent is a corporation: the president, secretary, or treasurer, or a vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; (2) if the Respondent is a partnership, a general partner; and (3) if the Respondent is a sole proprietorship, the sole proprietor.
INCLUDE A COPY OF THE REPORT FOLLOWING THE CERTIFICATION PAGE BOUND WITHIN THE PROPOSAL PACKAGE

CERTIFICATION OF RESPONDENT'S LEGAL AND COMPLIANCE HISTORY

Complete ONE of the Following Certifications:

I certify under penalty of law that the attached report of Respondent's Legal and Compliance History was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

RESPONDENT:

_____________________________ BY:___________________________
Company Name (print or type name of signatory)

______________________________ ______________________________
(Signature) Title (print or type)

____
Date

I certify under penalty of law that the legal and compliance history of Respondent, Officer's officers, Respondent's employees, and Respondent's proposed subcontractors was researched under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I hereby certify that no legal action relating to the protection of the environment was brought against Respondent, Respondent's officers, Respondent's employees, or Respondent's proposed subcontractors within the preceding five years. To the best of my knowledge and belief, this statement is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

RESPONDENT:

_____________________________ BY:___________________________
Company Name (print or type name of signatory)

______________________________ ______________________________
(Signature) Title (print or type)

____
Date

3.8 RESPONDENT'S LICENSES & CERTIFICATES

The Respondent shall procure all permits and licenses, pay all charges, costs, fees, and give all notices necessary and incident to the due and lawful prosecution of the work included under this contract.

The Respondent must provide a copy of the appropriate certifications, registrations, licenses and related certificates (including subcontractors) with their submittal.

ATTACH COPIES OF CURRENT APPLICABLE LICENSES AND CERTIFICATES
BOUND WITHIN THE PROPOSAL PACKAGE

3.9 CERTIFICATIONS OF RESPONDENT

I hereby certify that the information contained in this proposal and any attachments is true and correct and may be viewed as an accurate representation of proposed services to be provided by this organization. I certify that no employee, board member, or agent of the North Central Texas Council of Governments has assisted in the preparation of this proposal. I acknowledge that I have read and understand the requirements and provisions of the Request for Proposal and that the organization will comply with all rules, regulations and other applicable local, state, and federal regulations and directives in the implementation of this program. I also certify that I have read and understood the contents of this Request for Proposals and will comply with the terms; and furthermore that I, ______________________________________ (typed or printed name) certify that I am the _________________________ (typed title) of the corporation, partnership, or sole proprietorship, or other eligible entity named as Respondent and Respondent herein and that I am legally authorized to sign this offer and to submit it to the North Central Texas Council of Governments, on behalf of said Respondent by authority of its governing body.

Equal Opportunity and Nondiscrimination

As a condition of the award, the Respondent assures that it will comply fully with the following nondiscrimination and equal opportunity provisions:

Title VI and VII of the Civil Rights Act of 1964, including the Nontraditional Employment Act for Women of 1991;
Section 504 of the Rehabilitation Act of 1973, as amended
The Age Discrimination Act of 1975, as amended;
All applicable regulations implementing those laws.

DRUG FREE WORKPLACE CERTIFICATION

The _____________________________________ (proposing organization) will provide a Drug Free Work Place in compliance with the Drug Free Work Place Act of 1988. The unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited on the premises of the ______________________________________ (proposing organization) or any of its facilities. Any employee who violates this prohibition will be subject to disciplinary action up to and including termination. All employees, as a condition of employment, will comply with this policy.

ATTEST TO Attachments of Certification

______________________________ ________________________________
Signatory Authority Signature   Collateral Signature

______________________________ ________________________________
Typed Name   Date

Subscribed and sworn to before me this _______day of ________________ (month), 2011 in

______________________(city), ____________(county), ___________(state).

________________________________   **SEAL**

Notary Public in and for ________________________(County),

State of _________________   Commission expires:_______________

3.10 HISTORICALLY UNDERUTILIZED BUSINESSES CERTIFICATION

Historically Underutilized Businesses (HUBs) are encouraged to participate in the RFP process. Representatives from HUB companies should identify themselves and submit a copy of their Certification.

NCTCOG recognizes the certifications of both the State of Texas HUB Program and the North Central Texas Regional Certification Agency. All companies seeking information concerning HUB certification are urged to contact.

State of Texas HUB Program	OR	North Central Texas
Texas Comptroller of Public Accounts		Regional Certification Agency
Post Office Box 13528, Capitol Station		624 Six Flags Drive, #100
Austin, Texas 78711-3528		Arlington, TX 76011
(512) 463-5872		(817) 640-0606

Proposer must include a copy of its HUB certification documentation as part of this RFP.

The North Central Texas Regional Wet Weather Characterization Plan Proposal for the Third Permit Term

I. History of the Regional Program

Since 1996, a regional storm water monitoring program has been on-going in the Dallas-Fort Worth (DFW) metropolitan area among the seven largest cities and major transportation agencies for compliance with Federal and State storm water permit requirements. During the initial permit term (1996 -2001), seven municipalities (Dallas, Fort Worth, Arlington, Irving, Garland, Plano and Mesquite) and two local districts of the Texas Department of Transportation (TxDOT) received joint approval from U.S. Environmental Protection Agency (EPA) for a regional monitoring program which utilized the assistance of a shared consultant team and the United States Geological Survey (USGS) to sample and analyze 22 outfalls primarily from small watersheds of a predominantly single land use type. Although these sample collections served to characterize typical urban runoff from these limited land use types, and were useful for estimating general pollutant loadings, they did little to evaluate impacts on actual receiving streams. In the next permit term, now administered by the Texas Commission on Environmental Quality (TCEQ), approval was obtained to utilize in-stream stations for the regional monitoring program to better assess this impact. The revised program was termed the Regional Wet Weather Characterization Program (RWWCP) and was added as an option in Part IV.A.3 of the Texas Pollutant Discharge Elimination System (TPDES) Municipal Separate Storm Sewer System (MS4) permits issued to the Phase I North Central Texas governmental entities. The primary goal of this new in-stream monitoring program was to obtain baseline data on receiving streams in the DFW Metroplex for use in determining long-term water quality trends. Since the RWWCP language existed outside of each permit, it allowed greater flexibility for making changes to the program. During this second permit term, the North Texas Tollway Authority (NTTA) joined the regional program. All other participants remained the same, except for the TxDOT-Fort Worth District who became a co-permittee with the cities of Fort Worth and Arlington and were no longer required to conduct wet weather monitoring. According to the original RWWCP protocol, municipal participants collected data from three sampling sites in the watershed (typically upstream, midstream and downstream) and the transportation agencies collected data from two sites (upstream and downstream stations only). Samples were collected quarterly from each site during a qualifying rain event and were analyzed for 18 parameters.

As an added component, the City of Fort Worth selected the Representative Rapid Bioassessment Monitoring Option (Part IV.A.2) in their permit, which allowed the chemical sampling frequency to be reduced from four times per year per site to once per year per site. In its place, two bioassessments were conducted each year at a minimum of nine sites. These bioassessments were based on protocols developed by the EPA. A summarization of this bioassessment data was included along with the chemical data in the annual regional monitoring report each year of the permit term.

II. Lessons Learned from the Most Recent Permit Term

At the end of the second permit term's sampling effort, a final summary monitoring report was prepared by the regional consultant, PBS&J, to assess the three-year sampling effort. The report found that in general, firm conclusions regarding the factors determining in-stream water quality could not be made due to the limited number of samples collected. Nevertheless, the report observed that all of the watersheds sampled had relatively consistent concentrations when compared to each other and that there was a general tendency of decreasing concentrations of parameters analyzed going from upstream to downstream. Constituent concentrations were found to be typically higher in warmer months as expected, but the length of antecedent dry period had surprisingly little influence on the in-stream water quality. Depending on parameter, the data was either higher or lower than national averages of storm water outfall data; however, it was generally higher overall relative to local ambient, dry weather data. This last finding is somewhat to be expected since storm events wash down the urban landscape and carry a higher load of pollutants than ambient conditions. As a result of these findings and a retrospective evaluation of the regional sampling program, PBS&J made the following recommendations for modifying the RWWCP in the next term:

<u>Increase the number of sampling events per site</u> - PBS&J suggested that either the frequency of monitoring during the year be increased or the same watershed be monitored for at least two years.

<u>Refine sampling site selection process</u> – This suggestion includes locating sites within impaired watersheds, focusing on impairment-causing pollutants, locating sites that foster long-term deployment, allowing for flow monitoring and minimizing vandalism.

<u>Conduct more RBAs in other jurisdictions</u> – Encourage more participating entities to include Rapid Bioassessments in the next permit term to gain a more thorough understanding of water quality impacts to urban receiving streams.

<u>Revise monitored pollutants</u> – The residential use of Diazinon was banned several years ago and has not been detected in any samples taken during this permit term. Therefore, PBS&J has recommended that Diazinon be replaced with Carbaryl, a commonly-used pesticide, for the next permit term. They also suggested that Cadmium be dropped from the parameter list since it was detected at very low levels and in less than 25 percent of the samples collected.

These recommendations were incorporated in this proposal for the next permit term.

III. Characterization of the Proposed Program

<u>*Proposed Plan for Third Permit Term*</u>

The primary goal of the monitoring program was to obtain baseline data on receiving streams in the DFW Metroplex for use in determining long-term water quality trends. This was generally achieved in the past permit term but final analysis indicated that more data is needed to establish actual trends. The Regional Storm Water Monitoring Partners of North Central Texas seek to continue documenting water quality improvements resulting from BMP effectiveness as they have over the past several years encompassing two permit terms. The regional partners would like to continue with the RWWCP because it has allowed for: 1) more coordinated and comprehensive water quality sampling; 2) more sound and reliable data collection; 3) greater cost effectiveness; and 4) a truer assessment of regional impact on stream water quality.

For this upcoming permit term, the Cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite and Plano, together with the North Texas Tollway Authority and TxDOT-Dallas District have agreed to continue their regional partnership to work cooperatively through the North Central Texas Council of Governments to develop a revised RWWCP. Permit numbers and relevant dates for each participant are included in Table 1.

TABLE 1: LIST OF PERMITTEES			
PERMITTEE	TPDES PERMIT NUMBER	DATE ISSUED	EXPIRATION DATE
City of Arlington	WQ0004635000	5/26/2006	5/26/2011
City of Dallas	WQ0004396000	7/27/2007	2/22/2011
City of Fort Worth	WQ0004350000	2/22/2006	2/22/2011
City of Garland	WQ0004682000	12/22/2005	12/22/2010
City of Irving	WQ0004691000	5/26/2006	5/26/2011
City of Mesquite	WQ0004641000	5/26/2006	5/26/2011
City of Plano	WQ0004775000	7/20/2007	7/20/2012
North Texas Tollway Authority	WQ0004400000	2/22/2006	2/22/2011
Texas Department of Transportation-Dallas	WQ0004521000	6/30/2006	6/30/2011

The municipal regional partners have created a new sampling plan that will effectively monitor at least 50% of their jurisdictional area by the end of the permit term. This extent of jurisdictional coverage will allow a reasonable assessment of jurisdictional watersheds while striving to achieve a balance among the various goals of obtaining valid scientific information, meeting permit compliance, and addressing what is practicable for each entity. As in the previous term, this plan proposes to continue in-stream watershed monitoring, but seeks to obtain greater statistical robustness of the data by increasing the sampling period at each location to a minimum of two years. The primary goal of the RWWCP during this permit term will be to continue the assessment of urban impact on receiving stream water quality and to document any improvement presumably resulting from local BMP implementation. The data collected during this permit term will build upon the set of regional data needed from each site for meaningful trend analysis.

This proposal also includes a more comprehensive biomonitoring component. Since assessing the impact of urban runoff on receiving stream quality is a primary focus of this program, assessing the biological integrity of the streams is fundamental. With this proposed plan, 24 watersheds will be chemically monitored and 12 watersheds will be bioassessed across the region, with substantial overlap between the two sampling approaches.

A map with each entity's selected watersheds is shown in Figure 1. Specific locations of sampling sites in each watershed will be determined prior to each sampling year and will be submitted in each prior year's annual regional monitoring report. Refer to Table 2a&b for identification of the watersheds selected by each entity and their relative proportion to jurisdictional area. The relative percent and the area of the selected watersheds are indicated with bold type. Unbolded watersheds indicate unselected, shared watersheds that were selected by other entities. Most of the municipal entities were able to achieve the 50% coverage with only two watersheds; however, due to the size of their jurisdictional area, the City of Dallas selected eight watersheds and the City of Fort Worth selected six to monitor. Jurisdictional coverage was not considered in the selection of the two transportation agency watersheds.

The North Central Texas Council of Governments (NCTCOG) role in the regional monitoring program is to coordinate the overall program, obtain consultant assistance on behalf of the regional partners, assist participants in site selection and the development of the sampling protocol(s); collect and summarize the data; and generate/deliver annual compliance reports.

Sampling Metrics

Monitoring is proposed to commence January 1 of the year following the issuance of the City of Garland's permit, anticipated in mid-2011. Given the existing staggered permit expiration dates among the participants, it is likely that permit renewals issued by TCEQ will also be staggered. Consequently, the regional program will need to have written endorsement from TCEQ that participants will receive credit for any monitoring they contribute as part of the regional effort that would be applied toward their eventual permit. However, by incorporating a lag period to maintain a calendar year-based schedule, most of the participating permittees will likely have their renewals issued by then (i.e. January 1, 2011), making for a smoother transition.

Table 3 provides a detailed breakdown of the number and frequency of each partner's proposed sampling activity(ies). Most entities are chemically sampling one watershed in their jurisdiction for two consecutive years and then moving to a second watershed for another two years. There are a few exceptions to this standard pattern:

- The City of Dallas will need to sample at least six watersheds in order to achieve the 50% coverage; This will be accomplished by chemically sampling four watersheds and performing bioassessment in four additional watersheds as a part of the regional program.
- To achieve the 50% area coverage, the City of Fort Worth needs to sample six watersheds. They intend to bioassess all six watersheds at two locations twice a year for all five years of the permit term. For chemical sampling, they intend to collect in-stream samples at two sites within two watersheds each year. By the end of the third year, they will have monitored each of their six selected watersheds once. They propose to then select the top four most biologically-impaired watersheds to continue with a second sample in the remaining two years of the permit term. Table 3 reflects this sampling pattern of four watersheds being sampled

twice and two watersheds being sampled once for a total of 20 chemical samples in the permit term.

- The City of Mesquite has a unique situation where there are only two watersheds in their jurisdiction and the two creeks of those watersheds are almost wholly contained within the city limits. They would prefer to establish permanent in-stream monitoring stations in each of the two creeks and to sample them concurrently all four years. Due to the relatively small size of the watersheds, they feel they can adequately assess the urban runoff impact by strategically locating a single sampling station in each watershed.

Chemical Sampling Details

Each participating entity will be responsible for final selection of sampling sites. Samples will be collected from these sites according to the schedule identified previously and analyzed for the parameters listed in the table below. Following consultant recommendations (see Section II Lessons Learned…), Diazinon has been replaced with Carbaryl, and Cadmium has been dropped from the parameter list.

Entities may use in-house staff or a consultant of their choice for sample collection. Although we encourage the use of a common laboratory for analysis to ensure consistency, entities may also select the TCEQ-approved laboratory of their choice, as long as procedures are followed and data quality objectives are met as specified in the approved regional monitoring protocol (to be finalized prior to the first sampling year).

Table 4: List of Parameters	
Parameter	**Method of Collection**
Oil & Grease	Grab
pH	Grab
E. coli	Grab
Total Coliforms	Grab
Total Dissolved Solids (TDS)	Composite
Total Suspended Solids (TSS)	Composite
Biochemical Oxygen Demand (BOD_5)	Composite
Chemical Oxygen Demand (COD)	Composite
Total Nitrogen	Composite
Dissolved Phosphorus	Composite
Total Phosphorus	Composite
Carbaryl	Composite
Total Arsenic	Composite
Total Chromium	Composite
Total Copper	Composite
Total Lead	Composite
Total Zinc	Composite

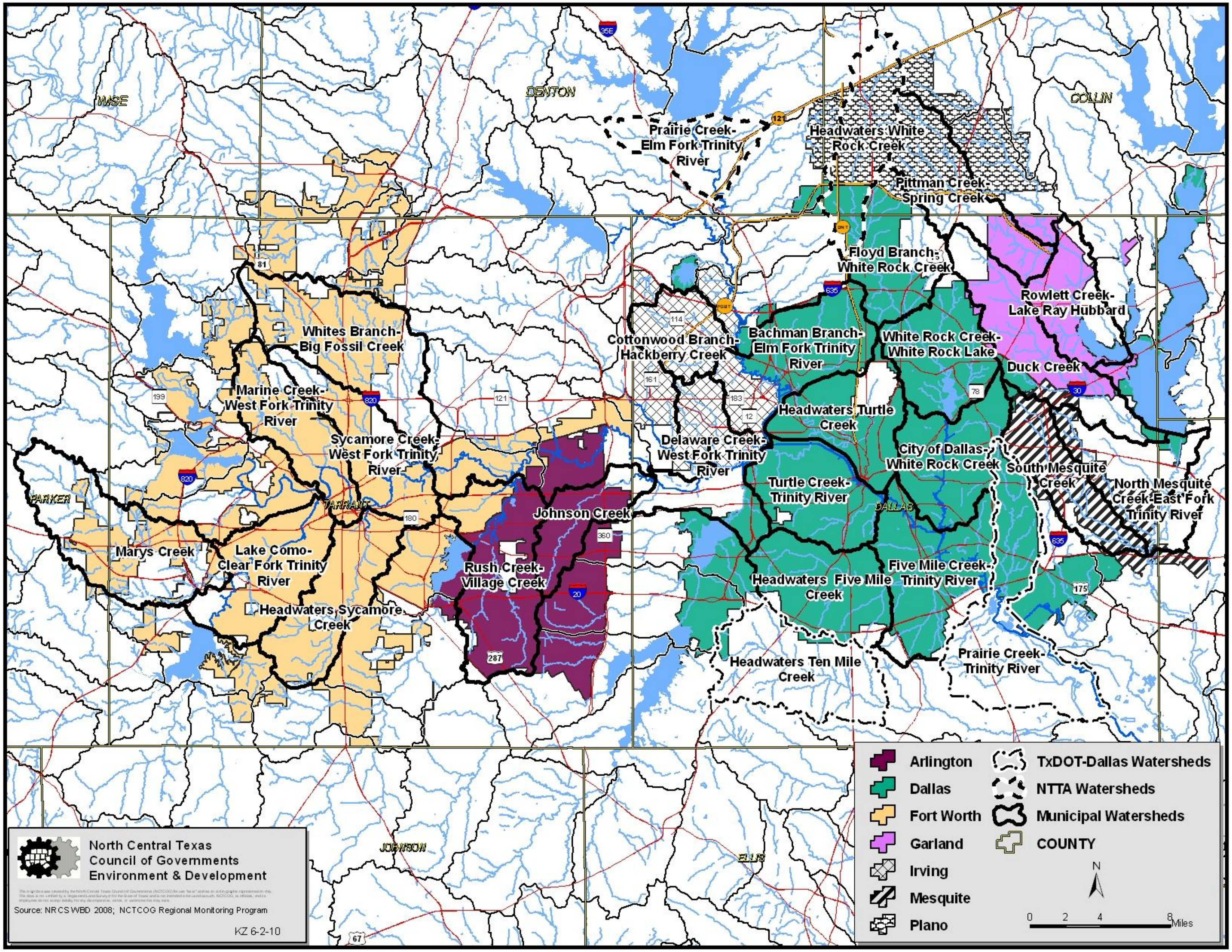

Figure 1: Regional Monitoring Entities & Selected HUC-12 Subwatersheds for Third Term Monitoring

Table 2a: RWWCP Watersheds Selected for Third Permit Term Monitoring

Area of City Sq mi. ⟶		Arlington 98.57		Dallas 385.92		Fort Worth 344.67		Garland 57.16		Irving 67.88		Mesquite 46.36		Plano 72.25	
HUC-12 Watersheds	*	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.
Johnson Creek	C	**17.61%**	**17.36**												
Rush Creek-Village Creek	C	**35.51%**	**35.01**												
Bachman Branch-Elm Fork Trinity River	B			**7.98%**	**30.79**					16.16%	10.97				
City of Dallas-White Rock Creek	C			**9.00%**	**34.75**							0.27%	0.13		
Five Mile Creek-Trinity River	C			**10.79%**	**41.66**										
Floyd Branch-White Rock Creek	B			5.5%	21.3									**3.1%**	2.2
Headwaters Five Mile Creek	B			**9.00%**	**34.74**										
Headwaters Turtle Creek	C			**7.4%**	**28.4**										
Turtle Creek-Trinity River	C			**8.94%**	**34.5**										
White Rock Creek-White Rock Lake	B			**8.73%**	**33.7**			1.46%	0.83						
Headwaters Sycamore Creek	BC					**10.22%**	**35.22**								
Lake Como-Clear Fork Trinity River	BC					**9.79%**	**33.74**								
Marine Creek-West Fork Trinity River	BC					**8.58%**	**29.56**								
Mary's Creek	BC					**6.29%**	**21.69**								
Sycamore Creek-West Fork Trinity River	BC					**6.77%**	**23.32**								
Whites Branch-Big Fossil Creek	BC					**9.73%**	**33.52**								
Duck Creek	BC			0.92%	3.56			**42.19%**	**24.11**			5.75%	2.67		
Rowlett Creek-Lake Ray Hubbard	BC			0.63%	2.42			**29.92%**	**17.1**						
Cottonwood Branch-Hackberry Creek	C			0.04%	0.15					**29.90%**	**20.29**				
Delaware Creek-West Fork Trinity River	C			1.53%	5.91					**22.16%**	**15.04**				
North Mesquite Creek-East Fork Trinity River	C			0.39%	1.5							**26.82%**	**12.43**		
South Mesquite Creek	C			0.22%	0.85							**54.27%**	**25.16**		
Pittman Creek-Spring Creek	BC							16.04%	9.17					**25.42%**	**18.37**
Headwaters White Rock Creek	BC			1.66%	6.42									**26.2%**	**18.93**
Totals of selected (bolded) watersheds ⟶		**53.12%**	**52.37**	**67.34%**	**259.84**	**53.76%**	**185.24**	**72.11%**	**41.21**	**52.06%**	**35.33**	**81.09%**	**37.59**	**51.62%**	**37.3**

*** (C) – Chemical (B) – Bioassessment (BC) – Both Bioassessment & Chemical** **"HUC12 Sq. Mi" indicates the area of the watershed within the jurisdictional boundary**

Table 2b: RWWCP Watersheds Selected for Third Permit Term Monitoring Transportation Agencies

Area of City Sq mi. ⟶	*	Arlington 98.57		Dallas 385.92		Fort Worth 344.67		Garland 57.16		Irving 67.88		Mesquite 46.36		Plano 72.25	
HUC-12 Watersheds		**% of City**	**HUC12 Sq. Mi.**	**% of City**	**HUC12 Sq. Mi.**	**% of City**	**HUC12 Sq. Mi.**	**% of City**	**HUC12 Sq. Mi.**	**% of City**	**HUC12 Sq. Mi.**	**% of City**	**HUC12 Sq. Mi.**	**% of City**	**HUC12 Sq. Mi.**
TxDOT- Dallas Selected Watersheds															
Headwaters Ten Mile Creek	C			**0.7%**	2.5										
Prairie Creek-Trinity River	C			**4.7%**	18.0							**1.6%**	0.7		
NTTA Selected Watersheds															
Headwaters White Rock Creek	C			1.66%	6.42									**26.2%**	**18.93**
Prairie Creek-Elm Fork Trinity River	C														
Totals of all watersheds (in this table only) ⟶				**7.06%**	26.92							**1.6%**	0.7	**26.2%**	**18.93**

Table 3: Sampling Metrics

	Chemical Sampling									Bioassessment Sampling				
	Annual				Permit Term					Annual			Permit Term	
Entity	Sampling Sites per Watershed A	Number of Watersheds Sampled B	Frequency of Sampling C	Total Annual Samples D (A×B×C)	Number of Years Sampling E	Total Samples For Permit Term F (D×E)	Number of Watersheds Sampled G	Number of Samples Taken in Each Watershed H (F÷G)	Number of Samples Per Site I (H÷A)	Sites Per Watershed Per Year J	Frequency of Sampling K	Watersheds Per Year L	Number of Years Sampling M	Total Samples N (J×K×L×M)
Arlington	3	1	4	12	4	48	2	24	8	-	-	-	-	-
Dallas	3	2	4	24	4	96	4	24	8	1	2	4	4	32
Fort Worth	2	2	1	4	4 and 1	16 + 4	4 and 2	4 + 2	2 and 1	2	2	6	5	120
Garland	3	1	4	12	4	48	2	24	8	1	2	1	4	8
Irving	3	1	4	12	4	48	2	24	8	-	-	-	-	-
Mesquite	1	2	4	8	4	32	2	16	8	-	-	-	-	-
Plano	2	1	4	8	4	32	2	16	8	1	2	1	4	8
NTTA	2	1	4	8	4	32	2	16	8	-	-	-	-	-
TxDOT-Dallas	2	1	4	8	4	32	2	16	8	-	-	-	-	-

Grab samples will be collected during the first flush and analyzed for *E. coli*, total coliforms, oil and grease, and pH. An additional first flush sample and four subsequent samples collected at equal time intervals will be taken over the first two hours of the event and combined for a composite sample. Samples will be collected for no more than two hours, regardless of storm duration. The grab samples can be obtained either manually or from some type of automated collection device to better address safety concerns. Sampling will be conducted only on qualifying events which are defined as satisfying the following requirements: 1) Antecedent dry period of 72 hours minimum; 2) Rainfall volume of 0.10 inch minimum; and a 3) Quantifiable increase in water surface elevation attributable to storm water runoff. Rain gauges will be deployed in each watershed to support assessment of local wet weather conditions.

Bioassessments

The recent National Research Council (NRC) report *Urban Stormwater Management in the United States* recommends including bioassessments for assessing storm water management program progress. It also recommends that storm water management strategies should address all stressors to a stream which can be accomplished through biological monitoring since biota naturally integrate the environmental conditions that impact them. TCEQ has continued the option established by EPA in the MS4 permit language of allowing bioassessments to be used as a replacement for a portion of the chemical monitoring requirement. The RWWCP has always had a bioassessment component as part of its overall approach and the partners would like to continue including it. In fact, this proposal suggests a greater use of bioassessments across the region than ever before.

Both EPA and TCEQ have developed an array of methods and approaches that can be used in conducting bioassessments. Each of these regulatory entities has developed manuals outlining these various steps. As EPA states in their manual, Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, 2nd Ed. (1999) the protocols described are not "intended to be used as a rigid protocol without regional modifications. Instead, they provide options for agencies or groups that wish to implement rapid biological assessment and monitoring techniques."

As such, the regional program participants that are implementing bioassessments (Dallas, Fort Worth, Garland and Plano) will be performing bioassessment based upon standardized protocols as set forth in applicable EPA and TCEQ manuals. These protocols will be detailed in each annual report but generally involve habitat assessment, a measurement of standard field physical conditions, and collection and identification of macroinvertebrates and possibly other biota. Watershed parameters will be compared to a baseline standard to determine the habitat's health, through use of a reference site or other methods. The number of watersheds being sampled, stations per watershed and samples per year using bioassessment protocols are all listed in Table 3.

IV. Summary of the RWWCP Proposal for the Third Permit Term

In summary:

- Each participant has selected watersheds to achieve greater than 50% coverage of their jurisdictional area.
- To increase statistical robustness, most watersheds will be sampled for a minimum of two years.
- Most watersheds will be sampled quarterly; Fort Worth is putting a greater effort into the bioassessment sampling instead.
- The number of sites per watershed varies per entity based on local conditions.
- Arlington, Dallas, Garland, Irving, Mesquite, Plano, NTTA and TxDOT-Dallas will collect samples for the first four years of the five-year permit term.
- Fort Worth has elected to perform chemical monitoring for the entire five-year permit term.
- 17 chemical parameters will be analyzed in each storm event sample
- Dallas, Fort Worth, Garland and Plano will also do biological assessments.

NCTCOG
ATTACHMENT B - PART A FIELD COLLECTION AND ANALYSIS OF STORM WATER SAMPLES

COST SUMMARY

	Task	Level of Effort: Hours	Personnel Costs	Laboratory Costs	Other Direct Expenses	Total
A. Project Management & Coordination						$ -
B. SAPP/QAPP						$ -
C. Field Sampling and Analyses						$ -
ARL	Johnson Creek					$ -
ARL	Rush Creek					$ -
DAL	City of Dallas White Rock Creek					$ -
DAL	Five Mile Creek - Trinity River					$ -
DAL	Headwaters Turtle Creek					$ -
DAL	Turtle Creek - Trinity River					$ -
GAR	Duck Creek					$ -
GAR	Rowlett Creek - Lake Ray Hubbard					$ -
IRV	Cottonwood Branch - Hackberry Creek					$ -
IRV	Delaware Creek - West Fork Trinity River					$ -
MES	North Mesquite Creek - East Fork Trinity River					$ -
MES	South Mesquite Creek					$ -
PLN	Pittman Creek - Spring Creek					$ -
PLN	Headwaters White Rock Creek					$ -
TxDOT	Headwaters Ten Mile Creek					$ -
TxDOT	Prairie Creek					$ -
NTTA	Headwaters White Rock Creek					$ -
NTTA	Prairie Creek - Elm Fork Trinity River					$ -
D. Annual Report (Four Permit Years)						$ -
	Compile Data					$ -
	Draft Report					$ -
	Final Report					$ -
E. Electronic Data Monitoring Report (Four Permit Years)						$ -
	Data QA/QC					$ -
	Draft for Participant Review					$ -
	Submit to TCEQ					$ -
F. Final Summary Report (End of Permit Term)						$ -
	Compile Data					$ -
	Draft Report					$ -
	Final Report					$ -
	TOTAL	**0**	**$ -**	**$ -**	**$ -**	**$ -**

	Unit Cost Per Sample Location					

ARL - City of Arlington
DAL - City of Dallas
GAR - City of Garland

IRV - City of Irving
MES - City of Mesquite
PLN - City of Plano

TxDOT - Texas Department of Transportation

NTTA - North Texas Tollway Authority

NCTCOG

ATTACHMENT C - PART B - BIOMONITORING SAMPLING AND ANALYSES

COST SUMMARY

Task		Level of Effort				
		Hours	Personnel Costs	Laboratory Costs	Other Direct Expenses	Total
A. Project Management & Coordination						$ -
B. SAPP/QAPP						$ -
C. Field Sampling and Analyses						$ -
DAL	Bachman Branch - Elm Fork Trinity River					$ -
DAL	Floyd Branch - White Rock Creek					$ -
DAL	Headwaters Five Mile Creek					$ -
DAL	White Rock Creek - White Rock Lake					
GAR	Duck Creek					$ -
GAR	Rowlett Creek - Lake Ray Hubbard					$ -
PLN	Pittman Creek - Spring Creek					$ -
PLN	Headwaters White Rock Creek					$ -
D. Annual Report (Four Permit Years)						$ -
	Compile Data					$ -
	Draft Report					$ -
	Final Report					$ -
E. Electronic Data Monitoring Report (Four Permit Years)						$ -
	Data QA/QC					$ -
	Draft for Participant Review					$ -
	Submit to TCEQ					$ -
F. Final Report (End of Permit Term)						$ -
	Compile Data					$ -
	Draft Report					$ -
	Final Report					$ -
	TOTAL	**0**	**$ -**	**$ -**	**$ -**	**$ -**

	Unit Cost Per Sample Location					

DAL - City of Dallas
GAR - City of Garland
PLN - City of Plano

Appendix B:

Monitoring Program and Quality Assurance Project Plan for Wet Weather Characterization Equipment Deployment and Sampling Protocol: 2018-2022

Regional Wet Weather Characterization Program, Permit Term Four

Monitoring Program and Quality Assurance Project Plan for Wet Weather Equipment Deployment and Sampling Protocol: 2018–2021

Prepared for:

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Texas Board of Professional Engineers
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May 1, 2018

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Acronyms and Abbreviations

BMP	Best Management Practice
CDMA	code division multiple access
DFW	Dallas-Fort Worth
EDD	electronic data deliverable
EPA	Environmental Protection Agency
FSO	Field Sampling Organization
LCD	liquid crystal display
MS4	Municipal Separate Storm Sewer System
NBS	National Bureau of Standards
NCTCOG	North Central Texas Council of Governments
NTTA	North Texas Tollway Authority
NWSWFO	National Weather Service Weather Forecast Office
PPE	personal protective equipment
QA	quality assurance
QAPP	Quality Assurance Project Plan
RWWCP	Regional Wet Weather Characterization Program
QC	quality control
TMDL	Total Maximum Daily Load
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TxDOT	Texas Department of Transportation
USGS	U.S. Geological Survey
UTC	Coordinated Universal Time

1.0 Introduction

1.1 Background

Since 1996, a regional storm water monitoring program has been ongoing in the Dallas-Fort Worth (DFW) metropolitan area among the seven largest cities and major transportation agencies for compliance with Federal and State storm water permit requirements. During the initial permit term (1996–2001), seven municipalities (Dallas, Fort Worth, Arlington, Irving, Garland, Plano and Mesquite) and the Dallas and Fort Worth Districts of the Texas Department of Transportation (TxDOT) received joint approval from U.S. Environmental Protection Agency (EPA) for a regional monitoring program which utilized the assistance of a shared consultant team and the United States Geological Survey (USGS) to sample and analyze 22 outfalls primarily from small watersheds of a predominantly single land use type. The Participants listed above worked through the North Central Texas Council of Governments (NCTCOG) to form a regional partnership and strategy to conduct wet-weather monitoring activities for the regional monitoring program.

The sample collections served to characterize typical urban runoff from limited land use types, and were useful for estimating general pollutant loadings. However, they did not directly evaluate impacts on actual receiving streams.

1.1.1 Second Permit Term

In the second permit term (2005–2010), the permit was administered by the Texas Commission on Environmental Quality (TCEQ) and implemented through NCTCOG and a consultant team led by Atkins. Approval was obtained to utilize in-stream stations for the regional monitoring program to more directly assess the impact of storm water within receiving streams. The revised program was termed the Regional Wet Weather Characterization Program (RWWCP) and was added as an option in Part IV.A.3 of the Texas Pollutant Discharge Elimination System (TPDES) Municipal Separate Storm Sewer System (MS4) permits issued to the Phase I North Central Texas governmental entities. The primary goal of the in-stream monitoring program was to obtain baseline data on receiving streams in the DFW Metroplex for use in determining long-term water quality trends. Since the RWWCP language existed outside of each permit, it allowed greater flexibility for making changes to the program. During this second permit term, the North Texas Tollway Authority (NTTA) joined the regional program. All other participants remained the same, except for the TxDOT-Fort Worth District who became a co-permittee with the cities of Fort Worth and Arlington and were no longer required to conduct wet weather monitoring. According to the original RWWCP protocol, municipal Participants collected data from three sampling sites in the watershed (typically upstream, midstream and downstream) and the transportation agencies collected data from two sites (upstream and downstream stations only). Samples were collected quarterly from each site during a qualifying rain event and were analyzed for 18 parameters.

As an added component, the City of Fort Worth selected the Representative Rapid Bioassessment Monitoring Option (Part IV.A.2) in their permit, which allowed the chemical sampling frequency to be reduced from four times per year per site to once per year per site. In its place, two bioassessments were conducted each year at a minimum of nine sites. These bioassessments were based on protocols developed by the EPA. A summarization of this bioassessment data was included along with the chemical data in the annual regional monitoring report each year of the permit term.

1.1.2 Third Permit Term

In the third permit term (2011–2016), the Cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite and Plano, together with the North Texas Tollway Authority and TxDOT-Dallas District agreed to continue their regional partnership and work cooperatively through the NCTCOG and Atkins to develop a revised RWWCP. This revised plan effectively monitored at least 50% of each entity's jurisdictional area by the end of the permit term. This extension of jurisdictional coverage allowed a reasonable assessment of each entity's jurisdictional watersheds while also achieving a balance among the various goals of obtaining valid scientific information, meeting permit compliance, and addressing what is practicable for each entity. The primary goal of the RWWCP during this permit term was to continue the assessment of urban impact on receiving stream water quality and to document any improvement presumably resulting from local BMP implementation. The data collected during this permit term built upon the set of regional water quality data collected under the previous term needed for meaningful trend analysis. Since assessing the impact of urban runoff on receiving stream quality is a primary focus of this program, assessing the biological integrity of the streams was deemed fundamental in the third term. During the third term, 24 watersheds were chemically monitored and 12 watersheds were bioassessed across the region, with substantial overlap between the two sampling approaches.

At the end of the third permit term's sampling effort, a final summary report was prepared by Atkins to assess the sampling effort. The report found that in more than half of the watersheds sampled had high bacteria exceedances, with the average number of nine exceedances in these watersheds. Stream degradation was noted by Atkins' monitoring team in about half of the sampled watersheds based on the data analyzed, and additional monitoring was recommended at these sites.

The report analyzed each of the monitored watersheds, and looked at characteristics specific to each watershed. This approach provided more usable information for each entity, and each individual watershed's information can be reviewed and used to implement BMPs and other monitoring practices in the future. Many of the watersheds that were studied in the third term were classified as high priorities to be studied again due to the data was collected during the third term. The watersheds that were classified as high priority were generally those with stream degradation, those with high number of exceedances of criteria of monitored parameters, and those with existing TMDLs.

Taking into account each watershed's characteristics and evaluating the RWWCP as a whole, Atkins made various recommendations for modifying the RWWCP in the next term, including the following that were applied to the proposal:

- Focus on Impaired Waterbodies –This suggestion is supported by TCEQ and EPA feedback provided to NCTCOG and the monitoring Participants. Atkins suggests a focus on monitoring impaired water bodies will also help with TMDL efforts already underway in the area.
- Rapid bio-assessment improvements – Rapid bio-assessments should continue to be part of the RWWCP, and entities that are not currently completing RBAs should be encouraged to do so. Atkins recommends that the parameters that are recorded during bio-assessment chemical monitoring activities be expanded to include/match those of the wet weather monitoring to allow for easier comparison.

- Revise monitored pollutants: Pesticides and Herbicides – During the third permit term, Carbaryl was chosen to replace Diazaon that was undetected in the second permit term. Carbaryl was not detected in any watershed during the third permit term, and therefore was recommended that it no longer be monitored for the fourth permit term. Suggestions for replacement are dieldrin or atrazine.
- Revise monitored pollutants: indicator bacteria – Remove total coliforms from list of monitoring parameters. There is no recognized correlation between total coliforms and fresh water pathogens by TCEQ or EPA.
- Revise monitored pollutants: nutrients – Add ammonia nitrogen, nitrate nitrogen, and ortho-phosphate to the monitoring parameters for wet weather chemical monitoring. These additions would allow for better comparisons between bioassessment and wet weather chemical monitoring results.
- Revise monitored pollutants: metals – For the Duck Creek, Johnson Creek, and White Rock Creek (headwaters) subwatersheds, it is recommended that sampling of dissolved fractions of metals is conducted in order to determine the concentration of bioavailable metals.

Many of these recommendations were incorporated in the proposal for the fourth permit term.

1.1.3 Current (Fourth) Permit Term

For the current permit term (2018 to 2022), the cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite, and Plano and the NTTA agreed to continue their regional partnership to work cooperatively through the NCTCOG to develop a revised regional monitoring program. TxDOT obtained a statewide permit incorporating both the Dallas and Fort Worth Districts, which removed the requirement to conduct wet weather monitoring. The revised regional monitoring program, which was approved by the TCEQ in 2017, incorporates the recommendations from the previous program outlined above.

The municipal regional Participants proposed to continue to use a sampling plan that will effectively monitor at least 50% of their jurisdictional area by the end of the permit term. As in the previous term, in-stream watershed monitoring will be continued to obtain greater statistical robustness of the data by increasing the sampling at each location for a minimum of two years. The Participants will maintain fixed sampling stations to the extent practicable. This will enable the data to be examined for trends and show improvements or decline in water quality within the fixed sampling period.

Watersheds that will be monitored were prioritized based on TMDLs and 303d streams which were in watersheds that cover the jurisdictional area of the municipalities. Participants proposed to monitor in these impaired waterbodies in order to better assess the impacts of storm water on these impaired streams. It is primarily the same area monitored during the previous permit terms with some additional watersheds.

In October 2017, a consultant team led by Atkins and including subconsultants Freese and Nichols, Inc. and Dougherty Sprague Environmental, Inc. was reselected to continue providing regional storm water monitoring services. Atkins will perform a variety of storm water monitoring compliance activities for the Cities of Arlington, Garland, Irving, Mesquite, and Plano, along with NTTA including storm water monitoring, bioassessments, and a BMP Analysis and Evaluation Plan. The bioassessment monitoring plan and BMP Analysis and Evaluation Plan will be provided in separate submittals. This document defines procedures for storm water sampling, sampling equipment and deployment, field trip preparation, sample retrieval, laboratory analysis, and post-sampling activities. Dallas and Fort Worth are part of the approved regional monitoring plan; however, this document is specific to the storm water monitoring activities for the Cities of Arlington, Garland, Irving, Mesquite, Plano, and NTTA.

1.2 Purpose of this Document

The purpose of this document is to fulfill the TPDES permit requirement held by the Cities of Arlington, Garland, Irving, Mesquite, Plano, and NTTA, and to provide instructions for the NCTCOG consulting staff on storm water sampling, sampling equipment and deployment, field trip preparation, sample retrieval, laboratory analysis, and post-sampling activities for the current permit term (2018 through 2022). This document will allow storm water monitoring to be conducted in an effective, consistent, and efficient manner. Results obtained from the monitoring described in this document will be submitted to the NCTCOG to meet compliance obligations for the TPDES permit holders. Data collected under this protocol will be used to assess wet weather in-stream conditions.

1.3 Organization of Document

The remainder of this document includes separate sections addressing different aspects of the monitoring protocol for the project.

Section 2.0 – Roles and Responsibilities: Describes the roles and responsibilities of all project participants.

Section 3.0 – Site Information: Provides information about the site locations and precipitation and hydrologic information.

Section 4.0 – Sampling Equipment: Provides an overview of the sampling equipment and programming requirements, including automatic sampler deployment and equipment protection procedures.

Section 5.0 – Sampling Strategy and Collection Procedures: Describes field trip preparation, mobilization, sample retrieval procedures, monitoring constituents, and quality assurance (QA)/quality control (QC) field samples to be obtained.

Section 6.0 – Sample Handling and Documentation: Describes information regarding chain-of-custody requirements and containers and preservatives.

Section 7.0 – Precipitation Monitoring: Describes the precipitation monitoring approach, including equipment, locations, maintenance, calibration, and data management.

Section 8.0 – Flow and Pollutant Load Estimations: Describes the methodology to be used to calculate flows and pollutant loads.

Section 9.0 – Laboratory Analysis: Provides laboratory sample preparation and data reports information.

Section 10.0 – Quality Assurance Project Plan: Outlines the required field and laboratory quality assurance procedures to be used.

Section 11.0 – Post-Sampling Activities: Discusses equipment maintenance, data management and retrieval, and redeployment of equipment.

Section 12.0 – Health and Safety: Addresses the health and safety of field sampling staff, including personal protective equipment and anticipated hazards, and provides emergency contact information.

Section 13.0 – References: Includes a list of references used to prepare this document.

2.0 Roles and Responsibilities

The names and responsibilities of the organizations involved in the orchestration and implementation of the regional storm water monitoring program are described in this section.

2.1 Monitoring Organization

The NCTCOG represents several municipalities in the Greater Dallas-Fort Worth Metroplex. Participating municipalities in this monitoring plan include the Cities of Arlington, Garland, Irving, Mesquite, and Plano, and the roadway authority of NTTA.

2.2 Monitoring Plan Developer

The monitoring plan was developed by Atkins. During the development of the monitoring plan, the plan developer is responsible for:

- Making updates and revisions to the monitoring plan according to *"The North Central Texas Regional Wet Weather Characterization Plan Proposal for the Fourth Permit Term"* (NCTCOG, 2017) and comments requested by the monitoring organization.
- Reviewing monitoring results and assisting the monitoring organization in implementing the monitoring plan.
- Assisting NCTCOG in coordinating the storm water activities of all involved organizations.

2.3 Field Sampling Organization

The Field Sampling Organization (FSO) will be Atkins, assisted by subconsultants Freese and Nichols, Inc. and Dougherty Sprague Environmental, Inc. The FSO will be responsible for executing the storm water monitoring activities as defined in this monitoring plan. Activities include monitoring equipment installation, maintenance, and calibration; sample collection; preparing the required reports; conducting the required equipment maintenance; validation tasks; QA tasks; and data reporting activities. The FSO will:

- Coordinate monitoring activities with participants on equipment delivery and pickup.
- Contract and coordinate with the analytical laboratory, contractors, and subconsultants necessary for implementation of the monitoring plan.
- Provide needed logistical support to field sampling crews, establish a communication network, and schedule and coordinate monitoring activities.
- Oversee or conduct field monitoring activities in accordance with the approved monitoring plan/ quality assurance project plan (QAPP).
- Prepare and maintain all field records and QA/QC forms.
- Receive, review, manage, and validate all laboratory reports.
- Prepare and submit all collected data to NCTCOG in accordance with protocol requirements and enter into the regional program monitoring database.

- Store hard copies.
- Assist in the review of annual reports.

2.4 Analytical Laboratory

The laboratory will be responsible for conducting QA tasks, laboratory analysis of samples, and reporting in accordance with the Sections 5.4, 6.0, 9.0, and 10.0 of the monitoring plan. The laboratory will also:

- Review monitoring plan/QAPP.
- Verify that all samples delivered to the laboratories meet applicable QA requirements listed in approved QAPP.
- Process and prepare composite and grab samples for analyses of the monitoring constituents listed in Section 5.4 of this monitoring plan.
- Analyze collected samples according to the methods listed in Section 5.4 of this monitoring plan.
- Conduct all necessary QA testing according to Section 10.0 of this monitoring plan.
- Report test results and QA data to the FSO according to Section 9.0 of this monitoring plan.

2.5 Communications Protocol

Communications within Atkins and between the subcontractors will be conducted by the Project and Task Managers or designated personnel. Managers and appropriate subcontractor staff will be copied on scope or policy issues along with day-to-day messages regarding the weather.

Communications to and from NCTCOG and the sampling teams will be conducted through Derica Peters of NCTCOG (or delegate) and Chad Richards (Atkins) for regional monitoring-related items, including sampling activities and laboratory results. Designated staff will be copied on scope and policy issues.

Sampling personnel may be divided into multiple field teams and office leaders if necessary. Each field team will consist of one field team leader and one field assistant. The office leader will remain in communication with the field team leaders and liaise between the field teams and the laboratory. The office leader will remain aware of potential weather and traffic concerns and alert the field teams as needed.

3.0 Site Information

This section describes the monitoring site locations that have been chosen for storm water monitoring during the calendar years of 2018–2021.

3.1 Site Locations

The watershed maps and deployment locations are provided in Appendix A.

3.2 Precipitation and Hydrology Information

All sites are located within the Dallas-Fort Worth Metroplex, which is approximately 250 miles north of the Gulf of Mexico. The climate is a mix of subtropical with humid, hot summers, and continental with wide ranges in annual temperature extremes. Rain occurs in the winter months associated with Pacific and Arctic cold fronts and in the summer months with thunderstorm activity. Rainfall occurs most frequently at night, with the highest amounts falling during the months of May and October (National Weather Service Weather Forecast Office [NWSWFO], 2011).

Rainfall records (1981–2010 data from NWSWFO, 2011) from the atmospheric monitoring station located at the Dallas-Fort Worth International Airport report a normal annual rainfall amount of 36.14 inches. Figure 3-1 shows each month with its corresponding normal rainfall volume.

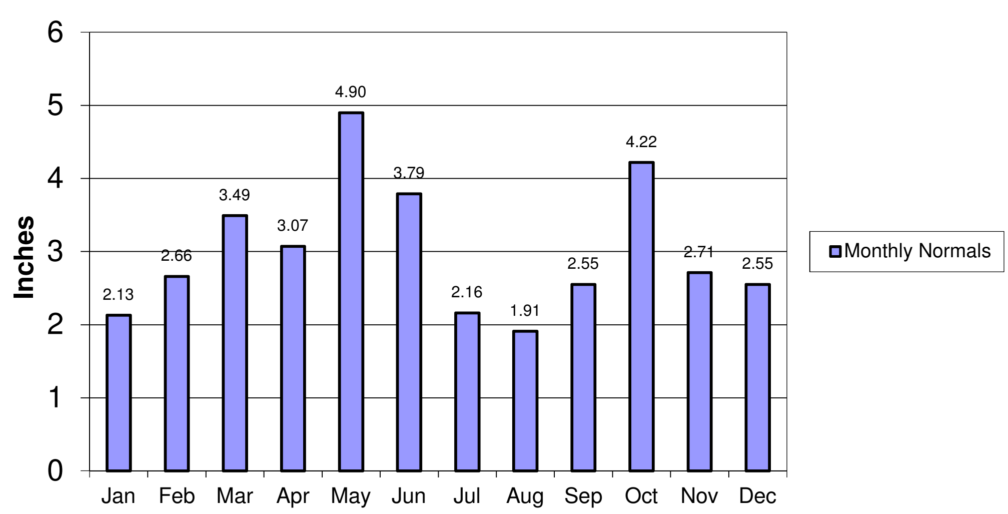


Figure 3-1 Monthly Distribution of Normal Rainfall Patterns (NWSWFO, 2011)

3.3 2018–2019 Monitoring Stations

The following are the monitoring station locations for each entity and the associated watersheds.

Arlington – Johnson Creek and Fish Creek – Mountain Creek Lake

- Johnson Creek at Six Flags (AR1801/1901)
- Fish Creek at SH 360 (AR1802/1902)

Garland – Duck Creek

- Duck Creek at Shiloh Bridge (GA1801/1901)
- Duck Creek between Forest North and South (GA1802/1902)
- Duck Creek under La Prada Bridge (GA1803/1903)

Irving – Delaware Creek

- Delaware Creek at Sowers Road (IR1801/1901)
- Delaware Creek at Oakdale (IR1802)

Mesquite – South Mesquite Creek and North Mesquite Creek

- North of New Market Road (MS1801)
- North Mesquite Creek at Edward's Church (MS1802)

Plano – Spring Creek

- Spring Creek at 16th Street (PL1801)

NTTA – Cottonwood Branch – Hackberry Creek and Cottonwood Creek – Mountain Creek Lake

- Unnamed Tributary at SH 161 North of Gateway Drive (NT1801)
- Cottonwood Creek at SH 161 South of Dickey Road (NT1802)

Maps and photos of the sites may be found in Appendix A. The equipment located at each station is discussed in detail in Section 4.0.

3.4 2020–2021 Monitoring Stations

This subsection will be finalized prior to the monitoring activities of 2020.

4.0 Sampling Equipment

This section presents an overview of the sampling equipment and deployment.

4.1 Overview of Equipment

Storm water monitoring equipment to be utilized at the sites includes:

- ISCO 6712 Automatic Sampler and Suction Line
- ISCO 730 Bubbler Flow Module and Bubbler Line
- ISCO CDMA Cellular Phone System
- ISCO 674 Rain Gauge (upstream sites only)

The storm water sampling will be conducted using an ISCO 6712 automatic sampler. The automatic sampler uses a battery-powered peristaltic pump to draw water through a strainer and flexible sample tube. The storm water sample will be collected using four 1-gallon glass containers located within the automatic sampler housing. Sampling will be triggered by a quantifiable increase in water surface elevation within the stream conveyance channel within a one-hour window. A 730 Bubbler Flow Module will be attached to a tube connected to the automatic sampler to monitor the water level increase. A computer processor with LCD display will allow programming of sampler functions, such as collection intervals and sample volumes, and additional data recording. A CDMA Cellular Phone System will be used on one sampler within the designated watershed to notify field crews that the sampling routine has been initiated. The cellular phone system is used only as an option to alert staff. A deep-cycle marine battery will provide power to the automatic sampler and related equipment. At applicable sites where a clear view of the sky is available, solar panels may be installed to provide a trickle charge to the deep-cycle marine battery. Vendor literature is provided in Appendix B.

Data from the ISCO 674 Rain Gauge, 6712 automatic sampler, and 730 Bubbler Flow Module will be downloaded during sample collection and reported with the laboratory data or, during dry periods, downloaded on a monthly basis by the FSO.

4.2 Automatic Sampler Deployment

4.2.1 Pump and Sample Bottle Housing

The automatic sampler will be located on a stable and flat surface within a storm water sample shelter. The equipment will be securely fastened by a steel cable to a solid object, such as a tree or earth anchor, to prevent removal by high flood events or vandals. The equipment will be located downstream of the solid object and the chain will have no slack. The automatic sampler and battery will be anchored suitably so that they are not tipped over by wind or water.

4.2.2 Suction Line

The automatic sampler will be located outside the conveyance and above the normal water surface elevation. The sampler pumps typically can provide about 25 to 28 vertical feet of suction lift. Placing the sampler higher will cause lower velocities than the 2 feet per second needed to collect representative samples, especially when considering solids content. Excessive elevation lift can also cause sampling to fail. Placing the sampler at longer horizontal distances will result in large friction losses along the sampler tube.

Where possible, the strainer or suction line intake will be located near the center of a straight length of channel. Soils, vegetation, and debris present in earthen channels can clog the collection tube intake. The suction line intake must not be clogged by debris and the suction line must not be displaced. To achieve this, the intake will be securely fastened above the streambed with the open end of the intake pointing downstream. The intake may be fastened to a steel stake or reinforcing bar driven into the center of the stream channel or attached to the side of the channel. Wire, cable ties, or hose clamps will be used to fasten the intake to the steel stake or sides of the channel. The tubing will not be crimped and vertical loops that can trap water in the tubing will be avoided.

4.2.3 Bubbler Module and Tubing

The 730 Bubbler Module uses a differential pressure transducer and a flow of bubbles to measure liquid levels up to 10 feet. The bubbler is unaffected by wind, fluctuations in air or liquid temperatures, turbulence, foam on the surface, corrosive chemicals, debris, oil, floating grease, or lightning. The bubbler tube will be secured similar to the suction line intake. Wire, cable ties, or hose clamps will be used to fasten the bubbler tubing to the steel stake. The tubing will not be crimped.

The bubbler module will be calibrated by measuring the depth of water and adjusting the reading to match as described in the vendor manual. The bubbler line will be routed and secured so that it does not disturb the flow. The mounting hardware will not be over-tightened to avoid kinking the tubing or restricting the airflow.

4.2.4 Sample Jar Installation and Securing

Sample jars will be set in the wire basket located in the bottom of the automatic sampler housing and positioned so the jar locations correspond to the numbers designated for collection. The wire retainer frame will be placed over the four jars and secured in place with the bungee cords located in the bottom of the automatic sampler housing.

4.2.5 Programming

The automatic sampler will be programmed to collect sample aliquots during storm events when the 730 Bubbler Module detects a quantifiable increase in water surface elevation (for example, 1-inch rise) within the stream conveyance channel within one hour. The automatic sampler will be programmed with three different activity modes: Disabled, Enabled, and Shut Down.

The automatic sampler will begin in "Disabled" mode. When the bubbler module detects a quantifiable rise in the stream channel within a one-hour window, the automatic sampler will switch from "Disabled" to "Enabled" mode. The sampler will perform a sample tube-cleaning routine consisting of an air purge followed by a tubing rinse. The sampler will then fill the first of the four 1-gallon glass containers located within the housing of the automatic sampler, which is considered time "0" in the programming sequence. The automatic sampler will collect an additional 0.5-gallon aliquot in the second 1-gallon glass container at time "0"; 0.5-gallon aliquots will be collected every 30 minutes after the sampler was enabled at time "0" up to 120 minutes.

The sampler will continue to take aliquots until 120 minutes has passed from the start of sample collection. Afterwards, the automatic sampler will "Shut Down." At the end of the programming sequence, aliquots will have been collected at 0 minutes, 30 minutes, 60 minutes, 90 minutes, and 120 minutes. Sample container one, or the grab sample container, will contain one 1-gallon aliquot, sample containers two and three will contain two 0.5-gallon aliquots, and sample container four will contain one 0.5-gallon aliquot.

Figures 4-1 through 4-4 provide a flow chart for programming of the samplers with 1 inch (as an example) used as the quantifiable rise to trigger the sample.

The most upstream site in each watershed will be equipped with an ISCO 674 Rain Gauge and CDMA Cellular Phone System. When the automatic sampler becomes "Enabled," an alarm will be sent to the FSO that the sampler has started sample collection activities.

4.2.6 Calibration and Testing

The automatic samplers will be calibrated and tested upon deployment. Sample volumes, depth measurements, and sampler programming will be verified. Volume calibration is described in Section 4.12 of the Teledyne ISCO 6712 Portable Samplers Installation and Operations Guide (Teledyne Isco, 2016). Calibration of the 730 Bubbler Module is described in the Teledyne ISCO 730 Bubbler Module Installation and Operations Guide (Teledyne Isco, 2013). These guides can be downloaded from www.isco.com.

4.2.7 Equipment Protection

Failure of the automatic sampler can occur from power failure, programming error, flood damage, theft, vandalism, or environmental conditions. Every effort will be taken to prevent failure and to protect the automatic sampler. Sufficient input will be obtained from ISCO technicians to reduce incidences of failure due to programming errors. The automatic sampler and battery will be hidden from view, secured with locks and cables, and enclosed in a shelter to reduce the possibility of theft or vandalism.

6712 SAMPLER EXTENDED PROGRAMMING For HELP at any screen press ? key.	This will appear briefly
RUN "EXTENDED 1" PROGRAM VIEW REPORT OTHER FUNCTIONS	Select PROGRAM
PROGRAM NAME: "EXTENDED 1 " CHANGE? YES NO	Select YES
SELECT NEW PROGRAM CHANGE PROGRAM NAME	Select CHANGE PROGRAM NAME
NAME: "STORM " ABCDEFGHIJKLMNOPQRST UVWXYZ-& 0123456789 BACK-UP DONE	Enter an appropriate program name
SITE: DESCRIPTION "FACTORY051" CHANGE? YES NO	Select YES
SITE: "SITE 54 " ABCDEFGHIJKLMNOPQRST UVWXYZ-& 0123456789 BACK-UP DONE	Enter the appropriate site name
SELECT UNITS FOR LENGTH: ft m	Select ft
SELECT UNITS FOR FLOW RATE cfs gps gpm Mgd lps m3s m3h m3d	Select gpm
SELECT UNITS FOR FLOW VOLUME cf gal Mgal m3 lit	Select gal
PROGRAM MODULE? YES NO	Select YES
MODE OF OPERATION FLOWMETER LEVEL ONLY	Select LEVEL ONLY
NEW MODULE SETUP-- DOWNLOAD DATA NOW OR LOSE ALL DATA! DONE	Select DONE
CURRENT LEVEL IS __.__ ft. ADJUST LEVEL TO __.__ ft.	Key in the current level and press Enter
DATA STORAGE INTERVAL IN MINUTES 1 2 5 10 15 30	Select 5

Figure 4-1
Automatic Sampler Programming Flowchart Part 1

NEW MODULE SETUP-- DOWNLOAD DATA NOW OR LOSE ALL DATA! DONE	Select Done
NUMBER OF BOTTLES: 1 2 4 8 12 24	Select 4
BOTTLE VOLUME IS 1000 ml (300-30000)	Enter 3700
SUCTION LINE LENGTH IS 5 ft (3-99)	Enter length of suction line
AUTO SUCTION HEAD ENTER HEAD	Select AUTO SUCTION HEAD
0 RINSE CYCLES (0-3)	Enter 1
RETRY UP TO 0 TIMES WHEN SAMPLING (0-3)	Enter 3
ONE-PART PROGRAM TWO-PART PROGRAM	Select TWO-PART PROGRAM
24 BOTTLES AVAILABLE ASSIGN BOTTLES 1 THRU 6 TO PART 'A' (1-23)	Enter 1 (Screen will say “Beginning Part A”)
UNIFORM TIME PACED FLOW PACED EVENT PACED NONUNIFORM TIME	Select UNIFORM TIME PACED
TIME BETWEEN SAMPLE EVENTS: 0 HOURS, 5 MINUTES	Enter 0 for HOURS and 5 for MINUTES
1 BOTTLES PER SAMPLE EVENT (1- 6)	Enter 1
SWITCH BOTTLES ON: NUMBER OF SAMPLES TIME	Select NUMBER OF SAMPLES
SWITCH BOTTLES EVERY 1 SAMPLES (1-50)	Enter 1
RUN CONTINUOUSLY? YES NO	Select NO

<u>Figure 4-2</u>
Automatic Sampler Programming Flowchart Part 2

DO YOU WANT SAMPLE VOLUMES DEPENDENT ON FLOW? YES NO	Select NO
SAMPLE VOLUME 200 ml (10-1000)	Enter 3700
ENABLE: RAIN LEVEL FLOW NONE	Select LEVEL
ENABLE: RAIN AND OR DONE	Select DONE
"LEVEL" CONDITION: SET POINT RANGE RATE OF CHANGE	Select RATE OF CHANGE
CONDITION IS TRUE WHEN "LEVEL" RISES FALLS	Select RISES
"LEVEL" RISES 1.000 ft __HOURS, __MINUTES	Enter 0.086 ft and 1 HOURS, 0 MINUTES
ONCE ENABLED, STAY ENABLED? YES NO	Select YES
SAMPLE AT ENABLE? YES NO	Select YES
PAUSE RESUME 1. HH:MM DD HH:MM DD 2. HH:MM DD HH:MM DD CLEAR DONE	Select DONE (Screen will say "Beginning Part B")
UNIFORM TIME PACED FLOW PACED EVENT PACED NONUNIFORM TIME	Select NONUNIFORM TIME
NONUNIFORM TIME: CLOCK TIMES INTERVALS IN MINUTES RANDOM INTERVALS	Select INTERVALS IN MINUTES
FIRST SAMPLE AT START TIME, THEN . . .	Press Enter
QUANTITY AT INTERVAL 1. __ AT __ MIN 2. __ AT __ MIN 3. __ AT __ MIN	**Enter 4 at 30 MIN; 1 at 9999 MIN; and 0 for interval 3**
1 BOTTLES PER SAMPLE EVENT (1- 18)	Enter **1**

Figure 4-3
Automatic Sampler Programming Flowchart Part 3

SWITCH BOTTLES ON: NUMBER OF SAMPLES TIME	Select NUMBER OF SAMPLES
SWITCH BOTTLES EVERY 1 SAMPLES (1- 50)	Enter 2 **(It may ask you this after the next step depending on the programming set-up)**
RUN CONTINUOUSLY? YES NO	**Select NO (We want 3 bottles per event and 2 samples per bottles)**
SAMPLE VOLUME: 200 ml (10-1000)	Enter 1850
ENABLE: RAIN LEVEL FLOW NONE	**Select 'A' DONE**
ENABLE: RAIN AND OR DONE	Select DONE
ONCE ENABLED, STAY ENABLED? YES NO	Select YES
SAMPLE AT ENABLE? YES NO	Select YES
PAUSE RESUME 1. HH:MM DD HH:MM DD 2. HH:MM DD HH:MM DD CLEAR DONE	Select DONE
NO DELAY TO START DELAYED START CLOCK TIME WAIT FOR PHONE CALL	Select NO DELAY TO START
PROGRAMMING COMPLETE RUN THIS PROGRAM NOW? YES NO	Select YES

<u>Figure 4-4</u>
Automatic Sampler Programming Flowchart Part 4

5.0 Sampling Strategy and Collection Procedures

This section describes the strategies and procedures for collecting storm water samples.

5.1 Field Trip Preparation

The following procedures (as a minimum) will be followed to ensure successful field data collection at each of the 21 sampling locations selected for calendar years 2018–2021. At all times, the FSO will observe all the safety features and protocols described in Section 12.0 to ensure a safe field campaign.

5.1.1 Weather Monitoring

Current and forecasted weather will be monitored on a continuous basis to better anticipate field sampling collection events. Larger rainfall events result in increases in water surface elevations at downstream sites.

The depth of rainfall in the previous 24-hour period can be obtained by visiting the website http://www.intellicast.com. Go to "Current" and "Precipitation," and select the map titled "Daily." Click on the Dallas-Fort Worth area (OK-Lawton Region) on the map to obtain a contour map of precipitation depth for the Dallas-Fort Worth Metroplex for the previous 24 hours. The precipitation depth is from 1200 hours Coordinated Universal Time (UTC) of the previous day to 1200 hours UTC of the current day.

Current weather forecasts can be obtained from National Weather Service website (http://www.weather.gov/) by entering the city name or zip code.

5.1.2 Storm Event Requirements

A qualifying storm event is defined as one that satisfies the following requirements:

1. Rainfall Volume: 0.10 inch, minimum
2. Antecedent Dry Period: 72 hours, minimum
3. Stream Level: Quantifiable rise within 1 hour

Rainfall volume is the total amount of rainfall in inches within the contributing watershed of a monitoring station. The "antecedent dry period" is defined as the period prior to a storm event in which no greater than 0.10 inch of rainfall has occurred. This dry period allows build-up of constituents on the ground surface that can be washed off by the next storm event during the "first flush." The quantifiable rise in stream level within a one-hour time span will be determined by visual observation, level sensors (i.e., bubbler module), stream gauges, or other methods of determining water level. The grab sample and the first composite aliquot will be collected during the "first flush," which is defined as the 30-minute period following a quantifiable rise in the stream level.

5.2 Mobilization

The details of when the field mobilization should occur and safety issues are discussed in this section. For full details on safety precautions, consult Section 12.0.

5.2.1 When to Mobilize

Field mobilization will occur when: (1) there is rainfall at the sampler deployment location, and (2) the water level increases by a quantifiable amount at the conveyance. This information is recorded by the bubbler module and can be obtained by querying the automatic sampler unit through the cell phone modem. If an automatic sampler does not have cell phone query capability, the mobilization will be initiated based on notification from another sampler within the particular watershed where the sampler is currently located, a nearby Internet rain gauge, or weather bands tracked on radar from the Internet.

Field mobilization will be conducted 24 hours a day, on weekdays or during holidays and weekends, unless prior arrangements with NCTCOG have been made.

5.2.2 Team Assembly

The office leader may assemble multiple teams in one day. Each field team will consist of two people for safety, the field team leader and the field assistant. Field personnel will gather necessary equipment, checklists, and logbooks and travel to the site when mobilization has been authorized. Field personnel will print out the required checklists for each sampling site they are expected to visit, as well as several additional forms. These forms may be found in Appendix C. Field personnel will attempt to arrive as soon as the storm event starts in the event the sampler is not working correctly.

5.2.3 Equipment Assembly

Field personnel will go through the mobilization checklist (Appendix C) for all the equipment needed for the field trip, making sure that equipment (including the vehicles) is in good working condition and that there is sufficient gas for the field trip.

5.2.4 Equipment

The following equipment will be gathered for the collection of the storm water samples:

- Maps
- Site description and driving directions to each site
- Checklists and data forms
- Calibrated pH/temperature/specific conductivity meter
- Digital photo capturing device
- Writing instruments (pens and sharpies)
- Rain gear
- Rubberized boots
- Flashlight
- Cell phone
- Picture identification, insurance information, and contact information of office colleagues

- Water and ice for field staff (optional)
- Chain-of-custody forms (Appendix D)
- Lab sample transfer ice chest and bubble wrap
- Jumbo zip-lock freezer bags
- Ice for samples
- Extra sample containers, lids, and deep cycle battery
- Keys for shelter locks and gates, where applicable

5.2.5 Laboratory Notification

The FSO office leader will notify the laboratory of the mobilization effort and provide them with the expected number of samples.

5.2.6 Tailgate Safety Meeting

A tailgate safety meeting will be conducted prior to every monitoring event to review the anticipated site hazards. All meeting information will be placed into the project file.

5.3 Sample Retrieval

Immediately after the occurrence of a qualified sampling event, samples will be retrieved from the sampling sites. This section describes procedures upon arrival at the sampling site, including sample collection from the automatic sampler, field documentation, sampler dismantling, and transport of water samples to the laboratory for analysis.

5.3.1 Vehicle Parking and Safety

The storm water monitoring sites will be readily accessible from existing state or city street rights-of-way. FSO field personnel will not park in private driveways or on private property.

For detailed parking and safety instructions, see Section 12.0. The FSO will park the truck in such a manner as to avoid being stuck in soft off-road soils. The sampling vehicle will be locked during the sampling activities.

5.3.2 Right of Entry

FSO field personnel will carry a laminated authorization letter from NCTCOG.

5.3.3 Automatic Sampler

At each site, FSO field personnel will check the automatic sampler to verify that it is enabled and is actively taking samples. The automatic sampler contains four 1-gallon glass sample containers. The automatic sampler will fill the first sample container with 1 gallon of water immediately when triggered and also immediately place in the subsequent container a 0.5-gallon aliquot. The sampler will continue to take

0.5-gallon aliquots every 30 minutes after the initial sample for 120 minutes. The automatic sampler display will notify field personnel that sampling is complete. At the end of the programming sequence, aliquots will have been collected at 0 minutes, 30 minutes, 60 minutes, 90 minutes, and 120 minutes, for a total of three full jars and one half jar. Sample container one, or the grab sample container, will contain one 1-gallon aliquot, sample containers two and three will contain two 0.5-gallon aliquots, and sample container four will contain one 0.5-gallon aliquot. When the collection is completed, sample containers one, two, and three will each contain 1 gallon, and sample container four will contain 0.5 gallon.

Field Documentation

FSO field personnel will be responsible for documenting site conditions using the Field Condition and Sample Station checklists provided in Appendix C. The following information should be included:

- Site Details
  - Participant
  - Location
  - Name of receiving water body
- Field Conditions
  - Antecedent dry period
  - Visible construction activities observed near the site (if applicable)
- Current Field Conditions
  - Date
  - Time begin and finish sample collection activities
  - Current air temperature
  - Current cloud condition
- Precipitation Data
  - Event ID (user-provided name for the precipitation event)
  - Monitoring station for event (rain station used to gather precipitation data)
  - Storm description
  - Duration (start date and time – end date and time)
  - Total storm precipitation
  - Peak 1-hour precipitation rate
- Storm Event Collection Data
  - Flow start time (time at the beginning of the flow event, typically the time preceding a quantifiable rise in the stream depth in response to a rain event)

- Flow end time (time at the end of a flow event, typically the time when the recession limb of the hydrograph is <2 percent of the peak or is within 10 percent of the pre-storm base flow, whichever is greater, but also may be the time preceding the next rain event from which water quality samples were not collected)
- Peak depth (maximum depth measurement in feet obtained between the flow start time and flow end time)
- Mean depth (the average of the depth measurements obtained between the flow start time and flow end time)

- Sample Documentation at Each Sampling Station
  - Chain-of-custody (Appendix D)
  - Sample identification number for composite sample
  - Description of the sample characteristics (e.g., turbid, clear, oil sheen)
  - Estimated water volume in sample containers
  - Number of total aliquots
  - Time first aliquot sample collected
  - Time last aliquot sample collected
- Collection of Field QA Samples
  - Sample identification number and sample type of field QA samples collected

5.3.4 Storm Water Sample Collection

The storm water samples will be collected from within the automatic sampler enclosure by removing the top half of the ISCO unit. The sample containers will be capped and removed.

Each sample bottle will be uniquely identified, labeled, and documented in the field at the time of collection. Samples will be identified with a unique series of letters and numbers that indicate the location and date that the sample was collected. The following labeling system will be used:

The first two characters will indicate the participant for which the sample was collected. "AR" will be used for Arlington sites, "GA" will be used for Garland sites, "IR" will be used for Irving sites, "MS" will be used for Mesquite sites, "NT" will be used for the NTTA sites, and "PL" will be used for the Plano sites.

The next four digits will indicate the site number and associated calendar year in which it was sampled. The first two digits will indicate the year that the sample was collected. An example for 2018 would be "18." This is followed by the site location in regard to where it is located in the watershed. All sites upstream will start with "01," mid-stream sites will be characterized as "02," and downstream "03." For example, the downstream site in Garland sampled in calendar year 2018 will be labeled "GA-1803."

The next digit will indicate the sampling season during which the sample was collected. "1" will be used for January 1 through March 31, "2" will be used for April 1 through June 30, "3" will be used for July 1 through September 30, and "4" will be used for October 1 through December 31.

The last digit will indicate the sample bottle number. "A" will be the first grab sample container, and "B" will represent bottle 2, "C" will represent bottle 3, and "D" will represent bottle 4.

To summarize, the code GA-1802-1-B would identify the second bottle container collected during the January 1 through March 31 season at the midstream station from Garland's 2018 watershed.

5.3.5 Equipment Malfunction

In the event that the automatic equipment malfunctions, a sample may be collected manually by obtaining grab samples from the stream into the four clean 1-gallon glass sample containers. Field personnel should fill the first sample container with 1 gallon of water immediately following storm flow and also immediately obtain a 0.5-gallon grab sample aliquot in the subsequent container. Field personnel should continue to take 0.5-gallon grab sample aliquots every 30 minutes after the initial sample for 120 minutes. At the end of the sampling sequence, aliquots will have been collected at 0 minutes, 30 minutes, 60 minutes, 90 minutes, and 120 minutes, for a total of three full jars and one half jar. Sample container one, or the grab sample container, will contain one 1-gallon aliquot, sample containers two and three will contain two 0.5-gallon aliquots, and sample container four will contain one 0.5-gallon aliquot. When the collection is completed, sample containers one, two, and three will each contain 1 gallon, and sample container four will contain 0.5 gallon. The grab samples will be collected using a pre-cleaned bucket that will be triple rinsed with the water to be sampled or distilled water between each sample collection. Field personnel should also note approximate water levels in a field logbook during the sampling sequence.

5.3.6 Missed and Unusable Samples

If a sample is determined to be missed or unusable for purposes of submittal to the State, the FSO will conduct a re-sampling effort. If inadequate time or insufficient rainfall occurs during the remaining permit term, a letter will be provided to NCTCOG by the FSO (and potentially the laboratory) explaining the cause of the missed sample. An additional sample will be collected during the next quarter.

5.3.7 Sampler Dismantling

The automatic sampler will be dismantled along with the battery and removed to the truck. The enclosures will remain at the sites until the last quarterly samples are collected.

5.3.8 Sample Transport

Following the collection of water samples from each site, the FSO field personnel will call the office leader at the earliest opportunity to report the sample collection status. This information will be relayed to the laboratory. FSO field personnel will transport the water quality samples preserved in ice to maintain a temperature of 4ºC to the laboratory.

5.4 Monitoring Constituents

Table 5-1 lists the constituents to be monitored and analyzed in this project.

Table 5-1 Constituents to be Monitored

Constituent	Analysis Location	Method	Detection Limit	Holding Time
E coli	Laboratory	SM9223B	10 colonies/100 mL	6 hours
Oil and grease	Laboratory	EPA 1664A	1.7 ppm	28 days
pH	Field	Probe	-	Immediately
Temperature	Field	Probe	-	Immediately
Specific Conductance	Field	Probe	-	Immediately
Biochemical Oxygen Demand (BOD)	Laboratory	SM5210B	3 ppm	48 hours
Chemical Oxygen Demand (COD)	Laboratory	SM5220D	1 ppm	28 days
Total suspended solids (TSS)	Laboratory	SM2540D	2 ppm	7 days
Total Dissolved Solids (TDS)	Laboratory	SM2540C	5 ppm	7 days
Total arsenic	Laboratory	EPA 200.7	0.0005 ppm	6 months
Total chromium	Laboratory	EPA 200.7	0.003 ppm	6 months
Total copper	Laboratory	EPA 200.7	0.002 ppm	6 months
Total lead	Laboratory	EPA 200.7	0.0005 ppm	6 months
Total zinc	Laboratory	EPA 200.7	0.005 ppm	6 months
Dissolved phosphorus	Laboratory	EPA 200.7	0.005 ppm	48 hours
Orthophosphate	Laboratory	EPA 300	0.03 ppm	48 hours
Total phosphorus	Laboratory	EPA 200.7	0.05 ppm	6 months
Ammonia Nitrogen	Laboratory	SM4500NH3B	0.05 ppm	28 days
Total nitrogen	Laboratory	SM4500-N	0.05 ppm	28 days
Nitrate Nitrogen	Laboratory	EPA 300	0.03 ppm	48 hours
Atrazine	Laboratory	EPA 619	0.0005 ppm	7 days

5.5 QA/QC Field Samples

FSO personnel will collect QA/QC samples on 10 percent of the samples collected. QA/QC checks will include the following:

Field Duplicates – Consists of obtaining a second analytical result for a scheduled sample. Duplicate results will be analyzed to monitor intra-laboratory precision of data. The laboratory will obtain duplicates from the composite containers of the auto-samplers by sub-sampling the composite volume remaining after the initial sub-sampling. The composite containers will need a minimum volume of 2½ gallons in order to collect and analyze duplicate samples. TTI Laboratories will be responsible for receiving, labeling, analyzing, documenting, and reporting these duplicates from the composite sample containers noted by FSO field staff.

Trip Blanks – Consists of de-ionized water that is carried with the FSO staff during sample collection in sample containers. They will be collected to evaluate if cross-contamination occurs during sample transport.

1-Gallon Composite Bottle Blanks – Composite container blanks will be collected by pouring de-ionized water into laboratory-cleaned 1-gallon containers. This liquid will then be sub-sampled into laboratory containers for analysis. This will test the effectiveness of decontamination procedures used by the laboratory to clean reused 1-gallon containers. FSO field staff will document the identification number of the container blank collected.

QA/QC field sample types, locations, collection schedule, and container requirements are listed in Table 5-2.

Table 5-2 QA/QC Field Sample Collection

Type	Collection Schedule	Container
Field Duplicates	10% of qualified sampling events	From composite and grab containers when volume allows
Trip Blanks	10% of qualified sampling events	1-gallon glass
Bottle Blanks	10% of qualified sampling events	1-gallon glass

The FSO will label and note the identification number of all QA/QC samples collected and the type of QA/QC samples collected.

QA/QC samples will be identified with an extension placed at the end of the sample ID. "FD" will be used to identify field duplicates, "TB" will be used to identify trip blanks, and "BB" will be used to identify bottle blanks.

6.0 Sample Handling and Documentation

This section describes the manner in which samples will be handled and tracked from the time of sample collection/retrieval to laboratory analysis.

6.1 Containers and Preservatives

All composite and grab samples will be extracted by the laboratory into sub-samples for various constituent analyses or as duplicate samples. The laboratory will place sub-samples into containers meeting the requirements of the analytical method to be performed. Additional preservatives will be added by the laboratory if required by the specific analytical method. Sample preservation is to prolong the stability of the constituents and ensure that the levels of constituents in the collected samples match as closely as possible the levels in storm water at the sample location.

6.2 Chain-of-Custody

A chain-of-custody document must accompany each sample. Samples must be under the custody of field personnel until relinquished to a representative of the laboratory. A sample is defined as being under a person's custody if any of the following conditions exist: (1) it is in their possession, (2) it is in their view after being in their possession, (3) it was in their possession and they locked it up, or (4) it is in a designated secure area.

After the samples have arrived at the laboratory, they should remain under the custody of the laboratory.

Each person receiving or relinquishing custody of the samples must sign and date the chain-of-custody when transfer of sample custody occurs. Documentation of sample possession must include the following:

- Sample description/identification
- Date and time of sample collection
- Type of sample (composite or grab)
- Preservative used
- Sample container type
- Analyses required
- Name of collector(s)
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory
- Bill of lading or transporter tracking number (if applicable)

Preformatted chain-of-custody forms should be used to document the transfer of samples to the laboratory and the analysis to be conducted on each bottle. A sample chain-of-custody is provided in Appendix D.

7.0 Precipitation Monitoring

This section describes the manner in which precipitation amounts at the project sites will be monitored and recorded.

7.1 Rain Gauges

Tipping bucket rain gauges will be used at one site per watershed to monitor and record rainfall measurements. The tipping bucket rain gauges will be located at the most upstream sampling station within each watershed. On-line rain gauges will be used for the remainder of the sites.

7.1.1 Rain Gauge Description

The tipping bucket rain gauge to be installed at one site per watershed will provide accurate rainfall measurements from 0.01 to 22 inches per hour. The rain gauge will be mounted inside a steel cylinder and have an opening on top to collect rain. Rain falls through a screen into a funnel. From the funnel, rain collects in one side of a two-chambered plastic bucket mounted on jeweled pivots. When rain fills the chamber, the bucket tips, draining the water and exposing the other chamber to fill. When that chamber fills, the bucket tips back and the process begins anew. Each time the bucket tips from one side to the other a magnet passes over a reed switch, momentarily closing the normally open contacts. This contact closure provides a short-duration output pulse from the rain gauge for each 0.01 inch of rain. Vendor literature on the ISCO 674 rain gauge is provided in Appendix B.

7.1.2 Data Retrieval

The ISCO rain gauges will be compatible with the data logging equipment so that FSO field personnel will be able to monitor rainfall measurements and easily download recorded data during each site/sampling visit or at a minimum of once monthly. The rain gauge will connect to the data logger at each station and the data logger will store rainfall measurements. Data will be extracted from the data logger by the FSO while on-site. Data will be cleared from the data logger after it has been extracted by a prompt from the FSO.

7.1.3 Rain Gauge Maintenance

All connections from the ISCO rain gauge to the data logger should be inspected to ensure that the connections are secure. FSO field personnel should remove the rain gauge cover at least quarterly and check to see that dust, bird excrement, insect matter, or other debris has not affected the operation of the gauge. If debris is observed, the gauge should be cleaned in accordance with the vendor's recommended practices.

7.1.4 Rain Gauge Calibration

All rain gauges are factory-calibrated and adjusted. FSO personnel should not attempt to make adjustments to the jeweled pivot screws of the ISCO rain gauge as the jewel bearings may be damaged. If calibration is necessary, the equipment vendor will be contacted.

8.0 Flow and Pollutant Load Estimates

The annual pollutant loading from each watershed will be estimated for the parameters monitored during runoff events using the following equations:

Conventional Parameters:

Annual Pollutant Loading (lb) = Estimated Mean Annual Pollutant Concentration (mg/L) x 2.2046 x 10^{-6} (conversion factor) x Estimated Annual Flow Volume (L)

Bacteria:

Annual Pollutant Loading (billion colonies) = Estimated Mean Annual Pollutant Concentration (colonies/100 mL) x 1.0 x 10^{-8} (conversion factor) x Estimated Annual Flow Volume (L)

The Estimated Mean Annual Pollutant Concentration will be calculated by taking the average of the pollutant concentrations collected through in-stream storm water monitoring within each watershed per year.

The annual flow volume will be estimated using the annual precipitation and annual flow equations developed for each watershed. Sample annual flow equations are provided in Appendix E and will be updated, if necessary, prior to estimating the annual pollutant loading for the annual report. The annual precipitation will be estimated for each watershed by utilizing rain gauges located both at the monitoring site and nearby locations, where available.

The annual flow equations were developed using four methods. The first method is referred to as Reference Watershed and utilizes the regional frequency analysis approach (through U.S. Geological Survey [USGS] data obtained from nearby reference watersheds) to predict mean annual discharge using drainage area, slope, and imperviousness as definable basin characteristics. The second method is referred to as Historical Regression and utilizes mean annual discharge data from a USGS historical gage and nearby precipitation data to develop a regression equation to forecast mean annual discharge based upon precipitation amounts. The third method is referred to as Interpolation and utilizes USGS gages upstream and/or downstream of the location of interest to interpolate data collected from the gage. The fourth method is referred to as Gaged and utilizes a USGS gage located at the sampling location.

The annual load estimates for each of the parameters monitored will be calculated for the annual report. The annual load calculation as described above is based on the assumption that the dry weather portion of the annual flow volume is insignificant and that the pollutant concentrations observed during the storm events are representative of storm events occurring throughout the year.

9.0 Laboratory Analysis

9.1 Laboratory Sample Preparation

TTI Environmental Laboratory (http://www.ttilabs.com/) in Arlington [(817) 861-5322] will be alerted that weather conditions exist that may require collection of samples. This will be accomplished as soon as field crews are aware of the potential for rain so that the laboratory can prepare for receipt and analysis of samples. After sample collection, the laboratory will be informed that samples are being transported to the laboratory to allow them to have someone receive the samples for adding preservatives and to begin necessary analyses within specified holding times.

9.2 Lost or Inadequate Samples

The laboratory will notify the FSO and the FSO will notify NCTCOG immediately if a sample is lost or is determined to be inadequate according to the communication protocol specified in Section 2.5. The FSO will conduct a re-sampling effort for lost or inadequate samples according to Section 5.3.5.

9.3 Data Reports

The laboratory will submit data reports. Laboratory data reports will contain final results for blanks and recoveries, methods of analysis, detection limits, quantification levels, accuracy and precision data, MS/MSD data, laboratory method and equipment blank data, and limits of instrument calibration. In addition, special analytical problems or modifications of specified methods will be noted.

The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method. Consequently, most analytical results will contain no more than two significant figures. Concentrations in liquids will be expressed in terms of weight per unit volume (e.g., milligrams per liter). Reported detection limits will equal the concentration in the original matrix corresponding to the low-level instrument calibration standard after accounting for concentration, dilution, and/or extraction factors.

The laboratory will also provide:

- Hard copies of chains of custody
- Hard copies of sample receipt and log-in data
- Hard copies of analytical results
- Hard copies of quality control data
- Hard copies of narrative reports for each analytical batch that describe deviations from specifications in this scope of work and summarize QC data

10.0 Quality Assurance Project Plan

To achieve the overall monitoring objectives, data obtained during each sampling event must be accurate and precise. Additionally, samples potentially contaminated by external sources in the field or laboratory must be identified. This section defines QA procedures and requirements for the project.

10.1 Field Quality Assurance

Field QA is essential to providing accurate, representative samples of the water quality being monitored. Thus, it is important that field personnel be trained in proper sample collection procedures, including the use and programming of automatic samplers and sample handling procedures. FSO personnel collecting field samples will follow all field procedures outlined in Section 5.0.

10.2 Laboratory Quality Assurance

The FSO will utilize TTI Laboratories to analyze samples collected. The laboratory will certify the precision and accuracy of all analytical data and document all phases of sample handling, data acquisition, data transfer, report preparation, and report review.

10.2.1 Reference Materials and Reagents

Whenever possible, primary reference materials for instrument calibration, QC spikes, and performance evaluations will be obtained from the National Bureau of Standards (NBS) or the Environmental Protection Agency. In the absence of available reference materials from these organizations, other reliable sources will be sought. Such secondary reference materials may be used for these functions provided that they are traceable to an NBS standard.

Laboratory reagent quality will be sufficient to minimize or eliminate detectable concentrations of analytes in laboratory blanks. Furthermore, reagents will not contain other contaminants that interfere with sample analysis.

10.2.2 Laboratory Data Management

10.2.2.1 Laboratory Data Collection

In addition to the data recorded in field logbooks and chain-of-custody forms, data that describes sample processing will be recorded in laboratory notebooks. Laboratory notebooks will contain the following information:

- Date of processing
- Sample numbers
- Case number
- Analyses performed
- Calibration data

- QC samples
- Concentrations/dilutions required
- Instrument readings
- Special observations
- Analyst's signature

10.2.2.2 Laboratory Data Logging

TTI laboratories will utilize an established system for sample check-in, tracking of samples through the laboratory, assignment of laboratory analyses, and sample check-out. The system will provide for management review of all laboratory data before the issuance of laboratory reports. The review will be accomplished on two levels: (1) review of raw data for each analysis, and (2) review of the final results to check for consistency or agreement of the results between all parameters.

10.2.2.3 Laboratory Data Reduction

For methods that utilize a calibration curve, sample responses will be applied to the linear regression line to obtain an initial raw result that will be factored into equations to estimate the concentration in the original sample. Rounding will only be performed after the final result has been obtained to minimize rounding errors. Copies of the raw data and the calculations used to generate the final results will be retained on file to allow reconstruction of the data reduction process at a later date if necessary.

At the completion of a set of analyses, all calculations will be completed and checked by the analyst. The associated QC data will be entered onto QC charts. If all data is acceptable, the data summaries will be submitted to the laboratory project manager for review. If QC samples do not meet acceptance criteria, the appropriate laboratory project manager will be notified, and corrective action will be taken as specified in Section 10.2.3.

10.2.2.4 Laboratory Data Review

System reviews will be performed at all levels. The individual analyst will constantly review the quality of data through calibration checks, QC sample results, and performance evaluation samples. These reviews will be performed prior to submission to the laboratory project manager.

The laboratory project manager will review data for consistency and reasonableness with other data and will determine if QA/QC program requirements have been satisfied. Selected hard copy output of data, such as chromatograms and spectra, will be reviewed to verify that results were interpreted correctly. Unusual or unexpected results will be reviewed and a resolution will be made as to whether the analysis should be repeated. In addition, the laboratory project manager will recalculate selected results to verify the calculation procedure.

10.2.3 Corrective Actions

An analysis will be considered to be out of control when it does not conform to the QA/QC protocols specified by this document, applicable methods, or standard operating procedures. When an analysis is out of control, the analyst who identifies the problem will document the occurrence and notify the laboratory project manager. The analyst, working with the laboratory project manager, will determine the cause of the problem and take appropriate corrective action. Analysis may not resume until the problem has been corrected. Restoration of analytical control will be demonstrated by generating satisfactory calibration and/or QC sample data.

Data generated concurrently with an out-of-control system will be evaluated for usability in light of the nature of the deficiency. If the deficiency does not impair the usability of the results, the data will be reported and the deficiency noted in the laboratory data report (e.g., a constituent is detected in a laboratory blank but not in sample analyses). Where sample results are impaired, the FSO project manager will be notified. After the error has been corrected, the analysis will be rerun and the data can be reported. The laboratory project manager will outline the error and the corrective action in a QA report. If the cause of the error cannot be identified, the laboratory project manager will summarize the procedures and QA/QC used to analyze the sample and provide a statement of validity for the sample results.

Problems encountered during the field activities will be reported by the designated FSO field staff as soon after discovery as possible. The Atkins project manager will be responsible for ensuring that corrective actions produce satisfactory results in a timely manner. Outcomes of those actions and their effect or potential effect on the data will be reported to Atkins and NCTCOG.

Results of performance or systems audits or internal QC analyses may trigger corrective action within the designated laboratory and Atkins project team. However, it is generally the responsibility of the laboratory analyst or Atkins field personnel to initiate laboratory or field corrective actions, respectively.

11.0 Post-Sampling Activities

11.1 Equipment Maintenance

The FSO will perform maintenance activities after each mobilization. The FSO will clean field equipment and store in an accessible location at one of the FSO's storage facilities. Equipment cleaning procedures are described in the Teledyne ISCO 6712 Portable Samplers Installation and Operation Guide available at www.isco.com. Distilled water should be used for the equipment cleaning. All sample containers will be cleaned by the laboratory. Prior to the next quarter of sampling, the equipment will be returned to the site. Routine maintenance will be performed on the equipment, including replacing the auto-sampler composite containers and preparing the sampling stations for the next storm event. The shelter integrity will also be checked. The maintenance checklist in Appendix C will be used to guide and record the maintenance activities.

11.2 Data Management

The FSO will be responsible for the data management that will cover data storage systems, data handling, data validation and analysis, and data reporting.

An electronic data deliverable (EDD) will be established to store digital information such as laboratory analytical data and field recorded measurements. Hard-copy data from field sheets, log books, and computer outputs will be scanned as an electronic copy for backup.

The FSO will be responsible for the data validation that will be performed on field and laboratory data prior to submittal to the NCTCOG. Reports received from the laboratory will be reviewed for consistency and completeness. Reports will also be checked for the requested analyses and QA activities performed by the laboratory. Corrective actions will be initiated if inconsistencies or problems are encountered with submitted reports.

A data reporting schedule will be developed with NCTCOG. All validated sample collection data will be submitted to the NCTCOG in a pre-approved database or report format. Data will be reported in both hard copy and electronic formats. The data will also be input into the regional monitoring program database.

11.3 Floods and Retrieval of Equipment

FSO personnel will be aware of flood warnings and watches as posted by the National Weather Service. If flooding is anticipated, the FSO will make every effort to travel to the sampling equipment and remove it from watersheds where the flooding is expected. If the equipment is submerged or dangerous conditions threaten field personnel, the equipment may be abandoned and retrieved when the conditions subside.

11.4 Redeployment of Equipment

The automatic samplers will be serviced by the FSO and redeployed prior to each sampling quarter. The samplers will be serviced following the guidelines established by Teledyne Isco (2013 and 2016). These guides are available for download at www.isco.com. After collection of the last quarterly sample, all equipment will be removed and returned to the storage facility for cleaning and repairs, as necessary, before deploying to new sampling locations.

12.0 Health and Safety

This section is provided to assist field personnel in the safe performance of water quality data collection. Field work requires an awareness of potential hazards and knowledge of basic safety procedures. Atkins will provide health and safety documentation for this project to field personnel. Prior to the start of any work activity conducted by Atkins, all personnel participating in the work will review the applicable documentation to ensure full understanding of the job task, its associated hazards, and all applicable mitigation measures. All personnel must acknowledge this understanding and their intent to fully comply with all health and safety requirements by signing the provided Acknowledgement page.

12.1 Basic Safety Preparation

Basic preparations will be routine before every sampling activity. At a minimum, a trip plan should be completed for each field trip and left at a designated location in each consultant's office. The trip plan should include the following information:

- Field trip participants
- Departure and return times
- Contact phone numbers
- Basic itinerary, including where and when sampling will be performed

Field work must be done in pairs. FSO field staff will consider carrying the following safety equipment during sample collection activities:

- Rubber boots
- Safety vests, hard hats, and steel-toed shoes
- Amber warning light for vehicle
- Reflective traffic cones
- Bug repellent
- First aid kit
- Flashlight and spare batteries
- Cellular phone
- Rain gear
- Hat/sunscreen/sunglasses
- Drinking water/sports drinks
- Tool box with basic tools
- Latex gloves
- Antibacterial soap or hand cleaner
- Distilled water, 1 gallon

- List of emergency phone numbers/office contacts

The FSO will carry a packet of general safety information in each vehicle that contains the following materials:

- Emergency phone numbers
- Picture identification cards, insurance information, and project identification sheets
- Laminated work authorization from the NCTCOG
- Locations of emergency facilities (hospitals and police and fire departments)

12.2 Hazards

Atkins has developed and continually updates job safety instructions for known hazards and activities. Atkins will issue instructions to field personnel and provide updated instructions as necessary as part of the health and safety documentation provided to field personnel.

12.3 First Aid Equipment and Supplies

A first aid kit will be located within the vehicle located at the project sites during sample collection. The first aid kit must include at a minimum: snakebite kit, potable distilled water, bandages, scissors or knife, antiseptic, bee sting kit, and allergic reaction to insect bite kit.

Other required procedures to reduce injury include:

- Confined entry will not be conducted.
- Stream reaches must not be entered below the water level during sample collection, during a rainstorm, or when rain is imminent. FSO field staff must be aware of flash flood warnings and remain in contact with FSO office staff.
- Appropriate lighting equipment will be carried to illuminate potential hazards. The stream banks may be muddy and slippery.
- Care must be taken when handling the heavy composite and grab containers.

12.4 Selection of PPE

The selection of the personal protective equipment (PPE) will be done per site/field activity and after a thorough evaluation of the hazards involved at the site during each phase of the operation.

Recommended and required PPE is comprised of the following:

- Latex gloves when handling storm water samples
- Raingear
- Rubber boots

- Safety vest – reflective
- Coveralls or work clothing
- Work gloves

12.5 Nearest Hospital Information

Locations and information for the nearest hospitals for the various sampling sites are located in Appendix F.

12.6 Emergency Contact Information

Emergency contacts are listed below:

FIRE*	9-1-1
POLICE*	9-1-1
NATIONAL SPILL RESPONSE CENTER	(800) 424-8802
HOSPITAL	See Appendix F
AMBULANCE*	9-1-1

* Local Area Police and Fire will respond to a 9-1-1 call.

13.0 References

North Central Texas Council of Governments (NCTCOG). 2017. The North Central Texas Regional Wet Weather Characterization Plan Proposal for the Fourth Permit Term. 2017. Arlington, Texas.

National Weather Service Weather Forecast Office (NWSWFO). 2011. *National Weather Service Weather Forecast Office Dallas/Fort Worth, TX*. http://www.srh.noaa.gov/fwd/.

Teledyne Isco. 2016. 6712 Portable Samplers Installation and Operation Guide. Revision KK. February 2016. Lincoln, NE.

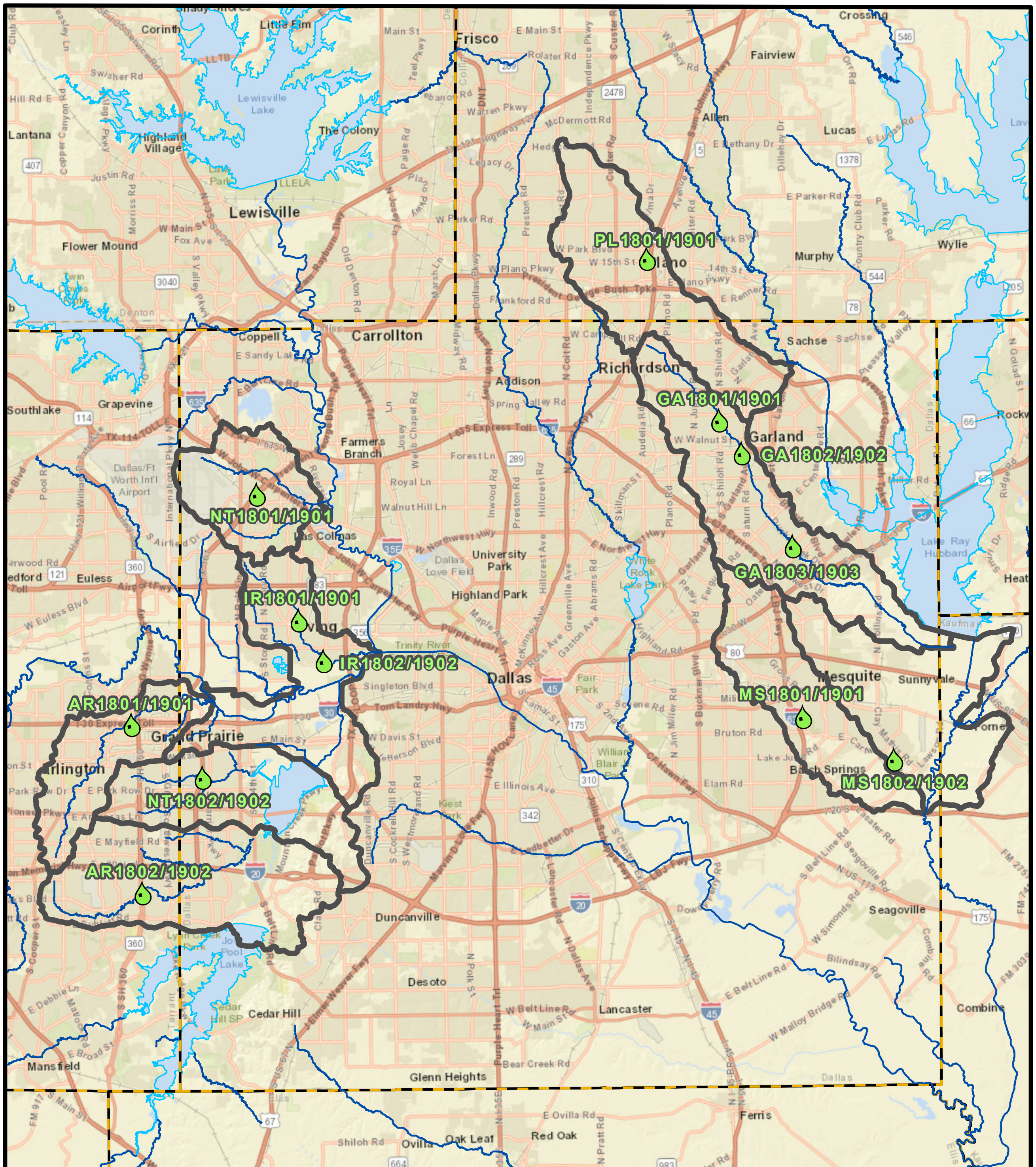
Teledyne Isco. 2013. 730 Bubbler Module Installation and Operation Guide. Revision M. October 2013. Lincoln, NE.

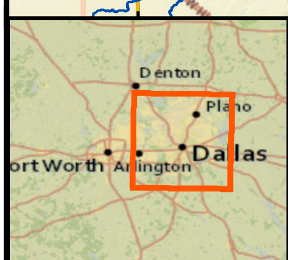
Appendix A

Sampling Locations

Monitoring Station Map

2018-2019





Monitoring Station
Stream Segments
Waterbody
Watershed
County Boundary

ATKINS
Member of the SNC-Lavalin Group

Monitoring Stations
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Permit Term Four

Collin, Tarrant, and Dallas Counties, Texas

Job No.: 100060260	Scale: 1 " = 6 miles
Prepared By: ATKINS/WHIT6392	Date: May 01, 2018

N:\Clients\M_N\NCTCOG\100060260\geo\figs\sampling.mxd

Datum: NAD 1983
Projection: State Plane
Texas North Central
Units: Feet
Basemap: ESRI Streets

0 3 6 Miles

Esri, DeLorme, HERE, USGS, Intermap, iPC, NRCAN, METI, TomTom. World Street Map. March 2014.
1:379,900; generated by Atkins; using ArcMap. <http://server.arcgisonline.com/ArcGIS/rest/services/World_Street_Map/MapServer> (01 May 2018)

City of Arlington

2018 - 2019 Sites

Johnson Creek and Fish Creek – Mountain Creek Lake Watersheds

Johnson Creek at Six Flags

AR1801/1901

North Central Texas Council of Governments

DFWMaps.com

DISCLAIMER
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Various official and unofficial sources were used to gather this information. Every effort was made to ensure the accuracy of this data, however, no guarantee is given or implied as to the accuracy of said data.

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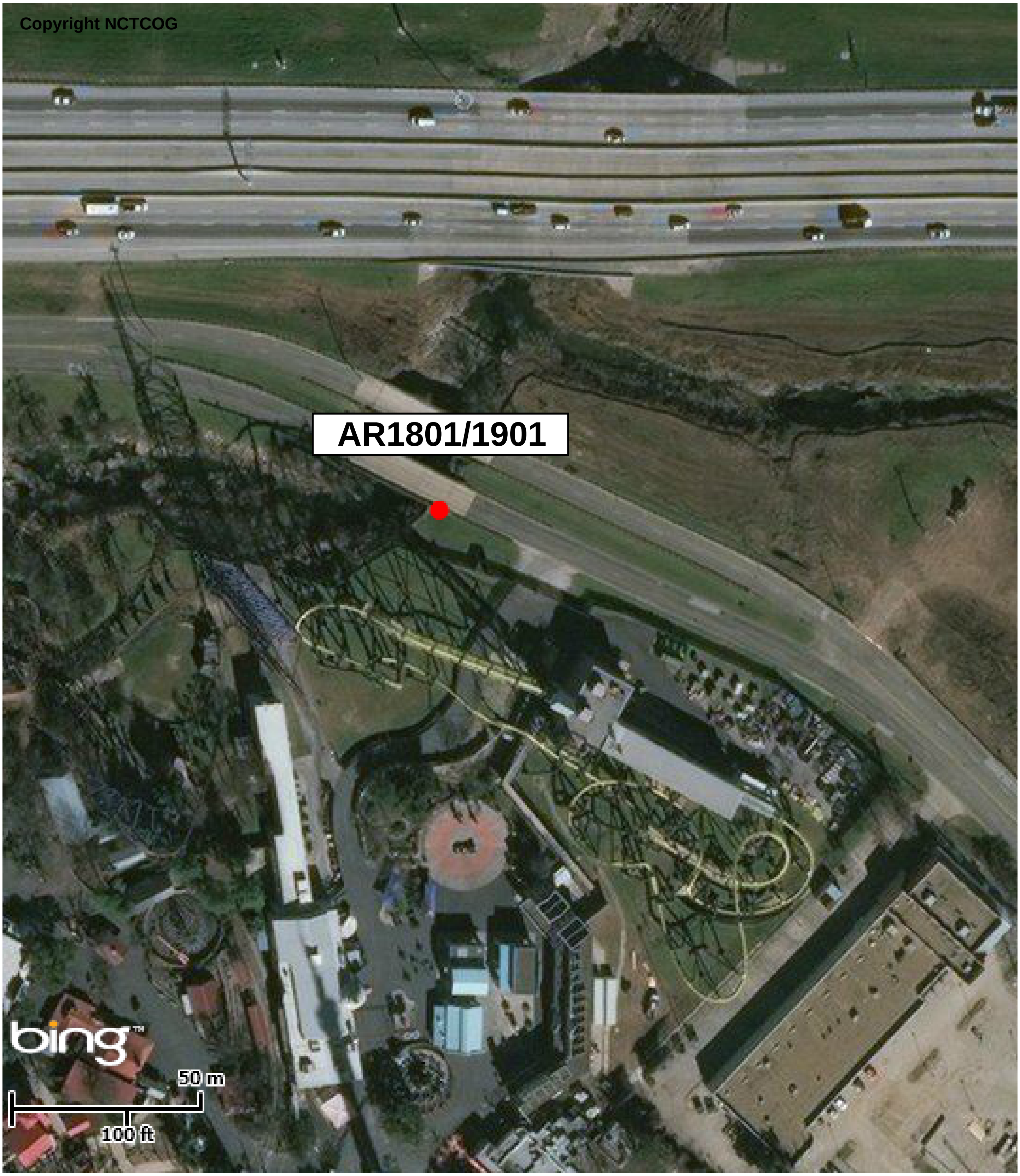

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Council of Governments

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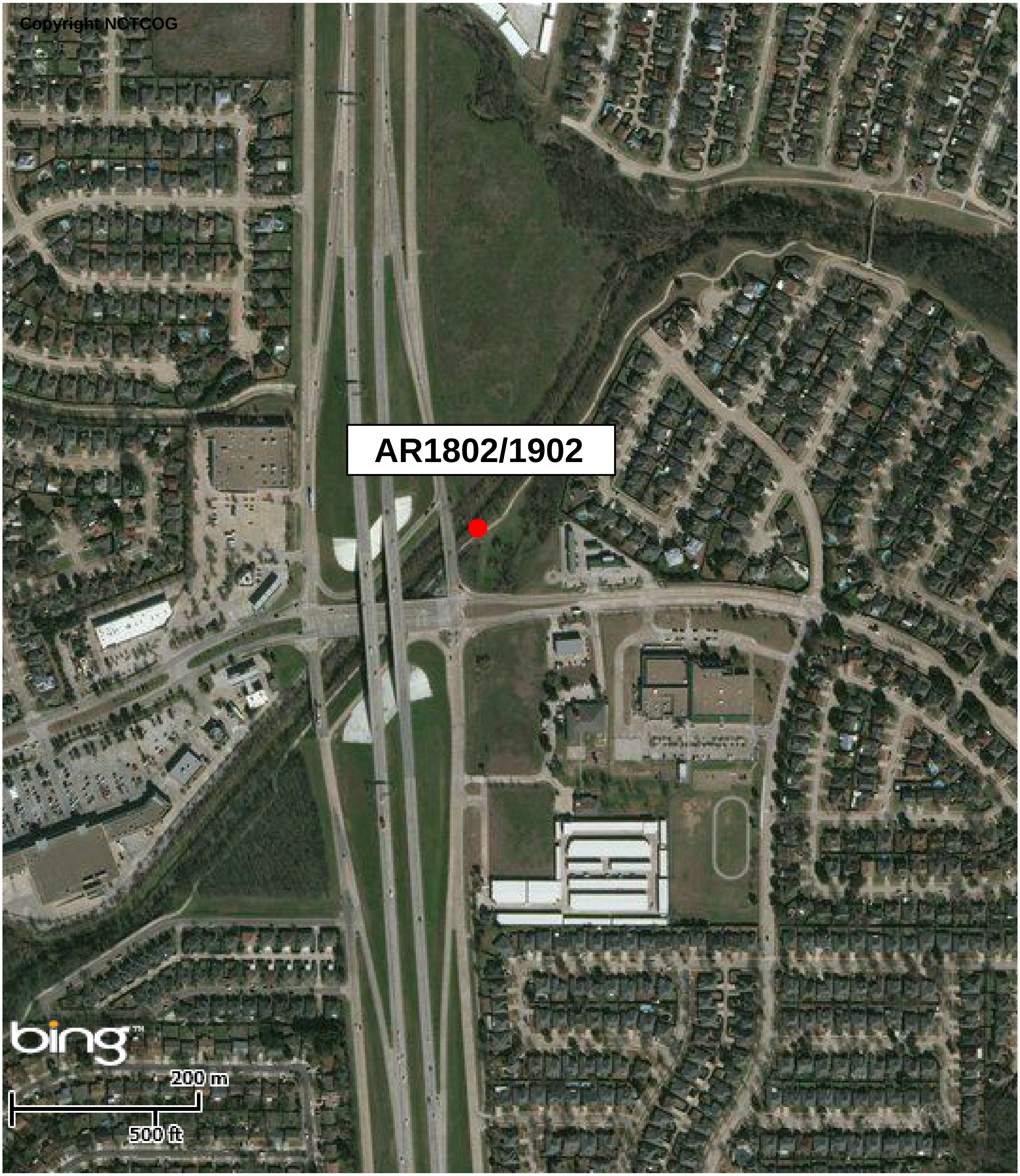
Fish Creek at SH360

AR1802/1902



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N

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/20/17 Time: 09:49

Location Name/Number: ARL 003 - Johnson Creek @ Copeland

Nearest Cross Street/Location Description: East Copeland + Six Flags Drive

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32°45'31.72" N, 97°04'01.41" W

Receiving Water: West Fork Trinity

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Flat surface present, slight leveling needed

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Easy access to box location. Tube maintenance more difficult. Almost vertical rip-rap to water surface.

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Rip-rap on east bank (right bank) + west bank.

Vegetative Cover ~ High ~ Medium ~ Low

Describe: Trees growing out of rip-rap. Grass area well-maintained

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Set below bridge elevation, low visibility from road

Public Access ~ Yes ~ No

Describe: At gate to Six Flags. (employee gate)

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: Minimal debris

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth >2' inches/feet

Describe:

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth >2' inches/feet

Describe:

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~20'
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~20'
(Recommended to be less than 25 feet)

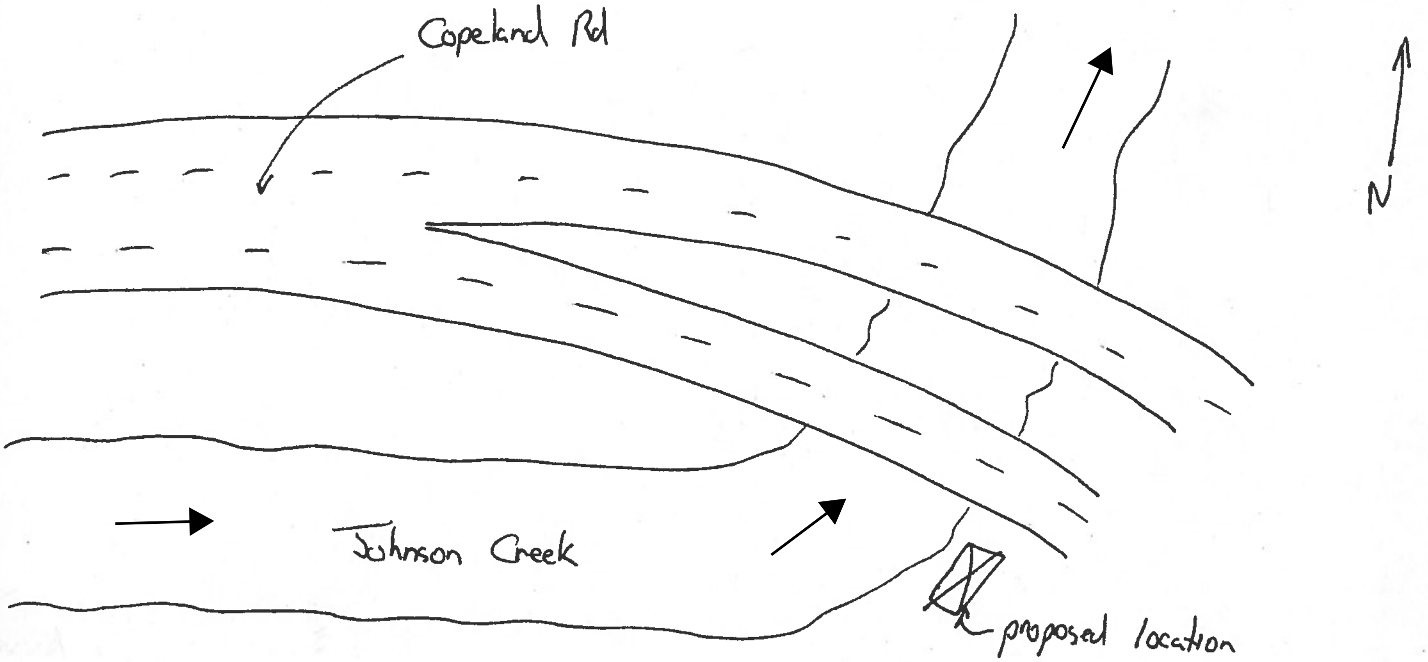
Other Site Features of Importance: Road construction of Copeland (~~East~~ westbound). East bound access only. SWP3 BMP's in place
Tree and branch removal needed.

Notes:

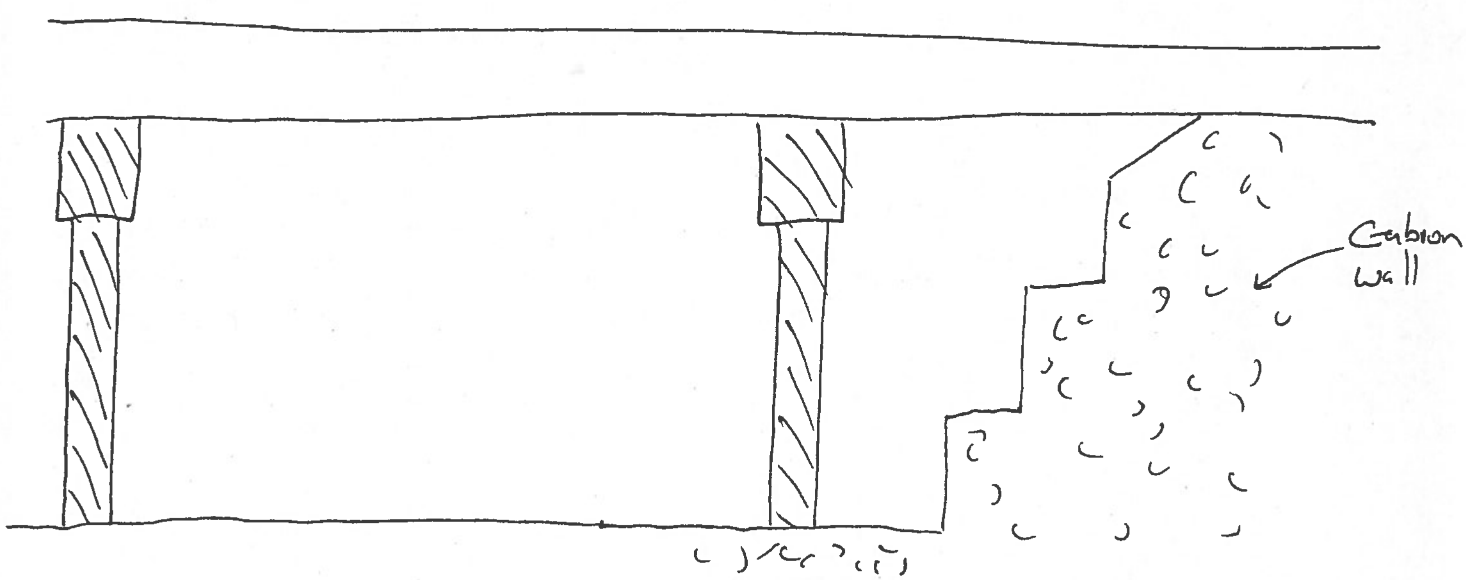
Provide Site Visit Attendee Name(s) and Company/Entity:
Brigette Gibson - City of Arlington
Ryan Deal - FNI

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/20/17 Time: 11:06

Location Name/Number: ARL-004 - Fish Creek @ 360

Nearest Cross Street/Location Description: Kingswood Blvd./SE Green Oaks Blvd. + SH-360

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32°39'44.47"N, 97°03'41.31" W

Receiving Water: West Fork Trinity

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Brush clearing needed, somewhat level ground

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Access off of SE Green Oaks Blvd. Next to Trinity Trail system

Conveyance Information:

RD

Conveyance Type & Size (Example: ~~Unlined~~ Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: ~~Natural stream channel~~ Lined channel (concrete)

Vegetative Cover ~ High ~ Medium ~ Low

Describe: Good riparian buffer

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Low from roadway, high from trail

Public Access ~ Yes ~ No

Describe: Trail system

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: In channel, does not appear to be from trail

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth <2" inches/feet

Describe:

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth <2" inches/feet

Describe:

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~35'
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~6'
(Recommended to be less than 25 feet)

Other Site Features of Importance: Heavy brush, trail access. Vandalism likely

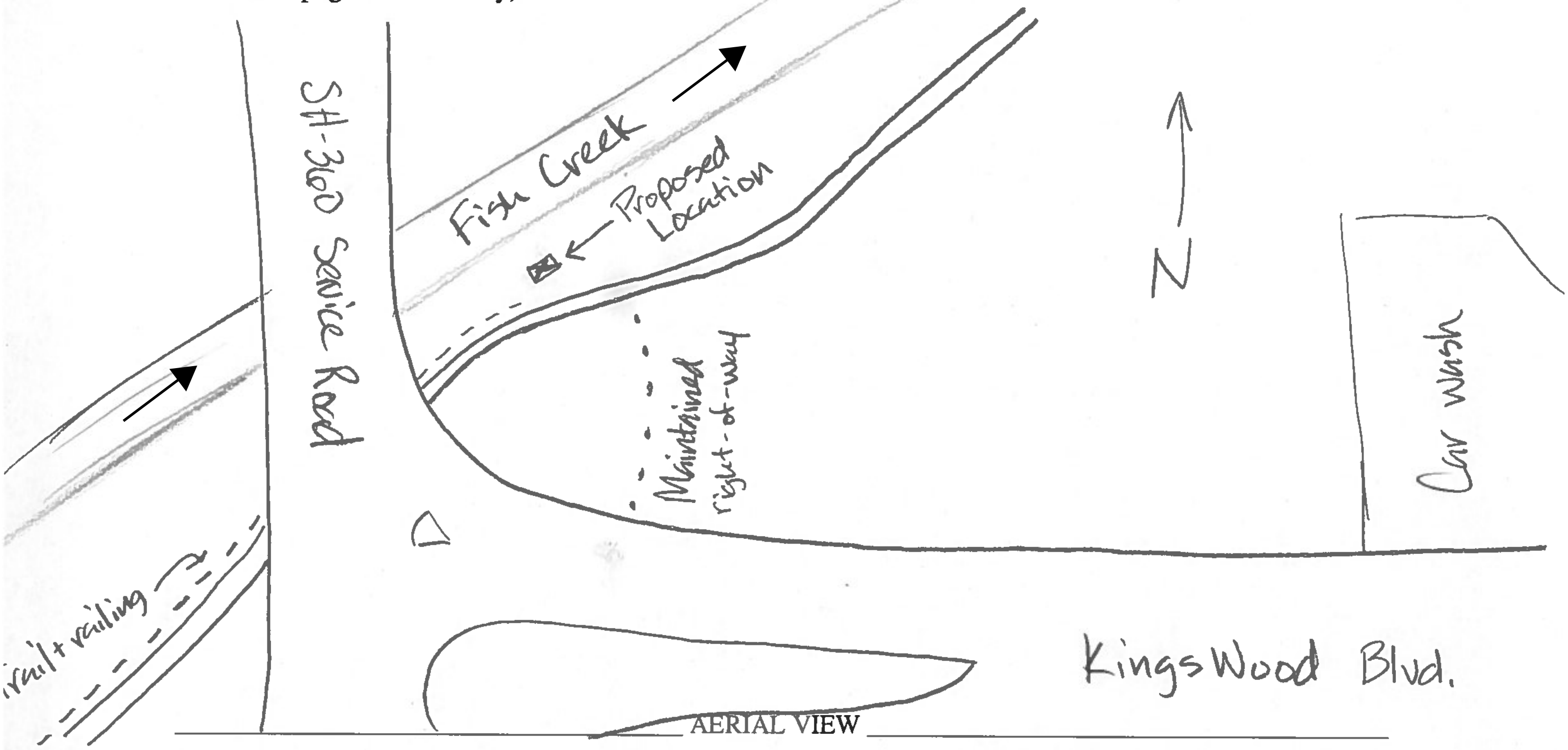
Notes:

Provide Site Visit Attendee Name(s) and Company/Entity:

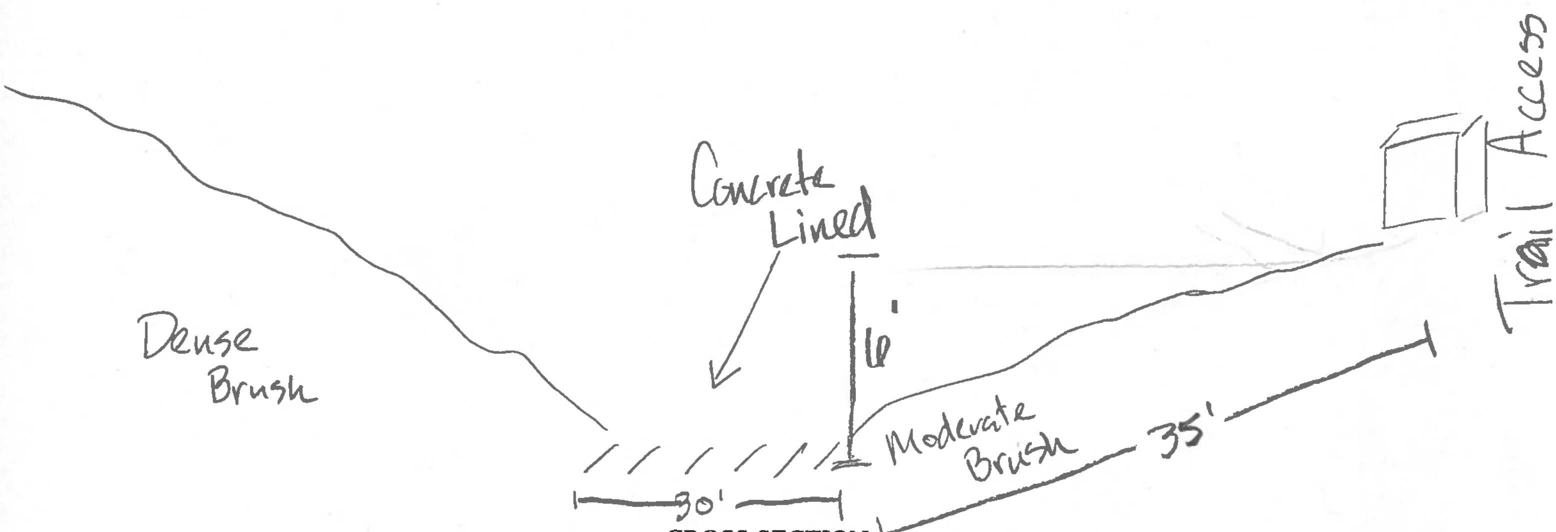
Brigette Gibson - City of Arlington
Ryan Deal - FNI

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

City of Garland

2018 - 2019 Sites

Duck Creek Watershed

Duck Creek at Shiloh Bridge

GA1801/1901

North Central Texas
Council of Governments

DFWMaps.com

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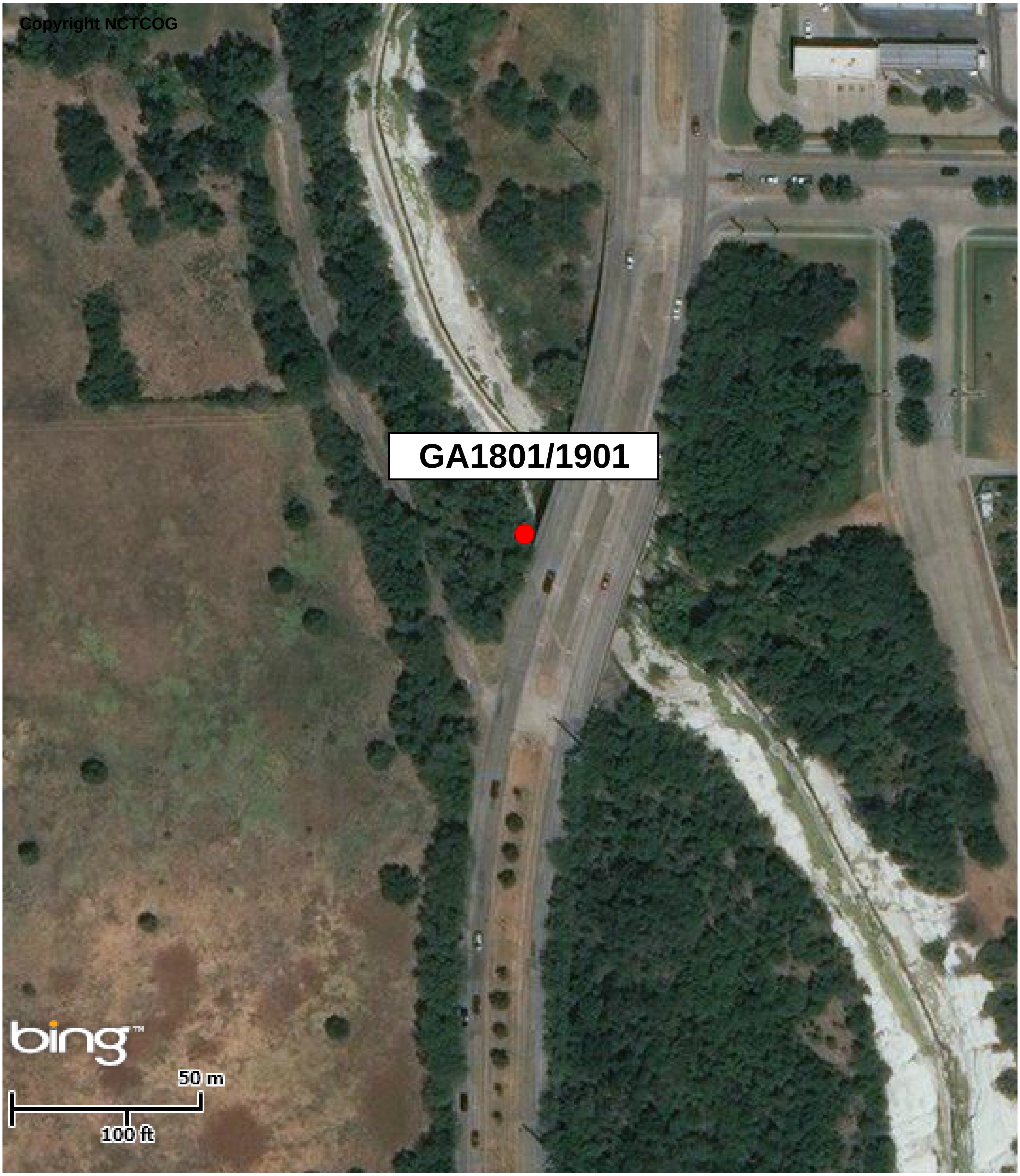

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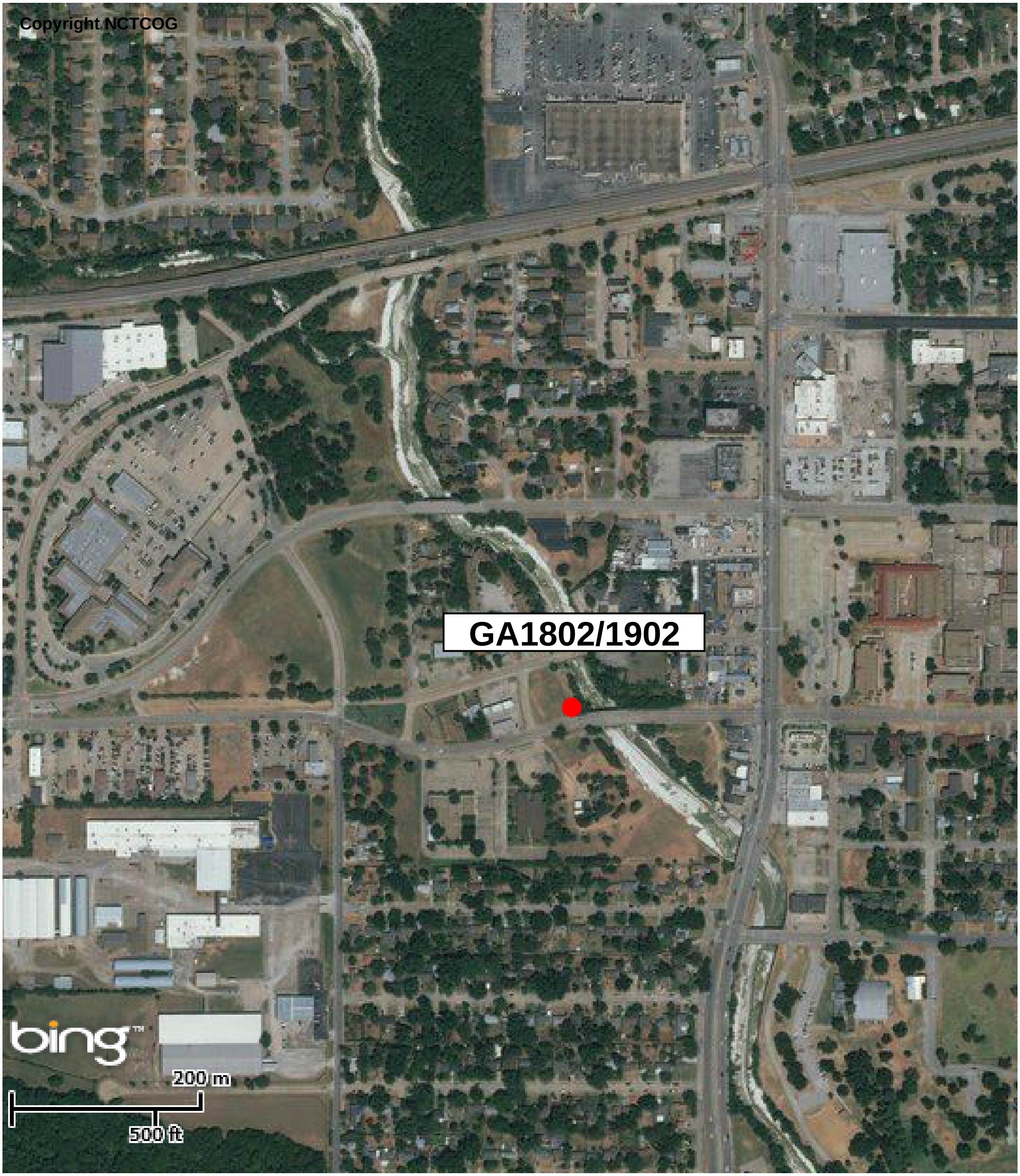
Duck Creek between Forest North and South GA1802/1902



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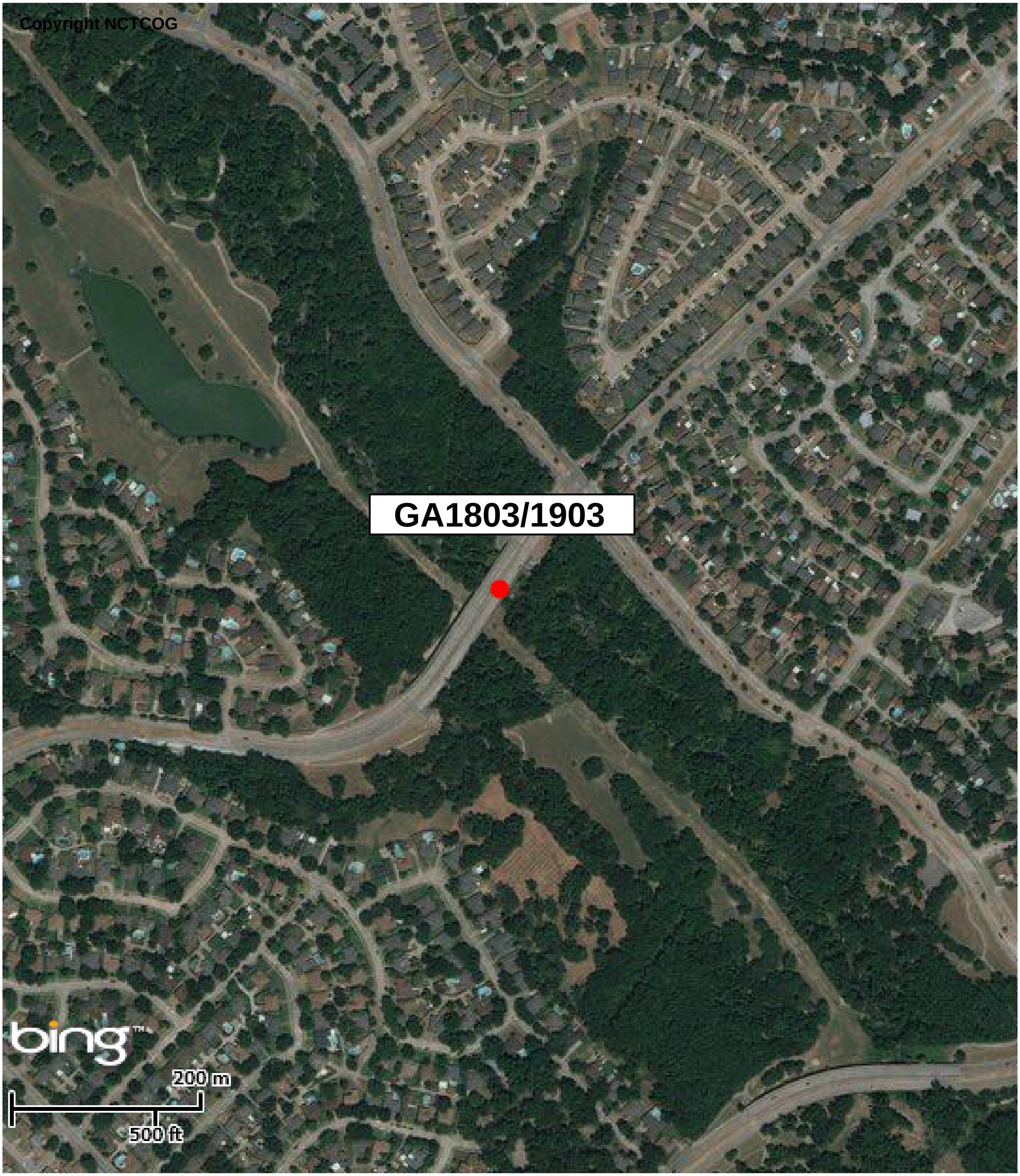
Duck Creek under La Prada Bridge

GA1803/1903



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North Central Texas
Council of Governments

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N

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/15/17 Time: 9:00 AM

Location Name/Number: Site F Shiloh GA 01 A

Nearest Cross Street/Location Description: N. Shiloh Road

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.928232° / -96.665222°

Receiving Water: Duck Creek

Data for locating automated samplers:

Ease of Installation ~~Native or Existing Location~~ / Bench Need to construct Location / Platform / Base

Describe: Level area above rock ledges from previous shelter

Ease of channel/sample area access and safety: Describe either YES or NO

Describe: Walk next to roadway; park on west side of Shiloh, south of bridge on small road in grass

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Rock channel, unlined, natural, minimal sediment deposits; channel not expected to shift

Vegetative Cover High Medium Low

Describe: Lots of vegetation on top of bank; some clearing required

Visibility from the Right-of-Way High Visibility Low Visibility None

Describe: SW side of bridge

Public Access Yes No

Describe: Only from bridge; very little public use

Shiloh

Evidence of Public Use Yes No (Circle all that apply, or describe)

Cans Bottles Paper Food Products Rubble Wood Brush Graffiti Transient Community

Describe: Some trash located on top of bank

Evidence of Normal Surface Water Elevation Yes No Depth ~3 inches/feet

Describe: Water about 3 inches deep on bottom of concrete apron

Perennial Flow Presence High Medium Low Depth ~3 inches/feet

Describe: Moderate flow; riffles upstream and downstream

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water 25 ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample 24 ft
(Recommended to be less than 25 feet)

Other Site Features of Importance: Kimley-Horn development adjacent
Plans submitted to City for subdivision.

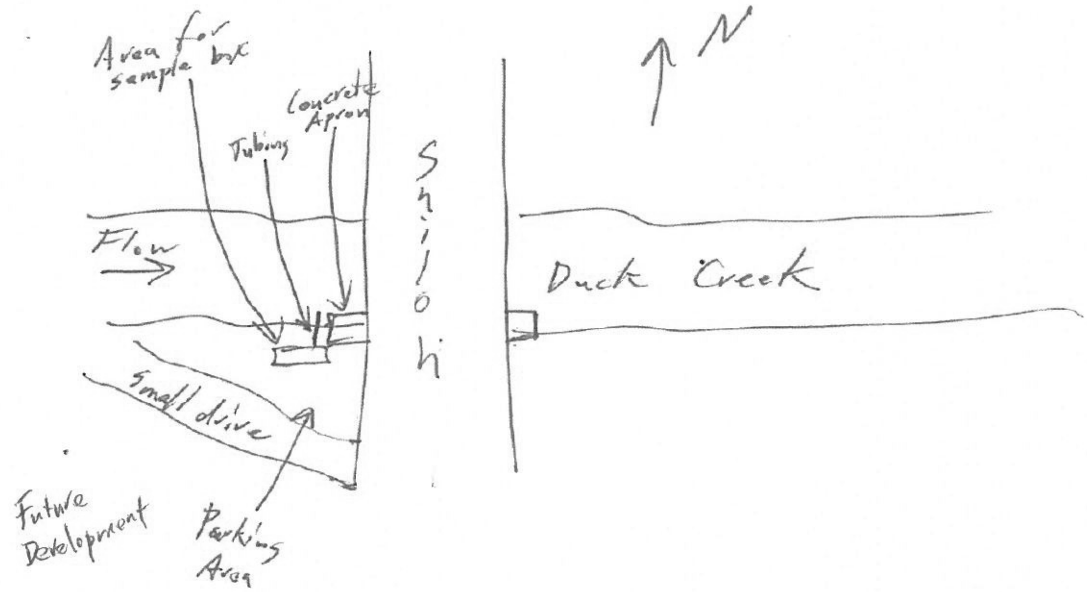
Notes:

Provide Site Visit Attendee Name(s) and Company/Entity:

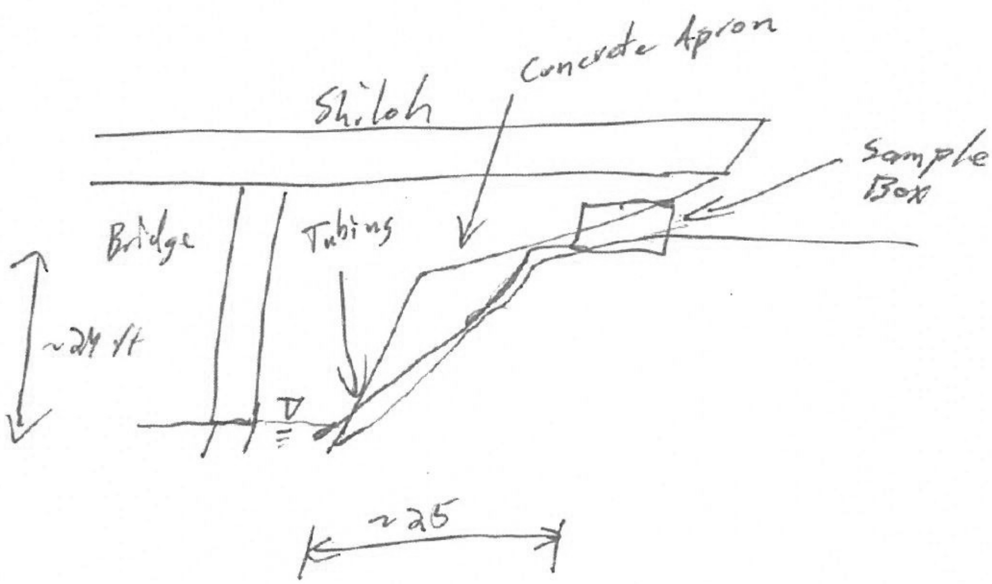
Wayne Wolverton - City of ~~Plano~~ Garland
Mike Wilson - City of ~~Plano~~ Garland
Chad Richards - Atkins

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/15/17 Time: 9:15 AM

Location Name/Number: Site G Forest Lane GA 02 A

Nearest Cross Street/Location Description: S. Forest Lane

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.909388° / -96.650556°

Receiving Water: Duck Creek

Data for locating automated samplers:

Ease of Installation Native or Existing Location / Bench Need to construct Location / Platform / Base

Describe: Top of bank level from previous installation

Ease of channel/sample area access and safety: Describe either YES or NO

Describe: Drive onto grass area off of Kevin Street b/w Forest Lane bridges

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Rock bottom; earthen sides; gradual side slope on west bank

Vegetative Cover High Medium Low

Describe: Low on west bank; medium near channel bottom

Visibility from the Right-of-Way High Visibility Low Visibility None

Describe: Located b/w bridges in open area

Public Access Yes No

Describe: May get pedestrian traffic crossing b/w Forest Lane North and South

Forest Lane

Evidence of Public Use Yes No (Circle all that apply, or describe)

Cans Bottles Paper Food Products Rubble Wood Brush Graffiti Transient Community

Describe: Very little trash; some remnants of old sampling lines

Evidence of Normal Surface Water Elevation Yes No Depth 3 inches/feet

Describe: Mostly shallow on west side

Perennial Flow Presence High Medium Low Depth 3 inches/feet

Describe: Moderate flow present; channel very wide; mostly shallow with few pools

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water 30 ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample 25 ft
(Recommended to be less than 25 feet) Almost TOB

Other Site Features of Importance: Rock channel bottom with minimal sediment deposits; wide channel; flow stream not expected to shift

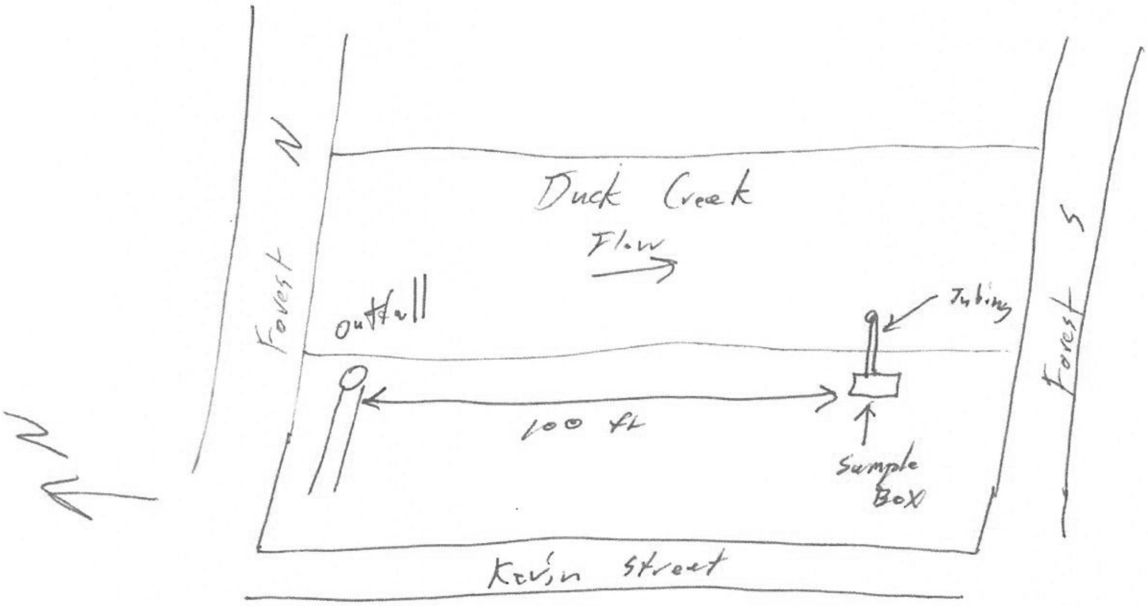
Notes: Previous installation near manhole

Provide Site Visit Attendee Name(s) and Company/Entity:

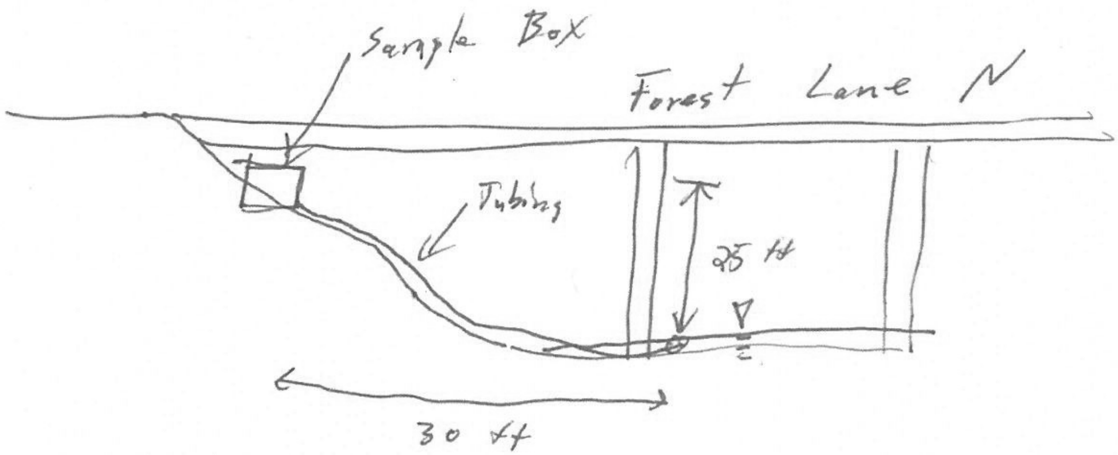
Wayne Wolverton - City of ~~Plano~~ Garland
Mike Wilson - City of ~~Plano~~ Garland
Chad Richards - Atkins

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/15/17 Time: 9:50

Location Name/Number: Site H La Prada GA 03 A

Nearest Cross Street/Location Description: La Prada Drive

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.855468°, -96.616894°

Receiving Water: Duck Creek

Data for locating automated samplers:

Ease of Installation Native or Existing Location / Bench Need to construct Location / Platform / Base

Describe: Secure to top of bank on gabions.

Ease of channel/sample area access and safety: Describe either YES or NO

Describe: Access down sidewalk and gravel road; do not park under bridge when wet

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Unlined channel with gravel bottom

Vegetative Cover High Medium Low

Describe: None under bridge; medium on sides of bridge

Visibility from the Right-of-Way High Visibility Low Visibility None

Describe: Visible from walking / bike trails

Public Access Yes No

Describe: Trails cross by area

La Prada

Evidence of Public Use Yes No (Circle all that apply, or describe)

Cans Bottles Paper Food Products Rubble Wood Brush Graffiti Transient Community

Describe: Evidence of use under bridge

Evidence of Normal Surface Water Elevation Yes No Depth ~3 inches/feet

Describe: Deep pool on west side of bridge; becomes shallower under bridge and goes to another deep pool downstream

Perennial Flow Presence High Medium Low Depth ~3 inches/feet

Describe: Moderate to high flow through channel

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water 25 ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample 20 ft
(Recommended to be less than 25 feet)

Other Site Features of Importance: Place sampler on upstream side to run conduit to pool

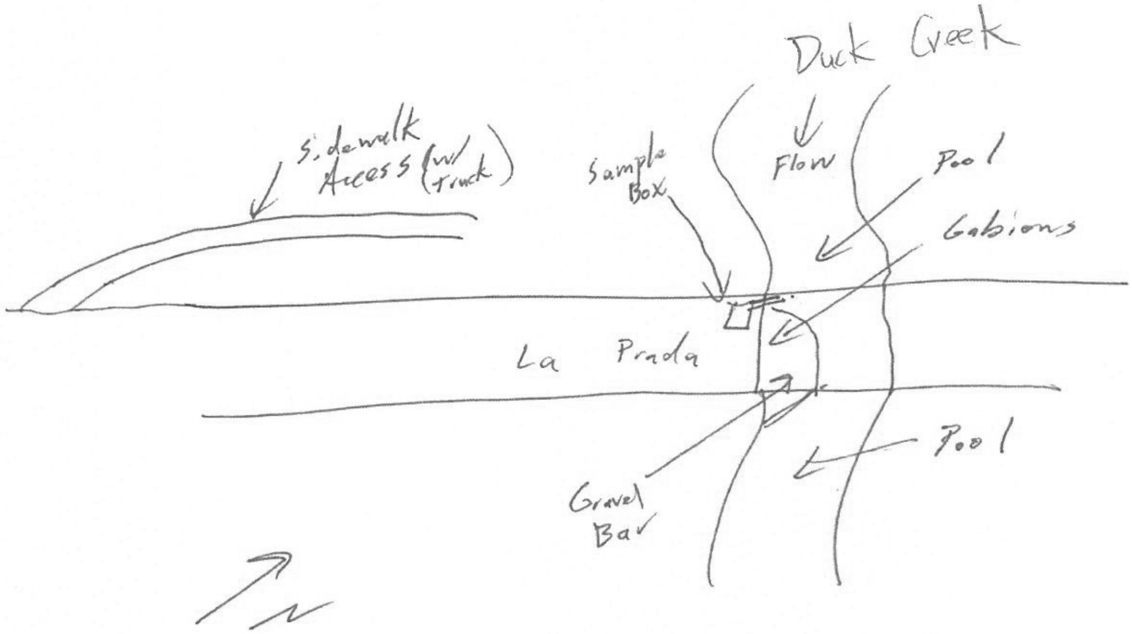
Notes:

Provide Site Visit Attendee Name(s) and Company/Entity:

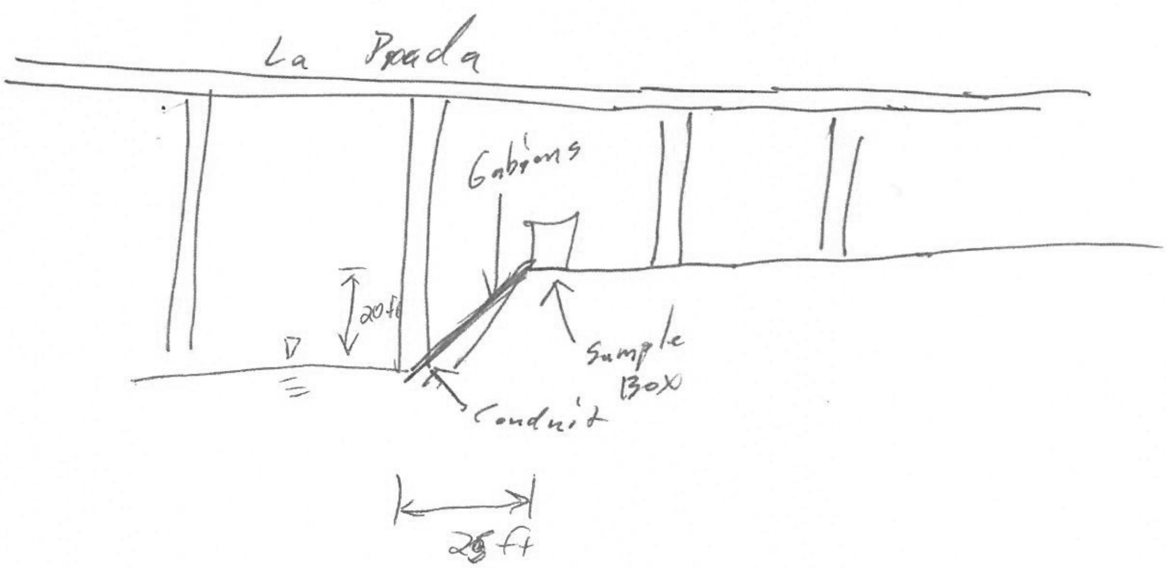
Chad Richards - Atkins
Mike Wilson - City of ~~[illegible]~~ Garland
Wayne Wolverton - City of ~~[illegible]~~ Garland

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

City of Irving

2018 - 2019 Sites

Delaware Creek – West Fork Trinity Watershed

Delaware Creek at Sowers Road

IR1801/1901

North Central Texas
Council of Governments

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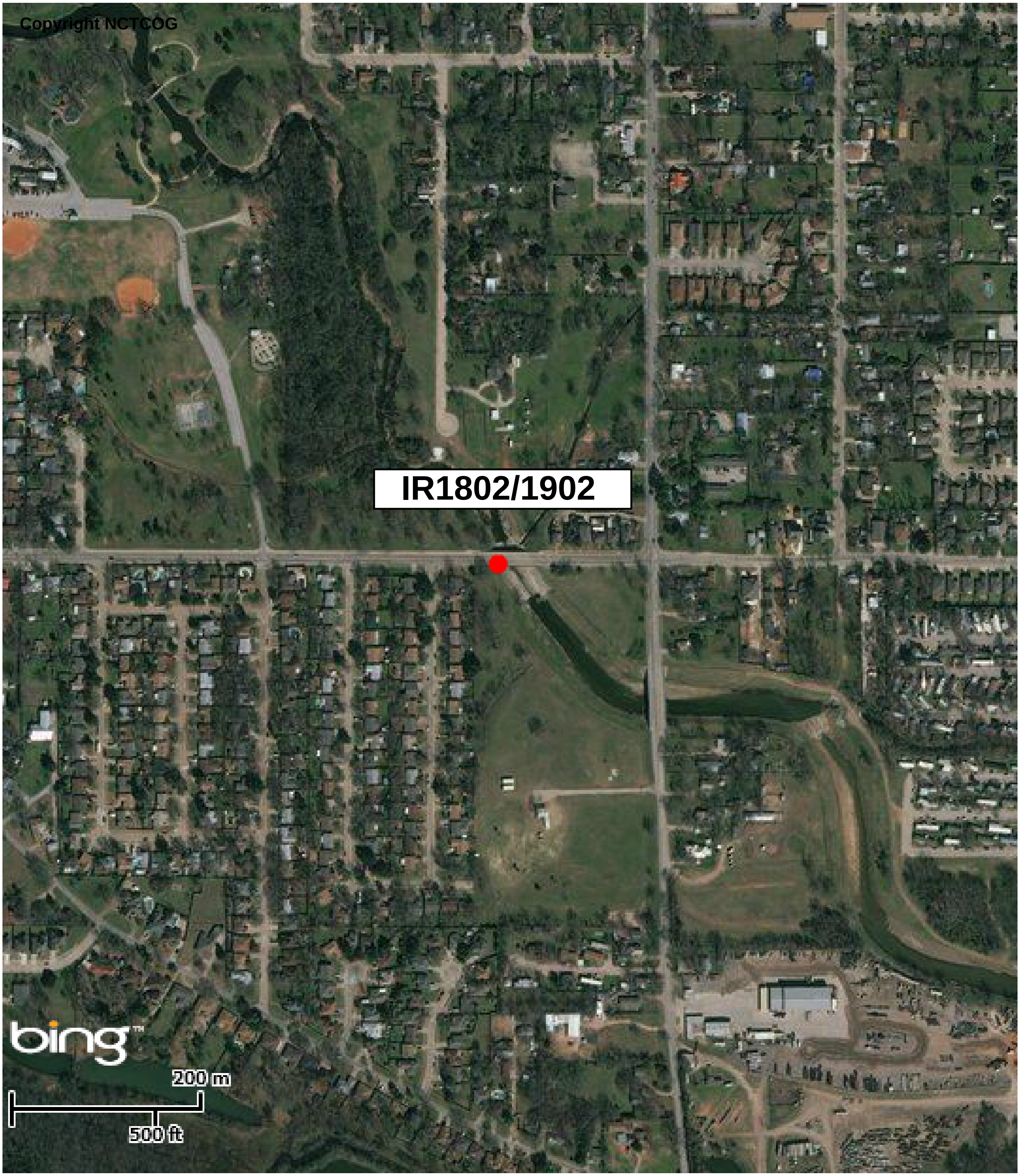
N

Delaware Creek at Oakdale

IR1802/1902



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N

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/13/17 Time: 10:01

Location Name/Number: Delaware Alternative 1 - Sowers Road

Nearest Cross Street/Location Description:

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.818N , 96.953N

Receiving Water: West Fork Trinity

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Well maintained grass cover

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Parking lot access & limited veg.

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Concrete lined channel

Vegetative Cover ~ High ~ Medium ~ Low

Describe: No veg in channel

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Easily seen from Sowers Road

Public Access ~ Yes ~ No

Describe: Parking lot adjacent to site

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: ____________________

____

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth <6" inches/feet

Describe: ____________________

____

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth <6" inches/feet

Describe: ____________________

____

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~35-40'
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~16'
(Recommended to be less than 25 feet)

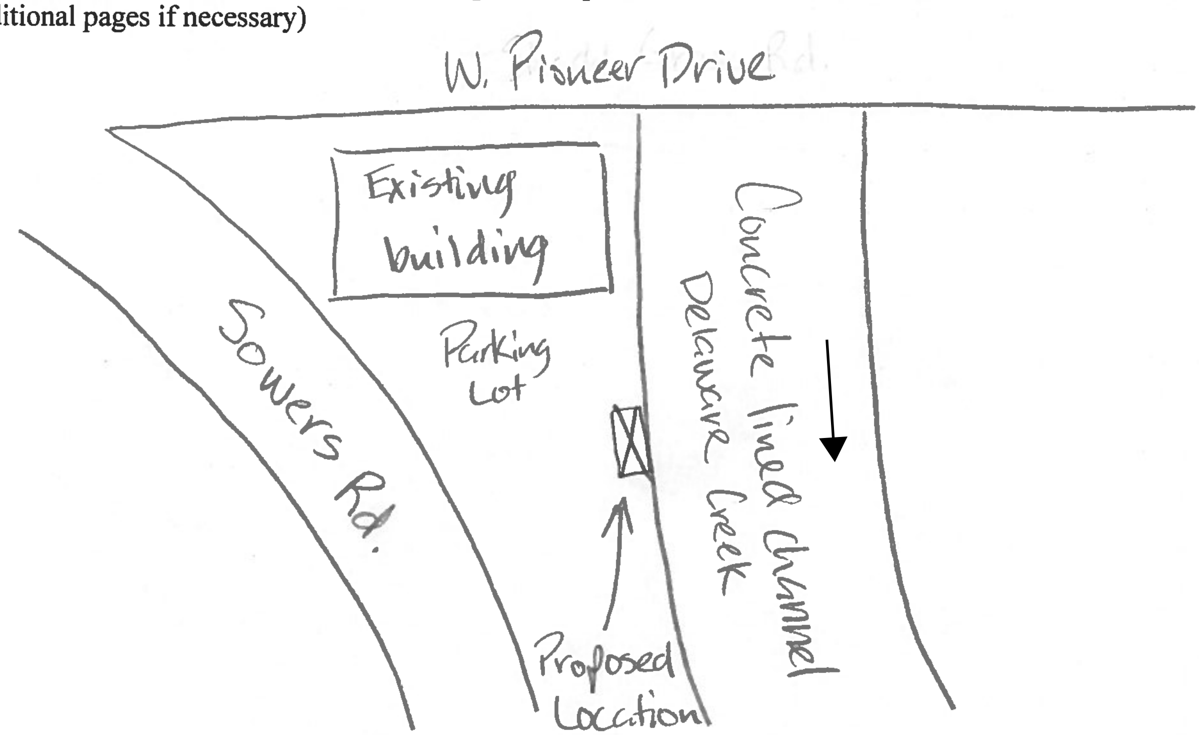
Other Site Features of Importance: ____________________

Notes: ____________________

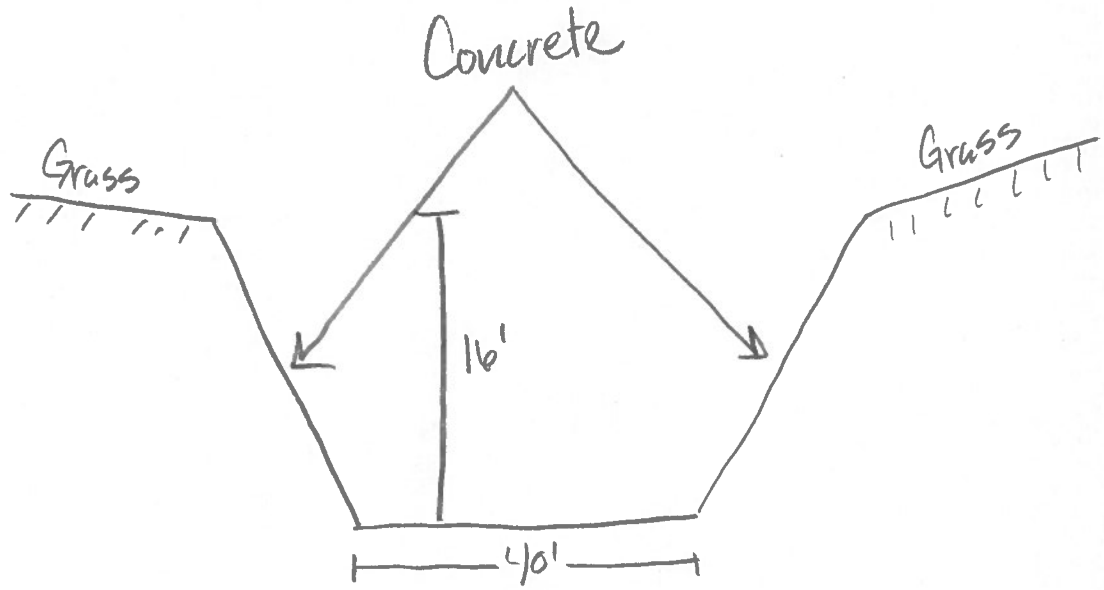
Provide Site Visit Attendee Name(s) and Company/Entity:
Jeff Shiflet - City of Irving
Ryan Deal - FNI

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/13/17 Time: 10:35

Location Name/Number: IR 004 - East Oakdale Road @ Delaware Creek

Nearest Cross Street/Location Description: South Nursery Road

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.794N , 96.936W

Receiving Water: West Fork Trinity

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Slightly maintained grass area

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Adjacent to E. Oakdale Rd.

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Concrete lined channel

Vegetative Cover ~ High ~ Medium ~ Low

Describe: No veg. in channel

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Along E. Oakdale Rd.

Public Access ~ Yes ~ No

Describe: Sidewalk + Residential access

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: Paper debris, small amount

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth <1 inches/feet

Describe:

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth <1 inches/feet

Describe:

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~60'
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~15-20'
(Recommended to be less than 25 feet)

Other Site Features of Importance: Stormwater outlet @ site

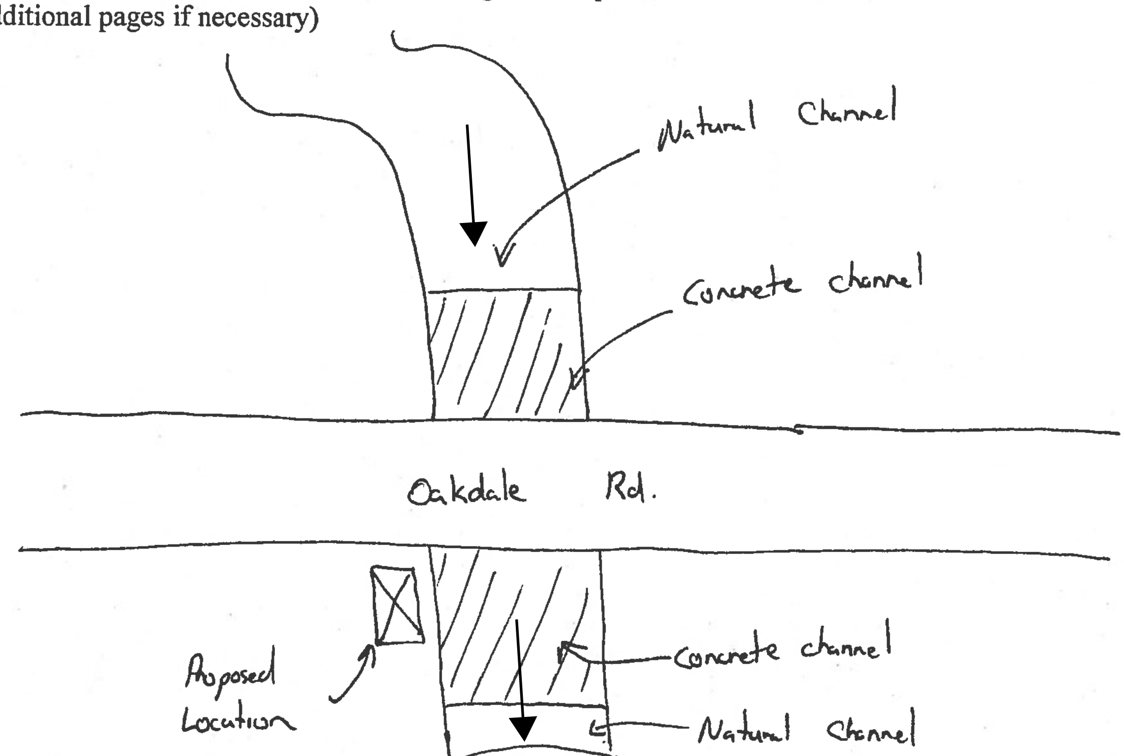
Notes: After speaking with Jeff Shiflet, he mentioned that this location has had theft of solar panels in the past. The city of Irving had to move the sampler off of the main road.

Provide Site Visit Attendee Name(s) and Company/Entity:

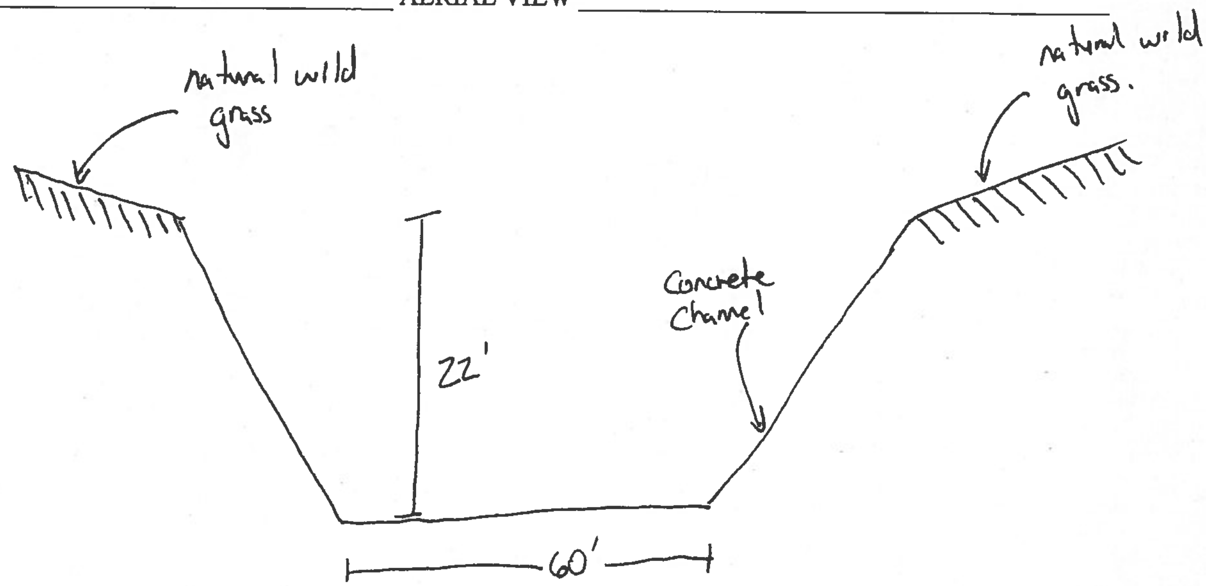
Jeff Shiflet - City of Irving
Ryan Deal - FNI

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

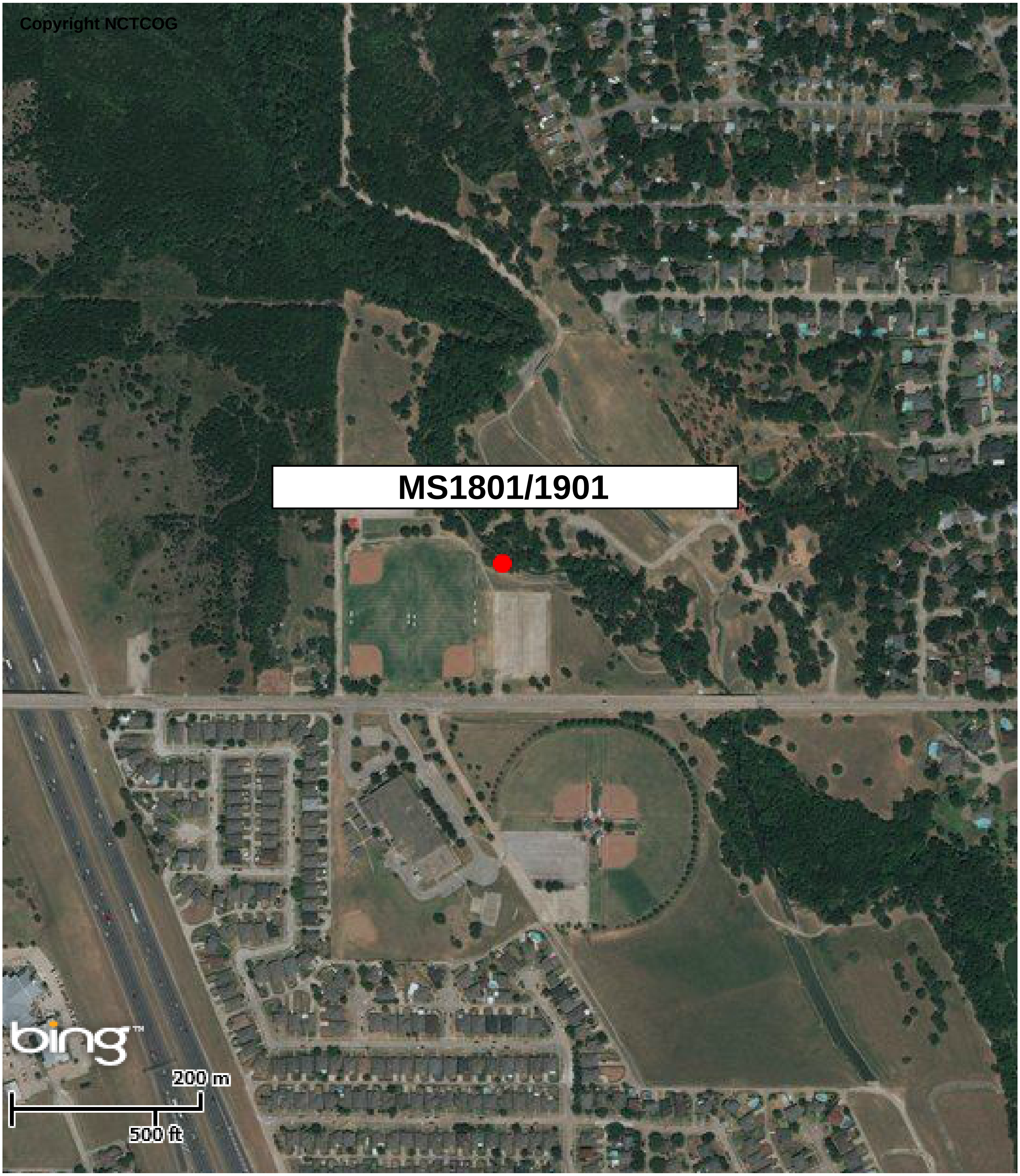
City of Mesquite

2018 - 2019 Sites

South Mesquite Creek and North Mesquite Creek Watersheds

North of New Market Road

MS1801/1901



North Central Texas Council of Governments

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North Mesquite Creek at Edward's Church
MS1802/1902

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Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/9/17 Time: 0950 AM

Location Name/Number: MES-001 North of New Market Rd (Paschall Park)

Nearest Cross Street/Location Description: New Market Road

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.757259, -96.6119444

Receiving Water: South Mesquite Creek

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Pre-existing location. Explore platform option due to flooding

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Pre-existing top of bank location. Access via parking lot and trail to the south.

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Multi-lined; Shelter location side has concrete side slope other bank is natural. Bottom is a mix of concrete & rock + sediment Moderately steep slope.

Vegetative Cover ~ High ~ Medium ~ Low

Describe: Well maintained grass

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: None from road / High for park / trail patrons

Public Access ~ Yes ~ No

Describe: Baseball park; Trail; Park users

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: ~~[illegible]~~ K.S typical instream floatables

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth ~6-15" inches/feet

Describe: Evidence of recent rain

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth ~6-15" inches/feet

Describe: See above

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~20-25ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~10-11ft
(Recommended to be less than 25 feet)

Other Site Features of Importance: Existing site with Shelters already in place.

Notes:

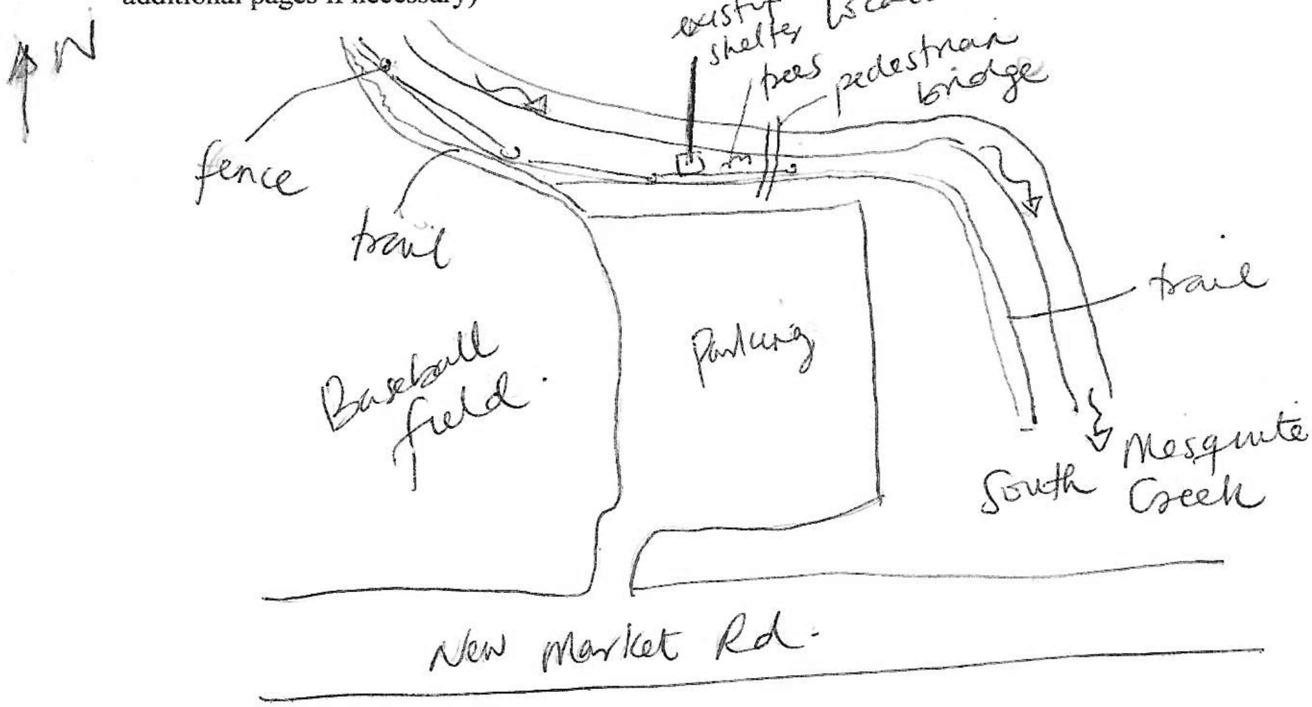
Provide Site Visit Attendee Name(s) and Company/Entity:

Robert Byrom (City of Mesquite)

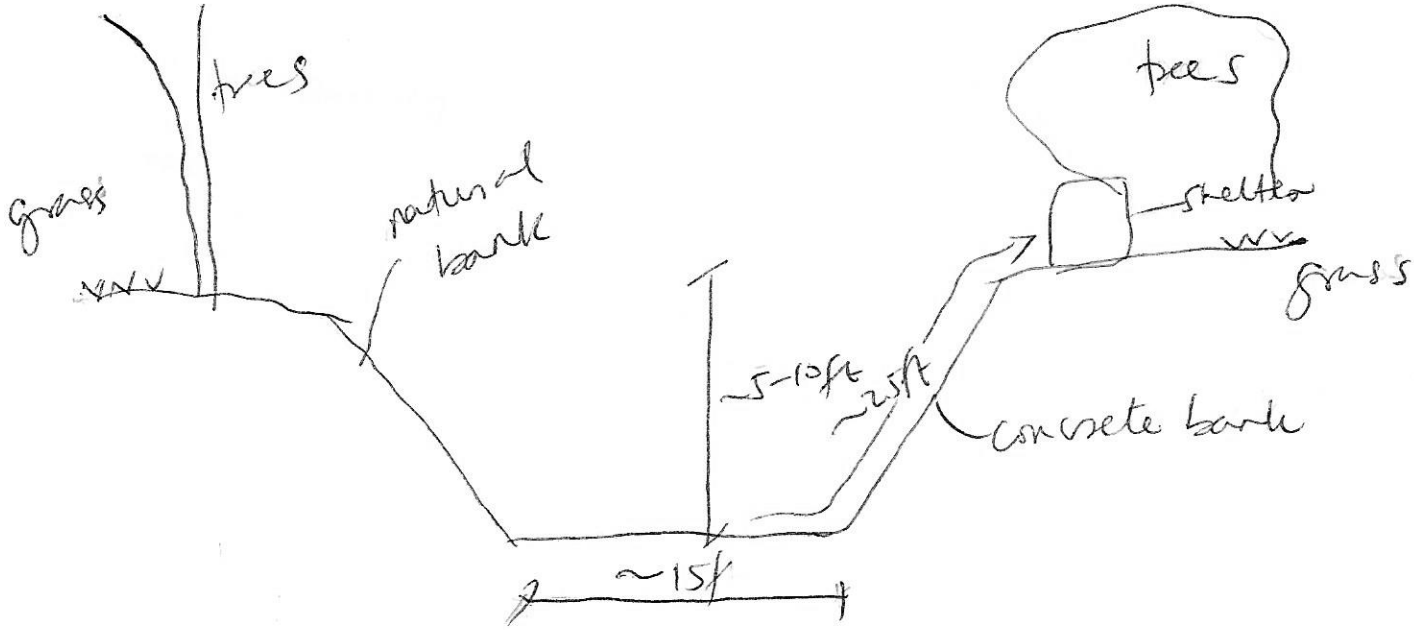
Kofi Sam (ATKINS)

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/9/17 Time: 1011 AM

Location Name/Number: MES-002 N Mesquite Creek @ Edwards Church

Nearest Cross Street/Location Description: Edwards Church Road

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.7321111°, -96.5505

Receiving Water: N Mesquite Creek

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Pre-existing location. Explore potential platform option due to flooding

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Pre-existing top of bank location. north of bridge. foot
Access via north side/Park on mini driveway east of creek.

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Natural channel; natural/earthen bank with rock/mesh lined lower bank bottom.

Vegetative Cover ~ High ~ Medium ~ Low

Describe: Low grass/brush

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Visible from sidewalk

Public Access ~ Yes ~ No

Describe: Sidewalk south of shelter location.

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: Instream wood/timber/logs and sediment

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth ~8"-12" inches/~~feet~~

Describe: moderate flow; recent rain

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth ______ inches/feet

Describe: See above

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~50ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~5-7ft
(Recommended to be less than 25 feet)

Other Site Features of Importance: Existing site with shelters already in place.

Notes:

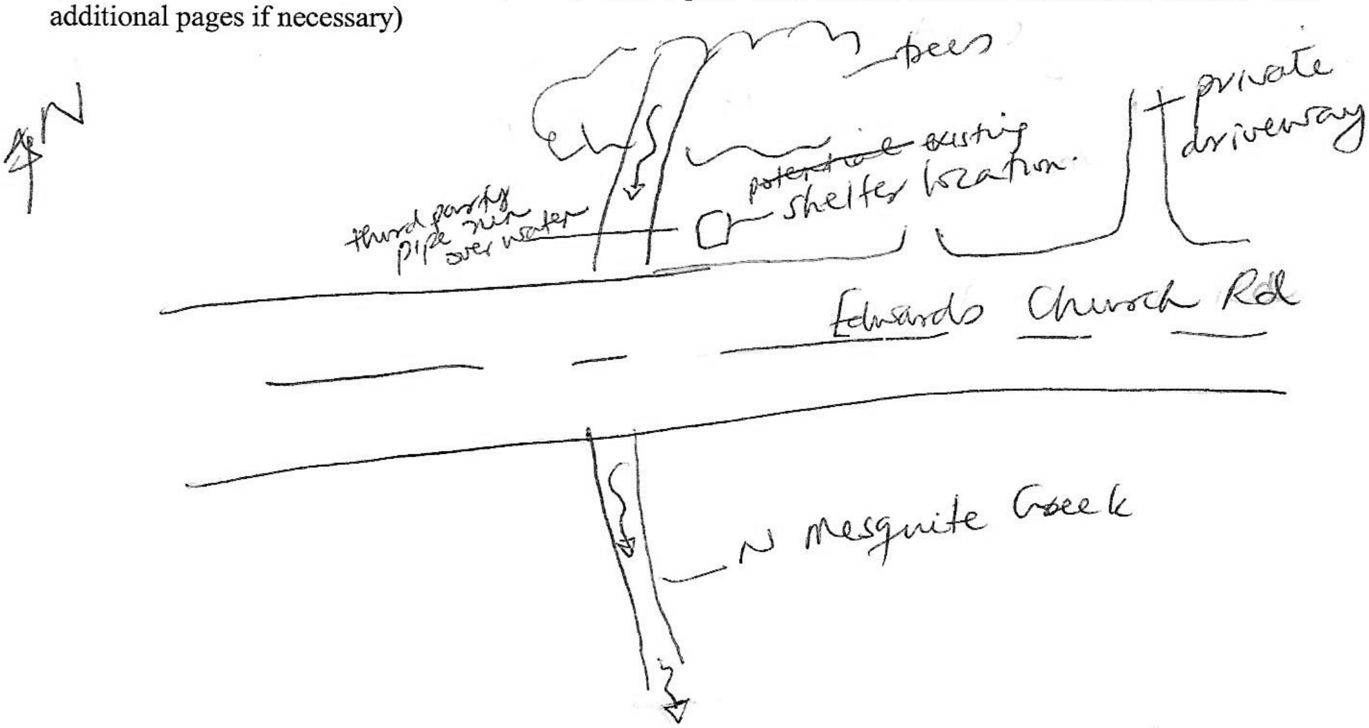
Provide Site Visit Attendee Name(s) and Company/Entity:

Robert Brown (City of Mesquite)

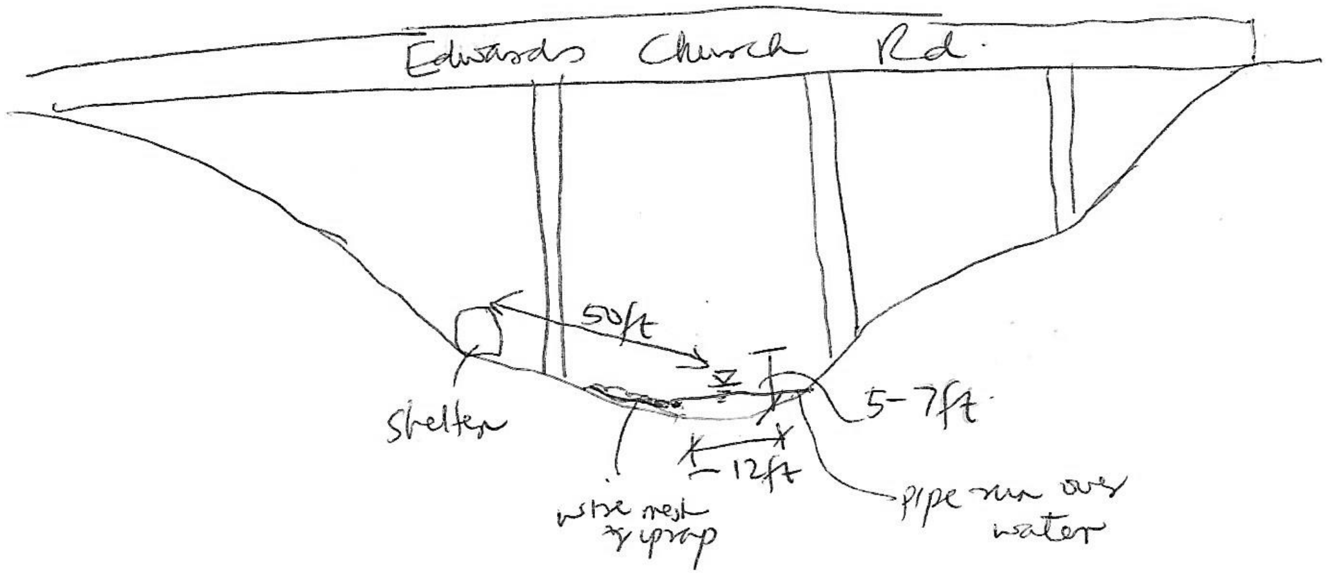
Kofi [illegible] (ATKINS)

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

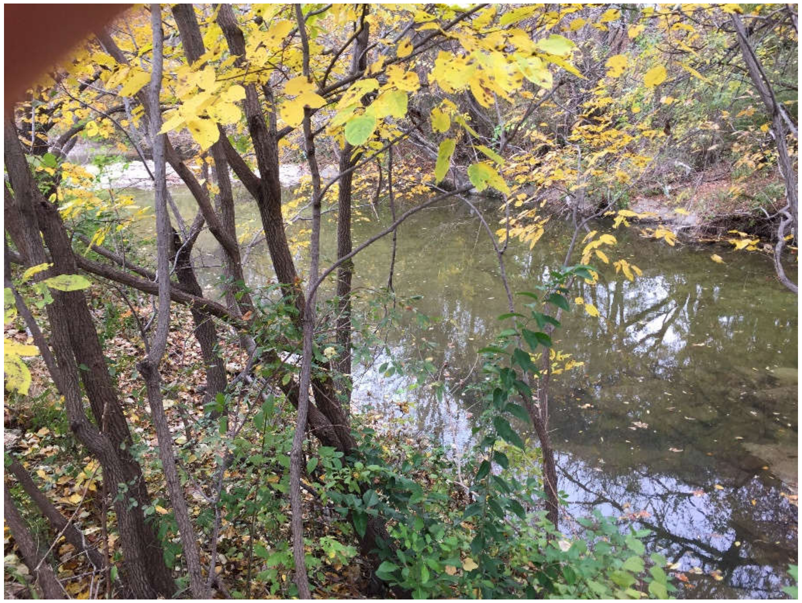
City of Plano

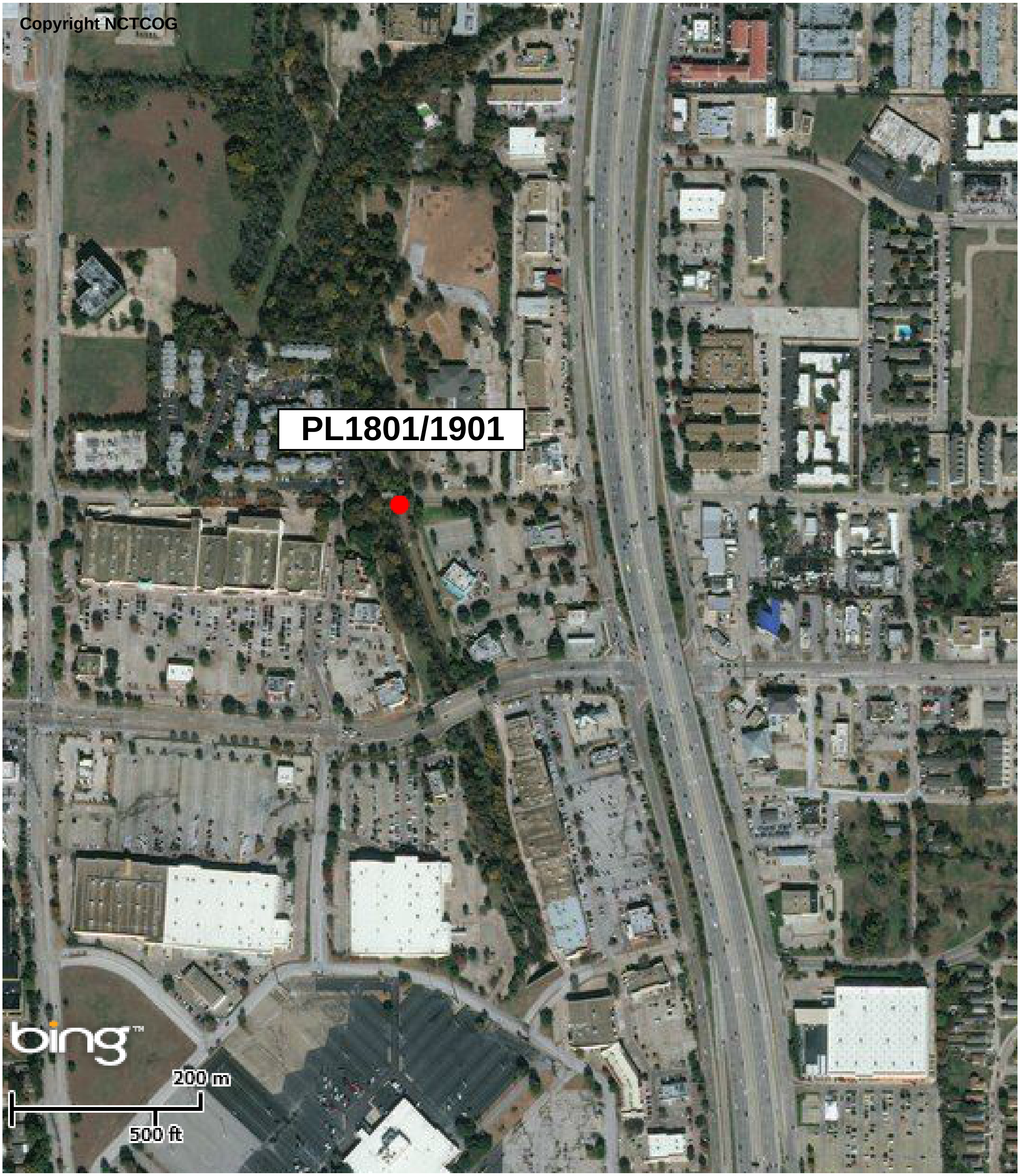
2018 - 2019 Sites

Spring Creek Watershed

Spring Creek at 16^{th} Street

PL1801/1901





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Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/15/17 Time: 10:15 AM

Location Name/Number: Spring Creek @ 16th Street PL01B

Nearest Cross Street/Location Description: 16th Street

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 33.021317° / -96.712406°

Receiving Water: Spring Creek

Data for locating automated samplers:

Ease of Installation Native or Existing Location / Bench Need to construct Location / Platform / Base

Describe: Concrete base/platform on sanitary line (existing)

Ease of channel/sample area access and safety: Describe either YES or NO

Describe: Harrington Park; parking lot access to site

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Natural, unlined, open channel with rock bottom

Vegetative Cover High Medium Low

Describe: Some brush, manicured grass at top of bank, trees near stream

Visibility from the Right-of-Way High Visibility ~~Low Visibility~~ CR None

Describe: Visible from roadway

Public Access Yes No

Describe: ~~From trail~~ Adjacent to walk/bike trail

16th Street

Evidence of Public Use Yes No (Circle all that apply, or describe)

Cans Bottles Paper Food Products Rubble Wood Brush Graffiti Transient Community

Describe: Trash present under bridge and in adjacent areas

Evidence of Normal Surface Water Elevation Yes No Depth ~1 inches/feet

Describe: Uniform depth under bridge crossing

Perennial Flow Presence High Medium Low Depth ~1 inches/feet

Describe: Uniform flow near proposed location

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water 30 ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample 20 ft
(Recommended to be less than 25 feet)

Other Site Features of Importance:

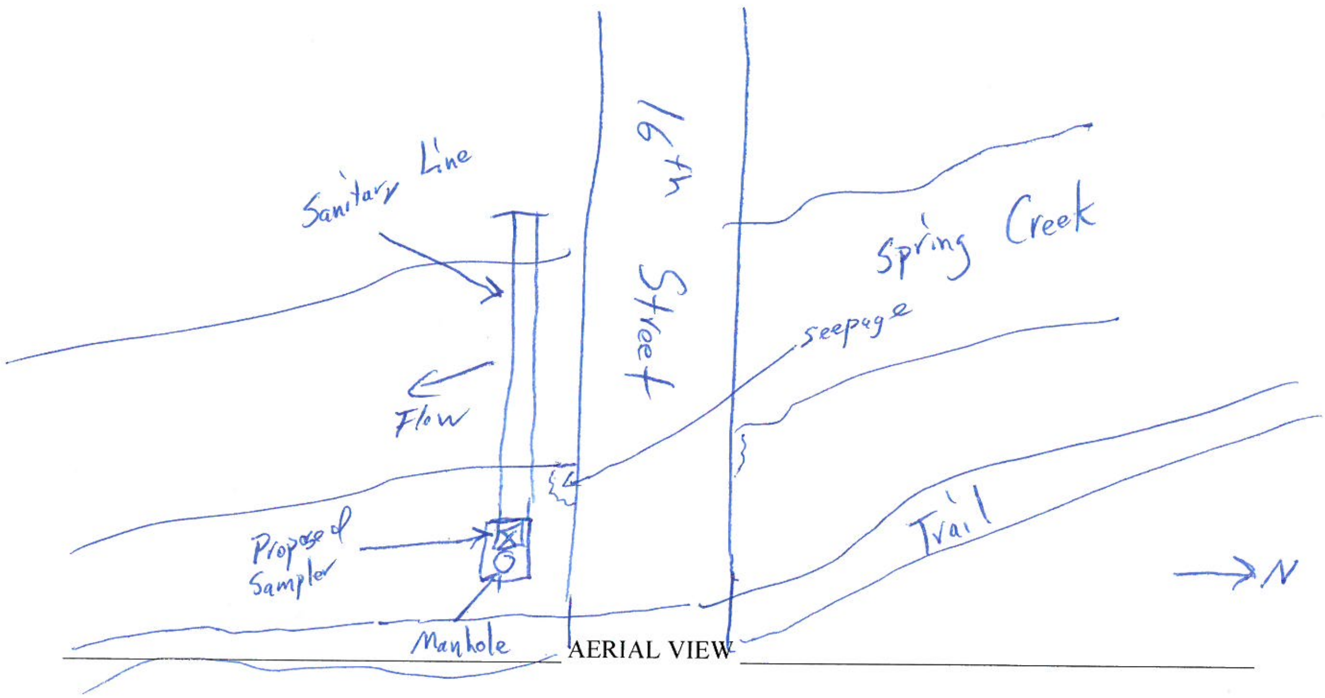
Notes: Evidence of overflow event from sanitary manhole (stains on manhole); seepage occurring under bridge

Provide Site Visit Attendee Name(s) and Company/Entity:

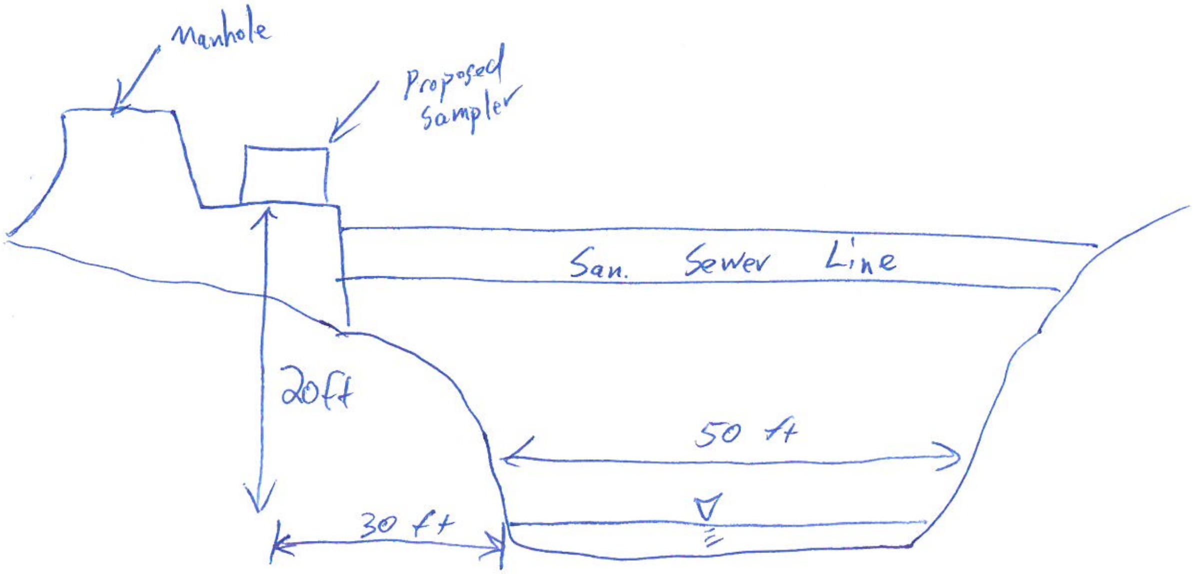
Chad Richards - Atkins
Mayra Lopez - NCTCOG
Heather Firn - City of Plano

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

NTTA

2018 - 2019 Sites

Cottonwood Branch – Hackberry Creek and Cottonwood Creek – Mountain Creek Lake Watersheds

Unnamed Tributary at SH161 N of Gateway Drive

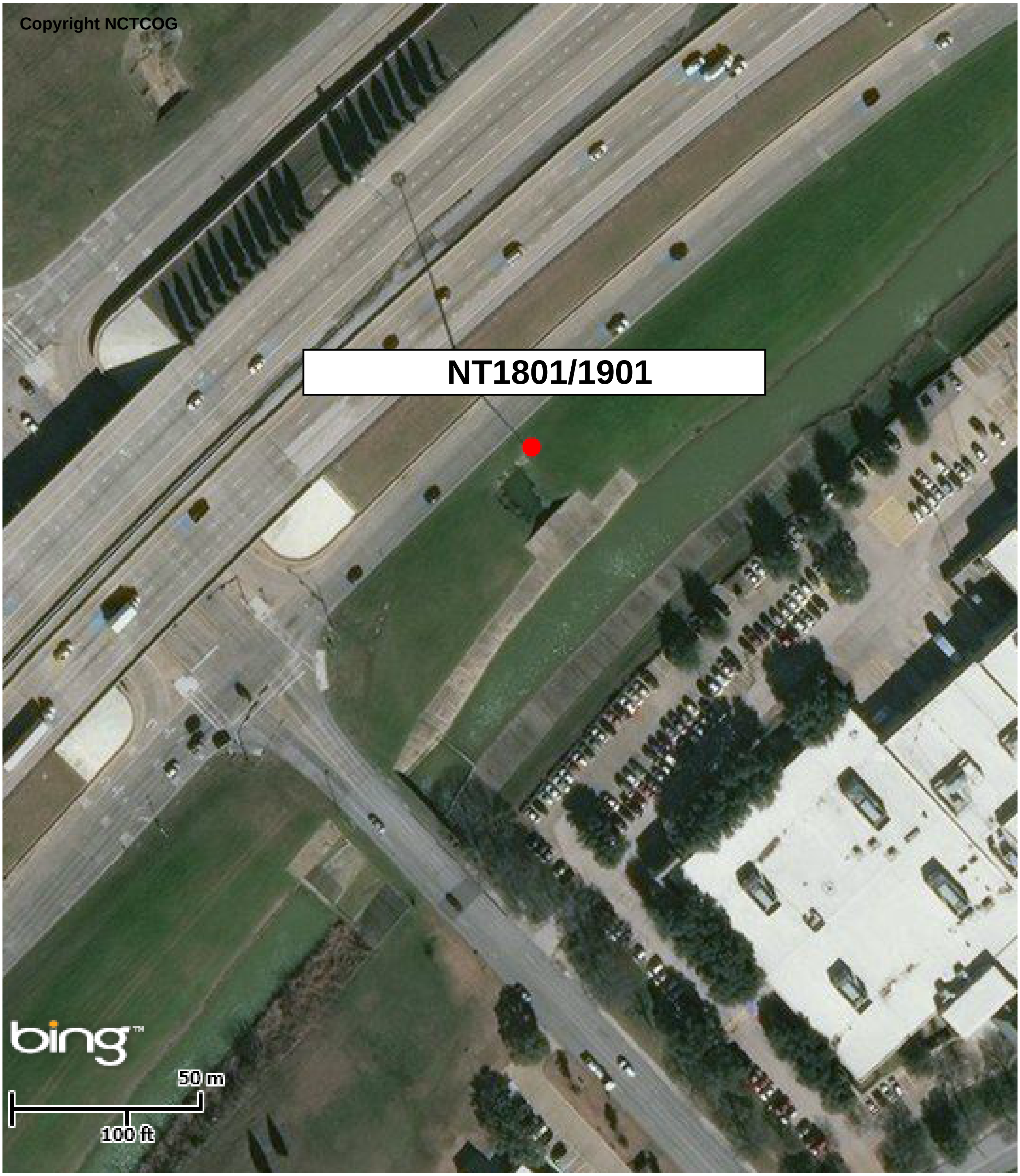
NT1801/1901

North Central Texas Council of Governments

DFWMaps.com

DISCLAIMER
This data has been compiled for NCTCOG.
Various official and unofficial sources were used to gather this information. Every effort was made to ensure the accuracy of this data, however, no guarantee is given or implied as to the accuracy of said data.

N



North Central Texas
Council of Governments

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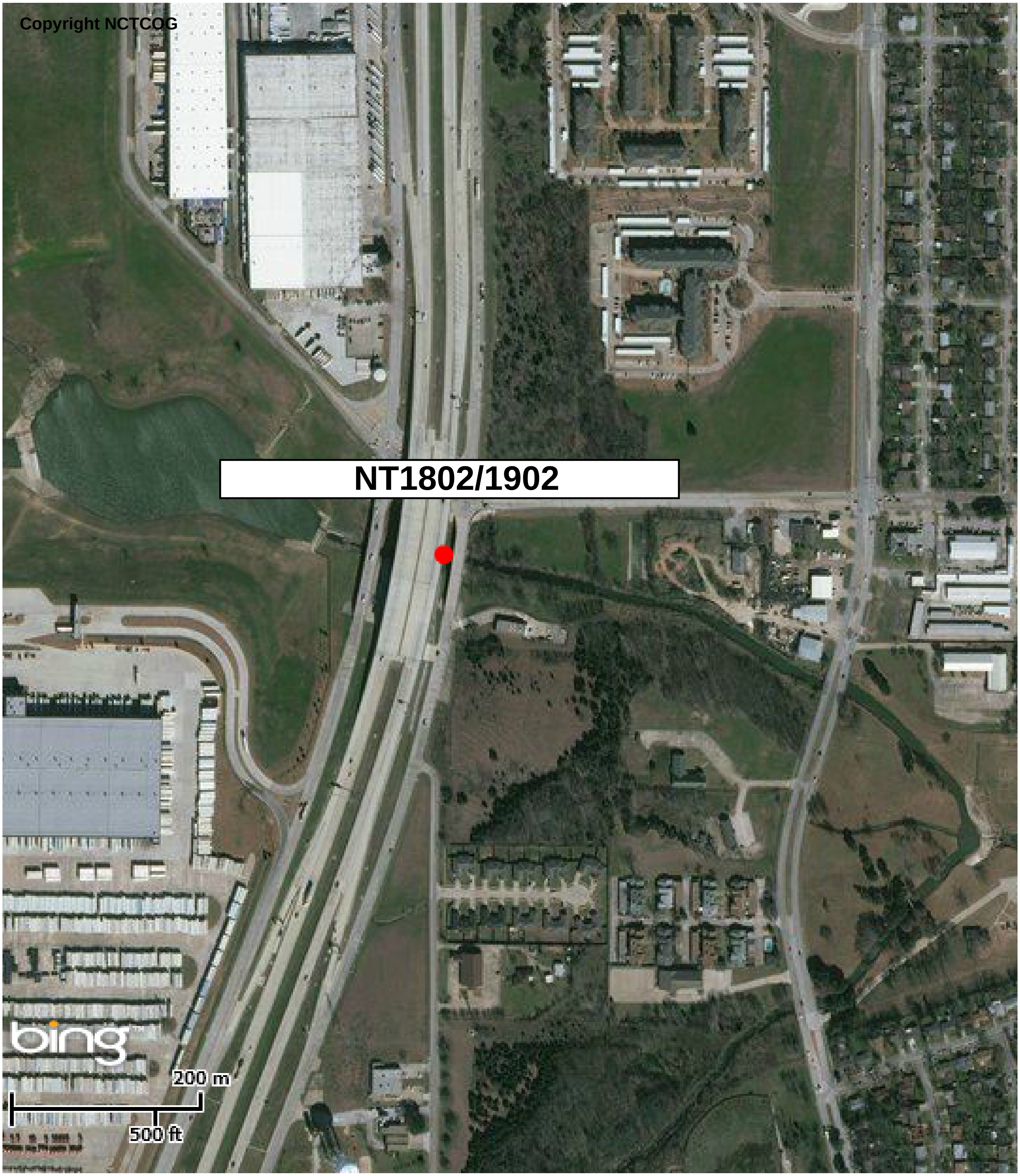
N

Cottonwood Creek at SH161 S of Dickey Road

NT1802/1902



North Central Texas Council of Governments

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N

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/3/17 Time: 1258 PM

Location Name/Number: NTTA-001B

Nearest Cross Street/Location Description: PGBT @ North of Gateway Dr

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.889808, -96.980065

Receiving Water: Unnamed Tributary to Hackberry Creek

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: level ground on top of bank

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Park on grass adjacent to culvert or in parking lot south of location and walk to site.

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: 4-~~box~~ pipe culvert apron with concrete bottom & sides serves as forebay into concrete lined trib to Hackberry Creek

Vegetative Cover ~ High ~ Medium ~ Low

Describe: Well maintained grass cover

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Vehicular traffic visibility

Public Access ~ Yes ~ No

Describe: Vehicular traffic visibility

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: No sign of public use

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth 1" inches/feet

Describe: 1" depth on concrete apron drops to about 2' forebay

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth 1"-2' inches/feet

Describe: See above

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ~15ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~5ft
(Recommended to be less than 25 feet)

Other Site Features of Importance:

Notes:

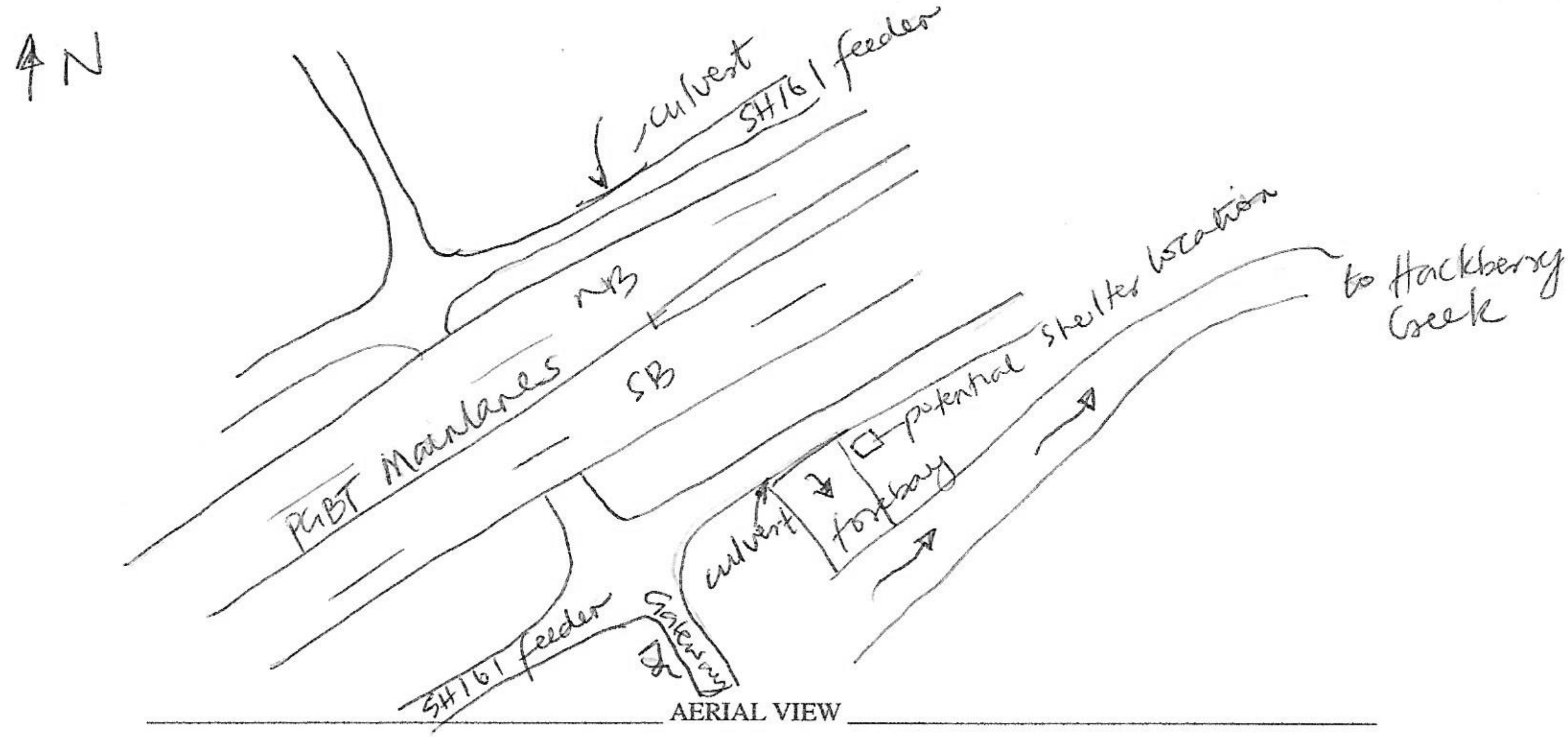
Provide Site Visit Attendee Name(s) and Company/Entity:

Moss Ferrell (VRX) On behalf of NTTA

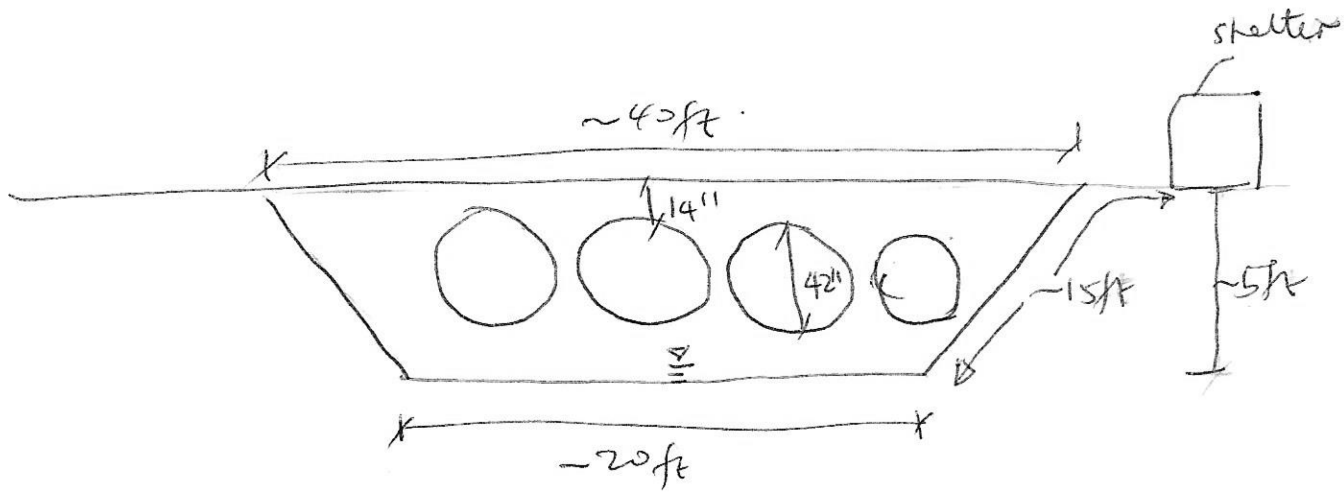
Kofi Sam (ATKINS)

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date: 11/3/17 Time: 1124 AM

Location Name/Number: NTTA – 002

Nearest Cross Street/Location Description: PGBT @ South of Dickey Rd

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude: 32.728181, -97.01946

Receiving Water: Cottonwood Creek

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: Level ground; south of Creek; east of gravel swale Explore bench

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: Park in paved area south of proposed location next to gravel swale

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: Natural grass lined channel with rocks in bottom

Vegetative Cover ~ High ~ Medium ~ Low

Describe: Low at top of bank; some medium brush in channel; poison ivy dotted on bank

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: Not visible to vehicular traffic but to transient community

Public Access ~ Yes ~ No

Describe: See public use

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: Typical instream floatables plus a transient person sleeping under bridge

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth ~4" inches/feet

Describe: Rapid low flow within multiple forks that converge under feeder bridge. Dam structure/reservoir upstream

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth ~4" inches/feet

Describe: See above.

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water 40-50ft
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ~10-15ft
(Recommended to be less than 25 feet)

Other Site Features of Importance:

Notes:

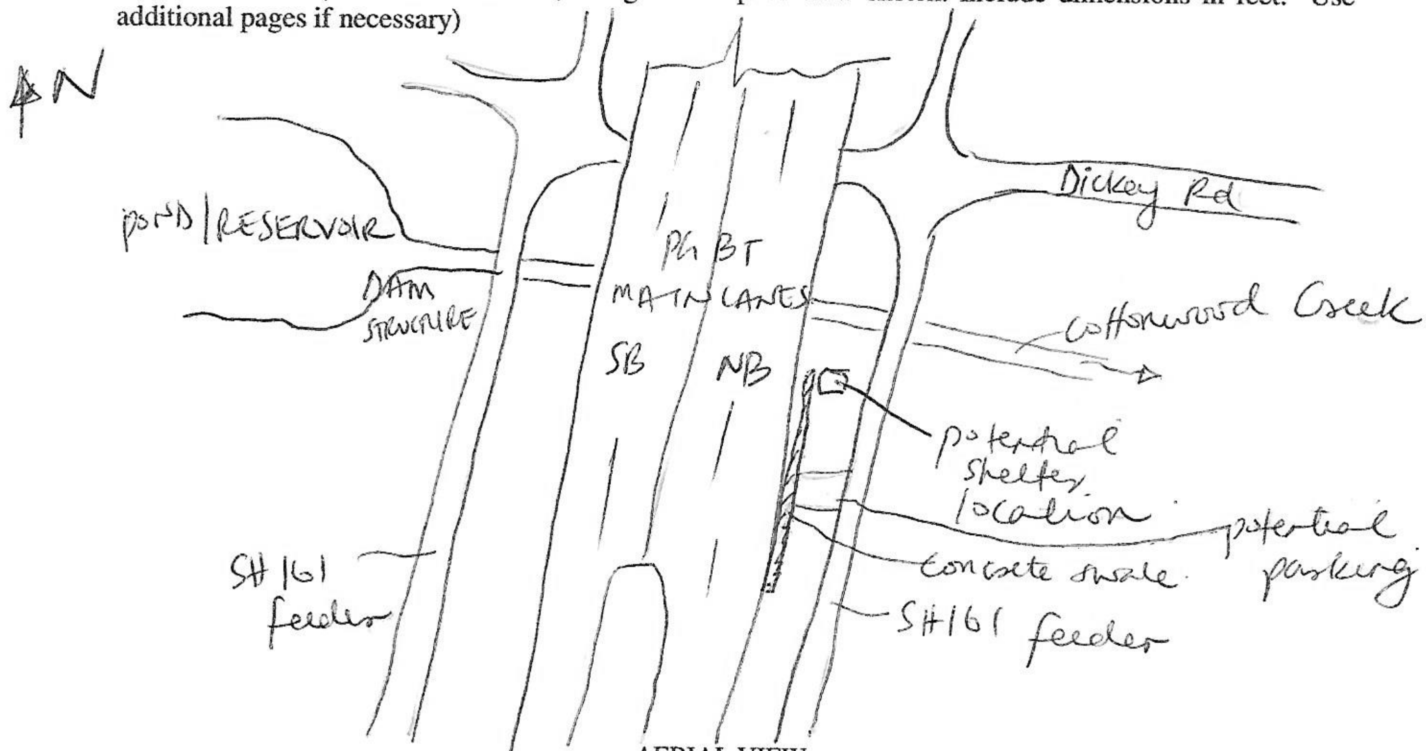
Provide Site Visit Attendee Name(s) and Company/Entity:

Moss Ferrell (VRX) On behalf of NTTA

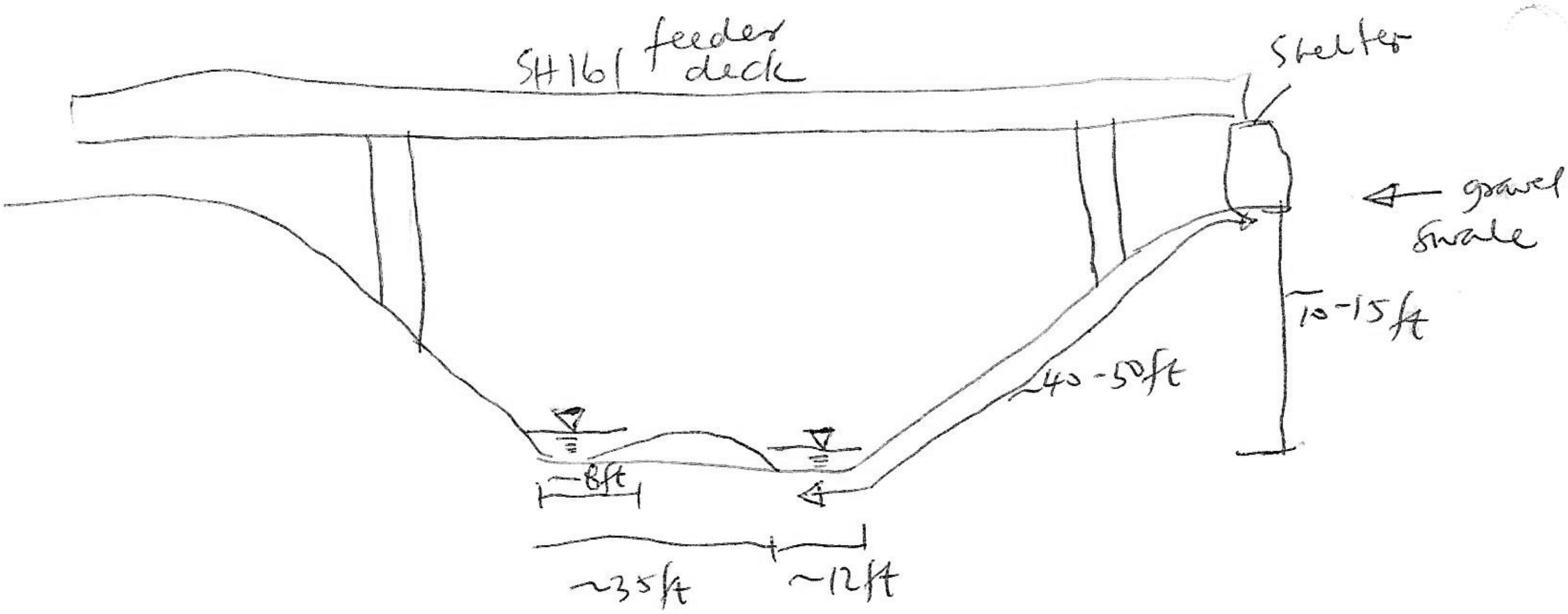
Kofi Sam (ATKINS)

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)



AERIAL VIEW



CROSS SECTION

Facing: Upstream / Downstream (Circle One)

Appendix B

Vendor Literature

Isco Product Data

Isco 6712C Compact Portable Sampler

Isco's 6712C Compact Portable Sampler delivers the advanced capabilities of our industry standard 6712 Sampler in a smaller package, allowing use where full-size samplers won't fit. Like the full-size 6712, the compact version uses Isco's advanced 6700 Series Controller, a device that allows you to select from a variety of programming modes, assuring the most suitable routine for your application. Programming is fast and simple, with on-line help just a key stroke away.

The environmentally-sealed 6712 controller delivers maximum accuracy and easily handles all of your sampling applications, including:

- wastewater effluent
- stormwater monitoring
- CSO monitoring
- permit compliance
- pretreatment compliance

In the Standard Programming Mode, the controller walks you through the sampling sequence step-by-step, allowing you to choose all parameters specific to your application. Selecting the Extended Programming Mode lets you enter more complex programs.

This comparison photo, showing the 6712C with mini base (left) and Isco's full-sized Portable Sampler (right), illustrate the broad scope of sampler configurations Isco offers to suit your particular sampling needs.

An optional telephone modem allows programming changes and data collection to be performed remotely, from a touch-tone phone. It also has dial-out alarm features.

Versatile, Tough, and Reliable

A tapered design and narrow 18-inch (45.7 cm) diameter allows use in small or offset manholes. Choose from five bottle configurations to suit a variety of sampling routines.

Isco's 6712C Compact Portable Sampler carries a NEMA 4X, 6 (IP67)corrosion-proof rating for submersible, watertight, dust-tight,and corrosion-resistant service.

Superior capability, rugged construction, and compact size, make this sampler ideal for size-restricted applications.

All 6712 Samplers share the following features:

Advanced Delivery System

The 6712's peristaltic pump delivers samples at the EPA-recommended velocity of 2 ft/sec., even at head heights of 26 feet. At a head height of 3 feet, line velocity is 3 ft/sec. No other automatic sampler achieves this level of performance!

Our patented* pump revolution counter tells you when tubing should be replaced. Changing tubing is a snap; there are no pump covers, collars or tools to slow you down. An exclusive safety interlock removes power from the pump when it's opened.

Step-by-Step Programming

This feature walks you through the sampling sequence and allows you to choose all parameters specific to your application:

- When to start
- What volume to collect
- How to distribute samples
- If samples are to be time- or flow-paced.

You can easily enter complex programs to suit your unique needs. Available routines include:

- Pause and resume for intermittent discharge flow monitoring
- Sampler pacing by time, non-uniform time, flow or external event
- Random interval sample collection

Convenient Data Retrieval

Every 6712 Sampler is also a powerful data logger. Sampling, flow, rainfall, and other water quality data can be stored in its 512 KB memory.

Data may be retrieved directly into a Flowlink® 4 equipped PC in three ways:

- Via cable connection
- Remotely, via Isco's 2102 Wireless Communication System
- By phone, using our optional built-in modem

SDI-12 Interfacing

The 6712 functions as a SDI-12 logger and connects to any sensor that fully implements the protocol standard.

Display window showing SDI-12 connection status.

In addition, Isco has defined extended commands to enable "plug and play" communications and ease of programming. These commands are implemented by the sensor manufacturer. Data are identified and logged by their specific type.

Expand your monitoring capabilities with these products and accessories.

Contact Isco or your Isco Representative to receive specific literature and prices on the following items.

Telephone Modem

A factory-installed option that lets you set up and make programming changes, or collect data from your 6712 sampler from the comfort of your office.

581 RTD (Rapid Transfer Device)

Slim enough to fit in your shirt pocket, yet rugged enough to withstand submersion, the 581 RTD lets you quickly retrieve and transfer data without taking your laptop computer into the field.

ProPak™ Disposable Sample Bags

Isco's patented ProPak bags eliminate the expense of washing and storing bottles, while taking away worries about contamination from previous samples. The bags are available with a 1000 ml capacity, or in a 2-gallon version for composite sampling.

Flowlink Software

Isco's advanced Flowlink® 4 for Windows Data Management Software harnesses the power of Microsoft Windows® to retrieve, import, compare, and analyze data, generate advanced charts and graphs, create comprehensive reports, and more.

700 Series Modules

Our 700 Series Modules let you adapt your 6712 sampler for a variety of jobs. These compact modules are environmentally sealed and may be added to your 6712 system at any time.

701 – pH and Temperature Module
Combines accurate pH and temperature monitoring in one module. It will also activate your 6712 Sampler at a user-elected pH or temperature range.

710 – Ultrasonic Flow Module
Uses our field-proven ultrasonic level sensor that doesn't require submersion in the flow stream.

720 – Submerged Probe Flow Module
Provides accurate measurement at sites where wind, steam, foam, turbulence, or air temperature fluctuations exist. Suitable for small channels, it accurately senses pressure even when covered with silt and sand.

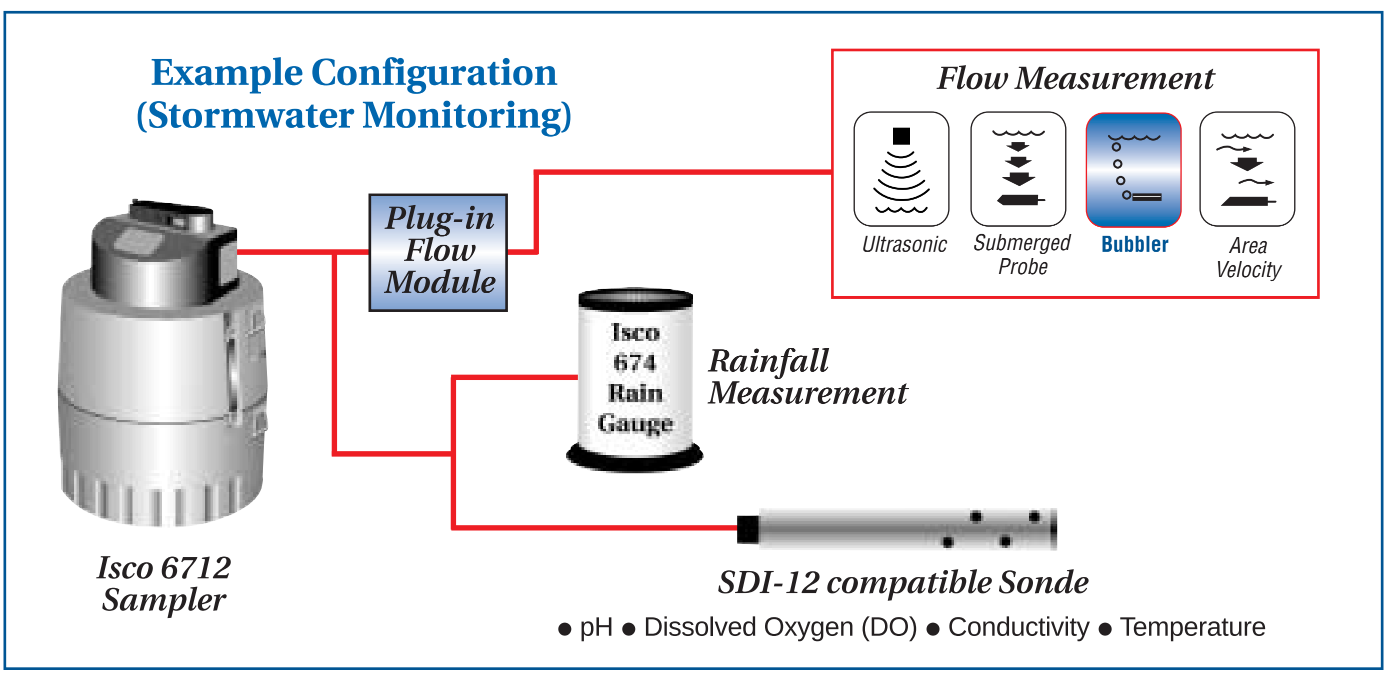
730 – Bubbler Flow Module
Get the dependability and accuracy of Isco bubbler flow meters in a miniaturized package. The 730 is unaffected by changing stream conditions, and level measurement remains accurate despite temperature fluctuations or exposure to harsh chemicals.

750 – Area Velocity Flow Module
Gives greater accuracy where weirs and flumes are not practical, and where submerged, full pipe, surcharged, and reverse flow conditions may occur. And, you don't have to estimate the slope and roughness of the channel.

780 – Smart 4-20 Module
Add intelligence to a simple analog signal. Flow rates are displayed in actual volume units, not merely a percent of full scale. Any linear 4-20 mA input can be characterized by using the 780. The information can be stored and retrieved for later analysis.

Integrated Water Monitoring

Isco 6712 Samplers feature “plug and play” connection with SDI-12 compatible measuring devices - including multi-parameter sondes from leading manufacturers. Combined with the 6712’s standard 512 KB of memory, enough for more than 200,000 stored readings. SDI-12 networking gives you great flexibility for logging environmental data, and for “smart sampling” event notification, triggered on any combination of up to 16 inputs.



Isco 6712C Compact Portable Sampler Specifications

Sampler

Height	27.6 in.	70.1 cm
Diameter	17.7 in.	45.1 cm
Weight (Dry/Less Battery)	31 lbs.	14 kg
Material	High-strength ABS plastic outer shell Stainless steel hardware	
Power Requirements	12 VDC	

Pump

Intake Purge	Adjustable air purge before and after each sample.	
Tubing Life Indicator	Provides a warning to change pump tubing.	
Intake Suction Tubing		
Length	3 to 99 ft.	1 to 30 m
Material	Vinyl or Teflon® lined	
Inside Dimension	⅜ in.	1 cm
Pump Tubing Life	Typically 1,000,000 pump counts	
Maximum Suction Lift	28 ft.	8.5 m
Typical Repeatability	±5 ml or ±5% of the average volume in a set	
Typical Line Transport Velocity at head heights of:		
3 ft. (0.9 m)	3.0 ft./s	0.91 m/s
10 ft. (3.1 m)	2.9 ft./s	0.87 m/s
15 ft. (4.6 m)	2.7 ft./s	0.83 m/s
Liquid Presence Detector	Non-wetted, non-conductive sensor detects when liquid sample reaches the pump to automatically compensate for changes in head heights.	

Controller

Weight	13 lbs.	5.9 kg
Dimensions	10.3 x 12.5 x 10 in.	26 x 31.7 x 25.4 cm
Operational Temperature	32° to 120°F	0° to 49°C
Enclosure Rating	NEMA 4X, 6	IP67
Program Memory	Non-volatile ROM	
Flow Meter Signal Requirements	5 to 15 volt DC pulse or 25 millisecond isolated contact closure.	
Number of Programmable Composite Samples	1 to 999 samples.	
Real Time Clock Accuracy	1 minute per month, typical	

Software

Sample Frequency Selection	1 minute to 99 hours 59 minutes, in 1 minute increments. Non-uniform times in minutes or clock times 1 to 9,999 flow pulses
Sampling Modes	Uniform time, non-uniform time, flow. *(Flow mode is controlled by external flow meter pulses.)*
Programmable Sample Volumes	10 to 9,990 ml in 1 ml increments
Sample Retries	If no sample is detected, up to 3 attempts; user selectable
Rinse Cycles	Automatic rinsing of suction line up to 3 rinses for each sample collection
Program Storage	5 sampling programs
Sampling Stop/Resume	Up to 24 real time/date sample stop/resume commands
Controller Diagnostics	Tests for RAM, ROM, pump display, and distributor

Ordering Information

Description	Part Number
6712C Compact Portable Sampler Includes controller with 512 KB RAM, top cover, center section, base, distributor arm, instruction manual, pocket guide.	**68-6710-071**
6712C Compact Portable Sampler with Mini Base (Includes items described above)	**68-6710-141**

The 6712 Controller is an SDI-12 logger. Manual pump operations are now located on the front panel keys.

Note: *Power source, bottle configuration, suction line, and strainer must be ordered separately. Other options and accessories are also available. Contact Isco or your Isco Representative for complete information.*

The 6712C Compact Portable Sampler features Isco's exclusive bottle carrier to make bottle changing and transportation a snap.

ISCO®
www.isco.com

Isco, Inc.
4700 Superior St.
Lincoln, NE 68504 USA
Phone: (402) 464-0231
USA & Canada: (800) 228-4373
Fax: (402) 465-3022
E-Mail: info@isco.com

Isco Flowlink® 5 Software

Isco's Flowlink is the premier flow data management software. Flowlink 5's advanced analysis, editing, and reporting, assure continued industry leadership.

Easy instrument configuration

Set up the following Isco instruments — on-site or remotely:

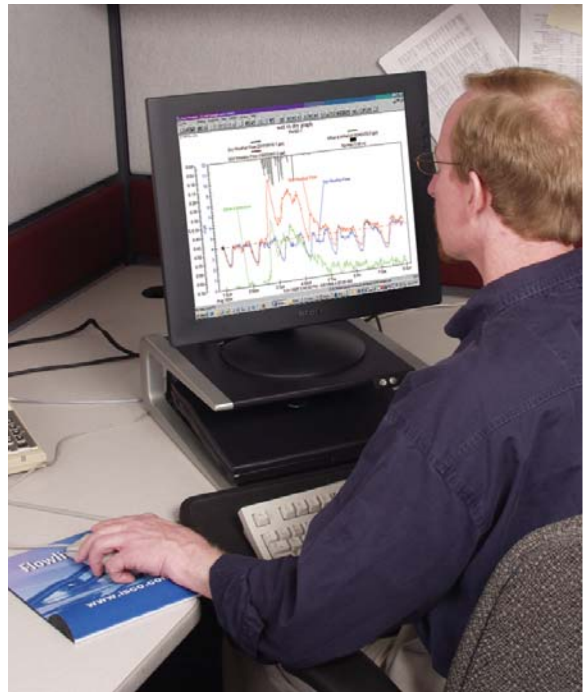
- 2100 Series Flow Modules
- 4100 Series Flow Loggers
- 4200 Series Flow Meters
- 676 Logging Rain Gauge systems

Enhance battery life by scheduling specific "run times" for communication modules.

Save configuration time by cloning when a flowmeter is replaced, or conditions are similar at another site.

Data handling options

Download data on site to your laptop PC, Isco 581 Rapid Transfer Device (RTD), or Isco 2101 Field Wizard.



Collect data from 2100 Series modules remotely via an Isco 2102 Wireless Module, 2103 Telephone or 2103c Cell Phone Modem.

Collect data from Isco 4200 Series Flow Meters and 6700 Series Samplers with voice modems.

Automate data collection.

Display default graphs immediately after data retrieval to quickly assess site conditions.

Import CSV-formatted data from non-Isco instruments.

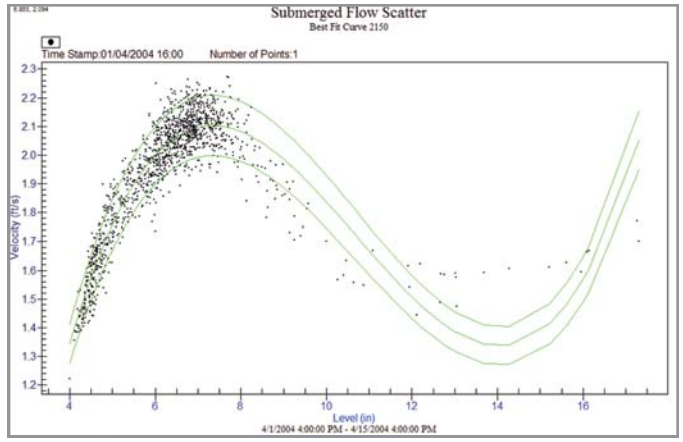
Convert Flowlink 4 files to Flowlink 5.

Archive data to a zipped file on a network drive and back up your database to insure against loss.

Data Presentation

- Drag and drop data onto graphs and tables.
- Generate graphs with up to four panes, with multiple data types in each pane.
- Display rainfall.
- Display sample events.
- Display scatter plots. Generate a best-fit curve with limits for analysis.
- Add text boxes to label events.
- Generate vertical lines that span all panes for accurate values of different parameters at specific times.
- Generate horizontal lines to distinguish points outside limits.

Scatter Plot

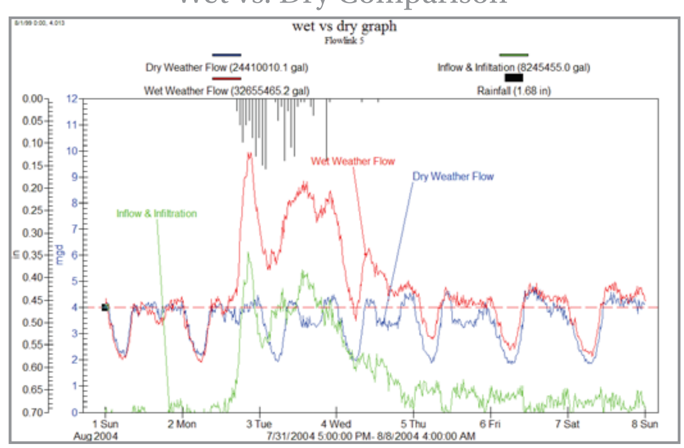


Generate flow channel performance pictures. Add upper and lower limits to indicate fitness of data by a percentage of offset, or test fitness of data using Manning Formula coefficients.

Advanced Data Analysis

- Calculate average, minimum, maximum, and total accumulated values.
- Compare data from multiple sites.
- Use series formulas to know the relation between sites or parameters.
- Zoom vertically and horizontally.
- Generate reference curves for wet weather analysis or problem identification.
- Compare flows using the continuity equation and Manning formula.

Wet vs. Dry Comparison



Create reference curves (blue line) for comparisons. Import rain data (inverted from top of graph) to help see the relationship between rainfall and I&I.

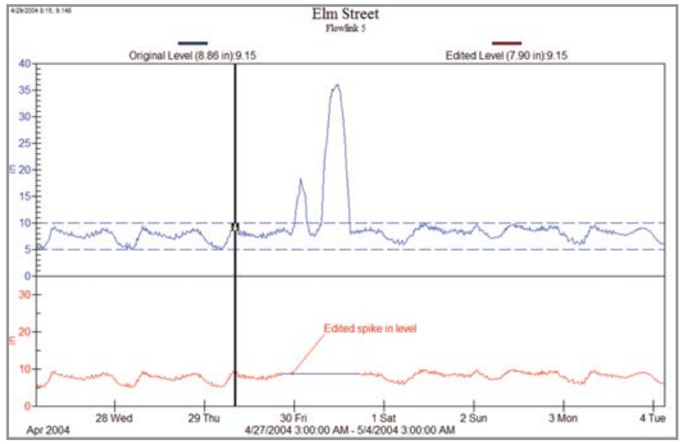
Editing Capability

External noise, site conditions, etc, can adversely affect data quality. Also, data from flow meters lacking Isco's exceptional stability can be corrected for calibration or temperature drift.

- Edit data with constant offset, fixed offset, proportional, time, or auto-correct functions.
- Edit data values by dragging them to correct values or by selecting multiple data values in a block, then applying corrections.
- Adjust scatter plot data within limits, or to the centerline of the best fit curve.
- View changes in a graph or table after editing.
- Copy, paste, cut, and insert.
- Show modified data in a different color.

.

Edited Graph



The erroneous spikes shown above would skew calculations. Simply highlight them and click "auto-correct".

Reporting

- Include Flowlink graphs and tables in Microsoft Word®, Excel®, and PowerPoint® with object linking and embedding (OLE).
- Exported into CSV format for analysis in spreadsheet programs. Export graphs and tables in HTML or PDF format.
- Automatically retrieve data, print graphs and tables, import/export data, and run command-line driven programs.

Printable Table

Min/Max/Avg Flow rates

Flowlink 5

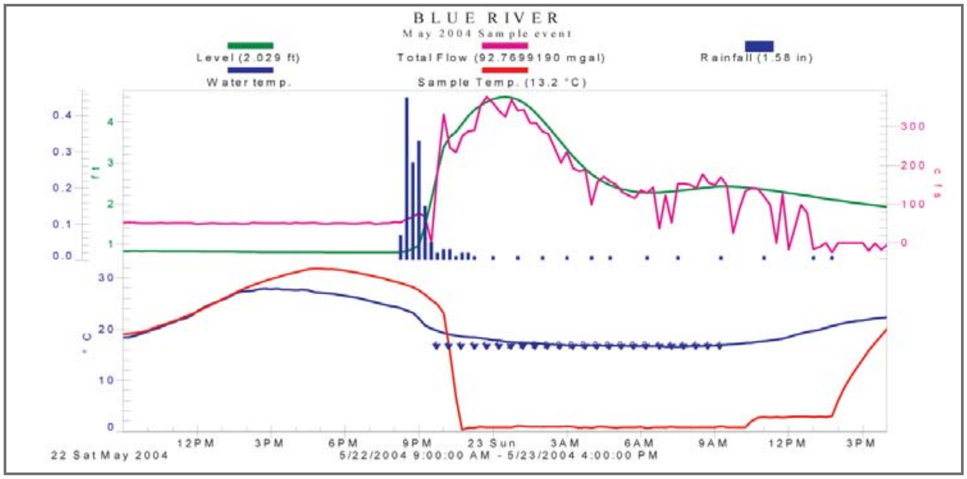
Date/Time	Average Flow Rate (gpm)	Minimum Flow Rate (gpm)	Time of Minimum Flow Rate	Maximum Flow Rate (gpm)	Time of Maximum Flow Rate
4/16/2004 3:00:00 AM	350	150	3:30:00 AM	480	7:15:00 AM
4/17/2004 3:00:00 AM	360	170	3:30:00 AM	500	9:00:00 AM
4/18/2004 3:00:00 AM	360	170	2:30:00 AM	510	8:45:00 PM
4/19/2004 3:00:00 AM	350	160	3:30:00 AM	510	6:00:00 PM
4/20/2004 3:00:00 AM	360	160	3:45:00 AM	510	8:00:00 PM
4/21/2004 3:00:00 AM	370	160	3:00:00 AM	500	9:00:00 PM
4/22/2004 3:00:00 AM	360	170	3:00:00 AM	500	8:15:00 PM
4/23/2004 3:00:00 AM	370	170	2:30:00 AM	480	7:30:00 PM
4/24/2004 3:00:00 AM	360	160	4:00:00 AM	500	9:15:00 AM
4/25/2004 3:00:00 AM	380	180	4:00:00 AM	490	10:15:00 AM
4/26/2004 3:00:00 AM	360	170	2:45:00 AM	510	8:00:00 PM
4/27/2004 3:00:00 AM	350	160	3:00:00 AM	490	6:45:00 PM
4/28/2004 3:00:00 AM	360	160	3:30:00 AM	490	9:15:00 PM
4/29/2004 3:00:00 AM	400	180	3:15:00 AM	640	12:15:00 AM

Average Flow Rate (gpm)	Minimum Flow Rate (gpm)	Time of Minimum Flow Rate	Maximum Flow Rate (gpm)	Time of Maximum Flow Rate
360	150	4/16/2004 3:30:00 AM	640	4/30/2004 12:15:00 AM
Total				
7357556.6 gal				

Convert graphical data to tabular with one click. Statistical functions are summarized beneath each column. Flowlink scales tables to your printed page.

Sampler Compatibility

Integrate data from Isco's 6700 Series, or Avalanche samplers,
with flow meter data for comprehensive analysis and reporting.



Upper pane shows level, flow rate and rainfall. Lower pane shows events (blue triangles) for each sample, with stream water and sample temperatures. Conductivity, pH, dissolved oxygen, etc., can also be displayed.

Flowlink 5 Computer Requirements

Operating System	Microsoft Windows 98, NT, 2000, and XP	Disk Drive	CD ROM
Microprocessor	133 MHz Pentium® or equivalent	Monitor	SVGA, 800 x 600 resolution
RAM	32 Mbytes[1] (recommended)	Printer	Color (recommended)
Hard Drive	100 Mbytes free space available for program data[2] (recommended)	Communication	Serial or USB[3] port with Isco Interrogator Cable, Hayes ™ compatible telephone modem

[1] System must meet the minimum hardware requirements for the selected operating system.
[2] Estimate based on a database with 15 sites, each having 3 data sets (e.g., level, velocity, and flow rate), each set having a 15-minute reading interval, with the database archived every 6 months.
[3] Requires customer-supplied USB to RS-232 adapter/converter cable.

NOTE: A Flowlink 3 database can be opened in Flowlink 5 after conversion, using Isco's Site Converter software (included with Flowlink 5).

Water is life. Protect it.

Teledyne Isco, Inc.
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USA & Canada: (800) 228-4373
FAX: (402) 465-3022
e-Mail: info@isco.com
Internet: www.isco.com

Isco Product Data

Isco 730 Bubbler Flow Module

Bubbler level sensing provides the most accurate measurement

Isco 730 Bubbler Flow Modules use an internal air compressor to force a metered amount of air through a bubble line submerged in the flow channel. By measuring the pressure needed to force air bubbles out of the line, the water level is accurately determined. The 6700 Series or Avalanche Sampler then converts the level into flow rate.

The 730 provides accurate measurement in a variety of conditions. It is suitable for small channels, and it is not affected by wind, steam, foam or turbulence. And, because only the bubble tube contacts the flow, corrosive chemicals are not a problem. Automatic bubble line purging prevents clogging. The 730 also resists damage by lightning and debris, making it ideal for stormwater applications.

Automatic drift compensation makes Isco bubbler flow meters the most accurate level measurement technology. In standby applications, such as stormwater runoff monitoring, Automatic drift compensation also allows the 730 to maintain calibration for extended periods.

Standard Features

- Bubbler line is unaffected by flow stream composition
- Automatic Drift Compensation provides high accuracy and maintains calibration in standby applications such as stormwater monitoring
- Built-in flow conversions for most applications, including weirs and flumes, Isco flow metering inserts, Manning formula, data points, or equation for special situations
- During the program's operation, current flow and level values are viewable on the sampler's LCD display
- All level data stored in the sampler is available for later retrieval, reporting, and graphing using Isco Flowlink® software

Applications

- Level and flow measurement in shallow streams, and/or where lightning and debris may occur
- Trigger sampling based on flow or level
- Flow-proportioned sample collection
- Treatment-capacity analysis
- River and stream gauging

Simply plug in one of the environmentally-sealed modules to expand monitoring capabilities. They can easily be added or changed in the field.

Specifications

730 Module		
Size *(H x W x D)*	4.9 x 5.7 x 2.0 in	12.4 x 14.5 x 5.1 cm
Weight	1.5 lbs	0.7 kg
Material	Polystyrene	
Enclosure	NEMA 4X, 6	IP67
Power *(provided by 6700 Series Sampler)*	9 to 14V DC	
Program Memory	Non-volatile, programmable flash; can be updated via interrogator port on 6700 Series Sampler using a PC	
Level Measurement Data Storage Interval *(programmable through 6700 Series Sampler)*	1, 2, 5, 10, 15, or 30 minutes	
Operating Temperature	32° to 120°F	0° to 49°C
Storage Temperature	0° to 140°F	-18° to 60°C

Bubbler				
Range	0.01 to 10 ft.		0.003 to 3.05 m	
Level Measurement Accuracy *Linearity, Repeatability, and Hysteresis at 77°F (25°C)*	**Level***	**Error**	**Level***	**Error**
	0.1 to 5.0 ft	±0.005 ft	0.03 to 1.52 m	±0.002 m
	0.1 to 7.0 ft	±0.01 ft	0.03 to 2.13 m	±0.003 m
	0.1 to 10 ft	±0.035 ft	0.03 to 3.05 m	±0.011 m
Temperature Coefficient *Maximum error over compensated temperature range (per degree of temperature change)*	**Level***	**Error**	**Level***	
	0.01 to 5.0 ft	±0.0006 x level x temperature change from 77°F	0.003 to 1.52 m	±0.00108 x level x temperature change from 25°C
	0.01 to 10 ft	±0.0005 x level x temperature change from 77°F *where level is measured in feet*	0.003 to 3.05 m	±0.0009 x level x temperature change from 25°C *where level is measured in meters*
Automatic Drift Correction	After a 5-minute warm up period, zero level is corrected to ±0.002 ft. (±0.0006 m) at programmed intervals between 2 and 15 minutes			
Operating Temperature	32° to 120°F		0° to 49°C	
Compensated Temperature	32° to 140°F		0° to 60°C	

**Actual vertical distance between the end of the bubble tube and the liquid surface.*

Ordering Information

Description	Part Number
730 Bubbler Flow Module	**68-6700-050**
730 Accessories	
Flow Metering Inserts	
6 in. (150 mm) Insert	**68-3230-005**
8 in. (200 mm) Insert	**68-3230-006**
10 in. (250 mm) Insert	**68-3230-007**
12 in. (300 mm) Insert	**68-3230-008**

ISCO®
Water is life. Protect it.

Teledyne Isco, Inc.
4700 Superior Street
Lincoln NE 68504 USA
Phone: (402) 464-0231
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Fax: (402) 465-3022
E-Mail: info@isco.com
Internet: www.isco.com

Isco Product Data

Isco 674 Rain Gauge

Connects directly to 6712 and Avalanche™ Samplers, 4200 Flow Meters, and 4100 Flow Loggers

The Isco 674 Rain Gauge is a precision instrument that uses a tipping bucket design for rainfall measurement. It has an 8-inch diameter orifice and is factory-calibrated to tip at either 0.01 inch or 0.1 mm of rainfall. With a 674 Rain Gauge connected, an Isco flow meter or sampler will:

- ♦ Store rainfall data in internal memory for retrieval and analysis with Isco Flowlink® Software
- ♦ Activate sampling based on rainfall
- ♦ Plot graphs and print reports of rainfall data on the flow meter's built-in printer

The 674 rain gauge features a precision tipping bucket and 3-point leveling system for easy setup.

Applications

- ♦ Stormwater runoff monitoring
- ♦ TMDL and Watershed surveys
- ♦ Inflow and infiltration studies
- ♦ cMOM and CSO/SSO programs (Sewer overflow monitoring and prevention)
- ♦ General rainfall measurement

Standard Features

- ♦ Three-point leveling and integral bubble level make it easy to align the rain gauge for maximum accuracy.
- ♦ Sapphire jewel bearings on the tipping bucket are spring-loaded to prevent damage to the bearings and ensure consistent operation over a wide temperature range.
- ♦ Screens cover all openings to prevent leaves, insects, and other debris from clogging the gauge.
- ♦ Included 50-foot cable connects directly to compatible Isco flow meters and samplers.

A 674 rain gauge connected to an Isco 6712 or Avalanche sampler is ideal for collecting rainfall data as well as runoff-triggered samples at remote monitoring sites.

Isco 674 Rain Gauge Specifications	
Type:	Tipping bucket
Compatible equipment:	Isco 6700, 6712, and Avalanche Samplers, 4200 Series Flow Meters, 4100 Series Flow Loggers
Connect cable:	50 ft. (15.2 m), 2 conductor with 4-pin plug
Bearings:	Spring-loaded sapphire jewel
Orifice Diameter:	8 in. (20 cm)
Sensitivity:	English - 0.01 inch; Metric 0.1 mm
Accuracy:	English - ±1% at 2 in/hour; +3%/-4% up to 5 in/hour Metric - ±1.5% at 5 cm/hour; +3.5%/-9% up to 13 cm/hour
Capacity:	English – 22 inches/hour Metric – 38 cm/hour
Output Signal:	Contact closure of at least 50 millisecond duration
Switch Type:	Hermetically sealed magnetic proximity switch. Normally open, 200V DC, 0.5 A maximum.
Height:	13 in. (33 cm)
Diameter:	9.5 in. (24 cm) (at mounting base)
Weight:	10 lbs. (4.5 kg)
Operating Temperature:	32° to 140°F (0° to 60°C)
Storage Temperature:	-40° to 140°F (-40° to 60°C)

The 674 Rain Gauge connects to any 6700 Series or Avalanche Sampler, 4200 Series Flowmeter, or 4100 Series Flow Logger. Rainfall data logged on the host instrument can be analyzed with Flowlink 4 Software.

Ordering Information

The 674 rain gauge includes a 50 ft (15 m) cable for connection to an Isco 6700, 6712, or Avalanche Sampler, 4200 Series Flow Meter, or 4100 Series Flow Logger. Specify English or Metric version.

Description	Part Number
674 Rain Gauge	
English - Tips every 0.01 inch of rainfall	60-3284-001
Metric - Tips every 0.1 mm of rainfall	68-3280-001

ISCO®

Isco, Inc.
4700 Superior Street
Lincoln NE 68504 USA
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Fax: (402) 465-3022
E-Mail: info@isco.com
Internet: www.isco.com

CDMA
Digital Cellular Modem System

TELEDYNE ISCO
A Teledyne Technologies Company

Special Product Application #1489

SPA Instruction Sheet
60-5314-626 Revision A

Overview

The CDMA digital cellular modem system from Teledyne Isco (part #60-5314-489) is designed for use with the 6700 Series Samplers (remote data access/commands, outgoing text messaging), and the 4100/4200 Series Flow Meters (remote data access only).

The system uses service providers Alltel, Verizon, and Telus (Canada)*.

Text Messaging

The digital text messaging function can dial out to up to 3 different phone numbers (from a single service provider) when an alarm condition has been met. The text message states which alarm condition has been met, and the phone number of the modem.

Remote Operation

You can call the sampler using a command program like Hyper Terminal and send commands such as: changing the sample rate/volume, starting/stopping a program, taking manual samples, etc. For a complete list of available remote commands, see “Computer Operation > Menu Control” in the Remote Operation section of the sampler’s Installation and Operation Guide.

Antenna Options

One of 3 antenna types is included with your system, also specified when ordering:

- The **external, magnetic mount whip** antenna (part #60-5314-606) is 6 feet long and 3 inches tall. The external whip antenna is for general use, and is especially desirable when the system is stored within an enclosure.
- The **internal** antenna is useful in maintaining low visibility of the system.
- The **external “hockey puck”** antenna (part #60-5314-605) is 10 feet (3m) long, and used primarily in manhole applications.
  The antenna is buried next to the manhole, in a hole bored into the pavement, at a depth leaving the top of the antenna flush with the street. An adjoining hole is drilled through the manhole collar for the antenna’s cable. To complete installation, fill the holes in with cement.

Sampler Programming

For alarm programming, see “Dial Out Alarms” in the Extended Programming section of the sampler’s Installation and Operation Guide.

After the phone number(s) for dial out have been entered, the sampler display will prompt you to enter first the modem’s phone number, then the TAP (Telocator Alphanumeric Protocol) service number, and then the parameter settings for that number (baud rate, data bits, parity, stop bits).

To program this information into the sampler, perform the following steps:

1. At the prompt, enter the phone number of the digital cellular modem.
2. To find your cell phone’s TAP service number and parameter settings, go to **http://www.avtech.com/Support/TAP/index.htm**.

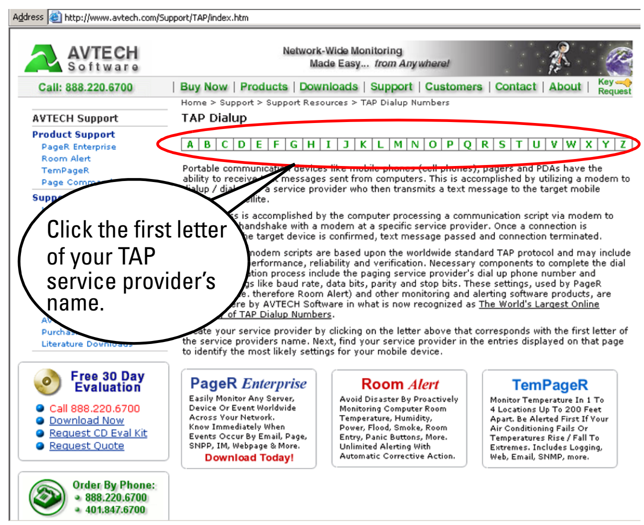

Figure 1: TAP Service Provider Screen Locating your service provider

3. Click on the letter corresponding with the first letter of the name of the service provider for your text message enabled hip phone.
4. On the next screen, locate your service provider’s name in the left column and program the correct TAP number and parameters into the sampler.

*Additional service providers may be available. Contact the factory for information.

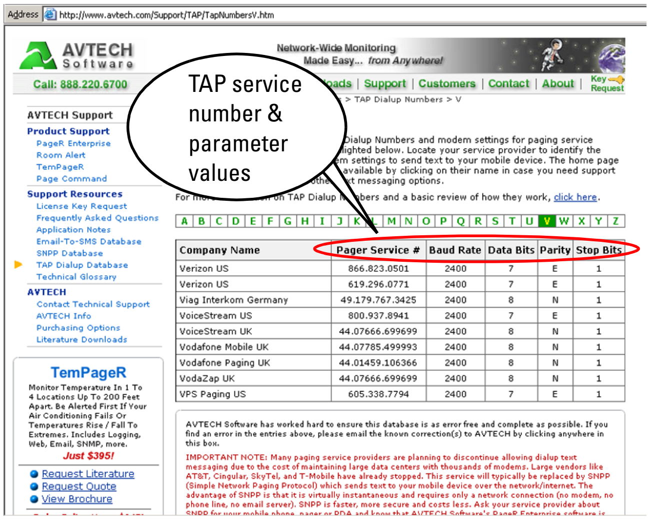

Figure 2: TAP Service Parameters Program phone number and parameters into your sampler

Installation

To install the cellular system:

1. Connect the modem to the interrogator port of the sampler or flow meter with the 10-foot cable provided with the system.

> ☑ ***Note***
>
> Connecting either the serial output or an interrogator cable to the sampler disables an internal modem, if one is installed.

2. Connect the antenna cable's SMA connector to the modem (if it is external).
3. Using a computer running Isco's Flowlink software and the baud rate set to 9600, call the system's modem to establish proper function.

Last modified December 5, 2005

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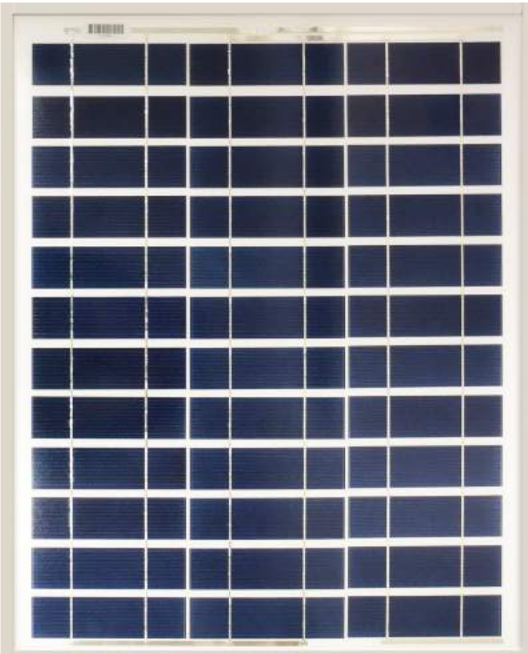


40W Photovoltaic module 40J

This line of modules is the direct result of over three decades of design, manufacturing and use. Attending to every detail in the design and manufacture of our products, our process controls and testing methods have optimized module life and electrical energy production.

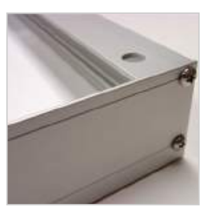
Ameresco Solar’s off-grid module line offers the following features and benefits:

► Built to last

From mountaintops to off-shore platforms, on weather stations in the bitter cold of Antarctica and on telephone signal repeaters in the hot Australian outback, the technology has been proven in the harshest environments.

► Accessible junction box for off-grid connections

J-type junction box has accessible terminals for easier module interconnections in off-grid applications, and it allows fitting cable glands for various sections.



► Thick, durable scratch resistant back sheet

The thick back sheet provides extra insulation and increased resistance to protect your module against rough handling. Made of white polyester, it ensures longer term performance and increased energy production.

► High reliability

Cell interconnections and diode placement use well-established industry practice and are field-proven to provide excellent reliability.

► Quality and certifications

ISO 9001

ISO 9001 factory certification ensures that our manufacturing facilities use proven manufacturing and quality control processes.

Certified to IEC 61215 and 61730

Certified to UL1703 and ULC1703
Certified for use in Class 1, Division 2 Hazardous locations

Conforms with European Directive 2006/95/EC

Photographs are intended to portray typical module appearance, actual module appearance may vary.

40W PHOTOVOLTAIC MODULE - 40J

Electrical characteristics

	(1) STC 1000W/m²	(2) NOCT 800W/m²
Maximum power (P_{max})	40W	29W
Voltage at P_{max} (V_{mpp})	17.9V	15.9V
Current at P_{max} (I_{mpp})	2.23A	1.83A
Short circuit current (I_{sc})	2.32A	1.88A
Open circuit voltage (V_{oc})	22.1V	20.1V
Module efficiency	11.4%	
Tolerance (P_{max})	±10%	
Nominal voltage	12V	
Efficiency reduction at 200W/m²	<5% reduction (efficiency 10.8%)	
Limiting reverse current	2.54A	
Temperature coefficient of I_{sc}	0.105%/°C	
Temperature coefficient of V_{oc}	-0.360%/°C	
Temperature coefficient of (P_{max})	-0.45%/°C	
(3) NOCT	47±2°C	
Maximum series fuse rating	6A	
Maximum system voltage	50V	
Application class (according to IEC 61730:2007)	Class C	

1: Values at Standard Test Conditions (STC): 1000W/m² irradiance, AM1.5 solar spectrum and 25ºC module temperature
2: Values at 800W/m² irradiance, Nominal Operation Cell Temperature (NOCT) and AM1.5 solar spectrum
3: Nominal Operation Cell Temperature: Module operation temperature at 800W/m² irradiance, 20ºC air temperature, 1m/s wind speed

Mechanical characteristics

Solar cells	36 crystalline silicon cut cells connected in series
Front cover	High transmission 3.2mm (1/8th in) glass
Encapsulant	EVA
Back cover	White polyester
Frame	Silver anodized aluminum
Junction box	IP65 with 4 terminal screw connection block; accepts PG 13.5, M20 13mm (½") conduit, or cable fittings accepting 6-12mm diameter cable. Terminals accept 2.5-10mm² (8-14 AWG) wire
Dimensions	655 x 537 x 50mm / 25.8 x 21.1 x 2in
Weight	5.75kg / 12.7lbs

All dimensional tolerances within ±1% unless otherwise stated.

Warranty*

► Free from defects in materials and workmanship for 2 years
► 90% min. power output over 12 years
► Optional 25 years available

* Refer to warranty document for terms and conditions.

Certification

Certified according to the extended version of the IEC 61215 (ed.2), EN 61215:2005-08 (Crystalline silicon terrestrial photovoltaic modules - Design qualification and type approval).

Certified according to IEC 61730-1 and IEC 61730-2 (ed.1), EN 61730-1:2007-05 and EN 61730-2:2007-05. (Photovoltaic module safety qualification, requirements for construction and testing).

Listed to UL 1703 & ULC ORD-C1703 Standard for Safety by Intertek ETL. Class C Fire Rating.

Approved by Intertek ETL according to FM 3611, Dec 2004, and according to CAN/CSA C22.2 No. 213-M1987, 1st Edition, Reaffirmed 2004, for use in a Class I, Division 2, Group A, B, C, D Hazardous (Classified) Location.

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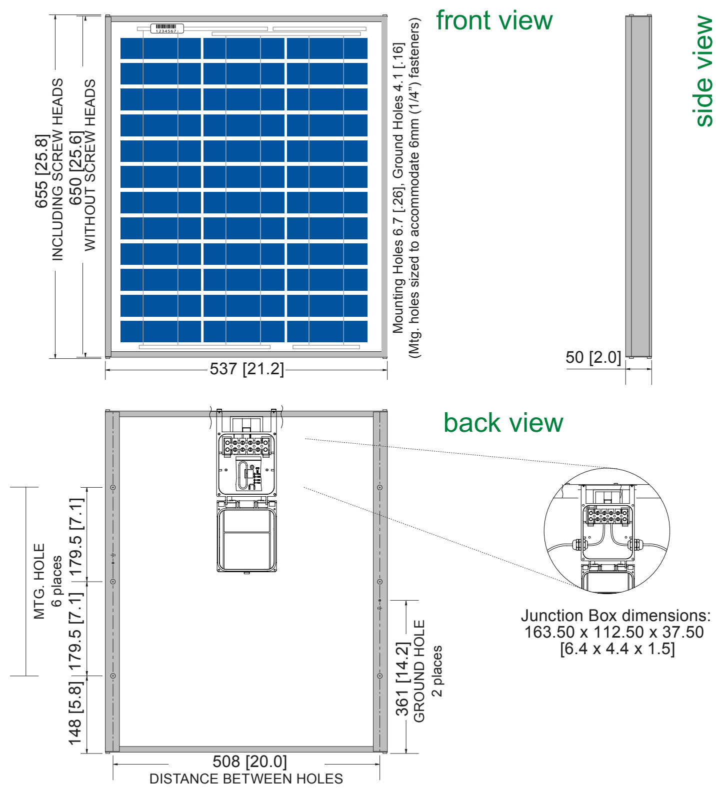
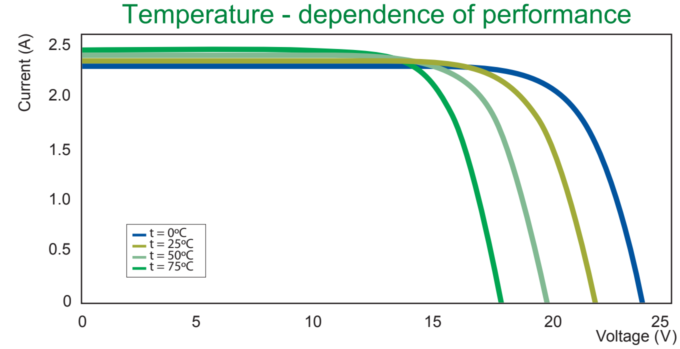
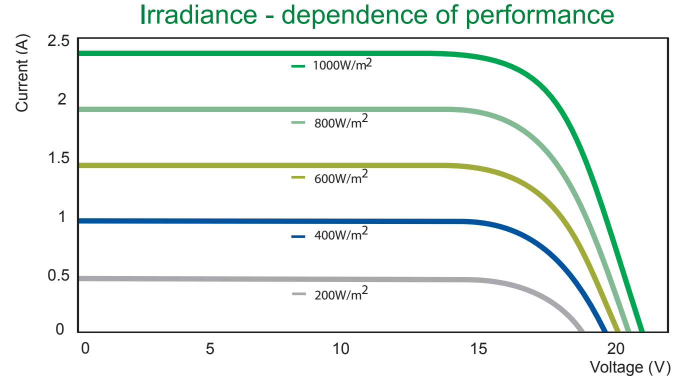


Dimensions in mm [in].

Temperature - dependence of performance



Irradiance - dependence of performance



For more information, call 855-43-SOLAR or visit www.amerescosolar.com.

Appendix C

Checklists

Candidate Wet Weather Sampling Site Evaluation Checklist
And Data Collection Form
North Central Texas Council of Governments
Regional Wet Weather Characterization Program
Fall 2017

Date:__________________ Time: _________________

Location Name/Number:____

Nearest Cross Street/Location Description: ____

Entity (Circle One): Arlington Garland Irving Mesquite NTTA Plano

GPS Latitude/Longitude:________________/______________________

Receiving Water: ____

Data for locating automated samplers:

Ease of Installation ~ Native or Existing Location / Bench ~ Need to construct Location / Platform / Base

Describe: ____

Ease of channel/sample area access and safety: ~ Describe either YES or NO

Describe: ____

____

Conveyance Information:

Conveyance Type & Size (Example: Unlined Channel, Grassy Swale, Open Channel Chute, etc.)

Describe: ____

____

Vegetative Cover ~ High ~ Medium ~ Low

Describe: ____

____

Visibility from the Right-of-Way ~ High Visibility ~ Low Visibility ~ None

Describe: ____

____

Public Access ~ Yes ~ No

Describe: ____

____

Evidence of Public Use ~ Yes ~ No (Circle all that apply, or describe)

Cans ~ Bottles ~ Paper ~ Food Products ~ Rubble ~ Wood ~ Brush ~ Graffiti ~ Transient Community

Describe: ____

____

Evidence of Normal Surface Water Elevation ~ Yes ~ No ~ Depth __________ inches/feet

Describe: ____

____

Perennial Flow Presence ~ High ~ Medium ~ Low ~ Depth __________ inches/feet

Describe: ____

____

Estimation of Automated Sampler, Sample Collection Criterion:

Estimate of maximum linear horizontal distance (in feet) of tubing needed to reach water ________
(Recommended to be less than 30 feet)

Estimate of maximum vertical distance (in feet) needed to collect sample ____________________
(Recommended to be less than 25 feet)

Other Site Features of Importance: ____

____

____

____

____

____

Notes: ____

____

____

____

____

____

____

____

Provide Site Visit Attendee Name(s) and Company/Entity:

____

____

____

____

Site Sketch(s):

(Provide a conveyance cross section, along with a plan view sketch. Include dimensions in feet. Use additional pages if necessary)

____ AERIAL VIEW ____

____ CROSS SECTION ____

Facing: Upstream / Downstream (Circle One)

NCTCOG STORMWATER SAMPLE COLLECTION
MOBILIZATION CHECKLIST

Municipality: (Circle One): Arlington Garland Irving Mesquite NTTA Plano

Date: ___________________ Name(s) of sampling team:_____________________

Confirm Qualified Storm Event		
1. Time since last rainfall (____ Days)		
2. Rain gauge & samplers functioning	Y	N
3. Rainfall amount ______ Rain gauge used ______		
Stations Active (List Stations Activated by Storm Event) Arlington: Garland: Irving: Mesquite: NTTA: Plano:		

Gather Required Field Equipment				
☐ Field Equipment Box (Latex gloves, first-aid kit, see MP/QAPP)				
☐ Chain of Custody for Samples				
☐ Sample Collection Call (Atkins, Lab, Field Team)				
☐ Waders/Rubber Boots/Rain Coat/ High Visibility Vest				
☐ Digital Camera for Photo Documentation				
Containers, Labels and Ice for Samples	Grab (1) ☐	Comp (2) ☐	Comp (3) ☐	Comp (4) ☐
Temperature/pH/Conductivity meter calibrated?	Y	N		

Final Preparation		
1. Is severe weather forecast for site? (Check NOAA and Local Websites for details – i.e. www.noaa.gov, etc.)	Y	N
2. Notified Atkins office personnel of trip and return time?	Y	N
3. Notify lab?	Y	N

NCTCOG STORMWATER SAMPLE COLLECTION CHECKLIST

Date: ___________________ Name: _____________________________________

Station ID: ___________ Station Name: ______________________________________

Entity: (Circle One): Arlington Garland Irving Mesquite NTTA Plano

Current Field Conditions

- Time begin sample collection activities: ______________

  Time end sample collection activities: ______________

- Ambient air temperature: _________ °F

- Current cloud condition:

  ☐ Fog ☐ High Clouds ☐ Partly Cloudy ☐ Cloudy ☐ Clear

  ☐ Other: ___________________________

- Current weather condition:

  ☐ Sunny ☐ Light Rain ☐ Heavy Rain ☐ Snow/Sleet/Hail

  ☐ Windy ☐ Thunderstorms ☐ Severe Storms ☐ Other –

- Construction activities w/n the drainage area: Y N

- Observed rise: Y N

  ☐ Estimate: _________________________

  Describe: ____

Comments: ____

____

Electronic Equipment Check
Sampler ☐ No error messages present (list error messages with comments) ☐ Sampling complete and sampler "disabled".
Rain Gauge ☐ Functioning and data recorded for duration of storm
Level ☐ Functioning and data recorded for duration of storm
Comment:

Grab Sample Documentation		
Grab sample collected appropriately during first flush?	Y	N
Time collected: ____________________ (e.g., 2100)		
pH ___________ Conductivity _______________ Temperature _____________ ***If any of the following conditions are observed call or text 713-501-4569 immediately.*** o pH outside of 6-9su range o Conductivity less than 50 umhos/cm or greater than 500 umhos/cm\ o Abnormal temperature o Abnormal color o Oil sheen o Odor: sewage, sulfur, sour, petroleum, natural gas		
Estimated volume in grab bottle: __________________gal (at least 0.5 gal)		
Qualitative description of sample characteristics: ☐ Turbid ☐ Clear ☐ Oil Sheen ☐ Debris ☐ Algae ☐ Other:		
Sample bottles labeled and placed on ice?	Y	N
Comment:		
Composite Sample Documentation		
Sub-samples collected appropriately throughout storm duration?	Y	N
Time Collected 1 of 2 Bottle 2: ____________________ (e.g., 2100) 2 of 2 Bottle 2: ____________________ (e.g., 2100) 1 of 2 Bottle 3: ____________________ (e.g., 2100) 2 of 2 Bottle 3: ____________________ (e.g., 2100) 1 of 2 Bottle 4: ____________________ (e.g., 2100)		
Actual volume w/n 20% of expected volume?	Y	N
Qualitative description of the sample characteristics (can be more than one): ☐ Turbid ☐ Clear ☐ Oil Sheen ☐ Debris ☐ Algae ☐ Other:		
Sample bottles labeled and placed on ice?	Y	N
Comment:		
Rainfall Documentation		
Time since last rainfall ___________ days Rainfall amount ___________ in. Rain gauge used ________________________		
Additional comments.		

NCTCOG MAINTENANCE CHECKLIST
FOR MONITORING STATIONS

Municipality: (Circle One): Arlington Garland Irving Mesquite NTTA Plano

Date: ___________________ Name: _______________________________

Intake Port (when accessible):

- ☐ Tubing opening cleaned of debris.
- ☐ Sample tubing in good condition and anchored securely.
- ☐ Defective tubing replaced (as needed).
- ☐ Debris and sediment removed from the immediate vicinity of the intake port and along the tubing line.
- ☐ Sample strainer cleaned periodically with a brush.

At Sampling Station:

Sampler

- ☐ Sample container dismantled successfully.
- ☐ Connectors at the back of the controller capped tightly.
- ☐ Controller power cable connected.
- ☐ Tubing in contact with the peristaltic pump inspected and in good condition.
- ☐ Tubing replaced (as needed after 1,000,000 pump counts).
  - o Number of counts _______________.
- ☐ Sample tubing in good condition (no cracks, visible obstructions, kinks)
- ☐ Sample tubing joint connections in good condition (no leak)
- ☐ Programmable controller display and keyboard in good condition

- ☐ Sampler firmly plugged into power supply and receiving power
- ☐ Desiccant bag within the controller case inspected and recharged/ replaced (as necessary)
- ☐ Error messages reported by the sampler investigated and remedied
- ☐ Connections inspected to ensure that they are secure

<u>Shelter</u>

- ☐ Sampling shelter exterior inspected and in good condition (no cracks, vandalism, etc.)
- ☐ No debris/waste inside or around shelter
- ☐ Shelter door and lock operational

<u>Rain Gauge</u>

- ☐ Rain gauge clear of debris (if applicable)
- ☐ Connection to sampler in good condition (if applicable)

<u>Cell Phone</u>

- ☐ Cell phone antenna attached to shelter (if applicable)
- ☐ Connection to sampler in good condition (if applicable)

<u>Temporary Power</u>

- ☐ Battery sufficiently charged to complete one sampling event
- ☐ Battery connections tight to battery probes?

<u>Equipment Calibration</u>

- ☐ Bubbler level calibrated
- ☐ Sample volume calibrated

NCTCOG STORMWATER MONITORING
LABORATORY DELIVERABLES CHECKLIST

Date: ___________________ Reviewer:_____________________________
Municipality: (Circle One): Arlington Garland Irving Mesquite NTTA Plano

Event ID: *STATION ID-*___________

Hard Copy Deliverable
Cover Page ☐ The proper event ID, type of sample analyzed and date of report specified on cover
Results ☐ The proper event ID, contact, sample location, date laboratory received and laboratory contact specified on analysis results page ☐ Matrix specified is consistent with the sample taken ☐ Sample holding times consistent with MP/QAPP ☐ Laboratory analyses match analytes requested on COC ☐ Laboratory methods match methods requested in MP/QAPP ☐ Units reported match units requested in MP/QAPP ☐ Proper MDL/MAL achieved Note exceptions:
Lab QA/QC ☐ The proper event ID and date of analysis specified on analysis results page ☐ Flagging criteria clearly defined ☐ QA/QC sample results are within acceptable levels ☐ Other QA/QC performed are acceptable (i.e. cone splitter blanks, etc.) List of other QA/QC items: _______________________________________ Note exceptions and flagged samples: Note exceptions and flagged samples:
Additional Material ☐ Proper COC copy attached ☐ Sample Protocol Nonconformance Worksheet attached, if applicable

Appendix D

Chain-of-Custody

800 106th Street
Arlington, Texas 76011

TTI ENVIRONMENTAL LABORATORIES

CHAIN OF CUSTODY RECORD

NELAP ACCREDITED TNI LABORATORY

Page________of________
Telephone: (817) 861-5322
FAX: (817) 261-1717
www.ttilabs.com

CLIENT NAME: Atkins	CLIENT CONTACT: Chad Richards
CLIENT ADDRESS: 17220 Katy Freeway, Building 1, Suite 200	PHONE: (281) 529-4200
CITY, STATE, ZIP: Houston, TX, 77094	FAX: (281) 493-1047
P.O. NO.	EMAIL: chad.richards@atkinsglobal.com
	QUOTE NO.

PROJECT NO.	PROJECT NAME	SAMPLER'S NAME
100060260	NCTCOG RSWMP	

TEST PARAMETERS

Date Ex:mm/dd/yyyy	Time Ex:hh:mm	(C)omp (G)rab	Matrix 1	Sample Description	VOA	1 LT.	A/G	P/O	PRES 3 4	E. coli	Oil and Grease	BOD5\COD\TSS\TDS	Tot. Pb/Tot. Zn/Tot. Cr	Tot. As/Tot. Cu	Diss. & Tot. P/Ortho P./Tot. N	Ammonia N./Nitrate N.	Atrazine				DRY WT.	TRRP	HOLD 4	TTI Lab ID
		C	W	A 3.7 L				G		✓	✓													
		C	W	B,C,D 3.7L				G				✓	✓	✓	✓	✓	✓							

No. / Type Containers 2

LAB USE

LAB NO.

ON ICE ☐ YES ☐ NO

TEMP.OF COOLERS °C

3		4	>

CUSTODY SEAL

Cooler	
☐ Y ☐	☐ Y ☐

SEAL INTACT

Cooler	
☐ Y ☐	☐ Y ☐

TURNAROUND TIME:

☑ STANDARD 5 Business Days ☐ 50% RUSH 3 Business Days ☐ 100% RUSH 1Business Day / ASAP* ☐ E.R. 300% RUSH Same Day / ASAP*

1. MATRIX: WW-Wastewater; W-Water; S-Soil; SD-Solid; L-Liquid; A-Airbag; C-Charcoal-Tube; SL-Sludge; O-Oil
2. CONTAINERS: VOA-40ml vial; A/G-Amber or Glass 1 Liter; 4 oz-Glass Wide Mouth; P/O-Plastic or O
3. PRES.: 1-None; 2-1:1 HNO_3; 3-1:1 HCL; 4-1:1 H_2SO_4; 5-NaOH; 6-Ice; 7-Other________
4. HOLD: Lab will hold samples for 30 (thirty) days.

Relinquished by (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished by (Signature)	Date	Time	Received By: (Signature)	Date	Time
Relinquished by (Signature)	Date	Time	Received By: (Signature)	Date	Time

REMARKS: ☐ TTI Drop Off ☐ TTI Pickup

Clients delivery of samples to TTI constitutes acceptance to reimburse TTI as per the terms and conditions listed in the price schedule.

Appendix E

Annual Flow Equations

Currently In Development

To Be Submitted Separately

Appendix F

Nearest Hospital Information

Station ID	Hospital	Directions
AR1801/1901	**Texas General Hospital** 2709 Hospital Blvd Grand Prairie, TX 75051 (469) 999-0000	1. Head southeast on E Copeland Rd toward Six Flags Dr 2. Slight right onto TX-360 Frontage Rd/N Watson Rd 3. Use the middle lane to turn left onto the ramp to E Abram St 4. Continue onto E Abram St 5. Turn right onto Osler 6. Turn left onto Howell 7. Turn right onto Stewart 8. Turn left at the 1st cross street onto Hospital Blvd Destination will be on the right
AR1802/1902	**Texas General Hospital** 2709 Hospital Blvd Grand Prairie, TX 75051 (469) 999-0001	1. Head north on S State Hwy 360 2. Use the left lane to take the ramp onto TX-360 N 3. Merge onto TX-360 N 4. Take the exit toward Abram St 5. Merge onto S Watson Rd 6. Turn right onto Prairie Oaks Dr 7. Turn right onto Osler Dr 8. Turn left onto Stewart Dr 9. Turn right at the 1st cross street onto Hospital Blvd Destination will be on the right
GA1801/1901	**Texas Health Presbyterian Hospital Dallas** 8200 Walnut Hill Ln Dallas, TX 75231 (214) 345-6789	1. Head south on N Shiloh Rd 2. Turn right onto Forest Ln 3. Keep left to stay on Forest Ln 4. Continue straight onto Skillman St 5. Continue straight to stay on Skillman St 6. Turn right onto Walnut Hill Ln 7. Turn left onto Main Cir 8. Enter the traffic circle Destination will be on the right
GA1802/1902	**Texas Health Presbyterian Hospital Dallas** 8200 Walnut Hill Ln Dallas, TX 75231 (214) 345-6789	1. Head east on Forest Ln toward S Garland Ave 2. Turn right at the 1st cross street onto S Garland Ave 3. Turn right onto W Kingsley Rd 4. Continue onto Walnut Hill Ln 5. Turn left onto Main Cir 6. Enter the traffic circle Destination will be on the right
GA1803/1903	**Baylor Scott & White Medical Center - Lake Pointe** 6800 Scenic Dr, Rowlett, TX 75088 (972) 412-2273	1. Head northeast on La Prada Dr toward Duck Creek Dr 2. Turn right onto Duck Creek Dr 3. Turn right onto Broadway Blvd 4. Turn left onto E Interstate 30 5. Use the left lane to take the ramp onto I-30 E 6. Take exit 64 for Dalrock Rd 7. Continue onto Dalrock Rd 8. Turn right onto Woodlake Dr 9. Turn left onto Scenic Dr 10. Sharp left to stay on Scenic Dr Destination will be on the right

IR1801/1901	**William P. Clements Jr. University Hospital** 6201 Harry Hines Blvd Dallas, TX 75390 (214) 633-5555	1. Head north on N Sowers Rd toward W Pioneer Dr 2. Turn left onto W Pioneer Dr 3. Turn right onto N MacArthur Blvd 4. Turn right onto W Airport Fwy 5. Use the left lane to take the ramp onto TX-183 E 6. Merge onto TX-183 E 7. Use the right lane to merge onto I-35E S 8. Take exit 432B for TX-356/Commonwealth Dr 9. Merge onto N Stemmons Fwy 10. Slight left toward N Stemmons Fwy 11. Turn left onto N Stemmons Fwy 12. Turn right onto Record Crossing Rd 13. Turn left 14. Turn left 15. Sharp left Destination will be on the right
IR1802/1902	**William P. Clements Jr. University Hospital** 6201 Harry Hines Blvd Dallas, TX 75390 (214) 633-5555	1. Head east on E Oakdale Rd toward S Nursery Rd 2. Turn left at the 1st cross street onto S Nursery Rd 3. Turn right onto E Shady Grove Rd 4. Use the right lane to turn slightly right onto E Irving Blvd 5. Slight right onto the TX-356 E ramp 6. Merge onto TX-356/Irving Blvd 7. Use the left 2 lanes to turn left onto Commonwealth Dr 8. Use any lane to turn left onto N Stemmons Fwy 9. Turn right onto Record Crossing Rd 10. Turn left 11. Turn left 12. Sharp left Destination will be on the right
MS1801/1901	**Dallas Regional Medical Center** 1011 N Galloway Ave Mesquite, TX 75149 (214) 320-7000	1. Head south toward New Market Rd 2. Turn left onto New Market Rd 3. Turn left onto S Beltline Rd 4. Continue straight onto S Bryan Belt Line Rd 5. Turn left onto Park Ln 6. Turn left onto N Galloway Ave Destination will be on the right
MS1802/1902	**Dallas Regional Medical Center** 1011 N Galloway Ave Mesquite, TX 75149 (214) 320-7000	1. Head east on Edwards-Church Rd toward Waterway Dr 2. Turn left onto Clay Mathis Rd 3. Turn left onto E Scyene Rd 4. Continue onto E Main St 5. Turn right onto N Bryan Belt Line Rd 6. Turn left onto Park Ln 7. Turn left onto N Galloway Ave Destination will be on the right
PL1801/1901	**Medical City Plano** 3901 W 15th St Plano, TX 75075 (972) 596-6800	1. Head west on W 16th St 2. Turn left onto Alma Dr 3. Turn right onto W 15th St/Norman F Whitsitt Pkwy 4. Turn right onto Coit Rd 5. Turn right 6. Sharp left Destination will be on the right
NT1801/1901	**Medical City Las Colinas** 6800 N MacArthur Blvd Irving, TX 75039 (972) 969-2000	1. Head northeast on State Hwy 161 N 2. Turn right onto N MacArthur Blvd 3. Turn left Destination will be on the right

NT1802/1902	**Texas General Hospital** 2709 Hospital Blvd Grand Prairie, TX 75051 (469) 999-0000	1. Head north on Robinson Rd 2. Slight left toward State Hwy 161 S 3. Turn left onto State Hwy 161 S 4. Turn right onto W Marshall Dr 5. Turn right onto S Great SW Pkwy 6. Turn left onto Hospital Blvd Destination will be on the left

Appendix C:

Monitoring Program and Quality Assurance Project Plan for:

Bioassessments: 2018-2022

Innovative approaches
Practical results
Outstanding service

REGIONAL WET WEATHER CHARACTERIZATION PROGRAM PERMIT TERM FOUR

MONITORING PROGRAM AND QUALITY ASSURANCE PROJECT PLAN FOR BIOASSESSMENTS: 2018–2021

Prepared for:

North Central Texas Council of Governments
P.O. Box 5888
Arlington, Texas 76005-5888

August 2018

Prepared by:

FREESE AND NICHOLS, INC.
10431 Morado Circle, Suite 300
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ACRONYMS AND ABBREVIATIONS

ALU	aquatic life use
cfs	cubic feet per second
DFW	Dallas-Fort Worth
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
FNI	Freese and Nichols, Inc.
FSO	field sampling organization
GPS	global positioning system
mg/L	milligrams per liter
mL	milliliter(s)
mm	millimeter(s)
mS/cm	milliSiemens per centimeter
NBS	National Bureau of Standards
NCTCOG	North Central Texas Council of Governments
NRC	National Research Council
NTTA	North Texas Tollway Authority
PPE	personal protective equipment
ppm	parts per million
QA/QC	quality assurance/quality control
QAPP	quality assurance project plans
TCEQ	Texas Commission on Environmental Quality
TMDLs	total maximum daily loads
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks & Wildlife Department
TxDOT	Texas Department of Transportation
USGS	U.S. Geological Survey
YSI	Yellow Springs Institute

1.0 INTRODUCTION

1.1 BACKGROUND

Since biota respond to environmental conditions impacting them, biological assessments can demonstrate the impacts of individual stressors and the combined effects of different stressors. With this understanding, the National Research Council (NRC) report, *Urban Stormwater Management in the United States* (NRC, 2008), recommends including assessments of storm water management program progress with biological assessments of stream conditions. It also recommends that storm water management strategies should address all stressors to a stream.

Assessing the biological health of streams in the North Central Texas Council of Governments (NCTCOG) jurisdiction helps measure whether program goals of aquatic life use (ALU) protection are met. ALU attainment is based on evaluations of biological communities along with water quality and physical habitat conditions. Stream habitats are typically impacted by channelization and increased impervious surfaces along the shores in urban and suburban areas. These areas are frequently exposed to non-point source discharges that can directly or indirectly depress dissolved oxygen (DO) levels in the water, bury portions of the stream bottom with sediment, or create toxic conditions.

ALU assessments have not been performed on most unclassified streams. Texas Surface Water Quality Standards assign a high aquatic life use to all unclassified perennial streams that have not been assessed (Texas Commission on Environmental Quality [TCEQ], 2018a). Furthermore, some unclassified streams (i.e., urban streams) are stressed by many natural and anthropogenic factors interacting in complex ways. Biological monitoring or bioassessments help interpret the effects of these factors on the health and function of the streams. While water chemistry and channel morphology are important parts of the assessment, biological sampling provides a view of the cumulative effects of different environment factors.

1.1.1 Second Permit Term, 2005-2010

In the second permit term (2005–2010), the permit was administered by the TCEQ and implemented through NCTCOG and a consultant team led by Atkins. Approval was obtained to utilize in-stream stations for the regional monitoring program to more directly assess the impact of storm water within receiving streams. The revised program was termed the Regional Wet Weather Characterization Program (RWWCP) and was added as an option in Part IV.A.3 of the Texas Pollutant Discharge Elimination System (TPDES)

Municipal Separate Storm Sewer System (MS4) permits issued to the Phase I North Central Texas governmental entities. The primary goal of the in-stream monitoring program was to obtain baseline data on receiving streams in the Dallas-Fort Worth (DFW) metroplex for use in determining long-term water quality trends. Since the RWWCP language existed outside of each permit, it allowed greater flexibility for making changes to the program. During this second permit term, the North Texas Tollway Authority (NTTA) joined the regional program. All other participants remained the same, except for the Texas Department of Transportation (TxDOT)-Fort Worth District, who became a co-permittee with the cities of Fort Worth and Arlington and were no longer required to conduct wet weather monitoring. According to the original RWWCP protocol, municipal participants collected data from three sampling sites in the watershed (typically upstream, midstream, and downstream), and the transportation agencies collected data from two sites (upstream and downstream stations only). Samples were collected quarterly from each site during a qualifying rain event and were analyzed for 18 parameters.

As an added component, the City of Fort Worth selected the Representative Rapid Bioassessment Monitoring Option (Part IV.A.2) in their permit, which allowed the chemical sampling frequency to be reduced from four times per year per site to once per year per site. In its place, two bioassessments were conducted each year at a minimum of nine sites. These bioassessments were based on protocols developed by the U.S. Environmental Protection Agency (EPA). A summarization of this bioassessment data was included along with the chemical data in the annual regional monitoring report each year of the permit term.

1.1.2 Third Permit Term, 2011‑2016

In the third permit term (2011–2016), the cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite, and Plano, together with the North Texas Tollway Authority and TxDOT-Dallas District agreed to continue their regional partnership and work cooperatively through the NCTCOG and Atkins to develop a revised RWWCP. This revised plan effectively monitored at least 50% of each entity's jurisdictional area by the end of the permit term. This extension of jurisdictional coverage allowed a reasonable assessment of each entity's jurisdictional watersheds while also achieving a balance among the various goals of obtaining valid scientific information, meeting permit compliance, and addressing what is practicable for each entity. The primary goal of the RWWCP during this permit term was to continue the assessment of urban impact on receiving stream water quality and to document any improvement presumably resulting from local Best Management Practice (BMP) implementation. The data collected during this permit term built upon the set of regional water quality data collected under the previous term needed for meaningful trend analysis. Since assessing the impact of urban runoff on receiving stream quality is a primary focus of this program, assessing the biological integrity of the streams was deemed fundamental in the third term. During the third term, 24 watersheds were chemically monitored and 12 watersheds were bioassessed across the region, with substantial overlap between the two sampling approaches.

At the end of the third permit term's sampling effort, a final summary report was prepared by Atkins to assess the sampling effort. The report found that in more than half of the watersheds sampled had high bacteria exceedances, with the average number of nine exceedances in these watersheds. Stream degradation was noted by Atkins' monitoring team in about half of the sampled watersheds based on the data analyzed, and additional monitoring was recommended at these sites.

The report analyzed each of the monitored watersheds, and looked at characteristics specific to each watershed. This approach provided more usable information for each entity, and each individual watershed's information can be reviewed and used to implement BMPs and other monitoring practices in the future. Many of the watersheds that were studied in the third term were classified as high priorities to be studied again due to the data was collected during the third term. The watersheds that were classified as high priority were generally those with stream degradation, those with high number of exceedances of criteria of monitored parameters, and those with existing total maximum daily loads (TMDLs).

Taking into account each watershed's characteristics and evaluating the RWWCP as a whole, Atkins made various recommendations for modifying the RWWCP in the next term, including the following that were applied to the proposal:

- Focus on Impaired Waterbodies –This suggestion is supported by TCEQ and EPA feedback provided to NCTCOG and the monitoring Participants. Atkins suggests a focus on monitoring impaired waterbodies will also help with TMDL efforts already underway in the area.
- Rapid bio-assessment improvements – Rapid bioassessments should continue to be part of the RWWCP, and entities that are not currently completing RBAs should be encouraged to do so.

Atkins recommends that the parameters that are recorded during bio-assessment chemical monitoring activities be expanded to include/match those of the wet weather monitoring to allow for easier comparison.

- Revise monitored pollutants: Pesticides and Herbicides – During the third permit term, Carbaryl was chosen to replace Diazaon that was undetected in the second permit term. Carbaryl was not detected in any watershed during the third permit term, and therefore was recommended that it no longer be monitored for the fourth permit term. Suggestions for replacement are dieldrin or atrazine.
- Revise monitored pollutants: indicator bacteria – Remove total coliforms from list of monitoring parameters. There is no recognized correlation between total coliforms and fresh water pathogens by TCEQ or EPA.
- Revise monitored pollutants: nutrients – Add ammonia nitrogen, nitrate nitrogen, and ortho-phosphate to the monitoring parameters for wet weather chemical monitoring. These additions would allow for better comparisons between bioassessment and wet weather chemical monitoring results.
- Revise monitored pollutants: metals – For the Duck Creek, Johnson Creek, and White Rock Creek (headwaters) subwatersheds, it is recommended that sampling of dissolved fractions of metals is conducted in order to determine the concentration of bioavailable metals.

Many of these recommendations were incorporated in the proposal for the fourth permit term.

1.1.3 Fourth Permit Term, 2018-2021

For the current permit term (2018 to 2022), the cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite, and Plano and the NTTA agreed to continue their regional partnership to work cooperatively through the NCTCOG to develop a revised regional monitoring program. TxDOT obtained a statewide permit incorporating both the Dallas and Fort Worth Districts, which removed the requirement to conduct wet weather monitoring. The revised regional monitoring program, which was approved by the TCEQ in 2017, incorporates the recommendations from the previous program outlined above.

The municipal regional participants proposed to continue to use a sampling plan that will effectively monitor at least 50% of their jurisdictional area by the end of the permit term. As in the previous term, in-stream watershed monitoring will be continued to obtain greater statistical robustness of the data by increasing the sampling at each location for a minimum of two years. The participants will maintain fixed sampling stations to the extent practicable. This will enable the data to be examined for trends and show improvements or decline in water quality within the fixed sampling period.

Watersheds that will be monitored were prioritized based on TMDLs and 303(d) streams, which were in watersheds that cover the jurisdictional area of the municipalities. Participants proposed to monitor in these impaired waterbodies in order to better assess the impacts of storm water on these impaired streams. It is primarily the same area monitored during the previous permit terms with some additional watersheds.

In October 2017, a consultant team led by Atkins and including subconsultants Freese and Nichols, Inc. (FNI) and Dougherty Sprague Environmental, Inc. was reselected to continue providing regional storm water monitoring services. Atkins will perform a variety of storm water monitoring compliance activities for the Cities of Arlington, Garland, Irving, Mesquite, and Plano, along with NTTA including storm water monitoring, bioassessments, and a BMP Analysis and Evaluation Plan. The bioassessment monitoring plan and BMP Analysis and Evaluation Plan will be provided in separate submittals. This document defines procedures for storm water sampling, sampling equipment and deployment, field trip preparation, sample retrieval, laboratory analysis, and post-sampling activities. Dallas and Fort Worth are part of the approved regional monitoring plan; however, this document is specific to the storm water monitoring activities for the cities of Arlington, Garland, Irving, Mesquite, Plano, and NTTA.

1.2 PURPOSE OF DOCUMENT

The purpose of this document is to fulfill the TPDES permit requirement held by Garland, Plano, and Irving to provide information to NCTCOG consulting staff on sample stations, equipment, personnel, and procedures to be used in bioassessments. It describes procedures to ensure data are adequate to support the assessment of stressor impacts. The goal of the bioassessments is to describe the aquatic communities of these streams and factors, including storm water runoff that may be impairing their ecological structure and function.

Both the EPA and TCEQ have an array of methods and approaches to use in bioassessments. Each has developed manuals outlining bioassessment methodology, but according to Barbour et al. (1999), protocols described are not "intended to be used as a rigid protocol without regional modifications. Instead, they provide options for agencies or groups that wish to implement rapid biological assessment and monitoring techniques."

1.3 ORGANIZATION OF DOCUMENT

This document includes sections addressing aspects of the monitoring plan for the project. All sections will be read and understood prior to initiating any monitoring activities.

Section 2.0 – Roles and Responsibilities: Roles and responsibilities of project personnel

Section 3.0 – Site Information: Sampling reaches and streams and rationale for their selection

Section 4.0 – Sampling Equipment: Description of sampling gear

Section 5.0 – Sampling Procedures: Procedures for field trip preparation, mobilization, and sampling

Section 6.0 – Sample Handling and Documentation: Sample handling and documentation procedures

Section 7.0 – Quality Assurance/Quality Control: Quality assurance procedures

Section 8.0 – Laboratory Analysis: Laboratory sample preparation and data reporting requirements

Section 9.0 – Post-Sampling Activities: Post-sampling activities

Section 10.0 – Data Analysis and Interpretation: Methods for data analysis and interpretation

Section 11.0 – Health and Safety: Procedures to ensure safety of field sampling personnel

Section 12.0 – References

2.0 ROLES AND RESPONSIBILITIES

The names and responsibilities of the organizations involved in the orchestration and implementation of the regional storm water monitoring program are described in this section.

2.1 MONITORING ORGANIZATION

The NCTCOG represents several municipalities in the greater Dallas-Fort Worth metroplex. Garland, Plano, and Irving are participating in the bioassessment monitoring.

2.2 MONITORING PLAN DEVELOPER

The monitoring plan was developed by FNI for Atkins. Atkins is responsible for:

- Reviewing and commenting on draft versions of the monitoring plan and helping FNI implement the monitoring plan.
- Helping NCTCOG coordinate bioassessment activities for Garland, Plano, and Irving.

2.3 FIELD SAMPLING ORGANIZATION

The Field Sampling Organization (FSO) will be the Atkins and FNI team. The FSO will execute the bioassessment activities defined in this monitoring plan. The FSO will conduct bioassessments based on protocols in the TCEQ *Surface Water Monitoring Procedures Manual* (TCEQ, 2012, 2014) and its updates (TCEQ, 2018b). These protocols are based in part on EPA rapid bioassessment methods (Barbour et al., 1999). The protocols involve assessment of ecological structure and function by sampling water quality, flow, habitat, fish, aquatic invertebrates, and other biota, including riparian vegetation and mussels. Indices of Biotic Integrity metrics will be calculated for fish and aquatic invertebrates. These indices will be compared to indices derived from reference streams in the same EPA ecoregion and published in TCEQ biological monitoring protocols (TCEQ, 2014) to help identify any degradation of those communities that has occurred. All sample locations are in the EPA's Level IV ecoregion, 32a Texas Blackland Prairie.

Metrics for fish and benthic macroinvertebrate community indices of biotic integrity will be calculated according to TCEQ (2014) protocols and compared to those illustrated in "Table B-5 Ecoregions 27, 29, and 32 Metrics" for fish and "Table B-11 Metrics and Scoring Criteria for Kick Samples" for benthic macroinvertebrates. This comparison will help identify any degradation of those communities that has occurred. If more current information is available about fish and benthic macroinvertebrate communities from reference streams in this ecoregion, which is the Texas Blackland Prairies Level IV ecoregion (32a), it will be considered in the comparison.

2.4 ANALYTICAL LABORATORY

The laboratory will assure the quality of its sample analysis and reporting in accordance with guidelines in Sections 6.0, 7.0, and 8.0 of this monitoring plan. The laboratory will also:

- Review monitoring plan/quality assurance project plans (QAPP).
- Verify samples delivered to the laboratory meet applicable QA requirements listed in the monitoring plan/QAPP.
- Process and prepare samples for analyses of the monitoring constituents listed in Section 4.1 of this monitoring plan.
- Analyze collected samples according to the methods listed in Section 4.1 of this monitoring plan.
- Conduct all necessary QA testing according to Section 7.2 of this monitoring plan.
- Report test results and QA data to Atkins and FNI according to Section 8.0 of this monitoring plan.

2.5 COMMUNICATIONS PROTOCOL

Communications between Atkins and the FNI bioassessment sampling team will be conducted by the Project and Task Managers or designated personnel. Managers and appropriate subcontractor staff will be copied on scope or policy issues along with day-to-day messages regarding the weather.

Communications to and from NCTCOG and the sampling teams will be conducted through Derica Peters (or delegate) and Chad Richards (Atkins) for regional monitoring-related items, including sampling activities and laboratory results. Designated staff will be copied on scope and policy issues.

Each field team will consist of one field team leader and one field assistant. The office leader will remain in communication with the field team leader and coordinate between the field team and laboratory as necessary. The office leader will remain aware of potential weather and traffic concerns and alert the field team as appropriate.

3.0 SITE INFORMATION

This section describes the sampling sites. Desired conditions for the sites include the presence of a variety of mesohabitats (a minimum of one pool and one riffle in each study reach), location as far downstream in the watershed as possible but within city limits; safe access for sampling personnel; locations for overnight water quality meters where they are not likely to be stolen or vandalized; and ease of access in moving large amounts of sample gear between the vehicle and stream. Reference sites will not be sampled since data collected during this study will be compared to values for metrics for indices of biotic integrity published from reference sites sampled in the same ecoregion (TCEQ, 2014).

3.1 GARLAND

3.1.1 Rowlett Creek Below Atchison Topeka and Santa Fe Railroad Bridge

Rowlett Creek, 200 feet downstream of its confluence with Spring Creek in Garland, Texas, will be sampled in 2018 through 2021 (Figure 3.1). This study reach begins where the Atchison Topeka and Santa Fe Railroad bridge crosses the creek and extends 2,600 feet downstream. The closest house or business to the creek in this reach is about 600 feet from the creek. In some areas, the forested riparian buffer extends more than 600 feet from the creek; however, in other areas there is no forested riparian buffer. This reach has a variety of mesohabitats, including riffles and pools. Much of the bottom is limestone bedrock (Figure 3.2). Much of the flow at this site is treated wastewater discharged to Rowlett Creek upstream of Garland.

Rowlett Creek was observed by Aaron Petty and David Buzan, FNI, and Mike Wilson, city of Garland, from the recommended study reach downstream to the Pleasant Valley Road bridge in Garland on May 10, 2018. Aaron Petty and David Buzan also observed the reach of Rowlett Creek downstream of Brand Road. The selected reach was chosen for the following reasons.

- This is the same reach sampled in 2014–2015 and sampling it maximizes comparability of habitats and data to be collected with data collected in 2014–2015.
- The selected reach has two meanders and the downstream reach does not have meanders.
- The U.S. Geological Survey (USGS) measures stream flow of Rowlett Creek in the selected reach. The provisional flow in Rowlett Creek on May 10, 2018, was 87 cubic feet per second (cfs).

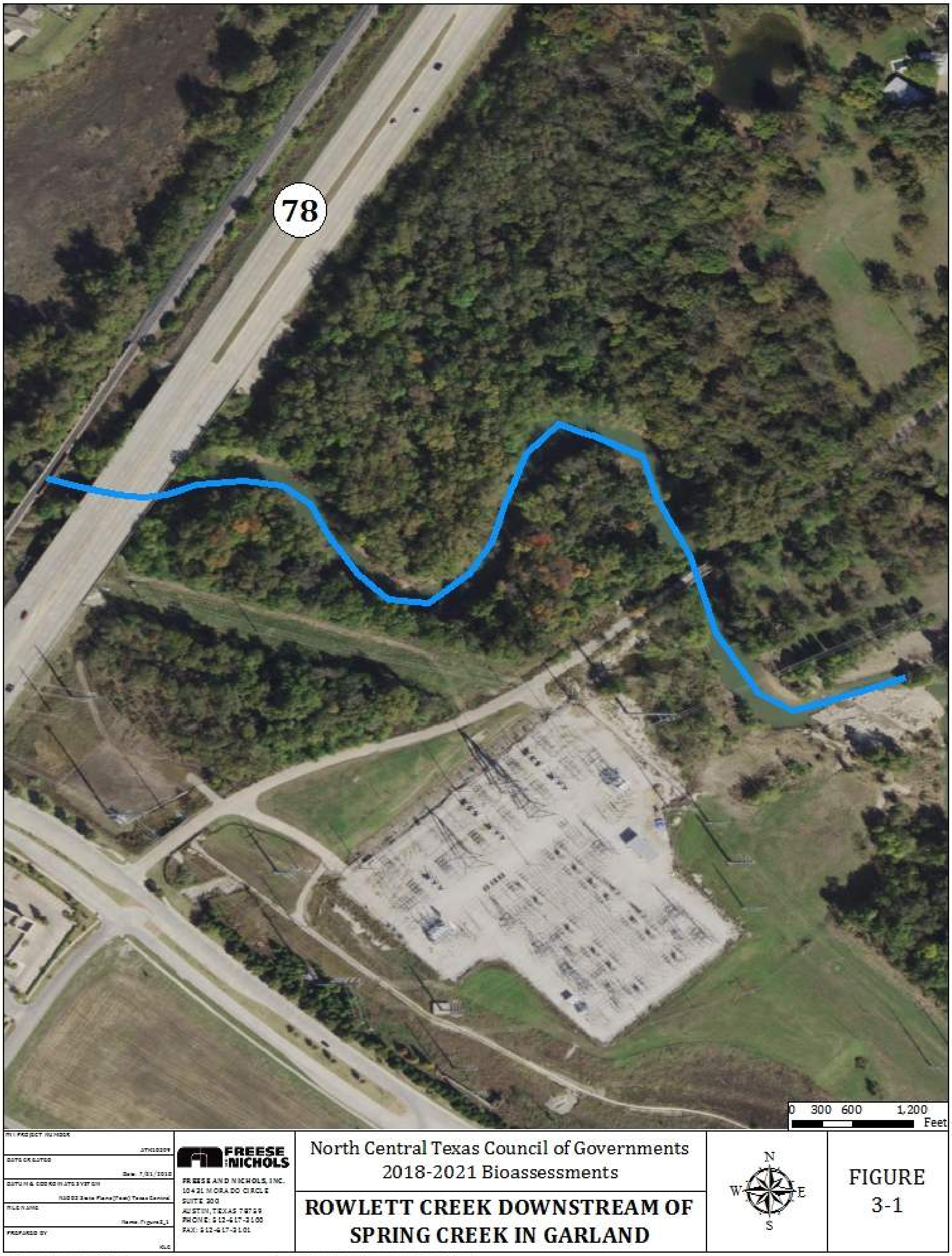

Figure 3-1: Rowlett Creek Downstream of Spring Creek in Garland

Figure 3-2: Rowlett Creek Downstream of the Atchison Topeka and Santa Fe Railroad Bridge on May 10, 2018.
View is upstream towards Atchison Topeka and Santa Fe Railroad bridge. Photograph taken from the south shore (right bank).

- The selected reach is far enough upstream from Lake Ray Hubbard to minimize the probability of reservoir water quality or biological communities affecting samples and data collected in this study. A small waterfall up to 3 feet high is present downstream of the selected reach. The waterfall may partially block upstream movement of fish from Lake Ray Hubbard and will hopefully minimize the influence of reservoir fish on evaluations of the stream fish community.
- Much of Rowlett Creek downstream of Brand Road and downstream of the selected reach, which is wadeable, has smooth limestone bedrock bottom with little habitat variability.

3.2 PLANO

3.2.1 Rowlett Creek at Brown Branch

Rowlett Creek at Brown Branch in Oak Point Park and Nature Preserve upstream of E. Parker Road (Figure 3-3) will be sampled in 2018 and 2019. This location is on the east side of Plano. There are no bridges or dams for about 1.3 stream miles upstream of this site, which is buffered along most of both banks by a forested riparian zone in a public park. The flow on May 10, 2018 was estimated to be 15 cfs. The creek was relatively clear and had multiple riffles, runs, glides and meanders (Figures 3-4 and 3-5).

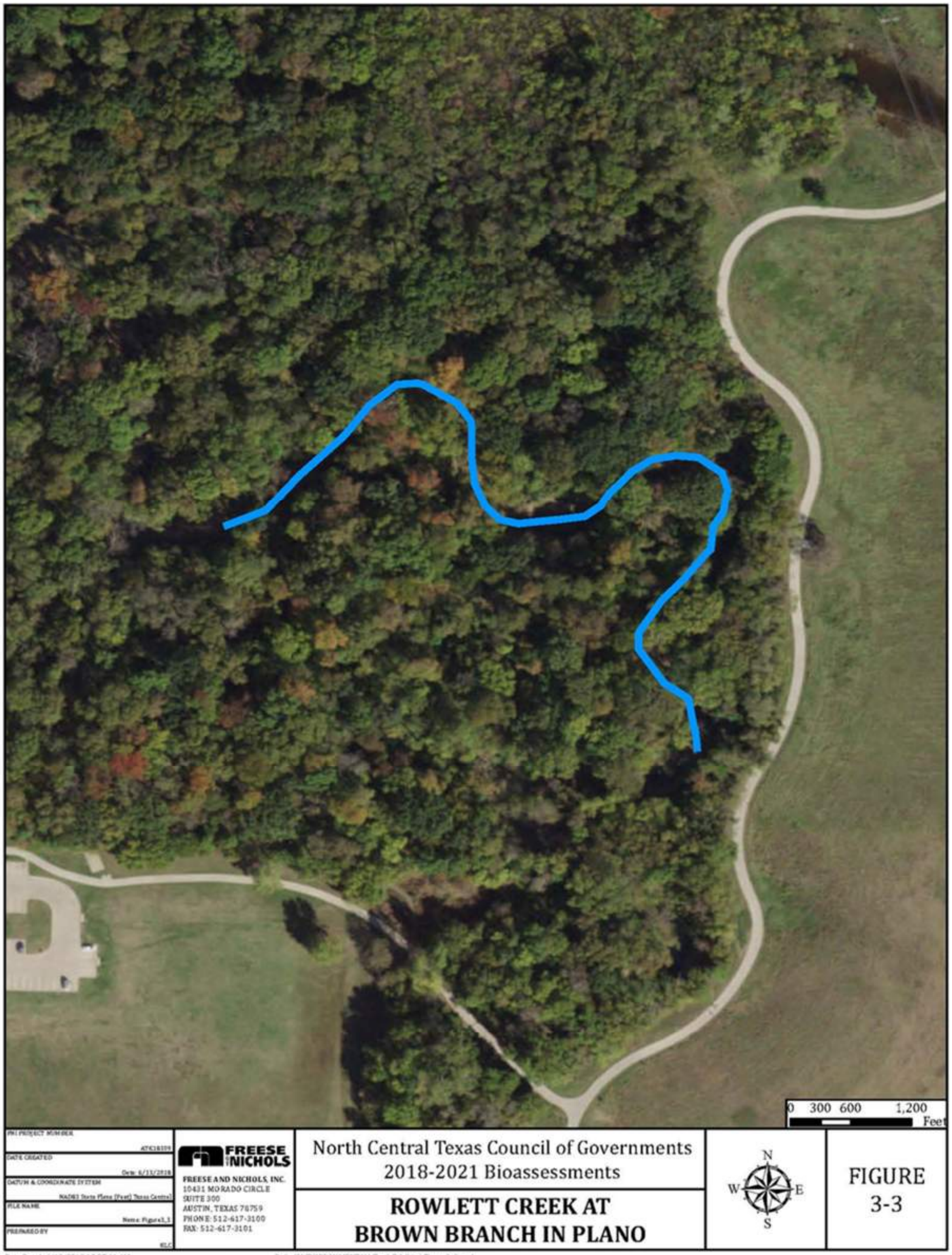

Figure 3-3: Rowlett Creek at Brown Branch in Plano

Figure 3-4: Rowlett Creek at Brown Branch in Plano on May 10, 2018.

Figure 3-5: Rowlett Creek at Brown Branch in Plano on May 10, 2018.

3.2.2 Rowlett Creek at Headwaters

Rowlett Creek at Headwaters will be sampled in 2020 and 2021 in Suncreek Park downstream of S. Alma Drive in Plano (Figure 3-6). It was observed on May 10, 2018. Creek flow was estimated at 5 cfs and riffles, runs, and pools were present (Figures 3-7 and 3-8). Much of the creek has a loose gravel substrate in this reach with steeply incised banks. The creek is surrounded by riparian buffer for over 1.2 miles upstream from the proposed study reach.

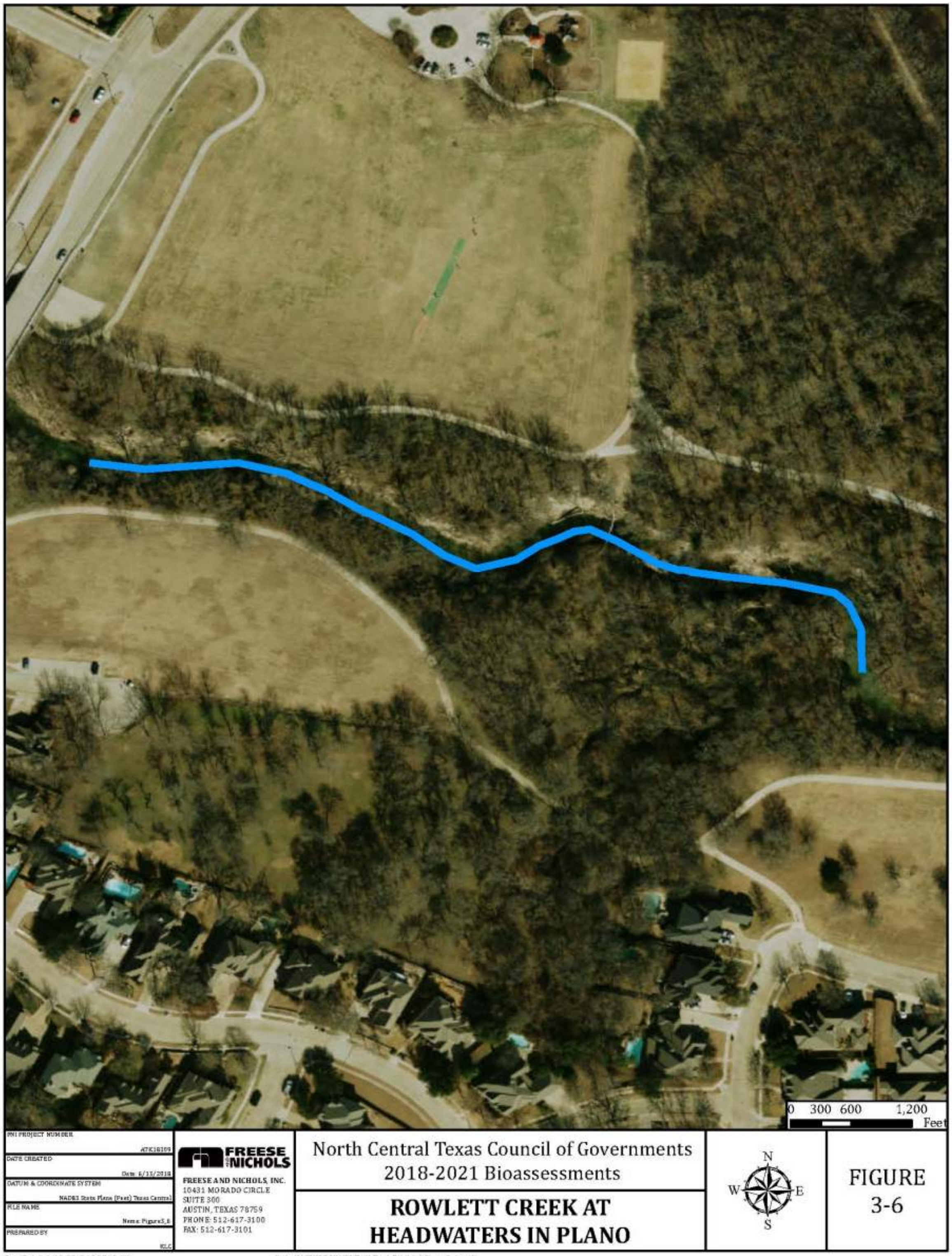

Figure 3-6: Rowlett Creek at Headwaters in Plano

Figure 3-7: Rowlett Creek at Headwaters in Suncreek Park in Plano on May 10, 2018.

Figure 3-8: Rowlett Creek at Headwaters in Suncreek Park in Plano on May 10, 2018.

3.3 IRVING

3.3.1 Delaware Creek

Delaware Creek will be sampled in 2018 and 2019 in Fritz Park upstream of E. Oakdale Road in south-central Irving (Figure 3-9). It was observed on May 10, 2018. Creek flow was estimated at less than 1 cfs and riffles, runs, and pools were present (Figures 3-10 and 3-11). Review of aerial imagery in Google Earth suggests the creek may be intermittent at times at E. Oakdale Road about 1,000 feet downstream of the study reach. Much of the creek has a concrete rubble substrate in this reach with steeply incised banks. The creek is substantially modified beginning 0.5 stream mile upstream of the upstream end of the study reach. For several stream miles upstream, the creek is embedded in a trapezoidal concrete channel for long reaches and impounded in on-channel reservoirs in other reaches. There is limited riparian buffer along the east (left) shore and substantial riparian buffer along most of the west (right) shore in the proposed study reach.

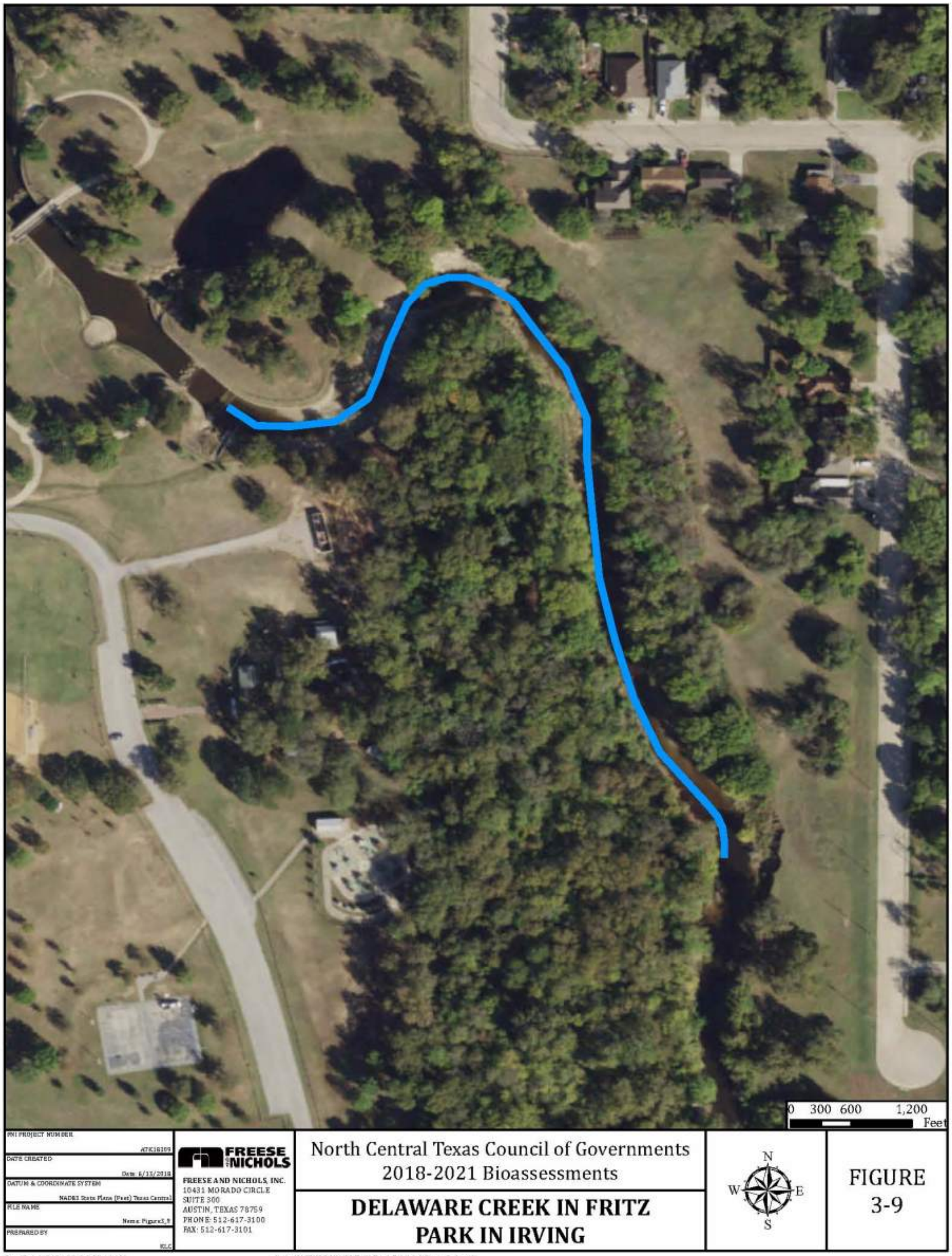

Figure 3-9: Delaware Creek in Fritz Park in Irving

Figure 3-10: Delaware Creek in Fritz Park in Irving on May 10, 2018.

Figure 3-11: Delaware Creek in Fritz Park in Irving on May 10, 2018.

3.3.2 Estelle Creek

Estelle Creek will be sampled in 2020 and 2021 downstream of W. Pioneer Dr in southwest Irving (Figure 3-12). It was observed on May 10, 2018. Creek flow was estimated at less than 0.5 cfs, and riffles, runs, and pools were present (Figures 3-13 and 3-14). There are two concrete drop structures on the creek in the study reach. Review of aerial imagery in Google Earth suggests the creek may be intermittent at times in the study reach. The creek is impounded in an on-channel reservoir surrounded by apartment complexes for 0.4 stream mile immediately upstream of the study reach, and upstream from that reach it is confined to a trapezoidal concrete channel for another 1.3 stream miles upstream. Riparian buffer is limited along both banks of the creek.

Figure 3-12: Estelle Creek Downstream of W. Pioneer Drive in Irving

Figure 3-13: Estelle Creek Downstream of W. Pioneer Drive in Irving. View upstream towards upstream end of study reach.

Figure 3-14: Estelle Creek Downstream of W. Pioneer Drive in Irving

4.0 SAMPLING EQUIPMENT

The following sections describe equipment expected to be used. Maintenance and quality assurance/quality control (QA/QC) guidelines for equipment are in Section 7.0. It should be noted that a Texas Parks and Wildlife Department (TPWD) scientific collection permit will be kept with staff in the field, and the TPWD will be notified at least 24 hours prior to field sampling.

4.1 WATER QUALITY

A Yellow Springs Institute (YSI) water quality meter 6920 or equivalent will be used for the measurement of water temperature, DO, specific conductivity, turbidity, and pH at each station. The instrument(s) will be equipped with optical DO and turbidity probes.

Instantaneous grab samples for laboratory analysis of water chemistry will be taken using sample containers provided by the laboratory.

4.2 FISH

Fish will be collected with a combination of backpack electrofishing and seining. The backpack electrofisher employed will be a variable-voltage Smith-Root Model LR-24 battery-powered backpack unit or comparable unit. Electrofishing will be conducted throughout the entire wadeable reach established during the habitat evaluation. Personal protection gear required for electrofishing will include rubber gloves, chest waders, and life vests. Dip nets with insulated or fiberglass handles with 1/8-inch mesh will be used to collect stunned fish. Fish will be placed alive in a bucket of stream water for later processing.

A variety of seines will be available, including 10-foot x 4-foot x 1/8-inch mesh, 20-foot x 6-foot x 1/8-inch mesh, and 30-foot x 6-foot x 3/16-inch mesh seines. Choice of seine will depend on the habitat conditions, and different seines may be used.

Other gear required for fish sampling and processing will include a measuring board (1-millimeter [mm] increments) to measure fish length, preservative (10 percent formaldehyde), 1-gallon sample jars, and a camera. An electronic scale capable of measuring fish weight to the nearest gram will be available if needed. Field books/keys, including *Freshwater Fishes of Texas* (Thomas et al., 2007) and *An Annotated Checklist of the Freshwater Fishes of Texas, with Keys to Identification of Species* (Hubbs et al., 2008) will be used as a guide for identifying fish in the field. The following is a list of field equipment needed for fish sampling:

- Smith-Root Model LR-24 battery-powered backpack unit or equivalent equipped with anode ring pole and stainless-steel cable cathode;
- Dip nets with insulated or fiberglass handles equipped with 1/8-inch mesh;
- Rubber gloves;
- Rubber or neoprene waders;
- A minimum of one each of a 10-foot x 4-foot x 1/8-inch mesh, 20-foot x 6-foot x 1/8-inch mesh, and 30-foot x 6-foot x 3/16-inch mesh seines;
- Buckets or tubs: 2- or 5-gallon to carry and hold fish;
- 14-foot jon boat with motor and trailer;
- Paddles and life vests;
- Global Positioning System (GPS) unit to measure locations of sample collections and distances of seine hauls;
- Field forms and field notebooks to record data;
- Maps illustrating sample reaches;
- 10% formalin and jars to collect voucher specimens;
- Fish identification keys: minimum of *Freshwater Fishes of Texas* (Thomas et al., 2007) and *An Annotated Checklist of the Freshwater Fishes of Texas, with Keys to Identification of Species* (Hubbs et al., 2008);
- TPWD scientific collection permit;
- Measuring board (graduated in millimeters); and,
- Scale: capable of weighing fish to the nearest gram.

4.3 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrates will be collected with a 5-minute kicknet sample in a representative riffle at each site and preserved in the field with 70% ethanol. Sample analysis will be conducted by Jack Davis, subcontractor. The following is a list of field equipment needed for benthic macroinvertebrate sampling:

- Long-handled D-frame dip net equipped with 0.5-mm mesh net;
- Stopwatch to time sample collection;
- Sample tray, rinse bottle, and tweezers to review the sample and ensure adequate numbers of organisms are collected;
- Sample bottles, waterproof labels, and 70% ethanol for transporting organisms to the laboratory;

- GPS to record the location of benthic macroinvertebrate sample collection; and,
- TPWD scientific collection permit.

4.4 MUSSELS

Mussels will be qualitatively sampled while biologists are seining, electrofishing, kick-netting, measuring habitat, and collecting water samples. Sampling will involve observing the creek bottom while biologists are moving upstream and downstream. Some locations will be probed by hand to determine if mussels may be present.

4.5 HABITAT

Habitat assessments will be conducted during the first sample event each year at six transects across the stream. Tools used to describe habitat characteristics are listed in Table 4-1.

Table 4-1. Habitat Equipment List

Parameter	Equipment
Stream water width	Tape measure
Bank slope	Clinometer
Canopy cover	Densiometer
Geographic coordinates	Global positioning system unit
Depth	Wading rod
Flow	SonTek FlowTracker Handheld-ADV
Photographs	Digital camera
Water transparency	Secchi disk

5.0 SAMPLING PROCEDURES

Sampling procedures will be those described in TCEQ (2012 and 2014) unless modified for site-specific conditions.

5.1 SAMPLE TIMING

Each selected site will be sampled twice per year for two consecutive years. Rowlett Creek in Garland will be sampled twice per year for each of the 4 years. One sample at each site each year will be collected during the period from July 1 through September 30, referred to by the TCEQ (2012) as the "critical period." One sample is collected during this period because water temperatures are usually high and stream flows low compared to flows during most of the year.

Water's ability to contain DO is reduced as temperature increases. Therefore, DO levels may become critically low for aquatic life during warmer times of the year (i.e., summer). Summer aquatic plant growth may exhibit large swings in photosynthesis between day and night. Large swings in photosynthesis combined with greater amounts of aquatic plants in the summer can drop DO to very low levels in the early morning. Early morning declines in oxygen result from lack of photosynthetic oxygen production during the night combined with relatively high rates of oxygen consumption by aquatic plants and animals in the warm stream.

The second sample at each site each year will be collected during the period from March 15 through June 30 or October 1 through October 15, referred to as the "index period" by the TCEQ (2012). The TCEQ (2012) recommends bioassessment samples be collected when flows are at or only slightly above low flows.

The sampling schedule for this project is:

Garland

- Rowlett Creek downstream of Atchison Topeka and Santa Fe Railroad Bridge: Twice in 2018, 2019, 2020 and 2021

Plano

- Rowlett Creek at Headwaters (Suncreek Park): Twice in 2018 and twice in 2019.
- Rowlett Creek at Brown Branch (Oak Point Park and Nature Preserve): Twice in 2020 and twice in 2021

Irving

- Delaware Creek at Fritz Park: Twice in 2018 and twice in 2019
- Estelle Creek downstream of W. Pioneer Drive: Twice in 2020 and twice in 2021

5.2 NOTIFICATION

Contacts for the NCTCOG, Garland, Plano, Irving, and the Atkins project manager will be notified at least 7 days prior to each sampling event and be invited to participate to the extent they wish. TPWD Law Enforcement will be notified no more than 72 hours prior to, and no later than 24 hours prior to biological sample collection. If excessive rain or some other event beyond the control of sampling personnel forces cancellation of a sampling trip, contacts for the NCTCOG, Garland, Plano, Irving, and the Atkins project manager will be notified the same day the decision is made to cancel sampling.

5.3 SAMPLE LOCATION IDENTIFICATION

Upon arrival at the site, the sample team will scout the stream reach to be sampled from the shore. The upstream and downstream ends of the study reach will be marked with GPS. The study reach will extend at least 150 meters but no more than 500 meters. Habitat types and their locations will be noted along the study reach. The study reach should include at least one riffle and one pool. This first detailed reconnaissance of the stream will be used to determine locations for water quality, fish, benthic macroinvertebrate, mussel, and habitat sampling. The water quality sampling location will be immediately upstream of the reach in an area for safe, secure, water quality sampling.

5.4 WATER QUALITY

A precalibrated YSI Series 6920 water quality meter or equivalent will be placed in the stream at a secure location during the day to measure DO during the night and morning when DO values may decline to levels injurious to aquatic life. It will record data every 30 minutes. Temperature, specific conductance, pH, turbidity, and DO will be recorded every 30 minutes for the time extending through the biological and habitat sampling. A back-up calibrated water quality meter will be available to ensure data are collected during biological sampling in case the primary meter fails.

Field water quality (temperature, specific conductance, pH and DO) will be measured next to the meter deployed for 24-hour measurements. These measurements will be made when the 24-hour meters are deployed and again when retrieved and will be made with a calibrated water quality meter to document any drift in measurements of water chemistry made by the 24-hour meters.

Water chemistry samples for laboratory analysis will be collected in clean containers provided by the laboratory. Samples will be collected in the proximity of the YSI water quality meter at a location representative of stream quality. Samples will be collected at a depth of a foot where stream depth allows sampling without disturbing the bottom. Samples will be placed immediately on ice in an ice chest for transport to the laboratory. Water chemistry samples will be collected upstream of all other sample collection to avoid changes in water quality resulting from sampling, particularly from disturbed sediments.

Samples will be collected by submerging a clean sample container in a representative portion of the flowing stream to a depth of 1 foot. Parameters listed in Table 5-1 will be analyzed by the laboratory.

Table 5-1. Water Quality Constituents to be Analyzed

Constituent	Method	Detection Limit	Maximum Holding Time
E coli	SM9222D	10 colonies/100 mL	6 hours
Nitrogen as nitrate and nitrite	300A	0.03 ppm	48 hours
Phosphorus as orthophosphates	200.7	0.005 ppm	48 hours

5.5 FISH

Given the variability of habitats, flow regimes, and water chemistry, professional judgment will be used to assess sampling necessary to characterize fish assemblages. Fish sampling describes species present, their relative abundance, and external condition. Fish will be collected at each station using a combination of backpack electrofishing and seining. Fish will be sampled until no new species are collected. Habitats will include riffles, runs, glides, and pools. Sampling protocols described here are included in more detail in TCEQ (2014). Sampling will be conducted from the downstream end of the study reach toward the upstream end of the study reach. Fish will be sampled in each habitat type and combination of habitat types.

Electrofishing will be conducted throughout the habitats identified during the stream reconnaissance. Electrofishing will be conducted for a minimum of 15 minutes and continue until no new species are collected and all habitat types are sampled. All fish observed will be collected. Notes will be made on fish that escape capture. Sampling will be conducted from downstream to upstream to help prevent clouding the water and reducing visibility due to disturbing bottom sediments.

Seining will be used to sample pools up to approximately 6 feet deep, riffles, and runs that are free of debris. Seines of variable sizes will be used to accommodate the type of habitat sampled. As recommended by TCEQ (2014), a minimum of six seine hauls covering at least 60 meters will be conducted. Seining will continue until no new species are collected.

Fish will be identified in the field to the lowest taxonomic level practical. All individuals will be measured (total length) to the nearest millimeter. Any external anomalies on sampled fish will be recorded. Two voucher specimens of each species less than 1 foot long will be preserved in the field with 10% formalin. Voucher photographs will be collected of specimens, which can be visually and clearly identified to species in a photograph. Fish identification will be conducted by a degreed fisheries biologist knowledgeable in fish taxonomy.

5.6 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrates sampling will be collected from the riffle with the highest proportion of cobble/gravel substrate. A 5-minute kicknet sample will be collected by placing the straight edge of the net with 500-µm (0.5-mm) mesh firmly on the bottom downstream of the biologist. The biologist will vigorously disturb the substrate within 1 foot of the net so the water current carries invertebrates knocked loose from the bottom into the net. The biologist continues this effort, zigzagging back and forth and sampling all microhabitats in the riffle while moving upstream for 5 minutes.

The kicknet is then emptied into a tray, and a quick estimate of the number of organisms is made. The sample will be preserved in a labeled bottle with 70% ethanol containing a sample label on waterproof paper. If there are less than 140 organisms in the sample, another 5-minute kicknet sample will be collected and combined in the sample jar with the first sample. This process will continue as necessary until at least 140 organisms are in the sample bottle. The sample will be field-picked and preserved in a labeled bottle with 70% ethanol containing a sample label on waterproof paper.

Although preliminary reconnaissance indicates the presence of riffles at all sites, snags and accumulations of leaf litter will be checked and notes recorded on the types and relative abundance of benthic macroinvertebrates using those habitats.

5.7 MUSSELS

Qualitative sampling of mussels to determine if mussels are present, and if so, which species are present, will be conducted because of growing interest in native mussel populations and factors affecting their distributions. Fifteen of 52 known species in Texas are on the state-threatened list, and 6 are candidates for federal listing (TPWD, 2011a). Two state-threatened species, the Louisiana pigtoe (*Pleurobema riddelli*) and the Texas heelsplitter (*Potamilus amphichaenus*), are listed by TPWD as state threatened and possibly occurring in Dallas County. Relatively little is known about water quality requirements of these mussels. Since intensive sampling will be conducted at these locations, the presence/absence of mussels will be relatively easy to document. Their presence/absence may not significantly enhance interpretation of water quality impacts; however, considering the relatively minimal level of effort involved in sampling them, information gained will be helpful in understanding if conditions are suitable for mussels and indicating whether a state-listed species may be present.

The streambed, wherever visible, will be visually inspected for live and dead mussels. Hand-sampling will be conducted at each of the six habitat transect locations and at selected sites in the study reach considered possible habitat for mussels. Hand-sampling consists of sifting the substrate by hand. Depth, substrate type, and area sampled will be recorded for each sample point. The condition of collected mussels will be characterized according to TPWD (2011b) as:

- **Live**
- **Very recently dead** (soft tissue remains attached to the shell; in good condition essentially as it would be in a living specimen; internal and external colors are not faded)
- **Recently dead** (no soft tissue remains, but otherwise in good condition (looking like a living specimen that had been killed and cleaned); internally, nacre is glossy and without evidence of algal staining, calcium deposition, or external erosive effects; internal and external colors are not faded)
- **Relatively recently dead** (in good condition, but nacre is losing its glossy nature; algal staining, calcium deposition, and/or external erosive effects are evident on the nacre; internal and external colors often faded somewhat)
- **Long dead** (early signs of internal and external erosion, staining, calcium deposition, or some combination of these; most or all of the internal coloration and glossy nature has faded; epidermis with major sections absent, or if present, clearly aged and flaking)
- **Very long dead** (significant signs of erosion, staining, and calcium deposition more widely pronounced than above; coloration often faded white or nearly so; relatively little intact epidermis left; for specimens in erosive environments, internal and external features often weathered and smoothed, or otherwise exfoliated; shells often chalky, brittle, and crumbling)

- **Subfossil** (little or no epidermis; nacre faded white and entire shell often white; sometimes with signs of erosion, staining, or calcium deposition; typically chalky and powdery to the touch; shells often brittle and crumbling)

Live mussels will be photographed and returned to the same part of the stream from which they were collected. If mussel valves are found, they will be identified and photographed.

5.8 HABITAT

Habitat evaluations will be conducted on the first sample trip to each station each year according to TCEQ protocols (TCEQ, 2014). The first transect will be conducted at the downstream end of the reach. Five more transects will be measured equidistant from each other with the last transect at the upstream end of the study reach. If there are some habitat types not measured in one of the six transects, additional transects will be measured with a minimum of one transect in each mesohabitat (riffle, pool, run, glide) type available. The coordinates of each transect at the midstream point will be documented with a hand-held GPS unit. The points where each transect intersects the right and left banks will be marked with surveyor's tape, so those points can be revisited.

Each transect will be perpendicular to the stream channel and serve as an observation point for habitat characterization. Stream width, bank slopes, bank erosion potential, depth (at a minimum of 11 points across the transect and at the thalweg), habitat type (riffle, pool, run, or glide), substrate composition, aquatic plants, instream cover, tree canopy, and riparian cover will be measured and recorded for each transect. Observations of stream use, maximum pool depth, channel modifications, channel sinuosity, reach slope, and channel flow status will be made over the entire reach.

On the second sample trip in the same sample year, width of the stream at each transect will be measured, photographs taken of each transect, and observations made of the bank and canopy conditions. If best professional judgment indicates habitat conditions have substantially changed, all habitat measurements from the first sample trip will be repeated. Data will be recorded on standardized forms provided by TCEQ (2014).

Stream flow will be measured at each station during each sample event (TCEQ, 2012). A location within the stream, free of debris with relatively smooth channel morphology and laminar flow, will be selected to measure velocity. Velocity will be measured with a Sontek FlowTracker acoustic Doppler flow meter. Measurements of depth (to the nearest 0.1 foot) and velocity will be made at approximately equal flow intervals along a transect perpendicular to stream flow. If the channel is less than 10 feet wide, at least

10 velocity and depth measurements will be made. If the stream is greater than 10 feet wide, velocity and depth will be measured at between 20 and 30 points across the stream depending on shape of the streambed and the requirement to ensure no measurement section contains more than 10% of the total flow.

6.0 SAMPLE HANDLING AND DOCUMENTATION

This section describes the manner in which samples will be handled and tracked from the time of sample collection/retrieval to laboratory analysis.

6.1 SAMPLE DOCUMENTATION

Sample documentation will be recorded for each sample collected. Information in bold will be placed on sample labels as well as the field logs:

- Geographic coordinates
- Unique sample identifier (represented by the "Watershed, City")
- Time and date
- Sample collectors
- Depth at sample point
- Substrate type at sample point
- Mesohabitat type
- Preservative
- Method of collection

Collection information will be entered on water-proof field forms or directly into a database on a field computer. Observations relevant to sample collection conditions and location will be noted. Sample tracking logs will include sample label identifiers, dates, times, locations, and destination, and will be completed in the field.

6.2 WATER QUALITY

Water quality samples will be collected in clean, labeled, approved containers with appropriate preservative as provided by the analytical laboratory. Within 5 minutes of collection, all water samples will be placed on enough ice to lower water temperatures to less than 4 degrees Celsius °C) in less than 30 minutes and maintain water temperatures at or below 4°C until samples are delivered to the laboratory. Chain-of-custody forms will be completed and will accompany each sample to the laboratory. Samples will be delivered to the laboratory within the shortest holding time for any of the constituents.

Water quality meters, which have collected data overnight and in the morning, will be downloaded and post-calibrated in the field.

6.2.1 Chain-of-Custody

A chain-of-custody document must accompany each sample. Samples must be under the custody of field personnel until relinquished to a representative of the laboratory. A sample is defined as being under a person's custody if any of the following conditions exist: (1) it is in their possession, (2) it is in their view after being in their possession, (3) it was in their possession and they locked it up, or (4) it is in a designated secure area.

After the samples have arrived at the laboratory, they should remain under the custody of the laboratory.

Each person receiving or relinquishing custody of the samples must sign and date the chain-of-custody when transfer of sample custody occurs. Documentation of sample possession must include the following:

- Sample description/identification;
- Date and time of sample collection;
- Type of sample (composite or grab);
- Preservative used;
- Sample container type;
- Analyses required;
- Name of collector(s);
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory; and,
- Bill of lading or transporter tracking number (if applicable).

Preformatted chain-of-custody forms will be used to document the transfer of samples to the laboratory and the analysis to be conducted on each bottle. A sample chain-of-custody is provided in Appendix A.

6.3 FISH

Most fish will be analyzed alive in the field and released after appropriate measurements are made. Collected fish will be held in buckets or tubs of water until fish sampling is completed. The following information from each sample of fish will be recorded:

- Number of each species of fish and external anomalies observed;
- Mesohabitat sampled;
- Sample gear;

- Length of seine haul, type of seine used, and time of electrofishing;

Two individuals (less than 1-foot-long total length) of each species will be retained as voucher specimens for 5 years.

Each fish sample will be analyzed for each habitat type in which it is collected. Each fish will be identified to species, counted, and observed for external anomalies. Some fish may be measured and weighed if it appears their length:weight relationship may deviate substantially from normal values.

Specimens that cannot be identified in the field will be preserved in the field and returned to the FNI Austin laboratory for identification.

Index of Biotic Integrity metrics will be calculated and compared to metric values in "Table B-5 Ecoregions 27, 29, and 32 Metrics" for fish (TCEQ, 2014). The metric values in Table B-5 (TCEQ, 2014) were calculated from reference streams for the same ecoregion from which samples will be collected.

6.4 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrate samples will be analyzed by Jack Davis, a qualified subcontractor with over 40 years of experience analyzing freshwater benthic macroinvertebrates in Texas. Laboratory analysis will include number of each taxon of benthic macroinvertebrates observed. Identification will be at least to genus, family, or order based on TCEQ (2014) guidance for rapid bioassessment samples. When possible, identification will be to the lowest taxonomic level possible. Index of Biotic Integrity metrics will be calculated and compared to metric values in "Table B-11 Metrics and Scoring Criteria for Kick Samples" (TCEQ, 2014). The metric values in Table B-11 (TCEQ, 2014) were calculated from reference streams.

6.5 MUSSELS

Live or dead mussels will be photographed, measured, and returned to the portion of the stream from which they were collected. Representative valves of dead mussels may be collected if necessary for identification. Representative specimens will be measured (valve length and height) and identified to species.

7.0 QUALITY ASSURANCE/QUALITY CONTROL

Data of known and documented quality are essential to the success of any monitoring or sampling program. Data quality objectives clarify the intended use of the data, define the type of data needed to support the decision, identify the conditions under which the data should be collected, and specify tolerable limits on the probability of making a decision error due to uncertainty in the data. Table 7-1 summarizes data quality objectives for the bioassessment field sampling. Data quality objectives are developed by data users to specify the data quality needed to support specific decisions.

The following sections provide the requirements for meeting data quality objectives. Specifically, these requirements are designed to ensure the quality of data collected in the field, preserve the integrity of samples in transit, and reduce errors in data processing.

Field personnel have used the bioassessment protocols outlined since 1990. Field personnel will review the relevant TCEQ (2012 and 2014) sampling protocols summarized in Sections 4 and 5 above. The same personnel will collect and analyze all data, which should minimize experimental error associated with different sampling personnel.

The first step in ensuring data quality is to collect samples under stable, normal spring to summer flow conditions. Flow will be monitored remotely by checking real-time flow data from the USGS gauge on Rowlett Creek at Sachse (USGS gauge 08061540) and the USGS gauge on Bear Creek in Grand Prairie (USGS gauge 0804956950). Sampling will be avoided to the extent possible when flows exceed the historical daily median flows at these locations by 50% of the daily median flow or within 4 days of the passage of a pulse that exceeded 15 times the daily median flow for the scheduled sample date. Collecting data at relatively stable low to normal flow conditions will help minimize temporary impacts to ecological conditions that can mask the evaluation of the biological community health.

Table 7-1. Data Quality Objectives

Parameter	First Year First Sample	First Year Second Sample	Second Year First Sample	Second Year Second Sample
Sample date	X	X	X	X
Sample time	X	X	X	X
Sample collectors	X	X	X	X
Fish community				
All species present	X	X	X	X
Percent abundance of each species in the fish community to the nearest percent	X	X	X	X
Percent of total fish with external anomalies	X	X	X	X
Photographs of external anomalies	X	X	X	X
Two voucher individuals for each species	Voucher specimens collected as necessary			
For each fish sample				
Mesohabitat sampled	X	X	X	X
Sampling effort (area seined or time electrofished)	X	X	X	X
Species collected	X	X	X	X
Number of each species collected	X	X	X	X
Index of Biotic Integrity	X	X	X	X
Benthic macroinvertebrate community				
Species present in riffle	X	X	X	X
Percent abundance of each species in the benthos	X	X	X	X
Index of Biotic Integrity	X	X	X	X
Two voucher individuals for each species	Voucher specimens collected as necessary			
Water quality (measured every 30 minutes from before midnight Central Standard Time through 10:00 a.m. the next day)				
Set of water chemistry samples for delivery to lab	X	X	X	X
Temperature ±0.15°C, reported to the nearest 0.1°C	X	X	X	X
pH ±0.2, reported to the nearest 0.1 standard units	X	X	X	X
Specific conductance, 0.001 mS/cm, reported to the nearest 0.10 mS/cm	X	X	X	X
DO ±0.2 mg/L, reported to the nearest 0.1 mg/L	X	X	X	X
Turbidity, ±2% of the reading or 0.3 NTU				
Secchi disk transparency, reported to the nearest centimeter	X	X	X	X
Flow, reported to the nearest 0.1 cfs	X	X	X	X
Mussels				
Species present and relative abundance by area or sample time	X	X	X	X
Habitat				
For each of a minimum of six transects and at least one transect in each mesohabitat				
Wetted stream width to the nearest inch	X	X	X	X
Left bank slope to the nearest degree*	X		X	
Right bank slope to the nearest degree*	X		X	
Left bank erosion potential, to the nearest percent*	X		X	
Right bank erosion potential, to the nearest percent*	X		X	
Habitat type*	X		X	
Dominant substrate*	X		X	
Right bank dominant riparian vegetation*	X		X	
Left bank dominant riparian vegetation*	X		X	
Macrophyte presence*	X		X	
Algae presence*	X		X	
Types of instream cover*	X		X	
Percent gravel to the nearest 10%*	X		X	
Percent instream cover to the nearest 10%*	X		X	

Parameter	First Year First Sample	First Year Second Sample	Second Year First Sample	Second Year Second Sample
Instream cover types*	X		X	
Width of natural buffer, right bank, to the nearest foot*	X		X	
Width of natural buffer, left bank to the nearest foot*	X		X	
Geographic coordinates at middle of transect*	X		X	
Stream depth at each of 11 points to the nearest 0.1 foot*	X		X	
Thalweg depth to the nearest 0.1 foot*	X		X	
Percent canopy to the nearest percent*	X		X	
Two photographs of each transect	X	X	X	X
Maximum pool width to the nearest inch	X		X	
Maximum pool depth to the nearest 0.1 foot	X		X	
Number of riffles	X		X	
Description of bank conditions in relation to the first event		X		X
Description of canopy conditions in relation to the first event		X		X
Number of bends in reach and characterization of each bend as well-defined or moderately well-defined	X		X	
Percent of channel bottom covered with water to the nearest 5%				

* Parameters with an asterisk may have to be sampled again during the second sample of the year if there has been substantial change in habitat.

7.1 WATER SAMPLES

The sampling team will not ship samples for weekend delivery to the water chemistry laboratory unless prior plans for such a delivery have been agreed upon with the sample control center.

Once a sample is collected, sample integrity is maintained through careful and controlled sample handling, storage, and preservation procedures. Samples are expected to remain in field sampling team custody until delivery to the water chemistry laboratory.

7.2 LABORATORY QUALITY ASSURANCE FOR WATER SAMPLES

TTI Laboratories (and/or their subcontracted laboratories) will analyze samples collected. The laboratory will certify the precision and accuracy of all analytical data and document all phases of sample handling, data acquisition, data transfer, report preparation, and report review.

7.2.1 Reference Materials and Reagents

Whenever possible, primary reference materials for instrument calibration, QC spikes, and performance evaluations will be obtained from the National Bureau of Standards (NBS) or the EPA. In the absence of available reference materials from these organizations, other reliable sources will be sought. Such secondary reference materials may be used for these functions provided that they are traceable to an NBS standard.

Laboratory reagent quality will be sufficient to minimize or eliminate detectable concentrations of analytes in laboratory blanks. Furthermore, reagents will not contain other contaminants that interfere with sample analysis.

7.2.2 Laboratory Data Management

A. Laboratory Data Collection

In addition to the data recorded in field logbooks and chain-of-custody forms, data that describe sample processing will be recorded in laboratory notebooks. Laboratory notebooks will contain the following information:

- Date of processing;
- Sample numbers;
- Case number;
- Analyses performed;
- Calibration data;
- QC samples;
- Concentrations/dilutions required;
- Instrument readings;
- Special observations; and.
- Analyst's signature.

B. Laboratory Data Logging

TTI Laboratories (and/or their subcontracted laboratories) will utilize an established system for sample check-in, tracking of samples through the laboratory, assignment of laboratory analyses, and sample check-out. The system will provide for management review of all laboratory data before the issuance of laboratory reports. The review will be accomplished on two levels: (1) review of raw data for each analysis, and (2) review of the final results to check for consistency or agreement of the results between all parameters.

C. Laboratory Data Reduction

For methods that utilize a calibration curve, sample responses will be applied to the linear regression line to obtain an initial raw result that will be factored into equations to estimate the concentration in the original sample. Rounding will only be performed after the final result has been obtained to minimize rounding errors. Copies of the raw data and the calculations used to generate the final results will be retained on file to allow reconstruction of the data reduction process at a later date if necessary.

At the completion of a set of analyses, all calculations will be completed and checked by the analyst. The associated QC data will be entered onto QC charts. If all data are acceptable, the data summaries will be submitted to the laboratory project manager for review. If QC samples do not meet acceptance criteria, the appropriate laboratory project manager will be notified and corrective action will be taken as specified in Section 7.2.3.

D. Laboratory Data Review

System reviews will be performed at all levels. The individual analyst will constantly review the quality of data through calibration checks, QC sample results, and performance evaluation samples. These reviews will be performed prior to submission to the laboratory project manager.

The laboratory project manager will review data for consistency and reasonableness with other data and will determine if QA/QC program requirements have been satisfied. Selected hard copy output of data, such as chromatograms and spectra, will be reviewed to verify that results were interpreted correctly. Unusual or unexpected results will be reviewed, and a resolution will be made as to whether the analysis should be repeated. In addition, the laboratory project manager will recalculate selected results to verify the calculation procedure.

7.2.3 Corrective Actions

An analysis will be considered to be out of control when it does not conform to the QA/QC protocols specified by this document, applicable methods, or standard operating procedures. When an analysis is out of control, the analyst who identifies the problem will document the occurrence and notify the laboratory project manager. The analyst, working with the laboratory project manager, will determine the cause of the problem and take appropriate corrective action. Analysis may not resume until the problem has been corrected. Restoration of analytical control will be demonstrated by generating satisfactory calibration and/or QC sample data.

Data generated concurrently with an out-of-control system will be evaluated for usability in light of the nature of the deficiency. If the deficiency does not impair the usability of the results, the data will be reported and the deficiency noted in the laboratory data report (e.g., a constituent is detected in a laboratory blank but not in sample analyses). Where sample results are impaired, the project manager will be notified. After the error has been corrected, the analysis will be rerun and the data can be reported. The laboratory project manager will outline the error and the corrective action in a QA report. If the cause of the error cannot be identified, the laboratory project manager will summarize the procedures and QA/QC used to analyze the sample and provide a statement of validity for the sample results.

Problems encountered during the field activities will be reported by the designated field staff as soon after discovery as possible. The Atkins project manager will be responsible for ensuring that corrective actions produce satisfactory results in a timely manner. Outcomes of those actions and their effect or potential effect on the data will be reported to Atkins and NCTCOG.

Results of performance or systems audits or internal QC analyses may trigger corrective action within the designated laboratory and Atkins project team. However, it is generally the responsibility of the laboratory analyst or field personnel to initiate laboratory or field corrective actions, respectively.

7.3 FIELD INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

All field equipment will be inspected prior to sampling to ensure it will collect accurate data of appropriate precision (e.g., electrofishers are operating correctly, nets are without defects, water quality meters properly calibrated, absence of contaminants). Inspection of field equipment will occur in advance of the field operation to allow time for replacement or repair of defective equipment. The field team will be equipped with proper backup equipment to prevent lost time on site in case of equipment failure in the field.

7.3.1 Water Quality and Flow Meters

The water quality meters and Sontek Flow Tracker flow meter will be inspected prior to sampling activities and the water quality meters calibrated within 24 hours of the start of sample collection.

7.3.2 Backpack Electrofisher

The Smith-Root Model Lr-24 is powered by a battery. The battery and back-up battery will be charged before sampling. Electric current is delivered through an anode ring pole and a "rat tail" cathode. Both electrodes should be inspected for electrolysis prior to sampling. If corrosion is present, electrode surfaces should be polished with an emery cloth or comparable abrasive. The electrofisher offers multiple voltage, duty cycle, and frequency settings. Operators will be familiar with the settings prior to field work. Since water resistance to electrical charge differs among waterbodies, settings should be tested at each stream to identify settings that maximize the number of fish collected.

Dip net handles used for electrofishing are made of fiberglass or insulated to prevent electrocution of sampling personnel. The dip net should be inspected for holes prior to deployment to avoid sample loss.

7.3.3 Seines

Seines will be inspected for holes prior to sampling and repaired as necessary.

7.4 SAMPLE LABELS

Adequate materials for labeling samples, including pre-printed sample labels on water-proof paper and pens with black indelible ink, will be prepared prior to traveling to the field. Each sample (i.e., collection of fish from a single location) will be double-labeled by affixing a sample label on the outside of the container and placing a label inside the container. All sample label entries will be made with black indelible ink. The sample label will accompany each sample through data entry. Each sample label will include the information described in Section 6.0.

7.5 DATA MANAGEMENT

Upon completion of sampling and sample analysis, all paper field records and chain-of-custody forms will be reviewed by the FSO for completeness and correctness. Any discrepancies in records will be reconciled with field personnel.

All data will be entered in an Excel spreadsheet. At least 10% of data entered will be checked for data entry errors. Data quality will be assessed by comparing entered data to original data or by comparing results with measurement criteria to determine whether to accept, reject, or qualify the data. Basic data retrievals will be made to review data and identify possible data entry errors. All computer files and paper records associated with the project will be archived until 5 years after project completion, approximately 2026.

8.0 LABORATORY ANALYSIS

TTI Laboratories (and/or their subcontracted laboratories; http://www.ttilabs.com/) in Arlington [(817) 861-5322] will be alerted when sampling is scheduled to begin so that the laboratory can prepare for receipt and analysis of samples. After sample collection, the laboratory will be informed that samples are being transported to the laboratory to allow them to have someone receive the samples and add preservatives if necessary and to begin necessary analyses within specified holding times.

8.1 LOST OR INADEQUATE SAMPLES

The laboratory will notify the FSO immediately if a sample is lost or is determined to be inadequate according to the communication protocol specified. The FSO will conduct a resampling effort for lost or inadequate samples.

8.2 DATA REPORTS

The laboratory will submit data reports via e-mail as electronic data deliverables in spreadsheet form. Laboratory data reports will contain final results for blanks and recoveries, methods of analysis, detection limits, quantification levels, accuracy and precision data, MS/MSD data, laboratory method and equipment blank data, and limits of instrument calibration. In addition, special analytical problems or modifications of specified methods will be noted. The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method. Consequently, most analytical results will contain no more than two significant figures. Concentrations in liquids will be expressed in terms of weight per unit volume (e.g., milligrams per liter [mg/L]). Reported detection limits will equal the concentration in the original matrix corresponding to the low-level instrument calibration standard after accounting for concentration, dilution, and/or extraction factors.

9.0 POST-SAMPLING ACTIVITIES

Upon return from sampling, the water quality meters will be post-calibrated within 24 hours, and their data downloaded to the Excel spreadsheet. Post-calibration will indicate if some data may be invalid because of meter drift. Invalid data will be excluded from the database, and a description of the reason for their exclusion will be provided. Photographs taken with the digital camera will be downloaded and labeled. Coordinates for sample points and routes will be downloaded from the GPS and placed into a Geographic Information System database.

Data on paper forms or in field computers will be entered in the Excel spreadsheet. Data management steps described in Section 7.5 will be followed to ensure final data meet data quality objectives.

Field equipment will be cleaned, post-calibrated, and repaired as necessary. Inventory of supplies and equipment will identify materials that need to be obtained prior to the next sample event. Field staff will review the sampling event and procedures and identify modifications that need to be made to the protocols for future sampling.

Voucher specimens will be preserved and labeled. If dead mussel shells have been collected, they will be identified to species.

10.0 DATA ANALYSIS AND INTERPRETATION

Metrics for fish and benthic macroinvertebrate communities will be calculated according to TCEQ (2014) protocols and compared to those illustrated in "Table B-5 Ecoregions 27, 29, and 32 Metrics" for fish and "Table B-11 Metrics and Scoring Criteria for Kick Samples" for benthic macroinvertebrates. This comparison will help identify any degradation of those communities that has occurred. If more current information is available about fish and benthic macroinvertebrate communities from reference streams in this ecoregion, which is the Texas Blackland Prairies Level IV ecoregion (32a), it will be considered in the comparison. Degradation of biological communities that is indicated by indices of biotic integrity will be evaluated by review of water quality, habitat, flow, land use, weather, and other sources of information as appropriate.

11.0 HEALTH AND SAFETY

11.1 BASIC SAFETY PREPARATION

Basic preparations will be routine before every sampling activity. At a minimum, a trip plan will be completed for each field trip and left at a designated location in the FNI office. The trip plan will include the following information:

- Field trip participants;
- Departure and estimated return times;
- Contact phone numbers; and,
- Basic itinerary, including where and when sampling will be performed.

Field work must be done in pairs. FSO field staff will consider carrying the following safety equipment during sample collection activities:

- Chest waders/hip boots/rubber knee boots;
- Safety vests and steel-toed shoes;
- Bug repellent;
- First aid kit;
- Cellular phone;
- Hat/sunscreen/sunglasses;
- Drinking water/sports drinks;
- Tool box with basic tools;
- Flashlights with spare batteries;
- Gloves;
- Antibacterial soap or hand cleaner;
- List of emergency phone numbers/office contacts.

The FSO will carry a packet of general safety information in each vehicle that contains the following materials:

- Emergency phone numbers; and,
- Picture identification cards, insurance information, and project identification sheets.
- Locations of emergency facilities (hospitals and police and fire departments)

- Work authorization from the NCTCOG

11.2 HAZARDS

FNI has developed and continually updates job safety instructions for known hazards and activities. FNI will issue instructions to field personnel and provide updated instructions as necessary as part of the health and safety documentation provided to field personnel.

11.2.1 Contaminated Water

Water collected from the stream reaches may be contaminated with pathogens and/or hazardous chemicals. Waterborne, disease-causing organisms (pathogens) are found in nearly all surface water systems. Some pathogens occur naturally while others enter surface water through untreated sewage discharges and bypasses, urban and agricultural runoff, and direct contact. To minimize the exposure to and effects from contaminated water, FSO field staff will maintain drinking water in a separate area from sampling activities. The FSO will carry antibacterial soap or hand cleaner on all field trips.

11.2.2 Heat Emergencies

Hyperthermia is caused by increasing body temperature due to exposure to extreme heat. Heat emergencies can be brought about by a combination of factors: physical exertion, clothing (waders), humidity, no breeze, air temperature, and the rate of fluid intake. Working in the extreme summer heat creates a very real threat of suffering from some form of heat-related stress.

Warning Signs: Chilling, headache, unsteadiness, dizziness, nausea, dry skin (either hot and red [heat stroke] or cool and pale [heat exhaustion]), rapid pulse, and muscle pain/spasms.

Treatment: General treatment for heat emergencies is cooling down and drinking plenty of fluids. A common symptom of dehydration is a headache. Heat stroke requires medical attention and is considered to be life threatening.

Prevention: Drink water in moderate amounts on a regular basis; do not wait until you are thirsty. Avoid alcohol, caffeine, and soda—these liquids are not water substitutes. Wear lightweight clothing and a wide-brimmed hat. Schedule activities that require the most exertion during early morning or late afternoon hours. Find some shade and take breaks during the day.

11.2.3 Ozone

FSO staff should be aware of the ozone alert level during summer months. On days with high ozone levels, FSO staff should be mindful not to overly exert themselves during sample collection activities.

11.2.4 Plants and Animals

Insects, reptiles, and certain plants are always potential hazards for field personnel. Tables 11-1 through 11-3 present a summary of general information on the most common plant and animal hazards encountered by field staff.

11.2.5 First-Aid Equipment and Supplies

A first-aid kit will be located within the vehicle located at the project sites during sample collection. The first-aid kit must include at a minimum: snakebite kit, potable distilled water, bandages, scissors or knife, antiseptic, bee sting kit, and allergic reaction to insect bite kit.

Other required procedures to reduce injury include:

- Confined entry will not be conducted.
- Stream reaches must not be entered below the water level during sample collection, during a rainstorm, or when rain is imminent. FSO field staff must be aware of flash flood warnings and remain in contact with FSO office staff.
- Appropriate lighting equipment will be carried to illuminate potential hazards. The stream banks may be muddy and slippery.
- Care must be taken when handling the heavy composite and grab containers.

11.2.6 Selection of Personal Protective Equipment

The selection of the personal protective equipment (PPE) will be done per site/field activity and after a thorough evaluation of the hazards involved at the site during each phase of the operation.

Recommended and required PPE is comprised of the following:

- Latex gloves when handling storm water samples
- Raingear
- Rubber boots
- Safety vest – reflective

- Coveralls or work clothing
- Work gloves

11.3 NEAREST HOSPITAL INFORMATION

Locations and information for the nearest hospitals for the various sampling sites are located in Appendix E of the Regional Storm water Monitoring Program: Monitoring Program and Quality Assurance Project Plan for Wet Weather Equipment Deployment and Sampling Protocol 2011-2016 (NCTCOG, 2012).

11.4 EMERGENCY CONTACT INFORMATION

Emergency contacts are listed below:

FIRE*	911
POLICE*	911
AMBULANCE*	911

* Local area police and fire will respond to a 911 call.

12.0 REFERENCES

Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

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National Research Council (NRC). 2008. Urban Stormwater Management in the United States. The National Research Council. Washington, D.C.

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Texas Commission on Environmental Quality. 2012. Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods. RG-415. 202 pp.

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_____. 2018a. Texas Surface Water Quality Standards, adopted by the Texas Commission on Environmental Quality February 7, 2018. Chapter 307-Texas Surface Water Quality Standards, Rule Project No. 2016-002-307-OW. 212 pp.

_____. 2018b. Updates to the Procedures for Surface Water Quality Monitoring. Accessed May 23, 2018. https://www.tceq.texas.gov/waterquality/monitoring/swqm_manualupdate.html.

Texas Parks & Wildlife Department (TPWD). 2011a. Endangered and Threatened Invertebrates in Texas and the United States. Accessed February 13, 2012. http://www.tpwd.state.tx.us/huntwild/wild/species/endang/animals/invertebrates/

Thomas, C., T. H. Bonner, and B. G. Whiteside. 2007. Freshwater Fishes of Texas: A Field Guide. River Books Sponsored by The River Systems Institute at Texas State University.

APPENDIX A
Sample Chain-of-Custody

800 106th Street
Arlington, Texas 76011

TTI ENVIRONMENTAL LABORATORIES

CHAIN OF CUSTODY RECORD

NELAP ACCREDITED TNI LABORATORY

Telephone: (817) 861-5322
FAX: (817) 261-1717
www.ttilabs.com

CLIENT NAME: Freese and Nichols, Inc.
CLIENT CONTACT: Aaron Petty
CLIENT ADDRESS: 10431 Morado Circle, Suite 300
PHONE: (512) 617-3124
FAX:
CITY, STATE, ZIP: Austin TX 78759
EMAIL: aaron.petty@freese.com
P.O. NO.:
QUOTE NO.:
PROJECT NO.: 100060260
PROJECT NAME: NCTCOG RSWMP
SAMPLER'S NAME: Aaron Petty

TEST PARAMETERS

Date Ex:mm/dd/yyyy	Time Ex:hh:mm	(C)omp (G)rab	Matrix [1]	Sample Description	VOA	A/G 1 LT.	4 OZ.	P/O	PRES [3]	Phosphorus, in orthophosphate	Nitrogen, in nitrate and nitrite	E. coli
		G	W	Rowlett Creek in Garland (below ATSF RR bridge)				2	6			
		G	W	Rowlett Creek at Suncreek Park, Plano				2	6			
		G	W	Delaware Creek at Fritz Park, Irving				2	6			

Sample Collection; No. / Type Containers [2]

LAB USE: LAB NO. ; ON ICE ☐ YES ☐ NO; TEMP.OF COOLERS °C: 3 | 4 | 5 | 6 | >6; CUSTODY SEAL: Cooler ☐ Y ☐ N, Samples ☐ Y ☐ N; SEAL INTACT: Cooler ☐ Y ☐ N, Samples ☐ Y ☐ N; DRY WT. | TRRP | HOLD [4] | TTI Lab ID

TURNAROUND TIME:
☑ STANDARD 5 Business Days
☐ 50% RUSH 3 Business Days
☐ 100% RUSH 1Business Day / ASAP*
☐ E.R. 300% RUSH Same Day / ASAP*

1. MATRIX: WW-Wastewater; W-Water; S-Soil; SD-Solid; L-Liquid; A-Airbag; C-Charcoal Tube; SL-Sludge; O-Oil
2.CONTAINERS: VOA-40ml vial; A/G-Amber or Glass 1 Liter; 4 oz-Glass Wide Mouth; P/O-Plastic or Other
3.PRES.: 1-None; 2-1:1HNO_3; 3-1:1 HCL; 4-1:1 H_2SO_4; 5-NaOH; 6-Ice; 7-Other______
4.HOLD: Lab will hold samples for 30 (thirty) days.

Relinquished by (Signature)	Date	Time	Received By: (Signature)	Date	Time

REMARKS: ☐ TTI Drop Off ☐ TTI Pickup

Please use an MDL of 0.005 mg/l for phosphorus (method 200.7)
Method 300A for nitrogen
Method SM9222D for E. coli

Clients delivery of samples to TTI constitutes acceptance to reimburse TTI as per the terms and conditions listed in the price schedule.

APPENDIX B
YSI 6920 Water Quality Meter

()

Search

(0) $0.00 (/my-profile/shoppingcart)

More

a xylem brand

MENU

‹ Multiparameter Sondes

9

6920 V2-2 Multi-Parameter Water Quality Sonde

(javascript:void(0))

(/Productimages/303d90a6-c6be-

(javascript:void(0))

48b2-bab5-8ba85f73c975/images/YSI-6920-V2-Horizontal.jpg)

6-Series Legacy Sondes

View YSI 6-Series water quality sondes being used in a variety of water environments for long-term underwater monitoring and spot sampling.

Price: Request Pricing

Option: 6920 V2-2 Sonde with temperature/conductivity sensor

SKU: 6920V2-01

Request a Quote (/request-a-quote)

Compact Data Sonde for Unattended Monitoring

The YSI 6920 V2-2 sonde is an economical water quality logging system, ideal for long-term in situ monitoring and profiling. Real-time turbidity monitoring, dissolved oxygen monitoring, algae monitoring, and more.

Instrument only. Cables, probes/sensors, and accessories sold separately.

Overview

Specifications

The 6920 V2-2 has:

- 2 optical ports
- Conductivity/temperature port
- pH or pH/ORP port
- ISE port

General Sonde Specifications	
Medium	Fresh, sea or polluted water
Temperature - Operating	-5 to +50°C
Temperature - Storage	-10 to +60°C
Communications	RS-232, SDI-12
Software	EcoWatch®
Diameter	2.85 in, 7.24 cm
Length	18 in, 45.7 cm
Weight	4 lbs, 1.8 kg
Power - External	12 V DC
Power - Internal	8 AA-size alkaline batteries
Certifications	CE, EU Battery Compliance, FCC, IP-67, WEEE, and MCERTS; Assembled in the USA

Sensor Specifications	Range	Resolution	Accuracy
ROX™ Optical Dissolved Oxygen• % Saturation	0 to 500%	0.1%	0 to 200%: ±1% of reading or 1% air saturation, whichever is greater; 200 to 500%: ±15% of reading

Sensor Specifications	Range	Resolution	Accuracy
ROX™ Optical Dissolved Oxygen• mg/L	0 to 50 mg/L	0.01 mg/L	0 to 20 mg/L: ± 0.1 mg/L or 1% of reading, whichever is greater; 20 to 50 mg/L: ±15% of reading
Conductivity•• 6560 Sensor‡	0 to 100 mS/cm	0.001 to 0.1 mS/cm (range dependent)	±0.5% of reading + 0.001 mS/cm
Salinity	0 to 70 ppt	0.01 ppt	±1% of reading or 0.1 ppt, whichever is greater
Temperature 6560 Sensor‡	-5 to +50°C	0.01°C	±0.15°C
pH 6561 Sensor‡	0 to 14 units	0.01 unit	±0.2 unit
ORP	-999 to +999 mV	0.1 mV	±20 mV
Depth - Deep	0 to 656 ft, 200 m	0.001 ft, 0.001 m	±1 ft, ±0.3 m
Depth - Medium	0 to 200 ft, 61 m	0.001 ft, 0.001 m	±0.4 ft, ±0.12 m
Depth - Shallow	0 to 30 ft, 9.1 m	0.001 ft, 0.001 m	±0.06 ft, ±0.02 m
Vented Level	0 to 30 ft, 9.1 m	0.001 ft, 0.001 m	±0.01 ft, 0.003 m
Turbidity• 6136 Sensor‡	0 to 1,000 NTU	0.1 NTU	±2% of reading or 0.3 NTU, whichever is greater**
Nitrate / nitrogen•••	0 to 200 mg/L-N	0.001 to 1 mg/L-N (range dependent)	±10% of reading or 2 mg/L, whichever is greater

Sensor Specifications	Range	Resolution	Accuracy
Ammonium / ammonia / nitrogen•••	0 to 200 mg/L-N	0.001 to 1 mg/L-N (range dependent)	±10% of reading or 2 mg/L, whichever is greater
Chloride•••	0 to 1000 mg/L	0.001 to 1 mg/L (range dependent)	±15% of reading or 5 mg/L, whichever is greater
Rhodamine•	0-200 µg/L	0.1 µg/L	±5% reading or 1 µg/L, whichever is greater

Blue-Green Algae Sensor Specifications	Range	Detection Limit	Resolution	Linearity
Blue-Green Algae Phycocyanin•	~0 to 280,000 cells/mL† 0 to 100 RFU	~220 cells/mL§	1 cell/mL 0.1 RFU	R2 > 0.9999**
Blue-Green Algae Phycoerythrin•	~0 to 200,000 cells/mL† 0 to 100 RFU	~450 cells/mL§§	1 cell/mL 0.1 RFU	R2 > 0.9999***
Chlorophyll• 6025 Sensor‡	~0 to 400 µg/L 0 to 100 RFU	~0.1 µg/L§§§	0.1 µg/L Chl 0.1% RFU	R2 > 0.9999****

• Maximum depth rating for optical probes is 200 feet, 61 m. Turbidity, Rhodamine, Blue-Green Algae (PC & PE) and Chlorophyll are available in a Deep Depth option (0 to 200 m). Anti-fouling optical probes have depth rating of 200 m.
•• Report outputs of specific conductance (conductivity corrected to 25° C), resistivity, and total dissolved solids are also provided. These values are automatically calculated from conductivity according to algorithms found in Standard Methods for the Examination of Water and Wastewater (ed 1989).
••• Freshwater only. Maximum depth rating of 50 feet, 15.2 m. 600 V2-2 has 3 ISE ports; not available on the 6600V2-4.

*In YSI AMCO-AEPA Polymer Standards.
**For serial dilution of Rhodamine WT (0-400 ug/L).
***For serial dilution of Rhodamine WT (0-8 µg/L).
****For serial dilution of Rhodamine WT (0-500 ug/L).

RFU = Relative Fluorescence Units
† Explanation of Ranges can be found in the 'Principles of Operation' section of the 6-Series Manual, Rev D.
‡ Sensors with listed with ETV logo were submitted to the U.S. EPA ETV program on the YSI 6600EDS. Information on performance characteristics of YSI water quality sensors can be found at www.epa.gov/etv (http://www.epa.gov/etv), or call YSI at 800.897.4151 (#) 800.897.4151 (#) for the ETV verification report. Use of ETV name or logo does not imply approval or certification of this product nor does it make any explicit or implied warranties or guarantees as to product performance.

§ Estimated from cultures of Microcystis aeruginosa.
§§ Estimated from cultures Synechococcus sp.
§§§ Determined from cultures of Isochrysis sp. and chlorophyll a concentration determined via extractions.

Specifications indicate typical performance and are subject to change.

Accessories

Reviews

Application Notes

Brochures and Catalogs

- 6-Series Multiparameter Water Quality Sondes | E23-10 (/File Library/Documents/Brochures and Catalogs/E23-6-Series-Multiparameter-Water-Quality-Sondes.pdf)
- Françias - Sondes Multiparametres Serie-6 Surveillance des eaux | E23-06-French (/File Library/Documents/Brochures and Catalogs/E23F-Francais-sondes-multiparametres-serie-6-surveillance-des-eaux.pdf)
- Deutsch - 6-Serie Multiparameter Wasserqualitats Messsonden (/File Library/Documents/Brochures and Catalogs/E23G-Deutsch-6-Serie-Multiparameter-Wasserqualitats-Messsonden.pdf)
- Japanese - 6-Series Multiparameter Water Quality Sondes | E23-10-Japanese (/File Library/Documents/Brochures and Catalogs/E23J-Japanese-6Series-Multiparameter-Water-Quality-Sondes.pdf)
- Water Monitoring Solutions | E58-07 (/File Library/Documents/Brochures and Catalogs/E58-Water-Monitoring-Solutions.pdf)
- 6-Series Anti Fouling Kits | E60-07 (/File Library/Documents/Brochures and Catalogs/E60-6-Series-Anti-Fouling-Kits.pdf)

- Source Water Monitoring Applications Capabilities and Solutions | E74-01 (/File Library/Documents/Brochures and Catalogs/E74-Source-Water-Monitoring-Applications-Capabilities-and-Solutions.pdf)
- YSI Vertical Profiler Brochure | E78-03 (/File Library/Documents/Brochures and Catalogs/E78-YSI-Vertical-Profiler-Brochure.pdf)
- HydroMet Water and Weather Monitoring Solutions Brochure | D86-02 (/File Library/Documents/Brochures and Catalogs/HydroMet-Monitoring-Brochure-D86-02-0516-.pdf)
- Surface Water Capabilities Brochure (/File Library/Documents/Brochures and Catalogs/Surface-Water-Capabilities-Brochure-E103-0416.pdf)
- Wastewater Catalog | W35 (/File Library/Documents/Brochures and Catalogs/W35-03-Wastewater-Catalog.pdf)
- Wastewater Water Quality Capabilities and Solutions | W35-03 (/File Library/Documents/Brochures and Catalogs/W35-Wastewater-Water-quality-capabilities-and-solutions.pdf)
- Groundwater Applications and Capabilities | W38-01 (/File Library/Documents/Brochures and Catalogs/W38-Groundwater-Applications-and-Capabilities.pdf)

FAQs

Guides

Infographics

Manuals

News Briefs

Specification Sheets

Technical Notes

Tips

You may also need

(/Accessory/id-606930/Carrying-Case-Large-Hard-sided)

(/Accessory/id-6155/6155-Optical-DO-Membrane-Kit)

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APPENDIX C
SonTek Flow Tracker Handheld-ADV

24/7 Technical Support

PINE (/)

The equipment supply & support people

Technical Support (24/7) : 800.301.9663 (tel:8003019663)

- CEMS & Protocol Gas
- Environmental Monitoring
- Health & Safety
- Motorized Rentals
- Non-Destructive Testing (NDT)
- Remote Visual Inspection (RVI)

SonTek FlowTracker Handheld-ADV

Equipment (/products/) /
Environmental Monitoring (/products/category/1001/environmental-monitoring/) /
Water Level & Flow Monitoring (/products/category/1169/water-level-and-flow-monitoring/) /
Water Flow Meters (/products/category/1195/water-flow-meters/) /
SonTek FlowTracker Handheld-ADV (/products/detail/10964/sontek-flowtracker-handheld-adv/)

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Question? (/products/question/10964/sontek-flowtracker-handheld-adv/)

Overview Specifications

Technical Specifications

Velocity Range:	±0.001 to 4.0 m/s (0.003 to 13 ft/s)
Velocity Resolution:	0.0001 m/s (0.0003 ft/s)
Velocity Accuracy:	±1% of measured velocity, ±0.25 cm/s
Sample Volume Location:	10 cm from center transducer

Communication Protocol:	RS-232
Power Supply:	8 AA Alkaline batteries (25+ hours of continuous operation)
Weight:	4 lbs
Probe Width:	5.1\"
LCD/Keypad Unit:	Temporarily submersible to 1 m (3 ft)
Operating/Storage Temperature:	-20º to 50ºC

CONTACT

help@pine-environmental.com (mailto:help@pine-environmental.com)

800.301.9663 (tel:8003019663)

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APPENDIX D
Smith-Root LR-24 Electrofisher

LR-24 Electrofisher

The World's Most Advanced and Safest Electrofisher

You, a Fisheries Biologist, called for a lightweight backpack electrofisher with precise digital controls, "quick setup" options, and the ability to store and recall electrical settings. "Time in the field is valuable," said fisheries scientists, "and we want to efficiently capture fish while maintaining a safe work environment."

By engaging with fisheries scientists in the development process, Smith-Root engineers transformed the backpack electrofishing world when creating Smith-Root's LR-24 Backpack Electrofisher. Among many innovations, the LR-24 introduced digital controls, "quick setup" options, 10 programmable/recallable settings, electrical output monitoring, overload warning, customized shoulder harness, 400 Watt electrical output, and state of the art safety features.

Features

Quick Setup

Quick Setup will select a voltage level necessary to achieve 25 watts average power output through the water between electrodes. This setup uses a default setting of a pulsed DC waveform with a frequency of 30 Hz and a 12% duty cycle (equivalent to a 4ms pulse width). All settings can be adjusted up or down from this starting point to achieve levels necessary for fish capture. This is very useful when electrofishing in a new area and you're not sure what settings to use.

Dual Output

This feature allows the operator to set up two completely independent sets of waveforms and voltages and toggle between them simply by releasing and pressing the anode pole switch in less than one second. This can be very useful if working in waters with multiple age classes, or multiple species where the optimal settings may be quite different.

Safety Features

Emergency stop switch, twin audible alarms, tilt and immersion sensors and Anode-Out-of-Water sensor, combined with the ETL safety certification make the LR-24 the safest backpack electrofisher available. With the **ETL Listed Mark** on the LR-24 Backpack Electrofisher, researchers can be confident that they are using the safest backpack electrofisher in the world.

Power Limit Key and Power Limit Mode

The Power Limit Key allows the user to limit the maximum average output power. It is defaulted to 400 watts, which is the maximum average power output that the LR-24 is capable of producing. It can be easily changed to a lower limit, which can be useful if a study requires staying within a certain power level. The user can decide whether the frequency or the voltage will be automatically decreased in order not to exceed the output power at that limit.

Precise control over output settings

Voltage can be adjusted in 5 volt increments, frequency in 1 Hertz increments, and duty cycle (pulse width) in 1% increments. This is very desirable given study results which indicate that fish injury rates decrease corresponding to decreases in all of these settings. Exact control of the settings allows for much greater control of the output waveforms.

Numerous waveform choices

The LR-24 can produce straight DC, pulsed DC, and Burst of Pulses (previously known as CPS waveform).

Rugged Construction

Roto-molded packframe and molded control box housing offer tough structural support in a light-weight package. The removable battery cover protects all cable connections from environmental conditions and wear and tear.

Storage locations for up to 10 user selected settings

There are 10 storage locations available to either pre-program desirable settings or to store settings currently in use. These storage locations are filled with Factory Default Stored Waveforms, but can be replaced one by one with settings the user prefers. These can be pre-programmed before going in the field or saved and stored while in the field. This can be very useful if a setting has been found to be very effective with a particular species, or it can be of use if a project supervisor wants to standardize sampling and provide settings for crews to use in the field. Factory default stored waveforms can be restored if desired.

Suspension System

The easy-to-fit Cordura suspension harness allows for quick adjustment, making multi-user operations fast, simple and convenient.

SAFETY FIRST

The LR-24 Electrofisher is the first and only electrofisher independently tested and certified to meet published safety standards.

Technical Specifications

Output Power	400W continuous, 39,600W peak
Output Voltage	50 to 990V in 5V steps
Output Frequency	0 to 120Hz in 5Hz steps, Gated burst up to 1000Hz
Duty Cycle	0% to 99% in 1% steps
Output Current	40A peak max, 4A continuous at 100V

Specifications subject to change without notice.

Output Waveforms	Smooth DC, Pulsed DC, Burst of Pulses DC
Waveform Storage	Save voltage, frequency, duty cycle and pulse type for 10 different waveforms
Operational Duty Cycle	40% Max. (192 seconds on 288 seconds off) at 40° C ambient 400VA output
Overload Protection	Excessive peak current, average current or over-temperature will shutdown the unit before damage can occur. Resets automatically when condition is corrected
Output Indicator	Audio tone for 30VDC and greater and increasing pulse rate for output power, Flashing red light, Status display for output voltage both average and peak, output current both average and peak and output power
Metering	Peak and average output current, Peak and average output voltage, Peak and average output power, Battery voltage, Battery current, Battery fuel gauge, Timer, Waveform settings, Error messages, Fault conditions
Output On Timer	0 to 999,999 seconds, resettable via menu
Environmental Requirements	Operational altitude: -400 to 3000 meters Relative humidity: 10% to 90% noncondensing Operating temperature: 0° to 40° C Storage temperature: -15° to 50° C
Construction	Sealed molded polyethylene and ABS case NEMA 4, IP 65
Safety Devices	Output indicator Tilt switch: Forward 50°, backward 40°, sideways 45° all ± 10° Immersion sensor Electrode out of water sensor Electode pole switch Emergency stop switch Battery compartment interlock Battery fuseable link
Electrodes	6 ft. 2-piece pole, 6 ft. 1-piece pole; 6 in., 11 in., 18 in. aluminum ring, 11 in. stainless steel ring; stainless steel trailing cathode
Battery	Choice of 24V batteries
Battery Life	40 minutes continuous at 100W with 7Ah battery

Specifications subject to change without notice.

Size and Weight	Height: 27.5 in (69.9 cm) Width: 14.5 in (36.9 cm) Depth: 14.5 in (36.9 cm) Weight: 20.35 lb. (9.23 kg) without battery or accessories
Certifications	UL STD 61010A-1 CAN/CSA C22.2 STD NO. 1010.1

Specifications subject to change without notice.

Need an electrofisher for only a week or a month? Rent one.

The Smith-Root rental program is a worry-free and flexible way to get the equipment you need for field season. You can rent on a weekly or monthly basis and Smith-Root's rental program also offers you credit toward ownership of new equipment.

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Since 1964, Smith-Root has proudly partnered with fisheries scientists to develop solutions for the fisheries conservation community.

Appendix D:

2020 - 2021 Stream Bioassessment: Rowlett Creek, City of Garland, Rowlett Creek Brown Branch, City of Plano, and Estelle Creek, City of Irving

Innovative approaches
Practical results
Outstanding service

Job No. ATK18674

2020 - 2021 STREAM BIOASSESSMENT: ROWLETT CREEK, CITY OF GARLAND, ROWLETT CREEK BROWN BRANCH, CITY OF PLANO, AND ESTELLE CREEK, CITY OF IRVING

Prepared for:

North Central Texas Council of Governments
616 Six Flags Drive
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Prepared by:

ATKINS
17304 PRESTON ROAD, SUITE 1300
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AND

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10431 MORADO CIRCLE, SUITE 300
AUSTIN, TEXAS 78759

February 2022

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ACRONYMS AND ABBREVIATIONS

ALU	Aquatic Life Use
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
FNI	Freese and Nichols, Inc.
IBI	Index of Biotic Integrity
mg/L	milligrams per liter
mL	milliliter(s)
NCTCOG	North Central Texas Council of Governments
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks & Wildlife Department
USGS	U.S. Geological Survey

1.0 INTRODUCTION

Atkins, under contract to the North Central Texas Council of Governments (NCTCOG), subcontracted with Freese and Nichols, Inc. (FNI) to conduct stream rapid bioassessments on Rowlett Creek in Garland, Texas, Rowlett Creek Brown Branch in Plano, Texas, and Estelle Creek in Irving, Texas, in 2020 and 2021. Each creek was sampled at the same location during the months of June and September in 2020 and in 2021, for a total of four sampling trips per site. Habitat parameters, benthic macroinvertebrates and fish communities were sampled and data compared to metrics from the Texas Commission on Environmental Quality (TCEQ, 2014). Water chemistry and flow parameters were also measured during each trip.

All streams are located in the Texas Blackland Prairie ecoregion (Ecoregion 32) (Griffith et al., 2004). Within an ecoregion, soils, climate, landform, and vegetation are expected to be relatively similar. Reference conditions for benthic macroinvertebrates and fish inhabiting wadeable streams in the Texas Blackland Prairie ecoregion are described by the TCEQ (2012). Evaluating benthic macroinvertebrates and fish communities with aquatic life use (ALU) designations in TCEQ (2014) may indicate whether the streams have been impacted by human activities. ALU categories are based on the indices of biotic integrity (IBI) scores, calculated for each stream from a composite index of the overall condition of a fish or benthic community.

This report summarizes sampling methods, data collected, and final bioassessment results (**Table 1**). ALU designations help the TCEQ determine the desired uses and water quality criteria appropriate for streams, and the designations will reflect the impact that impairments such as pollutants, landscape stressors, and habitat alteration can have on stream integrity.

Table 1. Aquatic Life Use Designations for Fish, Benthic Macroinvertebrates, and Habitat in Rowlett, Rowlett Brown Branch and Estelle Creeks for 2020-2021

	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek	
2020	**June**	**Sept**	**June**	**Sept**	**June**	**Sept**
Habitat Quality Index	H	H	H	H	I	I
Fish IBI	H	H	H	I	I	L
Benthic Macroinvertebrate IBI	I	I	I	H	I	L
2021						
Habitat Quality Index	H	H	H	H	I	I
Fish IBI	H	H	H	I	I	I
Benthic Macroinvertebrate IBI	I	H	I	I	L	I

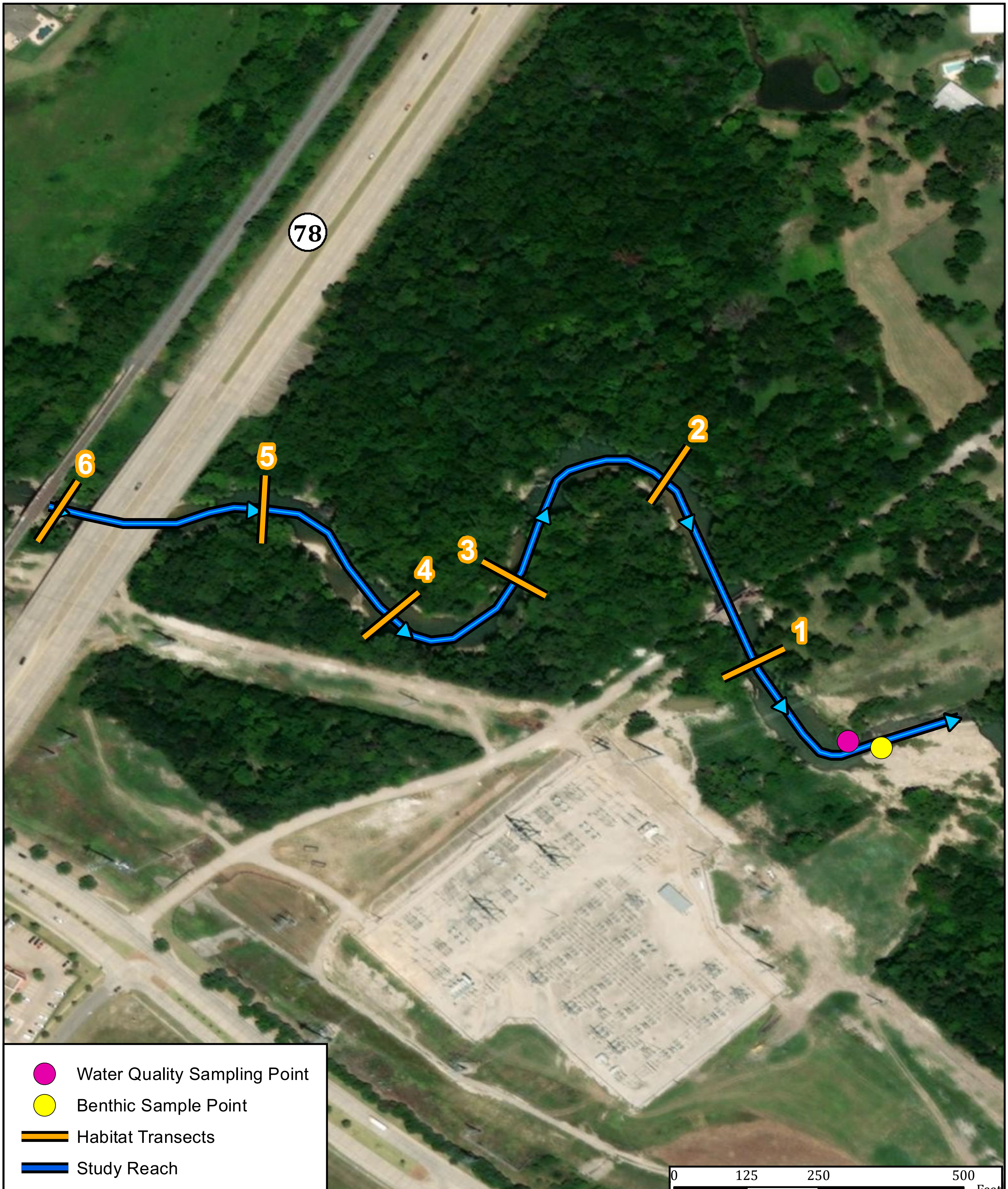
ALU abbreviations: L = Limited, I = Intermediate, H = High

2.0 SITE DESCRIPTIONS

Rowlett Creek (GARBA20201) was sampled downstream of State Highway 78 in the city of Garland, Dallas County, Texas (**Figures 1** and **2**). Rowlett Creek extends 25 stream miles upstream of the study reach into the city of McKinney, Collin County, Texas.

Figure 1: Rowlett Creek (GARBA20201) below State Highway 78 on September 24, 2020. View towards upstream. Photograph taken by Tam Tran (FNI).

Pittman and Spring creeks in Plano, Cottonwood Creek in Allen, and Russell and West Rowlett creeks in Frisco form the 77,000-acre Rowlett Creek watershed upstream of the Garland study reach. Treated wastewater from the North Texas Municipal Water District's (NTMWD) Rowlett Creek Regional Wastewater Treatment Plant (Texas Pollutant Discharge Elimination System water quality permit number WQ0010363001) is the only permitted wastewater discharge in the watershed. This discharge enters Rowlett Creek about 8.2 miles upstream of the study reach. The wastewater permit for this facility allows an annual average discharge of 24 million gallons per day. There are no dams on Rowlett Creek upstream of the study reach.



FNI PROJECT NUMBER	ATK18309
DATE CREATED	Date: 2/10/2021
DATUM & COORDINATE SYSTEM	NAD83 State Plane (Feet) Texas Central
FILE NAME	Name: Fig2_Rowlett Creek in Garland
PREPARED BY	KLC

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North Central Texas Council of Governments
2018-2021 Bioassessments

ROWLETT CREEK (GARBA20201) DOWNSTREAM OF KANSAS SO. RAILROAD IN GARLAND

N
W E
S

FIGURE 2

Date Saved: 2/10/2021 10:22:06 AM

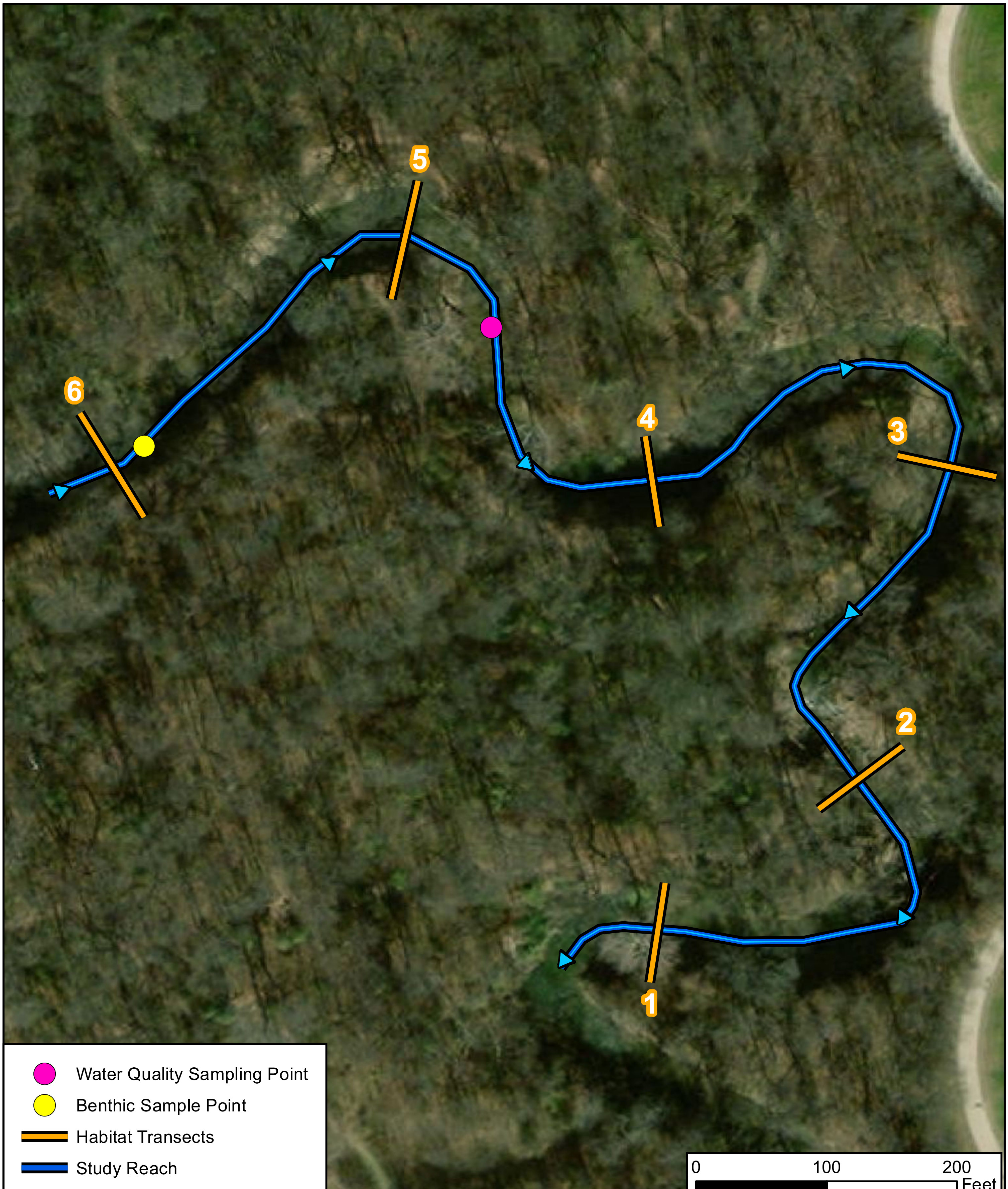
Path: H:\ENVIRONMENTAL\Final_Exhibits\2021-21 Report Figures\Fig2_Rowlett Creek in Garland.mxd

Except for riparian zones along creeks and parks, the watershed is rapidly developing with more than half the watershed covered with residential and commercial development. The 1,640-foot-long study reach captures drainage from most of the Rowlett Creek watershed upstream of Garland. The upstream end of the study reach starts at the downstream edge of the Kansas Southern Railroad bridge, about 180 feet downstream of the confluence with Spring Creek. The study reach extends under the State Highway 78 bridge, then under the Ben Davis Road bridge, which is closed to traffic, under two electric transmission lines, and ends downstream of a concrete pad extending from the south (right) bank into the creek. Much of the riparian zone along this reach is forested. Within the study reach the riparian buffer on the north side of Rowlett Creek is over 400 feet wide in places and wooded riparian vegetation extends along about 76% of the shore. Along the south shore, the riparian zone is up to 300 feet wide in places and extends along about 69% of the shore.

Rowlett Creek Brown Branch (PLRBA20201) was sampled downstream of Jupiter Road in Oak Point Park and Nature Preserve in the City of Plano, Collin County, Texas (**Figures 3** and **4**). The creek extends 2.7 stream miles upstream to Watters Branch and 3.1 stream miles to Russell Creek. The stream assessment reach is approximately 6 stream miles downstream of the confluence of West Rowlett Creek and Rowlett Creek. West Rowlett Creek extends an additional 6.8 miles upstream, and Rowlett Creek extends an additional 7 miles upstream from the confluence. No dams impound either creek upstream of the study reach.

Figure 3: Rowlett Creek Brown Branch (PLRBA20201) in Oak Point Park on September 23, 2020. View towards downstream. Photograph taken by Tam Tran (FNI).

At the upstream end of the watershed, the creek maintains a natural streambed and traverses through residential areas and golf courses. Rowlett Creek's watershed upstream of the study reach covers approximately 27,500 acres. There are no permitted wastewater discharges upstream of the study reach. The 1,420-foot-long study reach is buffered on the left and right banks by Oak Point Park and Nature Preserve. The park has a mowed and maintained grassy area with paved walking paths and dirt trails for hiking near and within the forested riparian areas. The riparian zone is relatively wide, with a minimum buffer of 70 feet, and a maximum buffer of 3,700 feet within the study reach.



FNI PROJECT NUMBER	ATK18309
DATE CREATED	Date: 2/10/2021
DATUM & COORDINATE SYSTEM	NAD83 State Plane (Feet) Texas Central
FILE NAME	Name: Fig4_Rowlett Creek at Brown Branc
PREPARED BY	KLC

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ROWLETT CREEK (PLRBA20201) AT BROWN BRANCH IN PLANO

FIGURE 4

Estelle Creek (IRRBA20201) was sampled downstream of West Pioneer Drive in the City of Irving, Dallas County, Texas (**Figures 5** and **6**). The creek extends 3.9 stream miles upstream of the study reach to north Irving, just east of the Dallas-Fort Worth International Airport. Throughout most of the watershed, the creek is confined to a concrete channel extending more than 3 miles and passes through DFW airport, and residential and commercial areas.

Figure 5: Estelle Creek (IRRBA20201) downstream of W Pioneer Dr. on September 25, 2020. View towards upstream. Photo taken by Tam Tran (FNI)

The Estelle Creek watershed upstream of the study reach covers approximately 2,100 acres. Estelle Creek is a highly altered watercourse with two low-head dams within the study reach that form impoundments. The creek is substantially modified between transects 2 to 5 of the study reach. An electrical transmission line crosses the stream at transect 3. An approximate 260-foot stretch between transects 1 and 2 is the only unaltered stream section until the confluence with Bear Creek. Along the 980-foot-long study reach there is a limited riparian buffer on both sides of the stream, with the largest buffer which is shared with Bear Creek along the right bank between transects 1 and 2. Residential areas and commercial properties are extensive near the study reach and surround the greater study reach area.

FNI PROJECT NUMBER	ATK18309
DATE CREATED	Date: 2/12/2021
DATUM & COORDINATE SYSTEM	NAD83 State Plane (Feet) Texas Central
FILE NAME	Name: Fig6_Estelle Creek
PREPARED BY	KLC

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2018-2021 Bioassessments

ESTELLE CREEK (IRRBA20201) NEAR W. PIONEER DR. IN IRVING

N W E S

FIGURE 6

3.0 METHODS

Methods described here were used for each sample event at each study reach. Rowlett Creek, Rowlett Creek Brown Branch, and Estelle Creek were sampled during the "Non-critical" period between June 17 and 19 in 2020, and between June 22 and 24 in 2021. The streams were sampled during the "Critical" period between September 23 and 25 in 2020, and September 15 and 17 in 2021. The TCEQ (2012) recommends one sample be collected during the Non-critical period and one during the Critical Period when two samples are collected at the same site during the same year. The TCEQ (2012) also recommends samples be collected at least 1 month apart, when flows are relatively low, and not recently impacted by rainfall runoff. To determine if flow conditions were suitable for sampling, flows at the U.S. Geological Survey (USGS) gauges on Rowlett Creek (Station 08061540) and Bear Creek (Station 0804956950) were observed for 2 weeks prior to each sample event. The Rowlett Creek gage was selected, because it is at the upstream end of the Rowlett Creek study reach and downstream of the Rowlett Creek Brown Branch study reach. The Bear Creek gage was selected because it is the closest relevant location to Estelle Creek, which flows into Bear Creek at the bottom of the assessment reach. Sampling methods followed the TCEQ's surface water quality monitoring procedures (TCEQ, 2012, 2014) and were also described in the "Regional Stormwater Monitoring Plan: Bioassessment Monitoring Plan 2018–2021" (FNI, 2018).

The Non-critical period (March 15–June 30 and October 1–15) represents the relatively warm period of the year when reproduction, growth, and migration of fish and other aquatic organisms typically occurs. The Critical Period (July 1–September 30) usually experiences lowest flows, highest water temperatures, and extended hours of sunlight. These conditions may contribute to dissolved oxygen levels that become critically low for aquatic life. The ability of water to contain dissolved oxygen decreases as temperature increases. If aquatic plants are abundant in the summer, dissolved oxygen can decline to harmful levels for fish in the early morning. These early morning declines in oxygen result from lack of photosynthetic oxygen production during the night combined with relatively high rates of oxygen consumption by aquatic plants and animals in the warm stream.

FNI fisheries biologist, Aaron Petty and biologist Tam Tran, conducted all of the sample events at each stream. City of Irving employee Cody Cash assisted with field sampling at Estelle Creek in June 2021.

3.1 HABITAT

Study reaches for each stream were calculated based on the average width measurements taken during initial site reconnaissance. Forty times the average wetted width of each stream (in meters) determined the length of stream reach evaluated. Habitat was assessed at six transects in Garland and Plano, and five transects in Irving. The transects were evenly spaced along each stream reach during the June sample event and marked with flagging for subsequent sampling trips. Photographs were taken of the upstream and downstream reaches and of each bank at each transect. During both the June and September sample events, a tape measure was used to measure stream widths at each transect. Habitat characteristics measured during the June sample event were reviewed in September, and the FNI team determined the habitats in September were similar to the June habitat measurements in all streams. Stream flows were measured using a Sontek Flowtracker2®. Study reaches included riffles, pools, glides, and runs.

3.2 WATER QUALITY

Grab samples for laboratory analysis of water quality were taken in representative portions of each creek at a depth of 1 foot, immediately preserved on ice, and delivered to the laboratory within 3 hours of collection. Water samples were analyzed by Pace Analytical Laboratory in Fort Worth for E. coli bacteria, and at the Allen laboratory for nitrate-nitrogen and dissolved phosphate-phosphorus.

A HydroTech OEM Hydrolab® Compact DS water quality meter measured dissolved oxygen (DO), specific conductance, temperature, and pH when water samples were collected for laboratory analysis at the water quality sampling point. A YSI 6920 V2 equipped with an optical dissolved oxygen probe and a turbidity probe measured DO, turbidity, specific conductance, temperature, and pH every 15 minutes over a diurnal period during each sample event.

3.3 FISH

Fish were collected along the length of the study reach using two methods:

- Electrofishing with a variable-voltage Midwest Lake Electrofishing Infinity XStream model battery-powered backpack unit fished for at least 15 minutes. One person operated the backpack unit, and one to three people collected fish with long-handled dip nets.
- Seining with a 10-x-6-foot x ⅛-inch mesh seine and a 30-x-6-foot x ¼-inch mesh seine for a minimum of six seine hauls. Fish collected in each seine haul were identified, counted, and released back to the stream after each haul.

All wadeable habitat types were sampled. Pools over 4 feet deep were not sampled due to the inability of seines and the backpack shocker to effectively and safely sample this habitat. Fish were identified to species, counted, and observed for external deformities. Two individuals of each species from each creek were preserved in 10% buffered formalin and will be maintained as voucher specimens. Voucher photographs were collected of fish longer than 10 inches total length if necessary.

3.4 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrates were collected with 5-minute kick-net samples in riffles with a triangle frame dip net equipped with 0.5-millimeter mesh. Snag sampling techniques were also employed to account for deeper areas and streams with unstable substrate and included the collection of macroinvertebrates from submerged woody debris and boulders. Samples were collected in riffles consisting of a variety of cobblestones, boulders, concrete riprap, coarse sand, and bedrock. The same riffles were sampled in all sample events. Organisms were preserved in the field with 95% ethanol and sent to Jack Davis, the benthic macroinvertebrate subcontractor, for analysis. After analysis, organisms identified and counted for the benthic macroinvertebrate assessments were preserved as voucher samples. Benthic IBIs were categorized and scored according to the TCEQ Updates to Chapter 5 and Appendix B of the Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (TCEQ 2019).

3.5 MUSSELS

Mussels were sought by visually scanning the stream bottom and shores. The clear shallow water in the Rowlett Creek Brown Branch and Estelle creeks allowed the bottom to be seen throughout much of the entire study reach. Empty mussel shells of Giant Floater (Pyganodon grandis) and Pondhorn (Uniomerus tetralasmus) were observed in Estelle Creek in 2020 and 2021, primarily near Transect 2 in shallow water. Native mussels were not observed in the Rowlett or Rowlett Brown Branch reaches. Corbicula fluminea, the non-native Asiatic clam, was observed in all three creeks.

4.0 RESULTS AND DISCUSSION

4.1 HABITAT

Habitat quality index scores are but one measure of stream composition, and they reflect the impact that impairments such as pollutant discharge, landscape stressors, and riparian zone alterations can have on stream integrity. Although the relationship between human activity from induced chemical contamination, flow modification, or habitat alteration to stream health may be complex, the resulting impairments can be quantified through index scores. To detect impacts possibly caused by those stressors, it is important to understand how physical habitat quality may affect biological communities.

Tables 2 and **3** summarize habitat quality assessments for Rowlett, Rowlett Brown Branch and Estelle creeks in the Critical and Non-critical periods for 2020 and 2021. The directional arrows next to the scores in **Tables 3** and **5** show changes in the habitat quality index scores and associated metrics between 2020 and 2021. For both 2020 and 2021, habitat characteristics measured during the June sample event in Rowlett, Rowlett Creek Brown Branch and Estelle creeks were reviewed in September, and the sampling crew determined habitats in September were similar to the June habitat measurements in all streams.

Tables 4 and **5** list data used to derive the assessments from 2020 and 2021, respectively. Rowlett Creek had the highest possible scores for pool size, water level, riparian buffer, and channel sinuosity. Rowlett Creek Brown Branch retained the highest possible scores for pool size, water level, channel sinuosity, and riparian buffer. Rowlett Creek and Rowlett Creek Brown Branch received the lowest scores for bank stability, based on high bank erosion potential and elevated bank angles. Estelle Creek retained the highest possible score for water level, bottom-substrate stability and pool size but scored the lowest possible in channel sinuosity and riparian buffer. Three out of five transects for the stream had no natural riparian buffer, and the stream exhibited only one poorly defined bend.

High habitat quality index scores range from 20 – 25 and intermediate scores range from 14 – 19. Rowlett Creek had a habitat quality index score of 22 in 2020 and 2021, placing it in the high habitat quality category for both years. Rowlett Creek Brown Branch had a habitat quality index score of 24 in 2020 and 23 in 2021, also remaining in the high habitat quality category for the two-year study period. The decrease in score by 1-point for 2021 was reflective of a reduction in the number of riffles from 5 in 2020 to 4 in 2021. The riffle was lost due to high flow scour events that redistributed gravel and cobble substrate between the 2020 and 2021 sample events. Estelle Creek had a habitat quality index score of 19 in 2020 and 2021, for an intermediate habitat index score. Estelle Creek is a recently reconstructed stream with significant amounts of stabilizing riprap and poured concrete forming much of the bottom and banks of the stream within the study reach. The riprap provides moderate instream cover and high substrate stability, but the engineered structures affect stream aesthetics.

All study reaches exhibited effects of high flow that had moved cobble and boulders in riffles and additional erosion between the 2020 and 2021 sample events. The habitat characteristics did not substantially change between years, except for the minor change in score for Rowlett Creek Brown Branch. Rowlett Creek flows in Garland differed among the Non-critical and Critical sampling events for both years, but the average flows were similar; the 2020 average flow during sampling events was 70 cubic feet per second (cfs) and 2021 was 81.5 cfs. The stabilizing influence of the wastewater treatment plant discharge maintains the flow from 45 – 50 cfs in the absence of precipitation. Rowlett Creek Brown Branch exhibited lower flows in 2020 compared with 2021, and the highest flow was observed in June of 2021 at 22 cfs. Average flows between the 2020 and 2021 sampling events were 11 and 15 cfs respectively. Low flows of around 0.2 cfs were recorded for Estelle Creek for each sampling event, and the impoundments upstream of the study area on Estelle Creek continued to buffer higher continuous flows, even during recent rain events.

Table 2. Habitat Quality Index Scores for Rowlett, Rowlett Brown Branch, and Estelle Creeks on June 17–19, 2020

Habitat Quality Index	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Maximum Possible Habitat Quality Index Score*
	Measurement Category	Habitat Quality Index Score	Measurement Category	Habitat Quality Index Score	Measurement Category	Habitat Quality Index Score	
Available Instream Cover	Rare	2	Rare	2	Common	3	4
Bottom Substrate Stability	Moderately Stable	3	Moderately Stable	3	Stable	4	4
Number of Riffles	Common	3	Abundant	4	Rare	2	4
Dimensions of Largest Pool	Large	4	Large	4	Large	4	4
Water Level	High	3	High	3	High	3	3
Bank Stability	Unstable	0	Unstable	0	Moderately Stable	2	3
Channel Sinuosity	High	3	High	3	None	0	3
Riparian Buffer Vegetation	Extensive	3	Extensive	3	Narrow	0	3
Aesthetics of Reach	Common Setting	1	Natural Area	2	Common Setting	1	3
Total Score		**22**		**24**		**19**	**31**
Habitat Quality		*High*		*High*		*Intermediate*	*Exceptional*

*Habitat quality index scores may range from 26–31 exceptional, 20–25 high, 14–19 intermediate, and ≤13 limited.

Table 3. Habitat Quality Index Scores for Rowlett, Rowlett Brown Branch, and Estelle Creeks on June 22–24, 2021

	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Maximum Possible Habitat Quality Index Score*
Habitat Quality Index	Measurement Category	Habitat Quality Index Score	Measurement Category	Habitat Quality Index Score	Measurement Category	Habitat Quality Index Score	
Available Instream Cover	Rare	2	Rare	2	Rare	3	4
Bottom Substrate Stability	Moderately Stable	3	Moderately Stable	3	Stable	4	4
Number of Riffles	Common	3	Common	↓3	Rare	2	4
Dimensions of Largest Pool	Large	4	Large	4	Large	4	4
Water Level	High	3	High	3	High	3	3
Bank Stability	Unstable	0	Unstable	0	Moderately Stable	2	3
Channel Sinuosity	High	3	High	3	None	0	3
Riparian Buffer Vegetation	Extensive	3	Extensive	3	Narrow	0	3
Aesthetics of Reach	Common Setting	1	Natural Area	2	Common Setting	1	3
Total Score		**22**		**23**		**19**	**31**
Habitat Quality		*High*		*High*		*Intermediate*	*Exceptional*

*Habitat quality index scores may range from 26–31 exceptional, 20–25 high, 14–19 intermediate, and ≤13 limited.

Table 4. Stream Characteristics for Rowlett, Rowlett Brown Branch, and Estelle Creeks on June 17–19, 2020, and the Habitat Quality Indices They Support

Habitat Characteristic	Rowlett Creek	Rowlett Creek Brown Branch	Estelle Creek	Habitat Quality Index Category
Dominant substrate	Gravel, clay, cobble, silt	Gravel, cobble, clay	Riprap, concrete, gravel	Available instream cover
Gravel-sized substrate or larger, average %	47%	50%	68%	Bottom substrate stability
Instream cover, average	23%	10%	34%	Available instream cover
Types of instream cover	Cobble, riprap, woody debris, undercut banks	Cobble, undercut banks, woody debris, leaf litter	Riprap, macrophytes, undercut banks	Available instream cover
Streambank erosion potential, average percent of streambank	50%	66%	32%	Bank stability
Streambank slope, average degrees	44°	37°	34°	Bank stability
Natural buffer vegetation width, average feet	270 ft	913 ft	68 ft	Riparian buffer vegetation
Riparian trees and shrubs, average % cover	60%	90%	15%	Riparian buffer vegetation
Tree canopy coverage, average %	64%	86%	16%	Riparian buffer vegetation
Maximum pool depth (ft)	10.0	3.5	5.1	Dimensions of largest pool
Maximum pool width (ft)	93	30	45	Dimensions of largest pool
Number of riffles	2	5	1	Number of riffles
% of channel bottom covered with water	95%	95%	95%	Channel Flow Status
Number of well-defined bends	2	3	1	Channel sinuosity
Number of moderately-defined bends	1	2	0	Channel sinuosity
Number of poorly-defined bends	0	0	1	Channel sinuosity
Flow (cubic feet per second) in Non-critical Period	45	8	0.1	Channel Flow Status
Flow (cubic feet per second) in Critical Period	95	14	0.2	Channel Flow Status
Aesthetics of stream reach	Altered landscape w/ few buildings, native veg.	Nature park setting, few buildings, native veg.	Altered landscape and stream, many buildings	Aesthetics of reach

Table 5. Stream Characteristics for Rowlett, Rowlett Brown Branch, and Estelle Creeks on June 22–24, 2021, and the Habitat Quality Indices They Support

Habitat Characteristic	Rowlett Creek	Rowlett Creek Brown Branch	Estelle Creek	Habitat Quality Index Category
Dominant substrate	Gravel, clay, cobble, silt	Gravel, cobble, claypan, bedrock	Riprap, cobble, gravel, cement	Available instream cover
Gravel-sized substrate or larger, average %	↓42%	↓30%	↑73%	Bottom substrate stability
Instream cover, average	↓12%	↓8%	34%	Available instream cover
Types of instream cover	Cobble, riprap, woody debris, undercut banks	Cobble, undercut banks, roots, woody debris, macrophytes	Riprap, macrophytes, undercut banks	Available instream cover
Streambank erosion potential, average percent of streambank	↑53%	↓65%	↓24%	Bank stability
Streambank slope, average degrees	44°	↓33°	↓24°	Bank stability
Natural buffer vegetation width, average feet	270 ft	913 ft	68 ft	Riparian buffer vegetation
Riparian trees and shrubs, average % cover	60%	90%	15%	Riparian buffer vegetation
Tree canopy coverage, average %	46%	↓78%	↑19%	Riparian buffer vegetation
Maximum pool depth (ft)	↑10.3	↑3.8	↑5.3	Dimensions of largest pool
Maximum pool width (ft)	↑97	↓29	↓40	Dimensions of largest pool
Number of riffles	2	↓4	1	Number of riffles
% of channel bottom covered with water	95%	95%	95%	Channel Flow Status
Number of well-defined bends	2	3	1	Channel sinuosity
Number of moderately-defined bends	1	2	0	Channel sinuosity
Number of poorly-defined bends	0	0	1	Channel sinuosity
Flow (cubic feet per second) in Non-critical Period	↑110	↑22	↑0.2	Channel Flow Status
Flow (cubic feet per second) in Critical Period	↓53	↓8	0.2	Channel Flow Status
Aesthetics of stream reach	Altered landscape w/ few buildings, native veg.	Nature park setting, few buildings, native veg.	Altered landscape and stream, many buildings	Aesthetics of reach

4.2 WATER QUALITY

Tables 6 and **7** summarize water quality in Rowlett, Rowlett Brown Branch and Estelle creeks for the Critical and Non-critical period sample events in 2020 and 2021, respectively. DO, pH, specific conductance, and temperature were within ranges expected to support ecologically healthy streams (TCEQ, 2020).

E. coli levels exceeded TCEQ's single sample criterion of 399 colonies per 100 ml in September 2020 for both the Rowlett Creek and Rowlett Creek Brown Branch locations and at Rowlett Creek in June 2021. The elevated values correspond with higher stream flows and the correlation between precipitation and non-point source runoff in urban environment. All sampling dates with elevated *E. coli* levels had significant antecedent precipitation events within two weeks of sampling. The precipitation total in the Rowlett Creek watershed within two weeks of sampling on September 23, 2020 was 3.6 inches, and 9 inches of rain fell within two weeks of the June 22, 2021 sample date. The June sampling events in 2020 and 2021 saw values below the 399 colonies/mL single sample criterion for Rowlett Creek and Rowlett Creek Brown Branch. Estelle Creek *E. coli* levels were below the 399 colonies/mL single sample criterion for all four sampling events in 2020 and 2021.

Dissolved phosphorus levels were below the screening level for unclassified freshwater streams during every sampling event in 2020 and 2021 for all streams. However, nitrate levels exceeded TCEQ screening levels in Rowlett Creek for all sampling events. The observed increased nutrient loads may be attributable to a high proportion of stream flow coming from the Rowlett Creek Regional Wastewater Treatment Plant located upstream of the sampling reach.

Turbidity values are reported in **Tables 6** and **7** and Estelle Creek had the lowest average turbidity values across all three streams. The on-channel dam structures act as a repository for fine sediments as water cascades from one pool to the next. Low flow conditions observed in Rowlett Creek Brown Branch also produced low turbidity values, where the stream bottom could be visualized in pools over 4 feet deep. Higher turbidity was consistently observed in Garland on Rowlett Creek due to the additional contributing upstream tributaries and wastewater influence.

Table 6. Water Quality in Rowlett, Rowlett Brown Branch, and Estelle Creeks during June and September 2020 Sample Events

Parameter	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Brown Branch June	Rowlett Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Water Quality Criteria (TCEQ, 2018) and Screening Criteria (TCEQ, 2020)
Field Measurements							
Number of measurements in 24-hour sample	88	81	91	85	77	86	
Dissolved oxygen, (mg/L), 24-hour average (range)	7.3 (6.1–8.8)	7.3 (7.1–7.6)	7.4 (6.4–9.1)	8.0 (7.8–8.5)	7.8 (6.1–9.7)	7.9 (7.0–8.9)	4.0 mg/L (24-hour average for Rowlett Creek), 5.0 mg/L (24-hour average for Rowlett Creek Brown Branch and Estelle Creek)
Dissolved oxygen, % saturation, 24-hour average (range)	92 (76–112)	85 (83–90)	94 (80–118)	91 (89-97)	99 (75–127)	94 (81–108)	
pH (standard units), 24-hour average (range)	7.7 (7.5–7.9)	7.0 (7.0–7.0)	7.8 (7.7–7.9)	7.2 (7.0–7.2)	7.7 (7.2–8.0)	7.1 (6.9–7.4)	
Specific conductance (µS/cm), 24-hour average (range)	722 (713–730)	553 (518–592)	665 (661–668)	413 (388–450)	567 (559–617)	632 (623–696)	
Temperature (°F), 24-hour average (range)	80.6 (78.5–83.0)	71.8 (71.6–72.6)	80.1 (77.4–83.0)	70.0 (69.4–70.7)	81.8 (79.1–86.7)	72.7 (70.1–75.6)	
Turbidity (Nephelometric turbidity units), 24-hour average (range)	8 (6–12)	21 (14–38)	3 (1–12)	8 (5–15)	2 (0–4)	1 (0–5)	

Parameter	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Brown Branch June	Rowlett Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Water Quality Criteria (TCEQ, 2018) and Screening Criteria (TCEQ, 2020)
Lab Measurements							
Escherichia coli bacteria (colonies/ 100 mL)	124	727[a]	126	1,120[a]	55	107	399 colonies/100 mL for a single sample
Phosphorus as Orthophosphate (mg/L)	0.31	0.093	<0.04	<0.04	<0.04	<0.04	0.69 mg/L (screening value Total P)
Nitrogen as Nitrate (mg/L)	9.7[b]	3.9[b]	1.1	0.90	<0.05	<0.05	1.95 mg/L (screening value)

mL = milliliter(s); mg/L = milligrams per liter
[a] Exceeded TCEQ single sample criterion for *E. coli* (TCEQ, 2018); [b] exceeded TCEQ screening value for nitrate (TCEQ, 2020)

Table 7. Water Quality in Rowlett, Rowlett Brown Branch, and Estelle Creeks during June and September 2021 Sample Events

Parameter	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Creek Brown Branch June	Rowlett Creek Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Water Quality Criteria (TCEQ, 2018) and Screening Criteria (TCEQ, 2020)
Field Measurements							
Number of measurements in 24-hour sample	96	92	93	87	93	85	
Dissolved oxygen, (mg/L), 24-hour average (range)	7.1 (6.4–8.1)	6.2 (5.5–7.2)	7.6 (7.1–8.7)	7.9 (6.9–9.5)	6.1 (4.6–7.2)	5.2 (4.1–6.7)	4.0 mg/L (24-hour average for Rowlett Creek [Garland]), 5.0 mg/L (24-hour average for Rowlett Creek Brown Branch and Estelle Creek)
Dissolved oxygen, % saturation, 24-hour average (range)	89 (79–104)	78 (69–92)	94 (86–109)	96 (83–118)	81 (61–95)	67 (51–88)	

Parameter	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Creek Brown Branch June	Rowlett Creek Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Water Quality Criteria (TCEQ, 2018) and Screening Criteria (TCEQ, 2020)
pH (standard units), 24-hour average (range)	7.8 (7.7–7.8)	7.4 (7.3–7.6)	7.9 (7.8–7.9)	7.8 (7.7–8.0)	7.2 (7.1–7.3)	*7.2 (7.1–7.5)*	
Specific conductance (µS/cm), 24-hour average (range)	757 (727–783)	775 (737–805)	707 (700–715)	611 (606–616)	1,016 (887–1,211)	899 (874–921)	
Temperature (°F), 24-hour average (range)	78.1 (76.8–81.4)	78.8 (77.3–80.1)	77.0 (75.0–79.7)	75.8 (74.3–77.9)	81.1 (79.3–88.5)	80.2 (78.2–82.6)	
Turbidity (Nephelometric turbidity units), 24-hour average (range)	10 (6–14)	8 (5–17)	4 (4–4)	1 (0–7)	2 (1–3)	1 (0–4)	
Lab Measurements							
Escherichia coli bacteria (colonies/ 100 mL)	2,420[a]	56	144	114	124	11	399 colonies/100 mL for a single sample
Phosphorus as Orthophosphate (mg/L)	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	0.69 mg/L (screening value Total P)
Nitrogen as Nitrate (mg/L)	3.12[b]	7.56[b]	1.51	0.45	<0.05	<0.05	1.95 mg/L (screening value)

mL = milliliter(s); mg/L = milligrams per liter

[a] Exceeded TCEQ single sample criterion for *E. coli* (TCEQ, 2018); [b] exceeded TCEQ screening value for nitrate (TCEQ, 2020)

4.3 FISH

Tables 8 and **9** summarize fish data collected from Rowlett Creek, Rowlett Creek Brown Branch and Estelle Creek during the Critical and Non-critical periods for 2020 and 2021. **Tables 10** and **11** summarize scores for fish IBI metrics from all creeks in 2020 and 2021. Directional arrows included with values in **tables 9** and **11** illustrate the change in numbers of fish and taxa, and IBI scores between the 2020 and 2021 sampling events.

Eleven species of fish were collected from Rowlett Creek in June, and 13 species were collected in September 2020. In 2021, 12 fish species were collected in June and 14 were collected in September. Sixteen total species were collected across the two-year study. All Rowlett Creek sampling events maintained a high ALU rating and an average score of 44. More fish were collected in 2021 (698) than 2020 (518). Four sunfish taxa were observed, the most numerous being the Longear Sunfish (*Lepomis megalotis*). The non-native species, Common Carp (*Cyprinus carpio*) was collected during the Non-critical period in June 2021.

Fifteen species of fish were collected from Rowlett Creek Brown Branch in June and 10 species were collected in September 2020. In 2021, 12 species were collected at the June and September sampling events. Fifteen total species were collected across the two-year study. Sampling for both June events resulted in a high ALU rating, and both the September events resulted in an IBI score of 40 and an intermediate ALU rating for the fish community. Although no single IBI metric is to blame for the reduction in the score for the September events, the absence of a benthic invertivore species and a higher proportion of environmental stress tolerant fish species were consistent. The average score across the two-year study was 42.5, a high ALU rating. More fish were collected in 2020 (426) than 2021 (381). The non-native fish species, Common Carp was also collected in during the Non-Critical Period in June 2020.

Eight fish species were collected from Estelle Creek in June, and 7 were collected in September 2020. In 2021, 10 and 9 species were collected in June and September respectively. Eleven total species were collected across the two-year study. The September 2020 sampling event had a limited ALU rating, but the remaining events scored in the intermediate range. Estelle Creek sampling events across the two-year study had an average score of 35.75, indicative of an intermediate ALU rating overall. Minnow species diversity in the Estelle Creek fish community was poor for the study, primarily due to a lack of available riffle habitat. Red Shiner (*Cyprinella lutrensis*) and Blacktail Shiner (*Cyprinella venusta*) were the only minnow species collected and were encountered in relatively low numbers across the study period. The primary metrics that prevented Estelle Creek from achieving a higher fish community score were overall low species diversity, a high proportion of pollution tolerant species, and high numbers of omnivores with few insectivores. Estelle Creek was reconstructed in 2019 with dam structures and large amounts of riprap. These hard structures provide excellent substrate stability and instream cover but lack optimal habitat variety. Sunfish species usually benefit most from this type of rubble habitat and that is reflected in the data, with Green Sunfish (*Lepomis cyanellus*) accounting for over 40% of all fish collected from Estelle Creek in 2020 and 2021.

Table 8. Fish Collected from Rowlett, Rowlett Brown Branch and Estelle Creeks in June and September 2020

Species[1]	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Creek Brown Branch June	Rowlett Creek Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Feeding Habits	Tolerance to Environmental Stress[2]
Bluegill (*Lepomis macrochirus*)	3	6	11	16	3	4	Insects	Tolerant
Longear Sunfish (*Lepomis megalotis*)	56	61	43	30	6	14	Insects	
Green Sunfish (*Lepomis cyanellus*)	7	50	15	18	93	178	Fish	Tolerant
Redear Sunfish (*Lepomis microlophus*)	0	0	1	0	0	0	Insects	
Largemouth Bass (*Micropterus salmoides*)	21	3	4	0	75	4	Fish	
Common Carp (*Cyprinus carpio*)	0	0	1	0	0	0	Plants & animals	Tolerant
Red Shiner (*Cyprinella lutrensis*)	79	68	85	68	8	0	Insects	Tolerant
Central Stoneroller (*Campostoma anomalum*)	24	3	39	14	0	0	Algae	
Plains Killifish (*Fundulus zebrinus*)	0	1	0	0	0	0	Insects	Tolerant
Bullhead Minnow (*Pimephales vigilax*)	11	30	4	8	0	0	Insects	
Mimic Shiner (*Notropis volucellus*)	4	14	5	10	0	0	Plants & animals	Intolerant

Species[1]	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Creek Brown Branch June	Rowlett Creek Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Feeding Habits	Tolerance to Environmental Stress[2]
Western Mosquitofish (*Gambusia affinis*)	39	14	4	9	153	61	Insects	Tolerant
Blackstripe Topminnow (*Fundulus notatus*)	10	10	14	11	4	14	Insects	
Yellow Bullhead (*Ameiurus natalis*)	0	1	9	0	12	38	Plants & animals	
Flathead Catfish (*Pylodictis olivaris*)	1	0	1	0	0	0	Fish and animals	
Channel Catfish (*Ictalurus punctatus*)	0	2	3	3	0	0	Plants & animals	Tolerant
Total fish	**255**	**263**	**239**	**187**	**354**	**313**		
Total taxa	11	13	15	10	8	7		

[1] All species are native except for Common Carp which is non-native.
[2] Blanks indicate species with intermediate tolerance of environmental stress.

Table 9. Fish Collected from Rowlett, Rowlett Brown Branch and Estelle Creeks in June and September 2021

Species[1]	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Feeding Habits	Tolerance to Environmental Stress[2]
	June	Sept.	June	Sept.	June	Sept.		
Bluegill (*Lepomis macrochirus*)	14	26	48	19	19	44	Insects	Tolerant
Longear Sunfish (*Lepomis megalotis*)	37	46	11	46	1	23	Insects	
Green Sunfish (*Lepomis cyanellus*)	22	30	9	9	159	144	Fish	Tolerant
Redear Sunfish (*Lepomis microlophus*)	0	6	2	0	0	1	Insects	
Sunfish Hybrid[3] (*Lepomis* spp.)	0	3	0	0	0	0		
Largemouth Bass (*Micropterus salmoides*)	39	3	12	4	37	2	Fish	
Common Carp (*Cyprinus carpio*)	2	0	0	0	0	0	Plants & animals	Tolerant
Red Shiner (*Cyprinella lutrensis*)	99	98	33	45	8	0	Insects	Tolerant
Blacktail Shiner (*Cyprinella venusta*)	0	0	0	0	27	0	Insects	
Central Stoneroller (*Campostoma anomalum*)	19	2	27	10	0	0	Algae	
Bullhead Minnow (*Pimephales vigilax*)	20	84	6	14	0	0	Insects	

Species[1]	Rowlett Creek June	Rowlett Creek Sept.	Rowlett Creek Brown Branch June	Rowlett Creek Brown Branch Sept.	Estelle Creek June	Estelle Creek Sept.	Feeding Habits	Tolerance to Environmental Stress[2]
Mimic Shiner (*Notropis volucellus*)	11	0	2	0	0	0	Plants & animals	Intolerant
Western Mosquitofish (*Gambusia affinis*)	13	44	0	19	127	98	Insects	Tolerant
Blackstripe Topminnow (*Fundulus notatus*)	3	62	7	43	12	52	Insects	
Yellow Bullhead (*Ameiurus natalis*)	0	2	2	4	8	13	Plants & animals	
Black Bullhead (*Ameiurus melas*)	0	0	0	0	1	16	Plants & animals	Tolerant
Channel Catfish (*Ictalurus punctatus*)	0	7	0	5	0	0	Plants & animals	Tolerant
Flathead Catfish (*Pylodictis olivaris*)	1	5	2	2	0	0	Fish	
Total fish	**↑280**	**↑418**	**↓161**	**↑220**	**↓399**	**↑393**		
Total taxa	↑12	↑14	↓12	↑12	↑10	↑9		

[1]All species are native except for Common Carp which is non-native.

[2]Blanks indicate species with intermediate tolerance of environmental stress.

[3]*Lepomis* which are not identified to species were not counted as a separate taxon.

Table 10. Fish Index of Biotic Integrity Metric Scores for Rowlett, Rowlett Brown Branch and Estelle Creeks, June and September 2020

Metric	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Maximum Possible
	June	September	June	September	June	September	
Total number of species	3	3	5	3	3	3	5
Number of native minnow species	5	5	5	5	1	1	5
Number of bottom dwelling fish that eat insects	1	1	1	1	1	1	5
Number of sunfish species	3	3	5	3	3	3	5
% of individuals that tolerate environmental stress	3	3	3	1	3	1	5
% of individuals that eat animals and plants	5	5	5	5	5	3	5
% of individuals that eat insects	5	5	5	5	3	1	5
% of individuals that eat fish	5	5	3	5	5	5	5
Number of individuals per sample	3	3	2	2	4	3	5
% of individuals that are non-native species	5	5	5	5	5	5	5
% of individuals with disease or physical anomalies	5	5	5	5	5	5	5
Total score	**43**	**43**	**44**	**40**	**38**	**31**	**55**
Aquatic life use category	*High*	*High*	*High*	*Intermediate*	*Intermediate*	*Limited*	*Exceptional*

*Fish index of biotic integrity scores for the Texas Blackland Prairie ecoregion (Ecoregion 32) range from ≥49 exceptional, 41–48 high, 35–40 intermediate, and <35 limited.

Table 11. Fish Index of Biotic Integrity Metric Scores for Rowlett, Rowlett Brown Branch and Estelle Creeks, June and September 2021

Metric	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Maximum Possible
	June	September	June	September	June	September	
Total number of species	↑5	↑5	5	↑5	3	3	5
Number of native minnow species	5	5	5	↓3	↑3	1	5
Number of bottom dwelling fish that eat insects	1	1	1	1	1	1	5
Number of sunfish species	3	↑5	5	3	3	↑5	5
% of individuals that tolerate environmental stress	3	3	3	↑3	↓1	1	5
% of individuals that eat animals and plants	5	5	5	5	5	↑5	5
% of individuals that eat insects	5	5	5	5	3	↑3	5
% of individuals that eat fish	5	5	↑5	↓3	5	5	5
Number of individuals per sample	↓2	↓2	2	2	↓3	3	5
% of individuals that are non-native species	5	5	5	5	5	5	5
% of individuals with disease or physical anomalies	5	5	5	5	5	5	5
Total score	**↑44**	**↑46**	**↑46**	**40**	**↓37**	**↑37**	**55**
Aquatic life use category	*High*	*High*	*High*	*Intermediate*	*Intermediate*	↑*Intermediate*	*Exceptional*

*Fish index of biotic integrity scores for the Texas Blackland Prairie ecoregion (Ecoregion 32) range from ≥49 exceptional, 41–48 high, 35–40 intermediate, and <35 limited.

4.4 BENTHIC MACROINVERTEBRATES

Tables 12 and **13** summarize benthic macroinvertebrate data collected for Rowlett, Rowlett Brown Branch and Estelle creeks during the Critical and Non-critical periods for 2020 and 2021. **Tables 14** and **15** summarize the scores for benthic macroinvertebrate index of biotic integrity metrics from all creeks in 2020 and 2021. Previously reported IBI scores and ALU determinations were based on statewide benthic IBI metrics. Updated TCEQ (2019) regional benthic IBI metrics and scoring criteria were applied for Ecoregion 32 (Blackland Prairie), resulting in IBI score changes to the data previously reported after 2020 sampling. Directional arrows included with values in **Tables 13** and **15** illustrate the change in numbers of benthic macroinvertebrates and taxa, and index of biotic integrity scores between 2020 and 2021 events.

Seventeen benthic macroinvertebrate taxa were collected in Rowlett Creek in 2020 and 16 were collected in 2021. Thirteen taxa were collected in June compared to 10 collected in September 2020. In 2021, 12 taxa were collected in June and 15 were collected in September. Both samples in 2020 and the June 2021 sample scored intermediate ALU ratings, however the September event scored a high rating. The primary metrics which led to a higher score in September than in June 2021 were higher numbers of mayfly, stonefly, and caddisfly taxa (EPT), higher numbers of mayfly taxa, and a lower percentage of the community made up of a numerically dominant taxon. Despite the lone high scoring sample event in 2021, the 2-year results point to an appropriate ALU benthic score of intermediate for Rowlett Creek in Garland. The average ALU score for 2020 – 2021 was 27.25.

Seventeen benthic macroinvertebrate taxa were collected in Rowlett Creek Brown Branch in both 2020 and 2021, with 11 collected in June compared to 13 collected in September 2020. Eight taxa were collected in June 2021 and 14 were collected in September 2021. The 2020 sample events split intermediate and high ALU ratings, however the ALU rating for both 2021 events was intermediate. The 2-year results point to an appropriate ALU benthic score of intermediate for Rowlett Creek Brown Branch in Garland, with an average numerical score of 26.5 across 2020 – 2021. The Rowlett Creek Brown Branch study reach had 5 riffles in 2020 and 4 were found in 2021. Although the study reach has a high number of riffles, the frequency of scouring high flow events tends to displace and migrate gravel and cobble material downstream, which can hamper the establishment of a higher scoring benthic community.

Eighteen benthic macroinvertebrate taxa were collected in Estelle Creek in 2020 and 21 taxa were collected in 2021. For 2020, 14 taxa were collected in June compared to only 8 collected in September.

Fifteen taxa were collected in June and 17 were collected in September 2021. The 2020 and 2021 sample events were split, with intermediate scores in June 2020 and September 2021, and limited ALU scores in September 2020 and June 2021 (**Tables 14** and **15**). Although Estelle Creek is the smallest drainage of the streams in the study, the 2-year results were mixed with alternating limited and intermediate ALU benthic scores. The average numerical score across 2020 – 2021 was 22 points, which qualifies for an intermediate ALU rating. Despite an intermediate ranking for the average of 4 samples, Estelle Creek has poor benthic macroinvertebrate habitat with only one small riffle. Stream reconstruction in 2019 resulted in the creation of primarily pool and glide habitats with multiple low-head dam structures on an already heavily impacted watershed. Achieving a higher benthic macroinvertebrate score would be difficult due to the habitat limitations, despite good water quality.

Table 12. Benthic Macroinvertebrates Collected from Rowlett, Rowlett Brown Branch and Estelle Creeks in June and September 2020

Species	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Feeding Habits	Tolerance Value*
	June	Sept.	June	Sept.	June	Sept.		
Leeches (Hirudinea)	4	0	0	0	0	0	Predator	8
Caddisfly (*Cheumatopsyche*)	39	42	41	34	3	98	Filtering collector	6
Caddisfly (*Chimarra*)	7	12	23	26	2	50	Filtering collector	2
Caddisfly (*Hydropsyche*)	0	4	0	0	0	0	Filtering collector	5
Caddisfly (*Oecetis*)	0	0	2	0	0	0	Shredder/predator	5
Scuds (*Hyallela*)	0	0	0	0	60	0	Collector-gatherer/ shredder	8
Snails (*Physella*)	0	0	0	0	0	2	Scraper	
Limpets (*Ferrissia*)	0	0	0	0	0	1	Scraper	7
Worms (Oligochaeta)	0	0	0	2	0	0	Collector-gatherer	8
Snout moth larvae (*Petrophila*)	0	0	0	0	0	4	Scraper	5
Damselfly larvae (*Argia*)	1	0	1	7	1	3	Predator	6
Damselfly larvae *(Enallagma*)	0	0	0	0	3	0	Predator	6
Damselfly larvae (Libellulidae)	0	0	0	0	1	0	Predator	8
Dragonfly larvae (*Brechmorhaga*)	0	0	0	3	0	0	Predator	6
Flatworm (*Dugesia*)	14	0	2	0	0	0	Predator	7.5
Midge fly larvae (Chironomidae)	20	26	7	14	13	5	Predator/collector- gatherer/filtering collector	6
Water boatmen (*Trichocorixa*)	0	0	0	0	1	0	Predator/collector-gatherer	5
Scavenger beetle larvae (*Berosus*)	0	0	0	0	3	0	Collector-gatherer/predator	9
Rove beetle larvae (Staphylinidae)	0	0	0	0	1	0	Predator	
Black fly larvae (*Simulium*)	0	6	0	5	0	0	Filtering collector	4
Mayfly larvae (*Baetis*)	8	1	3	0	0	0	Scraper/collector- gatherer	4

Species	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Feeding Habits	Tolerance Value*
	June	Sept.	June	Sept.	June	Sept.		
Mayfly larvae (*Caenis*)	3	0	1	2	78	0	Scraper/collector- gatherer	7
Mayfly larvae (*Callibaetis*)	1	0	0	0	10	0	Collector-gatherer	4
Mayfly larvae (*Camelobaetidius*)	0	15	2	21	0	0	Scraper/collector-gatherer	4
Mayfly larvae (*Fallceon*)	38	48	71	26	0	17	Scraper/collector- gatherer	4
Mayfly larvae (*Paracloeodes*)	1	0	0	1	0	0	Scraper/collector-gatherer	9
Mayfly larvae (*Procloeon*)	0	0	0	0	1	0	Scraper/collector-gatherer	4
Mayfly larvae (*Stenacron*)	0	0	0	0	1	0	Scraper/collector-gatherer	4
Mayfly larvae (*Tricorythodes*)	40	18	0	17	0	0	Collector-gatherer	5
Hellgrammite (*Corydalus*)	0	3	0	3	0	0	Predator	6
Water mite (Hydracarina)	1	0	1	0	0	0	Predator	6
Total benthic macroinvertebrates	**177**	**175**	**154**	**161**	**178**	**180**		
Total taxa	13	10	11	13	14	8		

*Tolerance to environmental stress values range from 0 (least tolerant) to 10 (most tolerant), but not all have listed tolerance values.

Table 13. Benthic Macroinvertebrates Collected from Rowlett, Rowlett Brown Branch and Estelle Creeks in June and September 2021

Species	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Feeding Habits	Tolerance Value*
	June	Sept.	June	Sept.	June	Sept.		
Leeches (Hirudinea)	0	0	0	0	2	2	Predator	8
Caddisfly larvae (*Cheumatopsyche*)	59	40	74	52	51	36	Filtering collector	6
Caddisfly larvae (*Chimarra*)	1	1	7	23	1	1	Filtering collector	2
Caddisfly larvae (*Hydropsyche*)	11	8	0	1	0	0	Filtering collector	5
Caddisfly larvae (*Hydroptila*)	0	0	0	0	0	5	Scraper	2
Caddisfly larvae (*Polycentropus*)	0	1	0	0	0	0	Filtering collector/predator	3
Scuds (*Hyallela*)	0	0	0	0	0	1	Collector-gatherer/ shredder	8
Snails (*Physella*)	0	0	0	0	6	12	Scraper	
Limpets (*Ferrissia*)	0	0	0	0	0	1	Scraper	7
Horn snails (*Gyraulus*)	0	0	0	0	1	5	Scraper	8
Horn snails (*Helisoma*)	0	0	0	0	21	3	Scraper	7
Asian clam (*Corbicula*)	0	0	0	0	0	2	Filtering collector	6
Fingernail clam (*Eupera*)	0	0	0	0	1	1	Filtering collector	
Worms (Oligochaeta)	0	0	0	1	0	0	Collector-gatherer	8
Snout moth larvae (*Petrophila*)	2	3	0	0	4	0	Scraper	5
Damselfly larvae (*Argia*)	1	0	0	1	21	22	Predator	6
Dragonfly larvae (*Brechmorhoga*)	0	0	0	1	0	0	Predator	6
Flatworm (*Dugesia*)	0	0	1	0	14	0	Predator	7.5
Midge fly larvae (Chironomidae)	35	23	4	49	30	22	Predator/collector- gatherer/filtering collector	6
Midge fly larvae (*Forcipomyia*)	0	0	0	0	0	1	Collector-gatherer/scraper	6
Water strider larvae (*Microvelia*)	0	1	0	0	0	0	Predator	6
Water strider larvae (*Rhagovelia*)	0	0	0	1	0	0	Predator	6

Species	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Feeding Habits	Tolerance Value*
	June	Sept.	June	Sept.	June	Sept.		
Riffle beetle larvae (*Stenelmis*)	0	0	0	0	1	0	Scraper/collector-gatherer	7
Scavenger beetle larvae (*Berosus*)	0	0	0	0	0	1	Collector-gatherer/predator	9
Rove beetle larvae (Staphylinidae)	0	0	0	0	4	0	Predator	
Dance fly larvae (*Hemerodromia*)	1	0	0	0	0	0	Predator	6
Black fly larvae (*Simulium*)	3	8	12	16	0	0	Filtering collector	4
Mayfly larvae (*Baetis*)	9	9	0	0	0	0	Scraper/collector- gatherer	4
Mayfly larvae (*Caenis*)	0	0	1	0	5	33	Scraper/collector- gatherer	7
Mayfly larvae (*Camelobaetidius*)	6	34	0	3	0	0	Scraper/collector-gatherer	4
Mayfly larvae (*Fallceon*)	35	17	50	6	0	0	Scraper/collector- gatherer	4
Mayfly larvae (*Maccaffertium*)	0	0	0	1	0	0	Scraper/collector-gatherer	4
Mayfly larvae (*Paracloeodes*)	0	1	0	0	0	0	Scraper/collector-gatherer	9
Mayfly larvae (*Tricorythodes*)	17	2	1	3	4	9	Collector-gatherer	5
Hellgrammite (*Corydalus*)	0	11	0	5	0	0	Predator	6
Water mite (Hydracarina)	0	1	0	0	0	0	Predator	6
Total benthic macroinvertebrates	**↑180**	**↓160**	**↓150**	**↑163**	**↓166**	**↓157**		
Total taxa	↓12	↑15	↓8	↑14	↑15	↑17		

*Tolerance to environmental stress values range from 0 (least tolerant) to 10 (most tolerant), but not all have listed tolerance values.

Table 14. Benthic Macroinvertebrate Index of Biotic Integrity Metric Scores for Rowlett, Rowlett Brown Branch and Estelle Creeks for June and September 2020

Metric	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Maximum Possible Score*
	June	Sept.	June	Sept.	June	Sept.	
Taxa Richness	2	1	2	2	2	1	4
Mayfly, Stonefly, and Caddisfly Taxa (EPT)	3	2	2	2	2	2	4
% Diptera and Non-Insect Taxa	3	3	4	4	1	4	4
% Chironomidae	2	1	4	3	3	4	4
Number of Ephemeroptera Taxa	3	2	2	3	2	1	4
% Dominant Taxon	4	3	2	4	2	2	4
% Dominant Functional Feeding Group	3	3	3	3	3	1	4
% Predators	3	4	1	4	4	1	4
% Collector-Gatherers	1	2	3	2	1	1	4
Hilsenhoff Biotic Index (HBI)	2	2	2	2	1	2	4
Number of Taxa with Tolerance <8.5	2	2	2	2	2	1	4
Total score	**28**	**25**	**27**	**31**	**23**	**20**	**44**
Aquatic life use category	*Intermediate*	*Intermediate*	*Intermediate*	*High*	*Intermediate*	*Limited*	*Exceptional*

*Benthic macroinvertebrate index of biotic integrity scores range from >32 exceptional, 29–32 high, 22–28 intermediate, and <22 limited.

Table 15. Benthic Macroinvertebrate Index of Biotic Integrity Metric Scores for Rowlett, Rowlett Brown Branch and Estelle Creeks for June and September 2021

Metric	Rowlett Creek		Rowlett Creek Brown Branch		Estelle Creek		Maximum Possible Score*
	June	Sept.	June	Sept.	June	Sept.	
Taxa Richness	2	↑2	↓1	2	2	↑2	4
Mayfly, Stonefly, and Caddisfly Taxa	↓2	↑3	2	2	2	2	4
% Diptera and Non-Insect Taxa	3	3	4	↓1	1	↓2	4
% Chironomidae	↓1	1	4	↓1	↓1	↓1	4
Number of Ephemeroptera Taxa	↓2	↑3	2	↓2	2	↑2	4
% Dominant Taxon	↓3	↑4	2	↓3	↑3	↑4	4
% Dominant Functional Feeding Group	3	3	↓1	↓1	↑4	↑4	4
% Predators	↑4	↓3	1	↓3	↓1	↑2	4
% Collector-Gatherers	↑3	↑3	↑4	↑4	1	↑3	4
Hilsenhoff Biotic Index (HBI)	2	2	2	2	1	↓1	4
Number of Taxa with Tolerance <8.5	2	2	2	2	2	↑2	4
Total score	**↓27**	**↑29**	**↓25**	**↓23**	**↓20**	**↑25**	**44**
Aquatic life use category	*Intermediate*	↑*High*	*Intermediate*	↓*Intermediate*	↓*Limited*	↑*Intermediate*	*Exceptional*

*Benthic macroinvertebrate index of biotic integrity scores range from >32 exceptional, 29–32 high, 22–28 intermediate, and <22 limited.

5.0 REFERENCES

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Appendix A
Bioassessment Photographs
2020

Appendix A – 2020 Photographs

Rowlett Creek in Garland on June 18, 2020. Photo faces upstream from habitat transect 5 toward Highway 78.

Rowlett Creek in Garland on June 18, 2020. Photo faces the right bank at transect 5 and illustrates severe ongoing bank erosion with near vertical banks.

Appendix A – 2020 Photographs

Rowlett Creek in Garland on September 24, 2020. Photo faces upstream from habitat transect 6 under the K.S. Railroad. The confluence between Spring Creek and Rowlett Creek is in the background.

Rowlett Creek in Garland on September 24, 2020. Photo faces upstream from habitat transect 1 and shows the old Ben Davis Road bridge crossing.

Appendix A – 2020 Photographs

Rowlett Creek - Brown Branch in Plano on June 16, 2020. Photo faces upstream from the pedestrian bridge at the stormwater sampling point, downstream of the study reach.

Rowlett Creek - Brown Branch in Plano on June 17, 2020. Photo faces upstream and shows a logjam with a riffle near habitat transect 2.

Appendix A – 2020 Photographs

Fish collected in Rowlett Creek - Brown Branch in Plano on June 17, 2020. Photo shows the fish species Bluegill, Flathead Catfish, and Longear Sunfish.

Rowlett Creek - Brown Branch in Plano on September 23, 2020. Photo faces upstream from habitat transect 1 and illustrates extensive erosion along the left bank in the background.

Appendix A – 2020 Photographs

Estelle Creek in Irving on June 19, 2020. Photo faces upstream from habitat transect 5 and illustrates the engineered portions of the stream with riprap lined banks.

Estelle Creek in Irving on September 25, 2020. Photo faces upstream from habitat transect 3 and illustrates one of the low head dam structures within the assessment reach.

Appendix A – 2020 Photographs

Estelle Creek in Irving on September 25, 2020. Photo faces downstream along the electric transmission line from habitat transect 4, illustrating the lack of native riparian buffer.

Estelle Creek in Irving on September 25, 2020. Photo faces downstream from habitat transect 1 at the confluence with Bear Creek.

Appendix B
Bioassessment Photographs
2021

Appendix B – 2021 Photographs

Rowlett Creek in Garland on June 23, 2021. Photo faces north toward the left bank at habitat transect 4. High erosion potential and incised bank illustrated.

Rowlett Creek in Garland on June 23, 2021. Photo of juvenile Largemouth Bass collected by seine net.

Appendix B – 2021 Photographs

Rowlett Creek in Garland on June 23, 2021. Photo faces north to left bank at habitat transect 5. Example of high vegetative cover, low erosion potential and low bank angle.

Rowlett Creek in Garland on September 16, 2021. Photo faces downstream from habitat transect 6 at a riffle with the Highway 78 bridge in the background.

Rowlett Creek - Brown Branch in Plano on June 22, 2021. Photo faces upstream from transect 3.

Rowlett Creek - Brown Branch in Plano on June 22, 2021. Juvenile Flathead Catfish (*Pylodictis olivaris*) collected during electrofishing.

Appendix B – 2021 Photographs

Rowlett Creek - Brown Branch in Plano on June 22, 2021. Photo faces downstream from transect 6 and illustrates the gravel/cobble riffle used for benthic macroinvertebrate sampling.

Rowlett Creek - Brown Branch in Plano on September 15, 2021. Photo faces downstream from habitat transect 2 and illustrates a large logjam.

Appendix B – 2021 Photographs

Estelle Creek in Irving on June 24, 2021. Photo faces downstream from habitat transect 5 and illustrates a long pool/glide habitat with concrete lined banks.

Estelle Creek in Irving on June 24, 2021. Blacktail Shiner (*Cyprinella venusta*) collected by seine near the confluence with Bear Creek.

Appendix B – 2021 Photographs

Estelle Creek in Irving on June 24, 2021. Photo faces downstream from habitat transect 2 toward the confluence with Bear Creek, with riffle habitat in the foreground.

Estelle Creek in Irving on September 17, 2021. Photo faces upstream from habitat transect 2, illustrating the riprap lined banks and dam structure in the background.

Appendix E:

Lab Certifications and Accreditations

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

		Certificate:	**T104704232-21-33**
Pace Analytical Services, LLC - Dallas, TX		**Expiration Date:**	**6/30/2022**
400 West Bethany Drive, Suite 190 **Allen, TX 75013-3714**		**Issue Date:**	**7/1/2021**

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Drinking Water***

Method SM 9222 D (MFC Medium)

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20210008

Method SM 9223-IDEXX Laboratories Colilert® Test

Analyte	AB	Analyte ID	Method ID
Total coliforms and E. coli (P/A)	TX	2502	20212413

Method SM 9223-IDEXX Laboratories Colilert® Quanti-Tray Test

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	20211603
Total coliforms (enumeration)	TX	2500	20211603

Texas Commission on Environmental Quality

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Matrix: ***Non-Potable Water***

Method EPA 1010

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10116606

Method EPA 120.1

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10006403

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 160.4

Analyte	AB	Analyte ID	Method ID
Residue-volatile	TX	1970	10010409

Method EPA 1664

Analyte	AB	Analyte ID	Method ID
n-Hexane Extractable Material (HEM) (O&G)	TX	1803	10127807
Silica Gel Treated n-Hexane Extractable Material (SGT-HEM)	TX	10220	10127807

Method EPA 1666

Analyte	AB	Analyte ID	Method ID
Ethyl acetate	TX	4755	10128208
Isopropyl acetate	TX	4890	10128208
n-Amyl acetate	TX	4360	10128208

Method EPA 180.1

Analyte	AB	Analyte ID	Method ID
Turbidity	TX	2055	10011606

Method EPA 200.7

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10013806
Antimony	TX	1005	10013806

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Matrix: ***Non-Potable Water***

Arsenic	TX	1010	10013806
Barium	TX	1015	10013806
Beryllium	TX	1020	10013806
Boron	TX	1025	10013806
Cadmium	TX	1030	10013806
Calcium	TX	1035	10013806
Chromium	TX	1040	10013806
Cobalt	TX	1050	10013806
Copper	TX	1055	10013806
Iron	TX	1070	10013806
Lead	TX	1075	10013806
Magnesium	TX	1085	10013806
Manganese	TX	1090	10013806
Molybdenum	TX	1100	10013806
Nickel	TX	1105	10013806
Potassium	TX	1125	10013806
Selenium	TX	1140	10013806
Silver	TX	1150	10013806
Sodium	TX	1155	10013806
Strontium	TX	1160	10013806
Thallium	TX	1165	10013806
Tin	TX	1175	10013806
Titanium	TX	1180	10013806
Vanadium	TX	1185	10013806
Zinc	TX	1190	10013806

Method EPA 200.8

Analyte	**AB**	**Analyte ID**	**Method ID**
Aluminum	TX	1000	10014605
Antimony	TX	1005	10014605
Arsenic	TX	1010	10014605

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Matrix: ***Non-Potable Water***

Barium	TX	1015	10014605
Beryllium	TX	1020	10014605
Cadmium	TX	1030	10014605
Calcium	TX	1035	10014605
Chromium	TX	1040	10014605
Cobalt	TX	1050	10014605
Copper	TX	1055	10014605
Iron	TX	1070	10014605
Lead	TX	1075	10014605
Magnesium	TX	1085	10014605
Manganese	TX	1090	10014605
Molybdenum	TX	1100	10014605
Nickel	TX	1105	10014605
Potassium	TX	1125	10014605
Selenium	TX	1140	10014605
Silver	TX	1150	10014605
Sodium	TX	1155	10014605
Thallium	TX	1165	10014605
Vanadium	TX	1185	10014605
Zinc	TX	1190	10014605

Method EPA 245.1

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10036609

Method EPA 300.0

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10053200
Chloride	TX	1575	10053200
Fluoride	TX	1730	10053200
Nitrate as N	TX	1810	10053200
Nitrate-nitrite	TX	1820	10053200
Nitrite as N	TX	1840	10053200

Matrix: ***Non-Potable Water***

Sulfate	TX	2000	10053200

Method EPA 353.2

Analyte	AB	Analyte ID	Method ID
Nitrate as N	TX	1810	10067400
Nitrate-nitrite	TX	1820	10067400
Nitrite as N	TX	1840	10067400

Method EPA 360.1

Analyte	AB	Analyte ID	Method ID
Oxygen, dissolved	TX	1880	10069008

Method EPA 420.1

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10079400

Method EPA 524.2

Analyte	AB	Analyte ID	Method ID
Acetone (2-Propanone)	TX	4315	10088809
Methylene chloride (Dichloromethane)	TX	4975	10088809

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10155609
Antimony	TX	1005	10155609
Arsenic	TX	1010	10155609
Barium	TX	1015	10155609
Beryllium	TX	1020	10155609
Boron	TX	1025	10155609
Cadmium	TX	1030	10155609
Calcium	TX	1035	10155609
Chromium	TX	1040	10155609
Cobalt	TX	1050	10155609
Copper	TX	1055	10155609
Iron	TX	1070	10155609
Lead	TX	1075	10155609

Matrix: ***Non-Potable Water***

Magnesium	TX	1085	10155609
Manganese	TX	1090	10155609
Molybdenum	TX	1100	10155609
Nickel	TX	1105	10155609
Potassium	TX	1125	10155609
Selenium	TX	1140	10155609
Silver	TX	1150	10155609
Sodium	TX	1155	10155609
Strontium	TX	1160	10155609
Thallium	TX	1165	10155609
Tin	TX	1175	10155609
Titanium	TX	1180	10155609
Vanadium	TX	1185	10155609
Zinc	TX	1190	10155609

Method EPA 6020

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10156419
Antimony	TX	1005	10156419
Arsenic	TX	1010	10156419
Barium	TX	1015	10156419
Beryllium	TX	1020	10156419
Cadmium	TX	1030	10156419
Calcium	TX	1035	10156419
Chromium	TX	1040	10156419
Cobalt	TX	1050	10156419
Copper	TX	1055	10156419
Iron	TX	1070	10156419
Lead	TX	1075	10156419
Magnesium	TX	1085	10156419
Manganese	TX	1090	10156419

Texas Commission on Environmental Quality

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Matrix: ***Non-Potable Water***

Molybdenum	TX	1100	10156419
Nickel	TX	1105	10156419
Potassium	TX	1125	10156419
Selenium	TX	1140	10156419
Silver	TX	1150	10156419
Sodium	TX	1155	10156419
Thallium	TX	1165	10156419
Vanadium	TX	1185	10156419
Zinc	TX	1190	10156419

Method EPA 608

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10103603
4,4'-DDE	TX	7360	10103603
4,4'-DDT	TX	7365	10103603
Aldrin	TX	7025	10103603
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10103603
Aroclor-1016 (PCB-1016)	TX	8880	10103603
Aroclor-1221 (PCB-1221)	TX	8885	10103603
Aroclor-1232 (PCB-1232)	TX	8890	10103603
Aroclor-1242 (PCB-1242)	TX	8895	10103603
Aroclor-1248 (PCB-1248)	TX	8900	10103603
Aroclor-1254 (PCB-1254)	TX	8905	10103603
Aroclor-1260 (PCB-1260)	TX	8910	10103603
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10103603
Chlordane (tech.)	TX	7250	10103603
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10103603
Dieldrin	TX	7470	10103603
Endosulfan I	TX	7510	10103603
Endosulfan II	TX	7515	10103603
Endosulfan sulfate	TX	7520	10103603

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Expiration Date:	**6/30/2022**
Issue Date:	**7/1/2021**

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Matrix: ***Non-Potable Water***

Endrin	TX	7540	10103603
Endrin aldehyde	TX	7530	10103603
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10103603
Heptachlor	TX	7685	10103603
Heptachlor epoxide	TX	7690	10103603
Methoxychlor	TX	7810	10103603
Toxaphene (Chlorinated camphene)	TX	8250	10103603

Method EPA 608.3

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10296625
4,4'-DDE	TX	7360	10296625
4,4'-DDT	TX	7365	10296625
Aldrin	TX	7025	10296625
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10296625
alpha-Chlordane	TX	7240	10296625
Aroclor-1016 (PCB-1016)	TX	8880	10296625
Aroclor-1221 (PCB-1221)	TX	8885	10296625
Aroclor-1232 (PCB-1232)	TX	8890	10296625
Aroclor-1242 (PCB-1242)	TX	8895	10296625
Aroclor-1248 (PCB-1248)	TX	8900	10296625
Aroclor-1254 (PCB-1254)	TX	8905	10296625
Aroclor-1260 (PCB-1260)	TX	8910	10296625
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10296625
Chlordane (tech.)	TX	7250	10296625
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10296625
Dieldrin	TX	7470	10296625
Endosulfan I	TX	7510	10296625
Endosulfan II	TX	7515	10296625
Endosulfan sulfate	TX	7520	10296625
Endrin	TX	7540	10296625

Matrix: ***Non-Potable Water***

Endrin aldehyde	TX	7530	10296625
Endrin ketone	TX	7535	10296625
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10296625
gamma-Chlordane	TX	7245	10296625
Heptachlor	TX	7685	10296625
Heptachlor epoxide	TX	7690	10296625
Methoxychlor	TX	7810	10296625
Toxaphene (Chlorinated camphene)	TX	8250	10296625

Method EPA 615

Analyte	AB	Analyte ID	Method ID
2,4,5-T	TX	8655	10298201
2,4-D	TX	8545	10298201
2,4-DB	TX	8560	10298201
Dalapon	TX	8555	10298201
Dicamba	TX	8595	10298201
Dichloroprop (Dichlorprop, Weedone)	TX	8605	10298201
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	TX	8620	10298201
MCPA	TX	7775	10298201
MCPP	TX	7780	10298201
Silvex (2,4,5-TP)	TX	8650	10298201

Method EPA 624

Analyte	AB	Analyte ID	Method ID
1,1,1-Trichloroethane	TX	5160	10107207
1,1,2,2-Tetrachloroethane	TX	5110	10107207
1,1,2-Trichloroethane	TX	5165	10107207
1,1-Dichloroethane	TX	4630	10107207
1,1-Dichloroethylene	TX	4640	10107207
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10107207
1,2-Dichlorobenzene	TX	4610	10107207
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10107207
1,2-Dichloropropane	TX	4655	10107207

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Matrix: ***Non-Potable Water***

1,3-Dichlorobenzene	TX	4615	10107207
1,4-Dichlorobenzene	TX	4620	10107207
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10107207
2-Chloroethyl vinyl ether	TX	4500	10107207
Acetone (2-Propanone)	TX	4315	10107207
Acrolein (Propenal)	TX	4325	10107207
Acrylonitrile	TX	4340	10107207
Benzene	TX	4375	10107207
Bromodichloromethane	TX	4395	10107207
Bromoform	TX	4400	10107207
Carbon tetrachloride	TX	4455	10107207
Chlorobenzene	TX	4475	10107207
Chlorodibromomethane	TX	4575	10107207
Chloroethane (Ethyl chloride)	TX	4485	10107207
Chloroform	TX	4505	10107207
cis-1,2-Dichloroethylene	TX	4645	10107207
cis-1,3-Dichloropropene	TX	4680	10107207
Ethylbenzene	TX	4765	10107207
m+p-xylene	TX	5240	10107207
Methyl bromide (Bromomethane)	TX	4950	10107207
Methyl chloride (Chloromethane)	TX	4960	10107207
Methyl tert-butyl ether (MTBE)	TX	5000	10107207
Methylene chloride (Dichloromethane)	TX	4975	10107207
Naphthalene	TX	5005	10107207
o-Xylene	TX	5250	10107207
Tetrachloroethylene (Perchloroethylene)	TX	5115	10107207
Toluene	TX	5140	10107207
Total trihalomethanes	TX	5205	10107207
trans-1,2-Dichloroethylene	TX	4700	10107207
trans-1,3-Dichloropropylene	TX	4685	10107207

Matrix: *Non-Potable Water*

Trichloroethene (Trichloroethylene)	TX	5170	10107207
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10107207
Vinyl chloride	TX	5235	10107207
Xylene (total)	TX	5260	10107207

Method EPA 624.1

Analyte	AB	Analyte ID	Method ID
1,1,1-Trichloroethane	TX	5160	10298121
1,1,2,2-Tetrachloroethane	TX	5110	10298121
1,1,2-Trichloroethane	TX	5165	10298121
1,1-Dichloroethane	TX	4630	10298121
1,1-Dichloroethylene	TX	4640	10298121
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10298121
1,2-Dichlorobenzene	TX	4610	10298121
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10298121
1,2-Dichloropropane	TX	4655	10298121
1,3-Dichlorobenzene	TX	4615	10298121
1,4-Dichlorobenzene	TX	4620	10298121
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10298121
2-Chloroethyl vinyl ether	TX	4500	10298121
Acetone (2-Propanone)	TX	4315	10298121
Acrolein (Propenal)	TX	4325	10298121
Acrylonitrile	TX	4340	10298121
Benzene	TX	4375	10298121
Bromodichloromethane	TX	4395	10298121
Bromoform	TX	4400	10298121
Carbon tetrachloride	TX	4455	10298121
Chlorobenzene	TX	4475	10298121
Chlorodibromomethane	TX	4575	10298121
Chloroethane (Ethyl chloride)	TX	4485	10298121
Chloroform	TX	4505	10298121

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Matrix: ***Non-Potable Water***

cis-1,2-Dichloroethylene	TX	4645	10298121
cis-1,3-Dichloropropene	TX	4680	10298121
Ethylbenzene	TX	4765	10298121
m+p-xylene	TX	5240	10298121
Methyl bromide (Bromomethane)	TX	4950	10298121
Methyl chloride (Chloromethane)	TX	4960	10298121
Methyl tert-butyl ether (MTBE)	TX	5000	10298121
Methylene chloride (Dichloromethane)	TX	4975	10298121
Naphthalene	TX	5005	10298121
o-Xylene	TX	5250	10298121
Tetrachloroethylene (Perchloroethylene)	TX	5115	10298121
Toluene	TX	5140	10298121
Total trihalomethanes	TX	5205	10298121
trans-1,2-Dichloroethylene	TX	4700	10298121
trans-1,3-Dichloropropylene	TX	4685	10298121
Trichloroethene (Trichloroethylene)	TX	5170	10298121
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10298121
Vinyl chloride	TX	5235	10298121
Xylene (total)	TX	5260	10298121

Method EPA 625

Analyte	**AB**	**Analyte ID**	**Method ID**
1,2,4,5-Tetrachlorobenzene	TX	6715	10107401
1,2,4-Trichlorobenzene	TX	5155	10107401
1,2-Dichlorobenzene	TX	4610	10107401
1,2-Diphenylhydrazine	TX	6220	10107401
1,3-Dichlorobenzene	TX	4615	10107401
1,4-Dichlorobenzene	TX	4620	10107401
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10107401
2,3,4,6-Tetrachlorophenol	TX	6735	10107401
2,4,5-Trichlorophenol	TX	6835	10107401

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Matrix: ***Non-Potable Water***

2,4,6-Trichlorophenol	TX	6840	10107401
2,4-Dichlorophenol	TX	6000	10107401
2,4-Dimethylphenol	TX	6130	10107401
2,4-Dinitrophenol	TX	6175	10107401
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10107401
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10107401
2-Chloronaphthalene	TX	5795	10107401
2-Chlorophenol	TX	5800	10107401
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10107401
2-Methylphenol (o-Cresol)	TX	6400	10107401
2-Nitrophenol	TX	6490	10107401
3,3'-Dichlorobenzidine	TX	5945	10107401
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10107401
4-Chloro-3-methylphenol	TX	5700	10107401
4-Chlorophenyl phenylether	TX	5825	10107401
4-Methylphenol (p-Cresol)	TX	6410	10107401
4-Nitrophenol	TX	6500	10107401
Acenaphthene	TX	5500	10107401
Acenaphthylene	TX	5505	10107401
Anthracene	TX	5555	10107401
Benzidine	TX	5595	10107401
Benzo(a)anthracene	TX	5575	10107401
Benzo(a)pyrene	TX	5580	10107401
Benzo(b)fluoranthene	TX	5585	10107401
Benzo(g,h,i)perylene	TX	5590	10107401
Benzo(k)fluoranthene	TX	5600	10107401
bis(2-Chloroethoxy)methane	TX	5760	10107401
bis(2-Chloroethyl) ether	TX	5765	10107401
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10107401
Butyl benzyl phthalate	TX	5670	10107401

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Matrix: ***Non-Potable Water***

Chrysene	TX	5855	10107401
Dibenz(a,h) anthracene	TX	5895	10107401
Diethyl phthalate	TX	6070	10107401
Dimethyl phthalate	TX	6135	10107401
Di-n-butyl phthalate	TX	5925	10107401
Di-n-octyl phthalate	TX	6200	10107401
Fluoranthene	TX	6265	10107401
Fluorene	TX	6270	10107401
Hexachlorobenzene	TX	6275	10107401
Hexachlorobutadiene	TX	4835	10107401
Hexachlorocyclopentadiene	TX	6285	10107401
Hexachloroethane	TX	4840	10107401
Indeno(1,2,3-cd) pyrene	TX	6315	10107401
Isophorone	TX	6320	10107401
Naphthalene	TX	5005	10107401
Nitrobenzene	TX	5015	10107401
n-Nitrosodiethylamine	TX	6525	10107401
n-Nitrosodimethylamine	TX	6530	10107401
n-Nitrosodi-n-butylamine	TX	5025	10107401
n-Nitrosodi-n-propylamine	TX	6545	10107401
n-Nitrosodiphenylamine	TX	6535	10107401
Pentachlorobenzene	TX	6590	10107401
Pentachlorophenol	TX	6605	10107401
Phenanthrene	TX	6615	10107401
Phenol	TX	6625	10107401
Pyrene	TX	6665	10107401
Pyridine	TX	5095	10107401

Method EPA 625.1

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10300024

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Matrix: ***Non-Potable Water***

1,2,4-Trichlorobenzene	TX	5155	10300024
1,2-Dichlorobenzene	TX	4610	10300024
1,2-Diphenylhydrazine	TX	6221	10300024
1,3-Dichlorobenzene	TX	4615	10300024
1,4-Dichlorobenzene	TX	4620	10300024
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10300024
2,3,4,6-Tetrachlorophenol	TX	6735	10300024
2,4,5-Trichlorophenol	TX	6835	10300024
2,4,6-Trichlorophenol	TX	6840	10300024
2,4-Dichlorophenol	TX	6000	10300024
2,4-Dimethylphenol	TX	6130	10300024
2,4-Dinitrophenol	TX	6175	10300024
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10300024
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10300024
2-Chloronaphthalene	TX	5795	10300024
2-Chlorophenol	TX	5800	10300024
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10300024
2-Methylphenol (o-Cresol)	TX	6400	10300024
2-Nitrophenol	TX	6490	10300024
3,3'-Dichlorobenzidine	TX	5945	10300024
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10300024
4-Chloro-3-methylphenol	TX	5700	10300024
4-Chlorophenyl phenylether	TX	5825	10300024
4-Methylphenol (p-Cresol)	TX	6410	10300024
4-Nitrophenol	TX	6500	10300024
Acenaphthene	TX	5500	10300024
Acenaphthylene	TX	5505	10300024
Anthracene	TX	5555	10300024
Benzidine	TX	5595	10300024
Benzo(a)anthracene	TX	5575	10300024

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Matrix: ***Non-Potable Water***

Benzo(a)pyrene	TX	5580	10300024
Benzo(b)fluoranthene	TX	5585	10300024
Benzo(g,h,i)perylene	TX	5590	10300024
Benzo(k)fluoranthene	TX	5600	10300024
bis(2-Chloroethoxy)methane	TX	5760	10300024
bis(2-Chloroethyl) ether	TX	5765	10300024
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10300024
Butyl benzyl phthalate	TX	5670	10300024
Chrysene	TX	5855	10300024
Dibenz(a,h) anthracene	TX	5895	10300024
Diethyl phthalate	TX	6070	10300024
Dimethyl phthalate	TX	6135	10300024
Di-n-butyl phthalate	TX	5925	10300024
Di-n-octyl phthalate	TX	6200	10300024
Fluoranthene	TX	6265	10300024
Fluorene	TX	6270	10300024
Hexachlorobenzene	TX	6275	10300024
Hexachlorobutadiene	TX	4835	10300024
Hexachlorocyclopentadiene	TX	6285	10300024
Hexachloroethane	TX	4840	10300024
Indeno(1,2,3-cd) pyrene	TX	6315	10300024
Isophorone	TX	6320	10300024
Naphthalene	TX	5005	10300024
Nitrobenzene	TX	5015	10300024
n-Nitrosodiethylamine	TX	6525	10300024
n-Nitrosodimethylamine	TX	6530	10300024
n-Nitrosodi-n-butylamine	TX	5025	10300024
n-Nitrosodi-n-propylamine	TX	6545	10300024
n-Nitrosodiphenylamine	TX	6535	10300024
Pentachlorobenzene	TX	6590	10300024

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Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Pentachlorophenol	TX	6605	10300024
Phenanthrene	TX	6615	10300024
Phenol	TX	6625	10300024
Pyrene	TX	6665	10300024
Pyridine	TX	5095	10300024

Method EPA 632

Analyte	AB	Analyte ID	Method ID
Carbaryl (Sevin)	TX	7195	10108608

Method EPA 7196

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	10162206

Method EPA 7470

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10165807

Method EPA 8081

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10178606
4,4'-DDE	TX	7360	10178606
4,4'-DDT	TX	7365	10178606
Aldrin	TX	7025	10178606
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10178606
alpha-Chlordane	TX	7240	10178606
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10178606
Chlordane (tech.)	TX	7250	10178606
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10178606
Dieldrin	TX	7470	10178606
Endosulfan I	TX	7510	10178606
Endosulfan II	TX	7515	10178606
Endosulfan sulfate	TX	7520	10178606
Endrin	TX	7540	10178606
Endrin aldehyde	TX	7530	10178606

Matrix: ***Non-Potable Water***

Endrin ketone	TX	7535	10178606
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10178606
gamma-Chlordane	TX	7245	10178606
Heptachlor	TX	7685	10178606
Heptachlor epoxide	TX	7690	10178606
Methoxychlor	TX	7810	10178606
Mirex	TX	7870	10178606
Toxaphene (Chlorinated camphene)	TX	8250	10178606

Method EPA 8082

Analyte	**AB**	**Analyte ID**	**Method ID**
Aroclor-1016 (PCB-1016)	TX	8880	10179007
Aroclor-1221 (PCB-1221)	TX	8885	10179007
Aroclor-1232 (PCB-1232)	TX	8890	10179007
Aroclor-1242 (PCB-1242)	TX	8895	10179007
Aroclor-1248 (PCB-1248)	TX	8900	10179007
Aroclor-1254 (PCB-1254)	TX	8905	10179007
Aroclor-1260 (PCB-1260)	TX	8910	10179007
PCBs (total)	TX	8870	10179007

Method EPA 8151

Analyte	**AB**	**Analyte ID**	**Method ID**
2,4,5-T	TX	8655	10183207
2,4-D	TX	8545	10183207
2,4-DB	TX	8560	10183207
Dalapon	TX	8555	10183207
Dicamba	TX	8595	10183207
Dichloroprop (Dichlorprop, Weedone)	TX	8605	10183207
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	TX	8620	10183207
MCPA	TX	7775	10183207
MCPP	TX	7780	10183207
Pentachlorophenol	TX	6605	10183207
Silvex (2,4,5-TP)	TX	8650	10183207

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Matrix: ***Non-Potable Water***

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	TX	5195	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802
1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
1,4-Dioxane (1,4-Diethyleneoxide)	TX	4735	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Pace Analytical Services, LLC - Dallas, TX

400 West Bethany Drive, Suite 190
Allen, TX 75013-3714

Certificate:	**T104704232-21-33**
Expiration Date:	**6/30/2022**
Issue Date:	**7/1/2021**

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Matrix: ***Non-Potable Water***

4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acetonitrile	TX	4320	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Allyl chloride (3-Chloropropene)	TX	4355	10184802
Benzene	TX	4375	10184802
Benzyl chloride	TX	5635	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
Chloroprene (2-Chloro-1,3-butadiene)	TX	4525	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Ethyl acetate	TX	4755	10184802
Ethyl methacrylate	TX	4810	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Hexachloroethane	TX	4840	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802

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Matrix: ***Non-Potable Water***

Isobutyl alcohol (2-Methyl-1-propanol)	TX	4875	10184802
Isopropyl alcohol (2-Propanol, Isopropanol)	TX	4895	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methacrylonitrile	TX	4925	10184802
Methyl acetate	TX	4940	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802
Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl methacrylate	TX	4990	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
Pentachloroethane	TX	5035	10184802
Propionitrile (Ethyl cyanide)	TX	5080	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
trans-1,4-Dichloro-2-butene	TX	4605	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

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Matrix: ***Non-Potable Water***

Method EPA 8270

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10185805
1,2,4-Trichlorobenzene	TX	5155	10185805
1,2-Dichlorobenzene	TX	4610	10185805
1,2-Dinitrobenzene	TX	6155	10185805
1,3-Dichlorobenzene	TX	4615	10185805
1,3-Dinitrobenzene (1,3-DNB)	TX	6160	10185805
1,4-Dichlorobenzene	TX	4620	10185805
1,4-Dinitrobenzene	TX	6165	10185805
1,4-Naphthoquinone	TX	6420	10185805
1-Chloronaphthalene	TX	5790	10185805
1-Naphthylamine	TX	6425	10185805
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10185805
2,3,4,6-Tetrachlorophenol	TX	6735	10185805
2,4,5-Trichlorophenol	TX	6835	10185805
2,4,6-Trichlorophenol	TX	6840	10185805
2,4-Dichlorophenol	TX	6000	10185805
2,4-Dimethylphenol	TX	6130	10185805
2,4-Dinitrophenol	TX	6175	10185805
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10185805
2,6-Dichlorophenol	TX	6005	10185805
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10185805
2-Acetylaminofluorene	TX	5515	10185805
2-Chloronaphthalene	TX	5795	10185805
2-Chlorophenol	TX	5800	10185805
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10185805
2-Methylaniline (o-Toluidine)	TX	5145	10185805
2-Methylnaphthalene	TX	6385	10185805
2-Methylphenol (o-Cresol)	TX	6400	10185805

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Matrix: ***Non-Potable Water***

2-Naphthylamine	TX	6430	10185805
2-Nitroaniline	TX	6460	10185805
2-Nitrophenol	TX	6490	10185805
2-Picoline (2-Methylpyridine)	TX	5050	10185805
3,3'-Dichlorobenzidine	TX	5945	10185805
3-Methylcholanthrene	TX	6355	10185805
3-Methylphenol (m-Cresol)	TX	6405	10185805
3-Nitroaniline	TX	6465	10185805
4-Aminobiphenyl	TX	5540	10185805
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10185805
4-Chloro-3-methylphenol	TX	5700	10185805
4-Chloroaniline	TX	5745	10185805
4-Chlorophenyl phenylether	TX	5825	10185805
4-Dimethyl aminoazobenzene	TX	6105	10185805
4-Methylphenol (p-Cresol)	TX	6410	10185805
4-Nitroaniline	TX	6470	10185805
4-Nitrobiphenyl	TX	6480	10185805
4-Nitrophenol	TX	6500	10185805
5,5-Diphenylhydantoin	TX	6215	10185805
5-Chloro-2-methylaniline	TX	5695	10185805
5-Nitroacenaphthene	TX	6455	10185805
5-Nitro-o-toluidine	TX	6570	10185805
7,12-Dimethylbenz(a) anthracene	TX	6115	10185805
Acenaphthene	TX	5500	10185805
Acenaphthylene	TX	5505	10185805
Acetophenone	TX	5510	10185805
Aminoazobenzene	TX	5535	10185805
Aniline	TX	5545	10185805
Anthracene	TX	5555	10185805
Azobenzene	TX	5562	10185805

Matrix: ***Non-Potable Water***

Benzidine	TX	5595	10185805
Benzo(a)anthracene	TX	5575	10185805
Benzo(a)pyrene	TX	5580	10185805
Benzo(b)fluoranthene	TX	5585	10185805
Benzo(g,h,i)perylene	TX	5590	10185805
Benzo(k)fluoranthene	TX	5600	10185805
Benzoic acid	TX	5610	10185805
Benzyl alcohol	TX	5630	10185805
bis(2-Chloroethoxy)methane	TX	5760	10185805
bis(2-Chloroethyl) ether	TX	5765	10185805
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10185805
Butyl benzyl phthalate	TX	5670	10185805
Carbazole	TX	5680	10185805
Chrysene	TX	5855	10185805
Dibenz(a,h) anthracene	TX	5895	10185805
Dibenzofuran	TX	5905	10185805
Diethyl phthalate	TX	6070	10185805
Diethylstilbestrol	TX	6075	10185805
Dimethyl phthalate	TX	6135	10185805
Di-n-butyl phthalate	TX	5925	10185805
Di-n-octyl phthalate	TX	6200	10185805
Diphenylamine	TX	6205	10185805
Ethyl methanesulfonate	TX	6260	10185805
Fluoranthene	TX	6265	10185805
Fluorene	TX	6270	10185805
Hexachlorobenzene	TX	6275	10185805
Hexachlorobutadiene	TX	4835	10185805
Hexachlorocyclopentadiene	TX	6285	10185805
Hexachloroethane	TX	4840	10185805
Hexachloropropene	TX	6295	10185805

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Matrix: ***Non-Potable Water***

Indeno(1,2,3-cd) pyrene	TX	6315	10185805
Isodrin	TX	7725	10185805
Isophorone	TX	6320	10185805
Isosafrole	TX	6325	10185805
Mestranol	TX	6340	10185805
Methyl methanesulfonate	TX	6375	10185805
Naphthalene	TX	5005	10185805
Nitrobenzene	TX	5015	10185805
n-Nitrosodiethylamine	TX	6525	10185805
n-Nitrosodimethylamine	TX	6530	10185805
n-Nitrosodi-n-butylamine	TX	5025	10185805
n-Nitrosodi-n-propylamine	TX	6545	10185805
n-Nitrosodiphenylamine	TX	6535	10185805
n-Nitrosomethylethylamine	TX	6550	10185805
n-Nitrosomorpholine	TX	6555	10185805
n-Nitrosopiperidine	TX	6560	10185805
n-Nitrosopyrrolidine	TX	6565	10185805
o-Anisidine	TX	5550	10185805
p-Cresidine	TX	5860	10185805
Pentachlorobenzene	TX	6590	10185805
Pentachloronitrobenzene (PCNB)	TX	6600	10185805
Pentachlorophenol	TX	6605	10185805
Phenacetin	TX	6610	10185805
Phenanthrene	TX	6615	10185805
Phenol	TX	6625	10185805
Pronamide (Kerb)	TX	6650	10185805
Pyrene	TX	6665	10185805
Pyridine	TX	5095	10185805
Safrole	TX	6685	10185805

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Matrix: ***Non-Potable Water***

Method EPA 9014

Analyte	AB	Analyte ID	Method ID
Amenable cyanide	TX	1510	10193803
Total cyanide	TX	1645	10193803

Method EPA 9040

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	10196802

Method EPA 9050

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10198808

Method EPA 9056

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10199209
Chloride	TX	1575	10199209
Fluoride	TX	1730	10199209
Nitrate as N	TX	1810	10199209
Nitrate-nitrite	TX	1820	10199209
Nitrite as N	TX	1840	10199209
Sulfate	TX	2000	10199209

Method EPA 9060

Analyte	AB	Analyte ID	Method ID
Total Organic Carbon (TOC)	TX	2040	10200201

Method EPA 9065

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10200405

Method IDEXX Laboratories Colilert®

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	60002600

Method SM 2120 B

Analyte	AB	Analyte ID	Method ID
Color	TX	1605	20223807

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Matrix: ***Non-Potable Water***

Method SM 2130 B

Analyte	AB	Analyte ID	Method ID
Turbidity	TX	2055	20042200

Method SM 2320 B

Analyte	AB	Analyte ID	Method ID
Alkalinity as CaCO3	TX	1505	20045005

Method SM 2340 B

Analyte	AB	Analyte ID	Method ID
Total hardness as CaCO3	TX	1755	20046008

Method SM 2510 B

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	20048004

Method SM 2540 B

Analyte	AB	Analyte ID	Method ID
Residue-total (total solids)	TX	1950	20004608

Method SM 2540 C

Analyte	AB	Analyte ID	Method ID
Residue-filterable (TDS)	TX	1955	20049803

Method SM 2540 D

Analyte	AB	Analyte ID	Method ID
Residue-nonfilterable (TSS)	TX	1960	20004802

Method SM 2540 F

Analyte	AB	Analyte ID	Method ID
Residue-settleable	TX	1965	20005009

Method SM 3500-Cr B

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	20065809

Method SM 3500-Fe D

Analyte	AB	Analyte ID	Method ID
Iron	TX	1070	20009603

Method SM 4500-Cl G

Analyte	AB	Analyte ID	Method ID

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Allen, TX 75013-3714		**Issue Date:**	**7/1/2021**

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Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Total residual chlorine	TX	1940	20020604

Method SM 4500-CN¯ E

Analyte	AB	Analyte ID	Method ID
Total cyanide	TX	1645	20021209

Method SM 4500-CN¯ G

Analyte	AB	Analyte ID	Method ID
Amenable cyanide	TX	1510	20021607

Method SM 4500-H+ B

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	20104603

Method SM 4500-NH3 F

Analyte	AB	Analyte ID	Method ID
Kjeldahl Nitrogen (Total Kjeldahl Nitrogen-TKN)	TX	1790	20023001

Method SM 4500-NH3 H

Analyte	AB	Analyte ID	Method ID
Ammonia as N	TX	1515	20023409

Method SM 4500-O C

Analyte	AB	Analyte ID	Method ID
Oxygen, dissolved	TX	1880	20025201

Method SM 4500-P E

Analyte	AB	Analyte ID	Method ID
Orthophosphate as P	TX	1870	20025803
Phosphorus	TX	1910	20025803

Method SM 4500-S2¯ D

Analyte	AB	Analyte ID	Method ID
Sulfide	TX	2005	20125400

Method SM 4500-SO3¯ B

Analyte	AB	Analyte ID	Method ID
Sulfite	TX	2015	20026806

Method SM 5210 B

Analyte	AB	Analyte ID	Method ID
Biochemical oxygen demand (BOD)	TX	1530	20027401

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Matrix: ***Non-Potable Water***

Carbonaceous BOD, CBOD	TX	1555	20027401

Method SM 5220 D

Analyte	**AB**	**Analyte ID**	**Method ID**
Chemical oxygen demand (COD)	TX	1565	20027809

Method SM 5310 C

Analyte	**AB**	**Analyte ID**	**Method ID**
Total Organic Carbon (TOC)	TX	2040	20138209

Method SM 5540 C

Analyte	**AB**	**Analyte ID**	**Method ID**
Surfactants - MBAS	TX	2025	20144405

Method SM 9222 B

Analyte	**AB**	**Analyte ID**	**Method ID**
Total coliforms (enumeration)	TX	2500	20198009

Method SM 9222 D

Analyte	**AB**	**Analyte ID**	**Method ID**
Fecal coliforms (enumeration)	TX	2530	20037405

Method TCEQ 1005

Analyte	**AB**	**Analyte ID**	**Method ID**
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

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Matrix: ***Solid & Chemical Materials***

Method EPA 1010

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10116606

Method EPA 1030

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10117201

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 300.0

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10053200
Chloride	TX	1575	10053200
Fluoride	TX	1730	10053200
Nitrate as N	TX	1810	10053200
Nitrate-nitrite	TX	1820	10053200
Nitrite as N	TX	1840	10053200
Sulfate	TX	2000	10053200

Method EPA 353.2

Analyte	AB	Analyte ID	Method ID
Nitrate as N	TX	1810	10067604
Nitrate-nitrite	TX	1820	10067604
Nitrite as N	TX	1840	10067604

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10155609
Antimony	TX	1005	10155609
Arsenic	TX	1010	10155609

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Matrix: ***Solid & Chemical Materials***

Barium	TX	1015	10155609
Beryllium	TX	1020	10155609
Boron	TX	1025	10155609
Cadmium	TX	1030	10155609
Calcium	TX	1035	10155609
Chromium	TX	1040	10155609
Cobalt	TX	1050	10155609
Copper	TX	1055	10155609
Iron	TX	1070	10155609
Lead	TX	1075	10155609
Magnesium	TX	1085	10155609
Molybdenum	TX	1100	10155609
Nickel	TX	1105	10155609
Potassium	TX	1125	10155609
Selenium	TX	1140	10155609
Silver	TX	1150	10155609
Strontium	TX	1160	10155609
Thallium	TX	1165	10155609
Tin	TX	1175	10155609
Titanium	TX	1180	10155609
Vanadium	TX	1185	10155609
Zinc	TX	1190	10155609

Method EPA 6020

Analyte	**AB**	**Analyte ID**	**Method ID**
Aluminum	TX	1000	10156419
Antimony	TX	1005	10156419
Arsenic	TX	1010	10156419
Barium	TX	1015	10156419
Beryllium	TX	1020	10156419
Cadmium	TX	1030	10156419

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Matrix: ***Solid & Chemical Materials***

Calcium	TX	1035	10156419
Chromium	TX	1040	10156419
Cobalt	TX	1050	10156419
Copper	TX	1055	10156419
Iron	TX	1070	10156419
Lead	TX	1075	10156419
Magnesium	TX	1085	10156419
Manganese	TX	1090	10156419
Molybdenum	TX	1100	10156419
Nickel	TX	1105	10156419
Potassium	TX	1125	10156419
Selenium	TX	1140	10156419
Silver	TX	1150	10156419
Thallium	TX	1165	10156419
Vanadium	TX	1185	10156419
Zinc	TX	1190	10156419

Method EPA 7471

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10166208

Method EPA 8081

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10178606
4,4'-DDE	TX	7360	10178606
4,4'-DDT	TX	7365	10178606
Aldrin	TX	7025	10178606
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10178606
alpha-Chlordane	TX	7240	10178606
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10178606
Chlordane (tech.)	TX	7250	10178606
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10178606
Dieldrin	TX	7470	10178606

Matrix: ***Solid & Chemical Materials***

Analyte	AB	Analyte ID	Method ID
Endosulfan I	TX	7510	10178606
Endosulfan II	TX	7515	10178606
Endosulfan sulfate	TX	7520	10178606
Endrin	TX	7540	10178606
Endrin aldehyde	TX	7530	10178606
Endrin ketone	TX	7535	10178606
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10178606
gamma-Chlordane	TX	7245	10178606
Heptachlor	TX	7685	10178606
Heptachlor epoxide	TX	7690	10178606
Methoxychlor	TX	7810	10178606
Mirex	TX	7870	10178606
Toxaphene (Chlorinated camphene)	TX	8250	10178606

Method EPA 8082

Analyte	AB	Analyte ID	Method ID
Aroclor-1016 (PCB-1016)	TX	8880	10179007
Aroclor-1221 (PCB-1221)	TX	8885	10179007
Aroclor-1232 (PCB-1232)	TX	8890	10179007
Aroclor-1242 (PCB-1242)	TX	8895	10179007
Aroclor-1248 (PCB-1248)	TX	8900	10179007
Aroclor-1254 (PCB-1254)	TX	8905	10179007
Aroclor-1260 (PCB-1260)	TX	8910	10179007
PCBs (total)	TX	8870	10179007

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	TX	5195	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802

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Matrix: ***Solid & Chemical Materials***

1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
1,4-Dioxane (1,4-Diethyleneoxide)	TX	4735	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802
4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acetonitrile	TX	4320	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Allyl chloride (3-Chloropropene)	TX	4355	10184802
Benzene	TX	4375	10184802

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Matrix: ***Solid & Chemical Materials***

Benzyl chloride	TX	5635	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
Chloroprene (2-Chloro-1,3-butadiene)	TX	4525	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	TX	4745	10184802
Ethyl acetate	TX	4755	10184802
Ethyl methacrylate	TX	4810	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Hexachloroethane	TX	4840	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802
Isobutyl alcohol (2-Methyl-1-propanol)	TX	4875	10184802
Isopropyl alcohol (2-Propanol, Isopropanol)	TX	4895	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methacrylonitrile	TX	4925	10184802
Methyl acetate	TX	4940	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802

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Matrix: ***Solid & Chemical Materials***

Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl methacrylate	TX	4990	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
Pentachloroethane	TX	5035	10184802
Propionitrile (Ethyl cyanide)	TX	5080	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
trans-1,4-Dichloro-2-butene	TX	4605	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

Method EPA 8270

Analyte	**AB**	**Analyte ID**	**Method ID**
1,2,4,5-Tetrachlorobenzene	TX	6715	10185805
1,2,4-Trichlorobenzene	TX	5155	10185805
1,2-Dichlorobenzene	TX	4610	10185805
1,2-Dinitrobenzene	TX	6155	10185805
1,3-Dichlorobenzene	TX	4615	10185805

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Matrix: ***Solid & Chemical Materials***

1,3-Dinitrobenzene (1,3-DNB)	TX	6160	10185805
1,4-Dichlorobenzene	TX	4620	10185805
1,4-Dinitrobenzene	TX	6165	10185805
1,4-Naphthoquinone	TX	6420	10185805
1-Chloronaphthalene	TX	5790	10185805
1-Naphthylamine	TX	6425	10185805
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10185805
2,3,4,6-Tetrachlorophenol	TX	6735	10185805
2,4,5-Trichlorophenol	TX	6835	10185805
2,4,6-Trichlorophenol	TX	6840	10185805
2,4-Dichlorophenol	TX	6000	10185805
2,4-Dimethylphenol	TX	6130	10185805
2,4-Dinitrophenol	TX	6175	10185805
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10185805
2,6-Dichlorophenol	TX	6005	10185805
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10185805
2-Acetylaminofluorene	TX	5515	10185805
2-Chloronaphthalene	TX	5795	10185805
2-Chlorophenol	TX	5800	10185805
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10185805
2-Methylaniline (o-Toluidine)	TX	5145	10185805
2-Methylnaphthalene	TX	6385	10185805
2-Methylphenol (o-Cresol)	TX	6400	10185805
2-Naphthylamine	TX	6430	10185805
2-Nitroaniline	TX	6460	10185805
2-Nitrophenol	TX	6490	10185805
2-Picoline (2-Methylpyridine)	TX	5050	10185805
3,3'-Dichlorobenzidine	TX	5945	10185805
3-Methylcholanthrene	TX	6355	10185805
3-Methylphenol (m-Cresol)	TX	6405	10185805

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Matrix: ***Solid & Chemical Materials***

3-Nitroaniline	TX	6465	10185805
4-Aminobiphenyl	TX	5540	10185805
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10185805
4-Chloro-3-methylphenol	TX	5700	10185805
4-Chloroaniline	TX	5745	10185805
4-Chlorophenyl phenylether	TX	5825	10185805
4-Methylphenol (p-Cresol)	TX	6410	10185805
4-Nitroaniline	TX	6470	10185805
4-Nitrobiphenyl	TX	6480	10185805
4-Nitrophenol	TX	6500	10185805
5,5-Diphenylhydantoin	TX	6215	10185805
5-Chloro-2-methylaniline	TX	5695	10185805
5-Nitroacenaphthene	TX	6455	10185805
5-Nitro-o-toluidine	TX	6570	10185805
7,12-Dimethylbenz(a) anthracene	TX	6115	10185805
Acenaphthene	TX	5500	10185805
Acenaphthylene	TX	5505	10185805
Acetophenone	TX	5510	10185805
Aminoazobenzene	TX	5535	10185805
Aniline	TX	5545	10185805
Anthracene	TX	5555	10185805
Azobenzene	TX	5562	10185805
Benzidine	TX	5595	10185805
Benzo(a)anthracene	TX	5575	10185805
Benzo(a)pyrene	TX	5580	10185805
Benzo(b)fluoranthene	TX	5585	10185805
Benzo(g,h,i)perylene	TX	5590	10185805
Benzo(k)fluoranthene	TX	5600	10185805
Benzoic acid	TX	5610	10185805
Benzyl alcohol	TX	5630	10185805

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Matrix: ***Solid & Chemical Materials***

bis(2-Chloroethoxy)methane	TX	5760	10185805
bis(2-Chloroethyl) ether	TX	5765	10185805
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10185805
Butyl benzyl phthalate	TX	5670	10185805
Carbazole	TX	5680	10185805
Chrysene	TX	5855	10185805
Dibenz(a,h) anthracene	TX	5895	10185805
Dibenzofuran	TX	5905	10185805
Diethyl phthalate	TX	6070	10185805
Diethyl sulfate	TX	6080	10185805
Diethylstilbestrol	TX	6075	10185805
Dimethyl phthalate	TX	6135	10185805
Di-n-butyl phthalate	TX	5925	10185805
Di-n-octyl phthalate	TX	6200	10185805
Diphenylamine	TX	6205	10185805
Ethyl methanesulfonate	TX	6260	10185805
Fluoranthene	TX	6265	10185805
Fluorene	TX	6270	10185805
Hexachlorobenzene	TX	6275	10185805
Hexachlorobutadiene	TX	4835	10185805
Hexachlorocyclopentadiene	TX	6285	10185805
Hexachloroethane	TX	4840	10185805
Hexachloropropene	TX	6295	10185805
Indeno(1,2,3-cd) pyrene	TX	6315	10185805
Isodrin	TX	7725	10185805
Isophorone	TX	6320	10185805
Isosafrole	TX	6325	10185805
Mestranol	TX	6340	10185805
Methyl methanesulfonate	TX	6375	10185805
Methylphenols, total	TX	10313	10185805

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Matrix: ***Solid & Chemical Materials***

Naphthalene	TX	5005	10185805
Nitrobenzene	TX	5015	10185805
n-Nitrosodiethylamine	TX	6525	10185805
n-Nitrosodimethylamine	TX	6530	10185805
n-Nitrosodi-n-butylamine	TX	5025	10185805
n-Nitrosodi-n-propylamine	TX	6545	10185805
n-Nitrosodiphenylamine	TX	6535	10185805
n-Nitrosomethylethylamine	TX	6550	10185805
n-Nitrosomorpholine	TX	6555	10185805
n-Nitrosopiperidine	TX	6560	10185805
n-Nitrosopyrrolidine	TX	6565	10185805
o-Anisidine	TX	5550	10185805
p-Cresidine	TX	5860	10185805
Pentachlorobenzene	TX	6590	10185805
Pentachloronitrobenzene (PCNB)	TX	6600	10185805
Pentachlorophenol	TX	6605	10185805
Phenacetin	TX	6610	10185805
Phenanthrene	TX	6615	10185805
Phenol	TX	6625	10185805
Pronamide (Kerb)	TX	6650	10185805
Pyrene	TX	6665	10185805
Pyridine	TX	5095	10185805
Safrole	TX	6685	10185805

Method EPA 9014

Analyte	**AB**	**Analyte ID**	**Method ID**
Amenable cyanide	TX	1510	10193803
Total cyanide	TX	1645	10193803

Method EPA 9040

Analyte	**AB**	**Analyte ID**	**Method ID**
Corrosivity	TX	1615	10196802
pH	TX	1900	10196802

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Matrix: ***Solid & Chemical Materials***

Method EPA 9045

Analyte	AB	Analyte ID	Method ID
Corrosivity	TX	1615	10197805
pH	TX	1900	10197805

Method EPA 9050

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10198808

Method EPA 9056

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10199209
Chloride	TX	1575	10199209
Fluoride	TX	1730	10199209
Nitrate as N	TX	1810	10199209
Nitrate-nitrite	TX	1820	10199209
Nitrite as N	TX	1840	10199209
Sulfate	TX	2000	10199209

Method EPA 9065

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10200405

Method EPA 9095

Analyte	AB	Analyte ID	Method ID
Paint Filter Liquids Test	TX	10312	10204009

Method EPA 9250

Analyte	AB	Analyte ID	Method ID
Chloride	TX	1575	10207202

Method SM 9221 C / 9221 E

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20195806

Method TCEQ 1005

Analyte	AB	Analyte ID	Method ID
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

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Matrix: ***Drinking Water***

Method SM 9222 D (MFC Medium)

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20210008

Method SM 9223-IDEXX Laboratories Colilert® Test

Analyte	AB	Analyte ID	Method ID
Total coliforms and E. coli (P/A)	TX	2502	20212413

Method SM 9223-IDEXX Laboratories Colilert® Quanti-Tray Test

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	20211603
Total coliforms (enumeration)	TX	2500	20211603

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Matrix: ***Non-Potable Water***

Method EPA 1010

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10116606

Method EPA 120.1

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10006403

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 160.4

Analyte	AB	Analyte ID	Method ID
Residue-volatile	TX	1970	10010409

Method EPA 1664

Analyte	AB	Analyte ID	Method ID
n-Hexane Extractable Material (HEM) (O&G)	TX	1803	10127807
Silica Gel Treated n-Hexane Extractable Material (SGT-HEM)	TX	10220	10127807

Method EPA 1666

Analyte	AB	Analyte ID	Method ID
Ethyl acetate	TX	4755	10128208
Isopropyl acetate	TX	4890	10128208
n-Amyl acetate	TX	4360	10128208

Method EPA 180.1

Analyte	AB	Analyte ID	Method ID
Turbidity	TX	2055	10011606

Method EPA 200.7

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10013806
Antimony	TX	1005	10013806

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Matrix: ***Non-Potable Water***

Arsenic	TX	1010	10013806
Barium	TX	1015	10013806
Beryllium	TX	1020	10013806
Boron	TX	1025	10013806
Cadmium	TX	1030	10013806
Calcium	TX	1035	10013806
Chromium	TX	1040	10013806
Cobalt	TX	1050	10013806
Copper	TX	1055	10013806
Iron	TX	1070	10013806
Lead	TX	1075	10013806
Magnesium	TX	1085	10013806
Manganese	TX	1090	10013806
Molybdenum	TX	1100	10013806
Nickel	TX	1105	10013806
Potassium	TX	1125	10013806
Selenium	TX	1140	10013806
Silver	TX	1150	10013806
Sodium	TX	1155	10013806
Strontium	TX	1160	10013806
Thallium	TX	1165	10013806
Tin	TX	1175	10013806
Titanium	TX	1180	10013806
Vanadium	TX	1185	10013806
Zinc	TX	1190	10013806

Method EPA 200.8

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10014605
Antimony	TX	1005	10014605
Arsenic	TX	1010	10014605

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Matrix: ***Non-Potable Water***

Barium	TX	1015	10014605
Beryllium	TX	1020	10014605
Cadmium	TX	1030	10014605
Calcium	TX	1035	10014605
Chromium	TX	1040	10014605
Cobalt	TX	1050	10014605
Copper	TX	1055	10014605
Iron	TX	1070	10014605
Lead	TX	1075	10014605
Magnesium	TX	1085	10014605
Manganese	TX	1090	10014605
Molybdenum	TX	1100	10014605
Nickel	TX	1105	10014605
Potassium	TX	1125	10014605
Selenium	TX	1140	10014605
Silver	TX	1150	10014605
Sodium	TX	1155	10014605
Thallium	TX	1165	10014605
Vanadium	TX	1185	10014605
Zinc	TX	1190	10014605

Method EPA 245.1

Analyte	**AB**	**Analyte ID**	**Method ID**
Mercury	TX	1095	10036609

Method EPA 300.0

Analyte	**AB**	**Analyte ID**	**Method ID**
Bromide	TX	1540	10053200
Chloride	TX	1575	10053200
Fluoride	TX	1730	10053200
Nitrate as N	TX	1810	10053200
Nitrate-nitrite	TX	1820	10053200
Nitrite as N	TX	1840	10053200

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Matrix: ***Non-Potable Water***

Sulfate	TX	2000	10053200

Method EPA 353.2

Analyte	**AB**	**Analyte ID**	**Method ID**
Nitrate as N	TX	1810	10067400
Nitrate-nitrite	TX	1820	10067400
Nitrite as N	TX	1840	10067400

Method EPA 360.1

Analyte	**AB**	**Analyte ID**	**Method ID**
Oxygen, dissolved	TX	1880	10069008

Method EPA 420.1

Analyte	**AB**	**Analyte ID**	**Method ID**
Total phenolics	TX	1905	10079400

Method EPA 524.2

Analyte	**AB**	**Analyte ID**	**Method ID**
Acetone (2-Propanone)	TX	4315	10088809
Methylene chloride (Dichloromethane)	TX	4975	10088809

Method EPA 6010

Analyte	**AB**	**Analyte ID**	**Method ID**
Aluminum	TX	1000	10155609
Antimony	TX	1005	10155609
Arsenic	TX	1010	10155609
Barium	TX	1015	10155609
Beryllium	TX	1020	10155609
Boron	TX	1025	10155609
Cadmium	TX	1030	10155609
Calcium	TX	1035	10155609
Chromium	TX	1040	10155609
Cobalt	TX	1050	10155609
Copper	TX	1055	10155609
Iron	TX	1070	10155609
Lead	TX	1075	10155609

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Pace Analytical Services, LLC - Dallas, TX

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Matrix: ***Non-Potable Water***

Magnesium	TX	1085	10155609
Manganese	TX	1090	10155609
Molybdenum	TX	1100	10155609
Nickel	TX	1105	10155609
Potassium	TX	1125	10155609
Selenium	TX	1140	10155609
Silver	TX	1150	10155609
Sodium	TX	1155	10155609
Strontium	TX	1160	10155609
Thallium	TX	1165	10155609
Tin	TX	1175	10155609
Titanium	TX	1180	10155609
Vanadium	TX	1185	10155609
Zinc	TX	1190	10155609

Method EPA 6020

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10156419
Antimony	TX	1005	10156419
Arsenic	TX	1010	10156419
Barium	TX	1015	10156419
Beryllium	TX	1020	10156419
Cadmium	TX	1030	10156419
Calcium	TX	1035	10156419
Chromium	TX	1040	10156419
Cobalt	TX	1050	10156419
Copper	TX	1055	10156419
Iron	TX	1070	10156419
Lead	TX	1075	10156419
Magnesium	TX	1085	10156419
Manganese	TX	1090	10156419

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Matrix: ***Non-Potable Water***

Molybdenum	TX	1100	10156419
Nickel	TX	1105	10156419
Potassium	TX	1125	10156419
Selenium	TX	1140	10156419
Silver	TX	1150	10156419
Sodium	TX	1155	10156419
Thallium	TX	1165	10156419
Vanadium	TX	1185	10156419
Zinc	TX	1190	10156419

Method EPA 608

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10103603
4,4'-DDE	TX	7360	10103603
4,4'-DDT	TX	7365	10103603
Aldrin	TX	7025	10103603
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10103603
Aroclor-1016 (PCB-1016)	TX	8880	10103603
Aroclor-1221 (PCB-1221)	TX	8885	10103603
Aroclor-1232 (PCB-1232)	TX	8890	10103603
Aroclor-1242 (PCB-1242)	TX	8895	10103603
Aroclor-1248 (PCB-1248)	TX	8900	10103603
Aroclor-1254 (PCB-1254)	TX	8905	10103603
Aroclor-1260 (PCB-1260)	TX	8910	10103603
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10103603
Chlordane (tech.)	TX	7250	10103603
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10103603
Dieldrin	TX	7470	10103603
Endosulfan I	TX	7510	10103603
Endosulfan II	TX	7515	10103603
Endosulfan sulfate	TX	7520	10103603

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Matrix: ***Non-Potable Water***

Endrin	TX	7540	10103603
Endrin aldehyde	TX	7530	10103603
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10103603
Heptachlor	TX	7685	10103603
Heptachlor epoxide	TX	7690	10103603
Methoxychlor	TX	7810	10103603
Toxaphene (Chlorinated camphene)	TX	8250	10103603

Method EPA 608.3

Analyte	**AB**	**Analyte ID**	**Method ID**
4,4'-DDD	TX	7355	10296625
4,4'-DDE	TX	7360	10296625
4,4'-DDT	TX	7365	10296625
Aldrin	TX	7025	10296625
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10296625
alpha-Chlordane	TX	7240	10296625
Aroclor-1016 (PCB-1016)	TX	8880	10296625
Aroclor-1221 (PCB-1221)	TX	8885	10296625
Aroclor-1232 (PCB-1232)	TX	8890	10296625
Aroclor-1242 (PCB-1242)	TX	8895	10296625
Aroclor-1248 (PCB-1248)	TX	8900	10296625
Aroclor-1254 (PCB-1254)	TX	8905	10296625
Aroclor-1260 (PCB-1260)	TX	8910	10296625
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10296625
Chlordane (tech.)	TX	7250	10296625
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10296625
Dieldrin	TX	7470	10296625
Endosulfan I	TX	7510	10296625
Endosulfan II	TX	7515	10296625
Endosulfan sulfate	TX	7520	10296625
Endrin	TX	7540	10296625

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Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Endrin aldehyde	TX	7530	10296625
Endrin ketone	TX	7535	10296625
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10296625
gamma-Chlordane	TX	7245	10296625
Heptachlor	TX	7685	10296625
Heptachlor epoxide	TX	7690	10296625
Methoxychlor	TX	7810	10296625
Toxaphene (Chlorinated camphene)	TX	8250	10296625

Method EPA 615

Analyte	AB	Analyte ID	Method ID
2,4,5-T	TX	8655	10298201
2,4-D	TX	8545	10298201
2,4-DB	TX	8560	10298201
Dalapon	TX	8555	10298201
Dicamba	TX	8595	10298201
Dichloroprop (Dichlorprop, Weedone)	TX	8605	10298201
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	TX	8620	10298201
MCPA	TX	7775	10298201
MCPP	TX	7780	10298201
Silvex (2,4,5-TP)	TX	8650	10298201

Method EPA 624

Analyte	AB	Analyte ID	Method ID
1,1,1-Trichloroethane	TX	5160	10107207
1,1,2,2-Tetrachloroethane	TX	5110	10107207
1,1,2-Trichloroethane	TX	5165	10107207
1,1-Dichloroethane	TX	4630	10107207
1,1-Dichloroethylene	TX	4640	10107207
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10107207
1,2-Dichlorobenzene	TX	4610	10107207
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10107207
1,2-Dichloropropane	TX	4655	10107207

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Matrix: ***Non-Potable Water***

1,3-Dichlorobenzene	TX	4615	10107207
1,4-Dichlorobenzene	TX	4620	10107207
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10107207
2-Chloroethyl vinyl ether	TX	4500	10107207
Acetone (2-Propanone)	TX	4315	10107207
Acrolein (Propenal)	TX	4325	10107207
Acrylonitrile	TX	4340	10107207
Benzene	TX	4375	10107207
Bromodichloromethane	TX	4395	10107207
Bromoform	TX	4400	10107207
Carbon tetrachloride	TX	4455	10107207
Chlorobenzene	TX	4475	10107207
Chlorodibromomethane	TX	4575	10107207
Chloroethane (Ethyl chloride)	TX	4485	10107207
Chloroform	TX	4505	10107207
cis-1,2-Dichloroethylene	TX	4645	10107207
cis-1,3-Dichloropropene	TX	4680	10107207
Ethylbenzene	TX	4765	10107207
m+p-xylene	TX	5240	10107207
Methyl bromide (Bromomethane)	TX	4950	10107207
Methyl chloride (Chloromethane)	TX	4960	10107207
Methyl tert-butyl ether (MTBE)	TX	5000	10107207
Methylene chloride (Dichloromethane)	TX	4975	10107207
Naphthalene	TX	5005	10107207
o-Xylene	TX	5250	10107207
Tetrachloroethylene (Perchloroethylene)	TX	5115	10107207
Toluene	TX	5140	10107207
Total trihalomethanes	TX	5205	10107207
trans-1,2-Dichloroethylene	TX	4700	10107207
trans-1,3-Dichloropropylene	TX	4685	10107207

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Matrix: ***Non-Potable Water***

Trichloroethene (Trichloroethylene)	TX	5170	10107207
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10107207
Vinyl chloride	TX	5235	10107207
Xylene (total)	TX	5260	10107207

Method EPA 624.1

Analyte	AB	Analyte ID	Method ID
1,1,1-Trichloroethane	TX	5160	10298121
1,1,2,2-Tetrachloroethane	TX	5110	10298121
1,1,2-Trichloroethane	TX	5165	10298121
1,1-Dichloroethane	TX	4630	10298121
1,1-Dichloroethylene	TX	4640	10298121
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10298121
1,2-Dichlorobenzene	TX	4610	10298121
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10298121
1,2-Dichloropropane	TX	4655	10298121
1,3-Dichlorobenzene	TX	4615	10298121
1,4-Dichlorobenzene	TX	4620	10298121
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10298121
2-Chloroethyl vinyl ether	TX	4500	10298121
Acetone (2-Propanone)	TX	4315	10298121
Acrolein (Propenal)	TX	4325	10298121
Acrylonitrile	TX	4340	10298121
Benzene	TX	4375	10298121
Bromodichloromethane	TX	4395	10298121
Bromoform	TX	4400	10298121
Carbon tetrachloride	TX	4455	10298121
Chlorobenzene	TX	4475	10298121
Chlorodibromomethane	TX	4575	10298121
Chloroethane (Ethyl chloride)	TX	4485	10298121
Chloroform	TX	4505	10298121

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Matrix: ***Non-Potable Water***

cis-1,2-Dichloroethylene	TX	4645	10298121
cis-1,3-Dichloropropene	TX	4680	10298121
Ethylbenzene	TX	4765	10298121
m+p-xylene	TX	5240	10298121
Methyl bromide (Bromomethane)	TX	4950	10298121
Methyl chloride (Chloromethane)	TX	4960	10298121
Methyl tert-butyl ether (MTBE)	TX	5000	10298121
Methylene chloride (Dichloromethane)	TX	4975	10298121
Naphthalene	TX	5005	10298121
o-Xylene	TX	5250	10298121
Tetrachloroethylene (Perchloroethylene)	TX	5115	10298121
Toluene	TX	5140	10298121
Total trihalomethanes	TX	5205	10298121
trans-1,2-Dichloroethylene	TX	4700	10298121
trans-1,3-Dichloropropylene	TX	4685	10298121
Trichloroethene (Trichloroethylene)	TX	5170	10298121
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10298121
Vinyl chloride	TX	5235	10298121
Xylene (total)	TX	5260	10298121

Method EPA 625

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10107401
1,2,4-Trichlorobenzene	TX	5155	10107401
1,2-Dichlorobenzene	TX	4610	10107401
1,2-Diphenylhydrazine	TX	6220	10107401
1,3-Dichlorobenzene	TX	4615	10107401
1,4-Dichlorobenzene	TX	4620	10107401
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10107401
2,3,4,6-Tetrachlorophenol	TX	6735	10107401
2,4,5-Trichlorophenol	TX	6835	10107401

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Matrix: ***Non-Potable Water***

2,4,6-Trichlorophenol	TX	6840	10107401
2,4-Dichlorophenol	TX	6000	10107401
2,4-Dimethylphenol	TX	6130	10107401
2,4-Dinitrophenol	TX	6175	10107401
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10107401
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10107401
2-Chloronaphthalene	TX	5795	10107401
2-Chlorophenol	TX	5800	10107401
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10107401
2-Methylphenol (o-Cresol)	TX	6400	10107401
2-Nitrophenol	TX	6490	10107401
3,3'-Dichlorobenzidine	TX	5945	10107401
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10107401
4-Chloro-3-methylphenol	TX	5700	10107401
4-Chlorophenyl phenylether	TX	5825	10107401
4-Methylphenol (p-Cresol)	TX	6410	10107401
4-Nitrophenol	TX	6500	10107401
Acenaphthene	TX	5500	10107401
Acenaphthylene	TX	5505	10107401
Anthracene	TX	5555	10107401
Benzidine	TX	5595	10107401
Benzo(a)anthracene	TX	5575	10107401
Benzo(a)pyrene	TX	5580	10107401
Benzo(b)fluoranthene	TX	5585	10107401
Benzo(g,h,i)perylene	TX	5590	10107401
Benzo(k)fluoranthene	TX	5600	10107401
bis(2-Chloroethoxy)methane	TX	5760	10107401
bis(2-Chloroethyl) ether	TX	5765	10107401
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10107401
Butyl benzyl phthalate	TX	5670	10107401

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Matrix: ***Non-Potable Water***

Chrysene	TX	5855	10107401
Dibenz(a,h) anthracene	TX	5895	10107401
Diethyl phthalate	TX	6070	10107401
Dimethyl phthalate	TX	6135	10107401
Di-n-butyl phthalate	TX	5925	10107401
Di-n-octyl phthalate	TX	6200	10107401
Fluoranthene	TX	6265	10107401
Fluorene	TX	6270	10107401
Hexachlorobenzene	TX	6275	10107401
Hexachlorobutadiene	TX	4835	10107401
Hexachlorocyclopentadiene	TX	6285	10107401
Hexachloroethane	TX	4840	10107401
Indeno(1,2,3-cd) pyrene	TX	6315	10107401
Isophorone	TX	6320	10107401
Naphthalene	TX	5005	10107401
Nitrobenzene	TX	5015	10107401
n-Nitrosodiethylamine	TX	6525	10107401
n-Nitrosodimethylamine	TX	6530	10107401
n-Nitrosodi-n-butylamine	TX	5025	10107401
n-Nitrosodi-n-propylamine	TX	6545	10107401
n-Nitrosodiphenylamine	TX	6535	10107401
Pentachlorobenzene	TX	6590	10107401
Pentachlorophenol	TX	6605	10107401
Phenanthrene	TX	6615	10107401
Phenol	TX	6625	10107401
Pyrene	TX	6665	10107401
Pyridine	TX	5095	10107401

Method EPA 625.1

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10300024

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Matrix: ***Non-Potable Water***

1,2,4-Trichlorobenzene	TX	5155	10300024
1,2-Dichlorobenzene	TX	4610	10300024
1,2-Diphenylhydrazine	TX	6221	10300024
1,3-Dichlorobenzene	TX	4615	10300024
1,4-Dichlorobenzene	TX	4620	10300024
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10300024
2,3,4,6-Tetrachlorophenol	TX	6735	10300024
2,4,5-Trichlorophenol	TX	6835	10300024
2,4,6-Trichlorophenol	TX	6840	10300024
2,4-Dichlorophenol	TX	6000	10300024
2,4-Dimethylphenol	TX	6130	10300024
2,4-Dinitrophenol	TX	6175	10300024
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10300024
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10300024
2-Chloronaphthalene	TX	5795	10300024
2-Chlorophenol	TX	5800	10300024
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10300024
2-Methylphenol (o-Cresol)	TX	6400	10300024
2-Nitrophenol	TX	6490	10300024
3,3'-Dichlorobenzidine	TX	5945	10300024
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10300024
4-Chloro-3-methylphenol	TX	5700	10300024
4-Chlorophenyl phenylether	TX	5825	10300024
4-Methylphenol (p-Cresol)	TX	6410	10300024
4-Nitrophenol	TX	6500	10300024
Acenaphthene	TX	5500	10300024
Acenaphthylene	TX	5505	10300024
Anthracene	TX	5555	10300024
Benzidine	TX	5595	10300024
Benzo(a)anthracene	TX	5575	10300024

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Matrix: ***Non-Potable Water***

Benzo(a)pyrene	TX	5580	10300024
Benzo(b)fluoranthene	TX	5585	10300024
Benzo(g,h,i)perylene	TX	5590	10300024
Benzo(k)fluoranthene	TX	5600	10300024
bis(2-Chloroethoxy)methane	TX	5760	10300024
bis(2-Chloroethyl) ether	TX	5765	10300024
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10300024
Butyl benzyl phthalate	TX	5670	10300024
Chrysene	TX	5855	10300024
Dibenz(a,h) anthracene	TX	5895	10300024
Diethyl phthalate	TX	6070	10300024
Dimethyl phthalate	TX	6135	10300024
Di-n-butyl phthalate	TX	5925	10300024
Di-n-octyl phthalate	TX	6200	10300024
Fluoranthene	TX	6265	10300024
Fluorene	TX	6270	10300024
Hexachlorobenzene	TX	6275	10300024
Hexachlorobutadiene	TX	4835	10300024
Hexachlorocyclopentadiene	TX	6285	10300024
Hexachloroethane	TX	4840	10300024
Indeno(1,2,3-cd) pyrene	TX	6315	10300024
Isophorone	TX	6320	10300024
Naphthalene	TX	5005	10300024
Nitrobenzene	TX	5015	10300024
n-Nitrosodiethylamine	TX	6525	10300024
n-Nitrosodimethylamine	TX	6530	10300024
n-Nitrosodi-n-butylamine	TX	5025	10300024
n-Nitrosodi-n-propylamine	TX	6545	10300024
n-Nitrosodiphenylamine	TX	6535	10300024
Pentachlorobenzene	TX	6590	10300024

Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Pentachlorophenol	TX	6605	10300024
Phenanthrene	TX	6615	10300024
Phenol	TX	6625	10300024
Pyrene	TX	6665	10300024
Pyridine	TX	5095	10300024

Method EPA 632

Analyte	AB	Analyte ID	Method ID
Carbaryl (Sevin)	TX	7195	10108608

Method EPA 7196

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	10162206

Method EPA 7470

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10165807

Method EPA 8081

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10178606
4,4'-DDE	TX	7360	10178606
4,4'-DDT	TX	7365	10178606
Aldrin	TX	7025	10178606
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10178606
alpha-Chlordane	TX	7240	10178606
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10178606
Chlordane (tech.)	TX	7250	10178606
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10178606
Dieldrin	TX	7470	10178606
Endosulfan I	TX	7510	10178606
Endosulfan II	TX	7515	10178606
Endosulfan sulfate	TX	7520	10178606
Endrin	TX	7540	10178606
Endrin aldehyde	TX	7530	10178606

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400 West Bethany Drive, Suite 190 **Allen, TX 75013-3714**	Issue Date:	7/1/2021

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Matrix: ***Non-Potable Water***

Endrin ketone	TX	7535	10178606
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10178606
gamma-Chlordane	TX	7245	10178606
Heptachlor	TX	7685	10178606
Heptachlor epoxide	TX	7690	10178606
Methoxychlor	TX	7810	10178606
Mirex	TX	7870	10178606
Toxaphene (Chlorinated camphene)	TX	8250	10178606

Method EPA 8082

Analyte	AB	Analyte ID	Method ID
Aroclor-1016 (PCB-1016)	TX	8880	10179007
Aroclor-1221 (PCB-1221)	TX	8885	10179007
Aroclor-1232 (PCB-1232)	TX	8890	10179007
Aroclor-1242 (PCB-1242)	TX	8895	10179007
Aroclor-1248 (PCB-1248)	TX	8900	10179007
Aroclor-1254 (PCB-1254)	TX	8905	10179007
Aroclor-1260 (PCB-1260)	TX	8910	10179007
PCBs (total)	TX	8870	10179007

Method EPA 8151

Analyte	AB	Analyte ID	Method ID
2,4,5-T	TX	8655	10183207
2,4-D	TX	8545	10183207
2,4-DB	TX	8560	10183207
Dalapon	TX	8555	10183207
Dicamba	TX	8595	10183207
Dichloroprop (Dichlorprop, Weedone)	TX	8605	10183207
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	TX	8620	10183207
MCPA	TX	7775	10183207
MCPP	TX	7780	10183207
Pentachlorophenol	TX	6605	10183207
Silvex (2,4,5-TP)	TX	8650	10183207

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Matrix: *Non-Potable Water*

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	TX	5195	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802
1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
1,4-Dioxane (1,4-Diethyleneoxide)	TX	4735	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802

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Matrix: ***Non-Potable Water***

4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acetonitrile	TX	4320	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Allyl chloride (3-Chloropropene)	TX	4355	10184802
Benzene	TX	4375	10184802
Benzyl chloride	TX	5635	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
Chloroprene (2-Chloro-1,3-butadiene)	TX	4525	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Ethyl acetate	TX	4755	10184802
Ethyl methacrylate	TX	4810	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Hexachloroethane	TX	4840	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802

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Matrix: ***Non-Potable Water***

Isobutyl alcohol (2-Methyl-1-propanol)	TX	4875	10184802
Isopropyl alcohol (2-Propanol, Isopropanol)	TX	4895	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methacrylonitrile	TX	4925	10184802
Methyl acetate	TX	4940	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802
Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl methacrylate	TX	4990	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
Pentachloroethane	TX	5035	10184802
Propionitrile (Ethyl cyanide)	TX	5080	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
trans-1,4-Dichloro-2-butene	TX	4605	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

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Matrix: ***Non-Potable Water***

Method EPA 8270

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10185805
1,2,4-Trichlorobenzene	TX	5155	10185805
1,2-Dichlorobenzene	TX	4610	10185805
1,2-Dinitrobenzene	TX	6155	10185805
1,3-Dichlorobenzene	TX	4615	10185805
1,3-Dinitrobenzene (1,3-DNB)	TX	6160	10185805
1,4-Dichlorobenzene	TX	4620	10185805
1,4-Dinitrobenzene	TX	6165	10185805
1,4-Naphthoquinone	TX	6420	10185805
1-Chloronaphthalene	TX	5790	10185805
1-Naphthylamine	TX	6425	10185805
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10185805
2,3,4,6-Tetrachlorophenol	TX	6735	10185805
2,4,5-Trichlorophenol	TX	6835	10185805
2,4,6-Trichlorophenol	TX	6840	10185805
2,4-Dichlorophenol	TX	6000	10185805
2,4-Dimethylphenol	TX	6130	10185805
2,4-Dinitrophenol	TX	6175	10185805
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10185805
2,6-Dichlorophenol	TX	6005	10185805
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10185805
2-Acetylaminofluorene	TX	5515	10185805
2-Chloronaphthalene	TX	5795	10185805
2-Chlorophenol	TX	5800	10185805
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10185805
2-Methylaniline (o-Toluidine)	TX	5145	10185805
2-Methylnaphthalene	TX	6385	10185805
2-Methylphenol (o-Cresol)	TX	6400	10185805

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Matrix: ***Non-Potable Water***

2-Naphthylamine	TX	6430	10185805
2-Nitroaniline	TX	6460	10185805
2-Nitrophenol	TX	6490	10185805
2-Picoline (2-Methylpyridine)	TX	5050	10185805
3,3'-Dichlorobenzidine	TX	5945	10185805
3-Methylcholanthrene	TX	6355	10185805
3-Methylphenol (m-Cresol)	TX	6405	10185805
3-Nitroaniline	TX	6465	10185805
4-Aminobiphenyl	TX	5540	10185805
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10185805
4-Chloro-3-methylphenol	TX	5700	10185805
4-Chloroaniline	TX	5745	10185805
4-Chlorophenyl phenylether	TX	5825	10185805
4-Dimethyl aminoazobenzene	TX	6105	10185805
4-Methylphenol (p-Cresol)	TX	6410	10185805
4-Nitroaniline	TX	6470	10185805
4-Nitrobiphenyl	TX	6480	10185805
4-Nitrophenol	TX	6500	10185805
5,5-Diphenylhydantoin	TX	6215	10185805
5-Chloro-2-methylaniline	TX	5695	10185805
5-Nitroacenaphthene	TX	6455	10185805
5-Nitro-o-toluidine	TX	6570	10185805
7,12-Dimethylbenz(a) anthracene	TX	6115	10185805
Acenaphthene	TX	5500	10185805
Acenaphthylene	TX	5505	10185805
Acetophenone	TX	5510	10185805
Aminoazobenzene	TX	5535	10185805
Aniline	TX	5545	10185805
Anthracene	TX	5555	10185805
Azobenzene	TX	5562	10185805

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Matrix: ***Non-Potable Water***

Benzidine	TX	5595	10185805
Benzo(a)anthracene	TX	5575	10185805
Benzo(a)pyrene	TX	5580	10185805
Benzo(b)fluoranthene	TX	5585	10185805
Benzo(g,h,i)perylene	TX	5590	10185805
Benzo(k)fluoranthene	TX	5600	10185805
Benzoic acid	TX	5610	10185805
Benzyl alcohol	TX	5630	10185805
bis(2-Chloroethoxy)methane	TX	5760	10185805
bis(2-Chloroethyl) ether	TX	5765	10185805
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10185805
Butyl benzyl phthalate	TX	5670	10185805
Carbazole	TX	5680	10185805
Chrysene	TX	5855	10185805
Dibenz(a,h) anthracene	TX	5895	10185805
Dibenzofuran	TX	5905	10185805
Diethyl phthalate	TX	6070	10185805
Diethylstilbestrol	TX	6075	10185805
Dimethyl phthalate	TX	6135	10185805
Di-n-butyl phthalate	TX	5925	10185805
Di-n-octyl phthalate	TX	6200	10185805
Diphenylamine	TX	6205	10185805
Ethyl methanesulfonate	TX	6260	10185805
Fluoranthene	TX	6265	10185805
Fluorene	TX	6270	10185805
Hexachlorobenzene	TX	6275	10185805
Hexachlorobutadiene	TX	4835	10185805
Hexachlorocyclopentadiene	TX	6285	10185805
Hexachloroethane	TX	4840	10185805
Hexachloropropene	TX	6295	10185805

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Matrix: ***Non-Potable Water***

Indeno(1,2,3-cd) pyrene	TX	6315	10185805
Isodrin	TX	7725	10185805
Isophorone	TX	6320	10185805
Isosafrole	TX	6325	10185805
Mestranol	TX	6340	10185805
Methyl methanesulfonate	TX	6375	10185805
Naphthalene	TX	5005	10185805
Nitrobenzene	TX	5015	10185805
n-Nitrosodiethylamine	TX	6525	10185805
n-Nitrosodimethylamine	TX	6530	10185805
n-Nitrosodi-n-butylamine	TX	5025	10185805
n-Nitrosodi-n-propylamine	TX	6545	10185805
n-Nitrosodiphenylamine	TX	6535	10185805
n-Nitrosomethylethylamine	TX	6550	10185805
n-Nitrosomorpholine	TX	6555	10185805
n-Nitrosopiperidine	TX	6560	10185805
n-Nitrosopyrrolidine	TX	6565	10185805
o-Anisidine	TX	5550	10185805
p-Cresidine	TX	5860	10185805
Pentachlorobenzene	TX	6590	10185805
Pentachloronitrobenzene (PCNB)	TX	6600	10185805
Pentachlorophenol	TX	6605	10185805
Phenacetin	TX	6610	10185805
Phenanthrene	TX	6615	10185805
Phenol	TX	6625	10185805
Pronamide (Kerb)	TX	6650	10185805
Pyrene	TX	6665	10185805
Pyridine	TX	5095	10185805
Safrole	TX	6685	10185805

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Matrix: ***Non-Potable Water***

Method EPA 9014

Analyte	AB	Analyte ID	Method ID
Amenable cyanide	TX	1510	10193803
Total cyanide	TX	1645	10193803

Method EPA 9040

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	10196802

Method EPA 9050

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10198808

Method EPA 9056

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10199209
Chloride	TX	1575	10199209
Fluoride	TX	1730	10199209
Nitrate as N	TX	1810	10199209
Nitrate-nitrite	TX	1820	10199209
Nitrite as N	TX	1840	10199209
Sulfate	TX	2000	10199209

Method EPA 9060

Analyte	AB	Analyte ID	Method ID
Total Organic Carbon (TOC)	TX	2040	10200201

Method EPA 9065

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10200405

Method IDEXX Laboratories Colilert®

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	60002600

Method SM 2120 B

Analyte	AB	Analyte ID	Method ID
Color	TX	1605	20223807

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Matrix: ***Non-Potable Water***

Method SM 2130 B

Analyte	AB	Analyte ID	Method ID
Turbidity	TX	2055	20042200

Method SM 2320 B

Analyte	AB	Analyte ID	Method ID
Alkalinity as CaCO3	TX	1505	20045005

Method SM 2340 B

Analyte	AB	Analyte ID	Method ID
Total hardness as CaCO3	TX	1755	20046008

Method SM 2510 B

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	20048004

Method SM 2540 B

Analyte	AB	Analyte ID	Method ID
Residue-total (total solids)	TX	1950	20004608

Method SM 2540 C

Analyte	AB	Analyte ID	Method ID
Residue-filterable (TDS)	TX	1955	20049803

Method SM 2540 D

Analyte	AB	Analyte ID	Method ID
Residue-nonfilterable (TSS)	TX	1960	20004802

Method SM 2540 F

Analyte	AB	Analyte ID	Method ID
Residue-settleable	TX	1965	20005009

Method SM 3500-Cr B

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	20065809

Method SM 3500-Fe D

Analyte	AB	Analyte ID	Method ID
Iron	TX	1070	20009603

Method SM 4500-Cl G

Analyte	AB	Analyte ID	Method ID

Total residual chlorine	TX	1940	20020604

Method SM 4500-CN^- E

Analyte	**AB**	**Analyte ID**	**Method ID**
Total cyanide	TX	1645	20021209

Method SM 4500-CN^- G

Analyte	**AB**	**Analyte ID**	**Method ID**
Amenable cyanide	TX	1510	20021607

Method SM 4500-H+ B

Analyte	**AB**	**Analyte ID**	**Method ID**
pH	TX	1900	20104603

Method SM 4500-NH3 F

Analyte	**AB**	**Analyte ID**	**Method ID**
Kjeldahl Nitrogen (Total Kjeldahl Nitrogen-TKN)	TX	1790	20023001

Method SM 4500-NH3 H

Analyte	**AB**	**Analyte ID**	**Method ID**
Ammonia as N	TX	1515	20023409

Method SM 4500-O C

Analyte	**AB**	**Analyte ID**	**Method ID**
Oxygen, dissolved	TX	1880	20025201

Method SM 4500-P E

Analyte	**AB**	**Analyte ID**	**Method ID**
Orthophosphate as P	TX	1870	20025803
Phosphorus	TX	1910	20025803

Method SM 4500-$S2^-$ D

Analyte	**AB**	**Analyte ID**	**Method ID**
Sulfide	TX	2005	20125400

Method SM 4500-$SO3^-$ B

Analyte	**AB**	**Analyte ID**	**Method ID**
Sulfite	TX	2015	20026806

Method SM 5210 B

Analyte	**AB**	**Analyte ID**	**Method ID**
Biochemical oxygen demand (BOD)	TX	1530	20027401

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Matrix: ***Non-Potable Water***

Carbonaceous BOD, CBOD	TX	1555	20027401

Method SM 5220 D

Analyte	AB	Analyte ID	Method ID
Chemical oxygen demand (COD)	TX	1565	20027809

Method SM 5310 C

Analyte	AB	Analyte ID	Method ID
Total Organic Carbon (TOC)	TX	2040	20138209

Method SM 5540 C

Analyte	AB	Analyte ID	Method ID
Surfactants - MBAS	TX	2025	20144405

Method SM 9222 B

Analyte	AB	Analyte ID	Method ID
Total coliforms (enumeration)	TX	2500	20198009

Method SM 9222 D

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20037405

Method TCEQ 1005

Analyte	AB	Analyte ID	Method ID
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

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Matrix: ***Solid & Chemical Materials***

Method EPA 1010

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10116606

Method EPA 1030

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10117201

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 300.0

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10053200
Chloride	TX	1575	10053200
Fluoride	TX	1730	10053200
Nitrate as N	TX	1810	10053200
Nitrate-nitrite	TX	1820	10053200
Nitrite as N	TX	1840	10053200
Sulfate	TX	2000	10053200

Method EPA 353.2

Analyte	AB	Analyte ID	Method ID
Nitrate as N	TX	1810	10067604
Nitrate-nitrite	TX	1820	10067604
Nitrite as N	TX	1840	10067604

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10155609
Antimony	TX	1005	10155609
Arsenic	TX	1010	10155609

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Pace Analytical Services, LLC - Dallas, TX

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Matrix: ***Solid & Chemical Materials***

Barium	TX	1015	10155609
Beryllium	TX	1020	10155609
Boron	TX	1025	10155609
Cadmium	TX	1030	10155609
Calcium	TX	1035	10155609
Chromium	TX	1040	10155609
Cobalt	TX	1050	10155609
Copper	TX	1055	10155609
Iron	TX	1070	10155609
Lead	TX	1075	10155609
Magnesium	TX	1085	10155609
Molybdenum	TX	1100	10155609
Nickel	TX	1105	10155609
Potassium	TX	1125	10155609
Selenium	TX	1140	10155609
Silver	TX	1150	10155609
Strontium	TX	1160	10155609
Thallium	TX	1165	10155609
Tin	TX	1175	10155609
Titanium	TX	1180	10155609
Vanadium	TX	1185	10155609
Zinc	TX	1190	10155609

Method EPA 6020

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10156419
Antimony	TX	1005	10156419
Arsenic	TX	1010	10156419
Barium	TX	1015	10156419
Beryllium	TX	1020	10156419
Cadmium	TX	1030	10156419

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Matrix: ***Solid & Chemical Materials***

Analyte	AB	Analyte ID	Method ID
Calcium	TX	1035	10156419
Chromium	TX	1040	10156419
Cobalt	TX	1050	10156419
Copper	TX	1055	10156419
Iron	TX	1070	10156419
Lead	TX	1075	10156419
Magnesium	TX	1085	10156419
Manganese	TX	1090	10156419
Molybdenum	TX	1100	10156419
Nickel	TX	1105	10156419
Potassium	TX	1125	10156419
Selenium	TX	1140	10156419
Silver	TX	1150	10156419
Thallium	TX	1165	10156419
Vanadium	TX	1185	10156419
Zinc	TX	1190	10156419

Method EPA 7471

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10166208

Method EPA 8081

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10178606
4,4'-DDE	TX	7360	10178606
4,4'-DDT	TX	7365	10178606
Aldrin	TX	7025	10178606
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10178606
alpha-Chlordane	TX	7240	10178606
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10178606
Chlordane (tech.)	TX	7250	10178606
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10178606
Dieldrin	TX	7470	10178606

Endosulfan I	TX	7510	10178606
Endosulfan II	TX	7515	10178606
Endosulfan sulfate	TX	7520	10178606
Endrin	TX	7540	10178606
Endrin aldehyde	TX	7530	10178606
Endrin ketone	TX	7535	10178606
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10178606
gamma-Chlordane	TX	7245	10178606
Heptachlor	TX	7685	10178606
Heptachlor epoxide	TX	7690	10178606
Methoxychlor	TX	7810	10178606
Mirex	TX	7870	10178606
Toxaphene (Chlorinated camphene)	TX	8250	10178606

Method EPA 8082

Analyte	AB	Analyte ID	Method ID
Aroclor-1016 (PCB-1016)	TX	8880	10179007
Aroclor-1221 (PCB-1221)	TX	8885	10179007
Aroclor-1232 (PCB-1232)	TX	8890	10179007
Aroclor-1242 (PCB-1242)	TX	8895	10179007
Aroclor-1248 (PCB-1248)	TX	8900	10179007
Aroclor-1254 (PCB-1254)	TX	8905	10179007
Aroclor-1260 (PCB-1260)	TX	8910	10179007
PCBs (total)	TX	8870	10179007

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	TX	5195	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802

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Matrix: ***Solid & Chemical Materials***

1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
1,4-Dioxane (1,4-Diethyleneoxide)	TX	4735	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802
4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acetonitrile	TX	4320	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Allyl chloride (3-Chloropropene)	TX	4355	10184802
Benzene	TX	4375	10184802

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Matrix: ***Solid & Chemical Materials***

Benzyl chloride	TX	5635	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
Chloroprene (2-Chloro-1,3-butadiene)	TX	4525	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	TX	4745	10184802
Ethyl acetate	TX	4755	10184802
Ethyl methacrylate	TX	4810	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Hexachloroethane	TX	4840	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802
Isobutyl alcohol (2-Methyl-1-propanol)	TX	4875	10184802
Isopropyl alcohol (2-Propanol, Isopropanol)	TX	4895	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methacrylonitrile	TX	4925	10184802
Methyl acetate	TX	4940	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802

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Matrix: ***Solid & Chemical Materials***

Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl methacrylate	TX	4990	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
Pentachloroethane	TX	5035	10184802
Propionitrile (Ethyl cyanide)	TX	5080	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
trans-1,4-Dichloro-2-butene	TX	4605	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

Method EPA 8270

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10185805
1,2,4-Trichlorobenzene	TX	5155	10185805
1,2-Dichlorobenzene	TX	4610	10185805
1,2-Dinitrobenzene	TX	6155	10185805
1,3-Dichlorobenzene	TX	4615	10185805

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Matrix: ***Solid & Chemical Materials***

1,3-Dinitrobenzene (1,3-DNB)	TX	6160	10185805
1,4-Dichlorobenzene	TX	4620	10185805
1,4-Dinitrobenzene	TX	6165	10185805
1,4-Naphthoquinone	TX	6420	10185805
1-Chloronaphthalene	TX	5790	10185805
1-Naphthylamine	TX	6425	10185805
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10185805
2,3,4,6-Tetrachlorophenol	TX	6735	10185805
2,4,5-Trichlorophenol	TX	6835	10185805
2,4,6-Trichlorophenol	TX	6840	10185805
2,4-Dichlorophenol	TX	6000	10185805
2,4-Dimethylphenol	TX	6130	10185805
2,4-Dinitrophenol	TX	6175	10185805
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10185805
2,6-Dichlorophenol	TX	6005	10185805
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10185805
2-Acetylaminofluorene	TX	5515	10185805
2-Chloronaphthalene	TX	5795	10185805
2-Chlorophenol	TX	5800	10185805
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10185805
2-Methylaniline (o-Toluidine)	TX	5145	10185805
2-Methylnaphthalene	TX	6385	10185805
2-Methylphenol (o-Cresol)	TX	6400	10185805
2-Naphthylamine	TX	6430	10185805
2-Nitroaniline	TX	6460	10185805
2-Nitrophenol	TX	6490	10185805
2-Picoline (2-Methylpyridine)	TX	5050	10185805
3,3'-Dichlorobenzidine	TX	5945	10185805
3-Methylcholanthrene	TX	6355	10185805
3-Methylphenol (m-Cresol)	TX	6405	10185805

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Matrix: ***Solid & Chemical Materials***

3-Nitroaniline	TX	6465	10185805
4-Aminobiphenyl	TX	5540	10185805
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10185805
4-Chloro-3-methylphenol	TX	5700	10185805
4-Chloroaniline	TX	5745	10185805
4-Chlorophenyl phenylether	TX	5825	10185805
4-Methylphenol (p-Cresol)	TX	6410	10185805
4-Nitroaniline	TX	6470	10185805
4-Nitrobiphenyl	TX	6480	10185805
4-Nitrophenol	TX	6500	10185805
5,5-Diphenylhydantoin	TX	6215	10185805
5-Chloro-2-methylaniline	TX	5695	10185805
5-Nitroacenaphthene	TX	6455	10185805
5-Nitro-o-toluidine	TX	6570	10185805
7,12-Dimethylbenz(a) anthracene	TX	6115	10185805
Acenaphthene	TX	5500	10185805
Acenaphthylene	TX	5505	10185805
Acetophenone	TX	5510	10185805
Aminoazobenzene	TX	5535	10185805
Aniline	TX	5545	10185805
Anthracene	TX	5555	10185805
Azobenzene	TX	5562	10185805
Benzidine	TX	5595	10185805
Benzo(a)anthracene	TX	5575	10185805
Benzo(a)pyrene	TX	5580	10185805
Benzo(b)fluoranthene	TX	5585	10185805
Benzo(g,h,i)perylene	TX	5590	10185805
Benzo(k)fluoranthene	TX	5600	10185805
Benzoic acid	TX	5610	10185805
Benzyl alcohol	TX	5630	10185805

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Matrix: ***Solid & Chemical Materials***

bis(2-Chloroethoxy)methane	TX	5760	10185805
bis(2-Chloroethyl) ether	TX	5765	10185805
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10185805
Butyl benzyl phthalate	TX	5670	10185805
Carbazole	TX	5680	10185805
Chrysene	TX	5855	10185805
Dibenz(a,h) anthracene	TX	5895	10185805
Dibenzofuran	TX	5905	10185805
Diethyl phthalate	TX	6070	10185805
Diethyl sulfate	TX	6080	10185805
Diethylstilbestrol	TX	6075	10185805
Dimethyl phthalate	TX	6135	10185805
Di-n-butyl phthalate	TX	5925	10185805
Di-n-octyl phthalate	TX	6200	10185805
Diphenylamine	TX	6205	10185805
Ethyl methanesulfonate	TX	6260	10185805
Fluoranthene	TX	6265	10185805
Fluorene	TX	6270	10185805
Hexachlorobenzene	TX	6275	10185805
Hexachlorobutadiene	TX	4835	10185805
Hexachlorocyclopentadiene	TX	6285	10185805
Hexachloroethane	TX	4840	10185805
Hexachloropropene	TX	6295	10185805
Indeno(1,2,3-cd) pyrene	TX	6315	10185805
Isodrin	TX	7725	10185805
Isophorone	TX	6320	10185805
Isosafrole	TX	6325	10185805
Mestranol	TX	6340	10185805
Methyl methanesulfonate	TX	6375	10185805
Methylphenols, total	TX	10313	10185805

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Matrix: ***Solid & Chemical Materials***

Naphthalene	TX	5005	10185805
Nitrobenzene	TX	5015	10185805
n-Nitrosodiethylamine	TX	6525	10185805
n-Nitrosodimethylamine	TX	6530	10185805
n-Nitrosodi-n-butylamine	TX	5025	10185805
n-Nitrosodi-n-propylamine	TX	6545	10185805
n-Nitrosodiphenylamine	TX	6535	10185805
n-Nitrosomethylethylamine	TX	6550	10185805
n-Nitrosomorpholine	TX	6555	10185805
n-Nitrosopiperidine	TX	6560	10185805
n-Nitrosopyrrolidine	TX	6565	10185805
o-Anisidine	TX	5550	10185805
p-Cresidine	TX	5860	10185805
Pentachlorobenzene	TX	6590	10185805
Pentachloronitrobenzene (PCNB)	TX	6600	10185805
Pentachlorophenol	TX	6605	10185805
Phenacetin	TX	6610	10185805
Phenanthrene	TX	6615	10185805
Phenol	TX	6625	10185805
Pronamide (Kerb)	TX	6650	10185805
Pyrene	TX	6665	10185805
Pyridine	TX	5095	10185805
Safrole	TX	6685	10185805

Method EPA 9014

Analyte	**AB**	**Analyte ID**	**Method ID**
Amenable cyanide	TX	1510	10193803
Total cyanide	TX	1645	10193803

Method EPA 9040

Analyte	**AB**	**Analyte ID**	**Method ID**
Corrosivity	TX	1615	10196802
pH	TX	1900	10196802

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Matrix: ***Solid & Chemical Materials***

Method EPA 9045

Analyte	AB	Analyte ID	Method ID
Corrosivity	TX	1615	10197805
pH	TX	1900	10197805

Method EPA 9050

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10198808

Method EPA 9056

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10199209
Chloride	TX	1575	10199209
Fluoride	TX	1730	10199209
Nitrate as N	TX	1810	10199209
Nitrate-nitrite	TX	1820	10199209
Nitrite as N	TX	1840	10199209
Sulfate	TX	2000	10199209

Method EPA 9065

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10200405

Method EPA 9095

Analyte	AB	Analyte ID	Method ID
Paint Filter Liquids Test	TX	10312	10204009

Method EPA 9250

Analyte	AB	Analyte ID	Method ID
Chloride	TX	1575	10207202

Method SM 9221 C / 9221 E

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20195806

Method TCEQ 1005

Analyte	AB	Analyte ID	Method ID
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

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Matrix: ***Drinking Water***

Method SM 9222 D (MFC Medium)

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20210008

Method SM 9223-IDEXX Laboratories Colilert® Test

Analyte	AB	Analyte ID	Method ID
Total coliforms and E. coli (P/A)	TX	2502	20212413

Method SM 9223-IDEXX Laboratories Colilert® Quanti-Tray Test

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	20211603
Total coliforms (enumeration)	TX	2500	20211603

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Matrix: ***Non-Potable Water***

Method EPA 1010

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10116606

Method EPA 120.1

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10006403

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 160.4

Analyte	AB	Analyte ID	Method ID
Residue-volatile	TX	1970	10010409

Method EPA 1664

Analyte	AB	Analyte ID	Method ID
n-Hexane Extractable Material (HEM) (O&G)	TX	1803	10127807
Silica Gel Treated n-Hexane Extractable Material (SGT-HEM)	TX	10220	10127807

Method EPA 1666

Analyte	AB	Analyte ID	Method ID
Ethyl acetate	TX	4755	10128208
Isopropyl acetate	TX	4890	10128208
n-Amyl acetate	TX	4360	10128208

Method EPA 180.1

Analyte	AB	Analyte ID	Method ID
Turbidity	TX	2055	10011606

Method EPA 200.7

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10013806
Antimony	TX	1005	10013806

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Pace Analytical Services, LLC - Dallas, TX	**Certificate:**	**T104704232-21-33**
	Expiration Date:	**6/30/2022**
400 West Bethany Drive, Suite 190 **Allen, TX 75013-3714**	**Issue Date:**	**7/1/2021**

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Matrix: ***Non-Potable Water***

Arsenic	TX	1010	10013806
Barium	TX	1015	10013806
Beryllium	TX	1020	10013806
Boron	TX	1025	10013806
Cadmium	TX	1030	10013806
Calcium	TX	1035	10013806
Chromium	TX	1040	10013806
Cobalt	TX	1050	10013806
Copper	TX	1055	10013806
Iron	TX	1070	10013806
Lead	TX	1075	10013806
Magnesium	TX	1085	10013806
Manganese	TX	1090	10013806
Molybdenum	TX	1100	10013806
Nickel	TX	1105	10013806
Potassium	TX	1125	10013806
Selenium	TX	1140	10013806
Silver	TX	1150	10013806
Sodium	TX	1155	10013806
Strontium	TX	1160	10013806
Thallium	TX	1165	10013806
Tin	TX	1175	10013806
Titanium	TX	1180	10013806
Vanadium	TX	1185	10013806
Zinc	TX	1190	10013806

Method EPA 200.8

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10014605
Antimony	TX	1005	10014605
Arsenic	TX	1010	10014605

Pace Analytical Services, LLC - Dallas, TX

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Matrix: ***Non-Potable Water***

Barium	TX	1015	10014605
Beryllium	TX	1020	10014605
Cadmium	TX	1030	10014605
Calcium	TX	1035	10014605
Chromium	TX	1040	10014605
Cobalt	TX	1050	10014605
Copper	TX	1055	10014605
Iron	TX	1070	10014605
Lead	TX	1075	10014605
Magnesium	TX	1085	10014605
Manganese	TX	1090	10014605
Molybdenum	TX	1100	10014605
Nickel	TX	1105	10014605
Potassium	TX	1125	10014605
Selenium	TX	1140	10014605
Silver	TX	1150	10014605
Sodium	TX	1155	10014605
Thallium	TX	1165	10014605
Vanadium	TX	1185	10014605
Zinc	TX	1190	10014605

Method EPA 245.1

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10036609

Method EPA 300.0

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10053200
Chloride	TX	1575	10053200
Fluoride	TX	1730	10053200
Nitrate as N	TX	1810	10053200
Nitrate-nitrite	TX	1820	10053200
Nitrite as N	TX	1840	10053200

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Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Sulfate	TX	2000	10053200

Method EPA 353.2

Analyte	AB	Analyte ID	Method ID
Nitrate as N	TX	1810	10067400
Nitrate-nitrite	TX	1820	10067400
Nitrite as N	TX	1840	10067400

Method EPA 360.1

Analyte	AB	Analyte ID	Method ID
Oxygen, dissolved	TX	1880	10069008

Method EPA 420.1

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10079400

Method EPA 524.2

Analyte	AB	Analyte ID	Method ID
Acetone (2-Propanone)	TX	4315	10088809
Methylene chloride (Dichloromethane)	TX	4975	10088809

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10155609
Antimony	TX	1005	10155609
Arsenic	TX	1010	10155609
Barium	TX	1015	10155609
Beryllium	TX	1020	10155609
Boron	TX	1025	10155609
Cadmium	TX	1030	10155609
Calcium	TX	1035	10155609
Chromium	TX	1040	10155609
Cobalt	TX	1050	10155609
Copper	TX	1055	10155609
Iron	TX	1070	10155609
Lead	TX	1075	10155609

Matrix: ***Non-Potable Water***

Magnesium	TX	1085	10155609
Manganese	TX	1090	10155609
Molybdenum	TX	1100	10155609
Nickel	TX	1105	10155609
Potassium	TX	1125	10155609
Selenium	TX	1140	10155609
Silver	TX	1150	10155609
Sodium	TX	1155	10155609
Strontium	TX	1160	10155609
Thallium	TX	1165	10155609
Tin	TX	1175	10155609
Titanium	TX	1180	10155609
Vanadium	TX	1185	10155609
Zinc	TX	1190	10155609

Method EPA 6020

Analyte	**AB**	**Analyte ID**	**Method ID**
Aluminum	TX	1000	10156419
Antimony	TX	1005	10156419
Arsenic	TX	1010	10156419
Barium	TX	1015	10156419
Beryllium	TX	1020	10156419
Cadmium	TX	1030	10156419
Calcium	TX	1035	10156419
Chromium	TX	1040	10156419
Cobalt	TX	1050	10156419
Copper	TX	1055	10156419
Iron	TX	1070	10156419
Lead	TX	1075	10156419
Magnesium	TX	1085	10156419
Manganese	TX	1090	10156419

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Matrix: ***Non-Potable Water***

Molybdenum	TX	1100	10156419
Nickel	TX	1105	10156419
Potassium	TX	1125	10156419
Selenium	TX	1140	10156419
Silver	TX	1150	10156419
Sodium	TX	1155	10156419
Thallium	TX	1165	10156419
Vanadium	TX	1185	10156419
Zinc	TX	1190	10156419

Method EPA 608

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10103603
4,4'-DDE	TX	7360	10103603
4,4'-DDT	TX	7365	10103603
Aldrin	TX	7025	10103603
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10103603
Aroclor-1016 (PCB-1016)	TX	8880	10103603
Aroclor-1221 (PCB-1221)	TX	8885	10103603
Aroclor-1232 (PCB-1232)	TX	8890	10103603
Aroclor-1242 (PCB-1242)	TX	8895	10103603
Aroclor-1248 (PCB-1248)	TX	8900	10103603
Aroclor-1254 (PCB-1254)	TX	8905	10103603
Aroclor-1260 (PCB-1260)	TX	8910	10103603
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10103603
Chlordane (tech.)	TX	7250	10103603
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10103603
Dieldrin	TX	7470	10103603
Endosulfan I	TX	7510	10103603
Endosulfan II	TX	7515	10103603
Endosulfan sulfate	TX	7520	10103603

Matrix: ***Non-Potable Water***

Endrin	TX	7540	10103603
Endrin aldehyde	TX	7530	10103603
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10103603
Heptachlor	TX	7685	10103603
Heptachlor epoxide	TX	7690	10103603
Methoxychlor	TX	7810	10103603
Toxaphene (Chlorinated camphene)	TX	8250	10103603

Method EPA 608.3

Analyte	**AB**	**Analyte ID**	**Method ID**
4,4'-DDD	TX	7355	10296625
4,4'-DDE	TX	7360	10296625
4,4'-DDT	TX	7365	10296625
Aldrin	TX	7025	10296625
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10296625
alpha-Chlordane	TX	7240	10296625
Aroclor-1016 (PCB-1016)	TX	8880	10296625
Aroclor-1221 (PCB-1221)	TX	8885	10296625
Aroclor-1232 (PCB-1232)	TX	8890	10296625
Aroclor-1242 (PCB-1242)	TX	8895	10296625
Aroclor-1248 (PCB-1248)	TX	8900	10296625
Aroclor-1254 (PCB-1254)	TX	8905	10296625
Aroclor-1260 (PCB-1260)	TX	8910	10296625
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10296625
Chlordane (tech.)	TX	7250	10296625
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10296625
Dieldrin	TX	7470	10296625
Endosulfan I	TX	7510	10296625
Endosulfan II	TX	7515	10296625
Endosulfan sulfate	TX	7520	10296625
Endrin	TX	7540	10296625

Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Endrin aldehyde	TX	7530	10296625
Endrin ketone	TX	7535	10296625
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10296625
gamma-Chlordane	TX	7245	10296625
Heptachlor	TX	7685	10296625
Heptachlor epoxide	TX	7690	10296625
Methoxychlor	TX	7810	10296625
Toxaphene (Chlorinated camphene)	TX	8250	10296625

Method EPA 615

Analyte	AB	Analyte ID	Method ID
2,4,5-T	TX	8655	10298201
2,4-D	TX	8545	10298201
2,4-DB	TX	8560	10298201
Dalapon	TX	8555	10298201
Dicamba	TX	8595	10298201
Dichloroprop (Dichlorprop, Weedone)	TX	8605	10298201
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	TX	8620	10298201
MCPA	TX	7775	10298201
MCPP	TX	7780	10298201
Silvex (2,4,5-TP)	TX	8650	10298201

Method EPA 624

Analyte	AB	Analyte ID	Method ID
1,1,1-Trichloroethane	TX	5160	10107207
1,1,2,2-Tetrachloroethane	TX	5110	10107207
1,1,2-Trichloroethane	TX	5165	10107207
1,1-Dichloroethane	TX	4630	10107207
1,1-Dichloroethylene	TX	4640	10107207
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10107207
1,2-Dichlorobenzene	TX	4610	10107207
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10107207
1,2-Dichloropropane	TX	4655	10107207

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Matrix: ***Non-Potable Water***

1,3-Dichlorobenzene	TX	4615	10107207
1,4-Dichlorobenzene	TX	4620	10107207
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10107207
2-Chloroethyl vinyl ether	TX	4500	10107207
Acetone (2-Propanone)	TX	4315	10107207
Acrolein (Propenal)	TX	4325	10107207
Acrylonitrile	TX	4340	10107207
Benzene	TX	4375	10107207
Bromodichloromethane	TX	4395	10107207
Bromoform	TX	4400	10107207
Carbon tetrachloride	TX	4455	10107207
Chlorobenzene	TX	4475	10107207
Chlorodibromomethane	TX	4575	10107207
Chloroethane (Ethyl chloride)	TX	4485	10107207
Chloroform	TX	4505	10107207
cis-1,2-Dichloroethylene	TX	4645	10107207
cis-1,3-Dichloropropene	TX	4680	10107207
Ethylbenzene	TX	4765	10107207
m+p-xylene	TX	5240	10107207
Methyl bromide (Bromomethane)	TX	4950	10107207
Methyl chloride (Chloromethane)	TX	4960	10107207
Methyl tert-butyl ether (MTBE)	TX	5000	10107207
Methylene chloride (Dichloromethane)	TX	4975	10107207
Naphthalene	TX	5005	10107207
o-Xylene	TX	5250	10107207
Tetrachloroethylene (Perchloroethylene)	TX	5115	10107207
Toluene	TX	5140	10107207
Total trihalomethanes	TX	5205	10107207
trans-1,2-Dichloroethylene	TX	4700	10107207
trans-1,3-Dichloropropylene	TX	4685	10107207

Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Trichloroethene (Trichloroethylene)	TX	5170	10107207
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10107207
Vinyl chloride	TX	5235	10107207
Xylene (total)	TX	5260	10107207

Method EPA 624.1

Analyte	AB	Analyte ID	Method ID
1,1,1-Trichloroethane	TX	5160	10298121
1,1,2,2-Tetrachloroethane	TX	5110	10298121
1,1,2-Trichloroethane	TX	5165	10298121
1,1-Dichloroethane	TX	4630	10298121
1,1-Dichloroethylene	TX	4640	10298121
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10298121
1,2-Dichlorobenzene	TX	4610	10298121
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10298121
1,2-Dichloropropane	TX	4655	10298121
1,3-Dichlorobenzene	TX	4615	10298121
1,4-Dichlorobenzene	TX	4620	10298121
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10298121
2-Chloroethyl vinyl ether	TX	4500	10298121
Acetone (2-Propanone)	TX	4315	10298121
Acrolein (Propenal)	TX	4325	10298121
Acrylonitrile	TX	4340	10298121
Benzene	TX	4375	10298121
Bromodichloromethane	TX	4395	10298121
Bromoform	TX	4400	10298121
Carbon tetrachloride	TX	4455	10298121
Chlorobenzene	TX	4475	10298121
Chlorodibromomethane	TX	4575	10298121
Chloroethane (Ethyl chloride)	TX	4485	10298121
Chloroform	TX	4505	10298121

Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
cis-1,2-Dichloroethylene	TX	4645	10298121
cis-1,3-Dichloropropene	TX	4680	10298121
Ethylbenzene	TX	4765	10298121
m+p-xylene	TX	5240	10298121
Methyl bromide (Bromomethane)	TX	4950	10298121
Methyl chloride (Chloromethane)	TX	4960	10298121
Methyl tert-butyl ether (MTBE)	TX	5000	10298121
Methylene chloride (Dichloromethane)	TX	4975	10298121
Naphthalene	TX	5005	10298121
o-Xylene	TX	5250	10298121
Tetrachloroethylene (Perchloroethylene)	TX	5115	10298121
Toluene	TX	5140	10298121
Total trihalomethanes	TX	5205	10298121
trans-1,2-Dichloroethylene	TX	4700	10298121
trans-1,3-Dichloropropylene	TX	4685	10298121
Trichloroethene (Trichloroethylene)	TX	5170	10298121
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10298121
Vinyl chloride	TX	5235	10298121
Xylene (total)	TX	5260	10298121

Method EPA 625

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10107401
1,2,4-Trichlorobenzene	TX	5155	10107401
1,2-Dichlorobenzene	TX	4610	10107401
1,2-Diphenylhydrazine	TX	6220	10107401
1,3-Dichlorobenzene	TX	4615	10107401
1,4-Dichlorobenzene	TX	4620	10107401
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10107401
2,3,4,6-Tetrachlorophenol	TX	6735	10107401
2,4,5-Trichlorophenol	TX	6835	10107401

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Matrix: ***Non-Potable Water***

2,4,6-Trichlorophenol	TX	6840	10107401
2,4-Dichlorophenol	TX	6000	10107401
2,4-Dimethylphenol	TX	6130	10107401
2,4-Dinitrophenol	TX	6175	10107401
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10107401
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10107401
2-Chloronaphthalene	TX	5795	10107401
2-Chlorophenol	TX	5800	10107401
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10107401
2-Methylphenol (o-Cresol)	TX	6400	10107401
2-Nitrophenol	TX	6490	10107401
3,3'-Dichlorobenzidine	TX	5945	10107401
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10107401
4-Chloro-3-methylphenol	TX	5700	10107401
4-Chlorophenyl phenylether	TX	5825	10107401
4-Methylphenol (p-Cresol)	TX	6410	10107401
4-Nitrophenol	TX	6500	10107401
Acenaphthene	TX	5500	10107401
Acenaphthylene	TX	5505	10107401
Anthracene	TX	5555	10107401
Benzidine	TX	5595	10107401
Benzo(a)anthracene	TX	5575	10107401
Benzo(a)pyrene	TX	5580	10107401
Benzo(b)fluoranthene	TX	5585	10107401
Benzo(g,h,i)perylene	TX	5590	10107401
Benzo(k)fluoranthene	TX	5600	10107401
bis(2-Chloroethoxy)methane	TX	5760	10107401
bis(2-Chloroethyl) ether	TX	5765	10107401
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10107401
Butyl benzyl phthalate	TX	5670	10107401

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Matrix: ***Non-Potable Water***

Chrysene	TX	5855	10107401
Dibenz(a,h) anthracene	TX	5895	10107401
Diethyl phthalate	TX	6070	10107401
Dimethyl phthalate	TX	6135	10107401
Di-n-butyl phthalate	TX	5925	10107401
Di-n-octyl phthalate	TX	6200	10107401
Fluoranthene	TX	6265	10107401
Fluorene	TX	6270	10107401
Hexachlorobenzene	TX	6275	10107401
Hexachlorobutadiene	TX	4835	10107401
Hexachlorocyclopentadiene	TX	6285	10107401
Hexachloroethane	TX	4840	10107401
Indeno(1,2,3-cd) pyrene	TX	6315	10107401
Isophorone	TX	6320	10107401
Naphthalene	TX	5005	10107401
Nitrobenzene	TX	5015	10107401
n-Nitrosodiethylamine	TX	6525	10107401
n-Nitrosodimethylamine	TX	6530	10107401
n-Nitrosodi-n-butylamine	TX	5025	10107401
n-Nitrosodi-n-propylamine	TX	6545	10107401
n-Nitrosodiphenylamine	TX	6535	10107401
Pentachlorobenzene	TX	6590	10107401
Pentachlorophenol	TX	6605	10107401
Phenanthrene	TX	6615	10107401
Phenol	TX	6625	10107401
Pyrene	TX	6665	10107401
Pyridine	TX	5095	10107401

Method EPA 625.1

Analyte	**AB**	**Analyte ID**	**Method ID**
1,2,4,5-Tetrachlorobenzene	TX	6715	10300024

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Matrix: ***Non-Potable Water***

1,2,4-Trichlorobenzene	TX	5155	10300024
1,2-Dichlorobenzene	TX	4610	10300024
1,2-Diphenylhydrazine	TX	6221	10300024
1,3-Dichlorobenzene	TX	4615	10300024
1,4-Dichlorobenzene	TX	4620	10300024
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10300024
2,3,4,6-Tetrachlorophenol	TX	6735	10300024
2,4,5-Trichlorophenol	TX	6835	10300024
2,4,6-Trichlorophenol	TX	6840	10300024
2,4-Dichlorophenol	TX	6000	10300024
2,4-Dimethylphenol	TX	6130	10300024
2,4-Dinitrophenol	TX	6175	10300024
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10300024
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10300024
2-Chloronaphthalene	TX	5795	10300024
2-Chlorophenol	TX	5800	10300024
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10300024
2-Methylphenol (o-Cresol)	TX	6400	10300024
2-Nitrophenol	TX	6490	10300024
3,3'-Dichlorobenzidine	TX	5945	10300024
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10300024
4-Chloro-3-methylphenol	TX	5700	10300024
4-Chlorophenyl phenylether	TX	5825	10300024
4-Methylphenol (p-Cresol)	TX	6410	10300024
4-Nitrophenol	TX	6500	10300024
Acenaphthene	TX	5500	10300024
Acenaphthylene	TX	5505	10300024
Anthracene	TX	5555	10300024
Benzidine	TX	5595	10300024
Benzo(a)anthracene	TX	5575	10300024

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NELAP - Recognized Laboratory Fields of Accreditation

		Certificate:	T104704232-21-33
Pace Analytical Services, LLC - Dallas, TX		Expiration Date:	6/30/2022
400 West Bethany Drive, Suite 190 Allen, TX 75013-3714		Issue Date:	7/1/2021

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Matrix: ***Non-Potable Water***

Benzo(a)pyrene	TX	5580	10300024
Benzo(b)fluoranthene	TX	5585	10300024
Benzo(g,h,i)perylene	TX	5590	10300024
Benzo(k)fluoranthene	TX	5600	10300024
bis(2-Chloroethoxy)methane	TX	5760	10300024
bis(2-Chloroethyl) ether	TX	5765	10300024
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10300024
Butyl benzyl phthalate	TX	5670	10300024
Chrysene	TX	5855	10300024
Dibenz(a,h) anthracene	TX	5895	10300024
Diethyl phthalate	TX	6070	10300024
Dimethyl phthalate	TX	6135	10300024
Di-n-butyl phthalate	TX	5925	10300024
Di-n-octyl phthalate	TX	6200	10300024
Fluoranthene	TX	6265	10300024
Fluorene	TX	6270	10300024
Hexachlorobenzene	TX	6275	10300024
Hexachlorobutadiene	TX	4835	10300024
Hexachlorocyclopentadiene	TX	6285	10300024
Hexachloroethane	TX	4840	10300024
Indeno(1,2,3-cd) pyrene	TX	6315	10300024
Isophorone	TX	6320	10300024
Naphthalene	TX	5005	10300024
Nitrobenzene	TX	5015	10300024
n-Nitrosodiethylamine	TX	6525	10300024
n-Nitrosodimethylamine	TX	6530	10300024
n-Nitrosodi-n-butylamine	TX	5025	10300024
n-Nitrosodi-n-propylamine	TX	6545	10300024
n-Nitrosodiphenylamine	TX	6535	10300024
Pentachlorobenzene	TX	6590	10300024

Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Pentachlorophenol	TX	6605	10300024
Phenanthrene	TX	6615	10300024
Phenol	TX	6625	10300024
Pyrene	TX	6665	10300024
Pyridine	TX	5095	10300024

Method EPA 632

Analyte	AB	Analyte ID	Method ID
Carbaryl (Sevin)	TX	7195	10108608

Method EPA 7196

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	10162206

Method EPA 7470

Analyte	AB	Analyte ID	Method ID
Mercury	TX	1095	10165807

Method EPA 8081

Analyte	AB	Analyte ID	Method ID
4,4'-DDD	TX	7355	10178606
4,4'-DDE	TX	7360	10178606
4,4'-DDT	TX	7365	10178606
Aldrin	TX	7025	10178606
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10178606
alpha-Chlordane	TX	7240	10178606
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10178606
Chlordane (tech.)	TX	7250	10178606
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10178606
Dieldrin	TX	7470	10178606
Endosulfan I	TX	7510	10178606
Endosulfan II	TX	7515	10178606
Endosulfan sulfate	TX	7520	10178606
Endrin	TX	7540	10178606
Endrin aldehyde	TX	7530	10178606

Matrix: *Non-Potable Water*

Endrin ketone	TX	7535	10178606
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10178606
gamma-Chlordane	TX	7245	10178606
Heptachlor	TX	7685	10178606
Heptachlor epoxide	TX	7690	10178606
Methoxychlor	TX	7810	10178606
Mirex	TX	7870	10178606
Toxaphene (Chlorinated camphene)	TX	8250	10178606

Method EPA 8082

Analyte	AB	Analyte ID	Method ID
Aroclor-1016 (PCB-1016)	TX	8880	10179007
Aroclor-1221 (PCB-1221)	TX	8885	10179007
Aroclor-1232 (PCB-1232)	TX	8890	10179007
Aroclor-1242 (PCB-1242)	TX	8895	10179007
Aroclor-1248 (PCB-1248)	TX	8900	10179007
Aroclor-1254 (PCB-1254)	TX	8905	10179007
Aroclor-1260 (PCB-1260)	TX	8910	10179007
PCBs (total)	TX	8870	10179007

Method EPA 8151

Analyte	AB	Analyte ID	Method ID
2,4,5-T	TX	8655	10183207
2,4-D	TX	8545	10183207
2,4-DB	TX	8560	10183207
Dalapon	TX	8555	10183207
Dicamba	TX	8595	10183207
Dichloroprop (Dichlorprop, Weedone)	TX	8605	10183207
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	TX	8620	10183207
MCPA	TX	7775	10183207
MCPP	TX	7780	10183207
Pentachlorophenol	TX	6605	10183207
Silvex (2,4,5-TP)	TX	8650	10183207

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Matrix: ***Non-Potable Water***

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	TX	5195	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802
1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
1,4-Dioxane (1,4-Diethyleneoxide)	TX	4735	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802

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Matrix: ***Non-Potable Water***

4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acetonitrile	TX	4320	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Allyl chloride (3-Chloropropene)	TX	4355	10184802
Benzene	TX	4375	10184802
Benzyl chloride	TX	5635	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
Chloroprene (2-Chloro-1,3-butadiene)	TX	4525	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Ethyl acetate	TX	4755	10184802
Ethyl methacrylate	TX	4810	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Hexachloroethane	TX	4840	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802

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Matrix: ***Non-Potable Water***

Isobutyl alcohol (2-Methyl-1-propanol)	TX	4875	10184802
Isopropyl alcohol (2-Propanol, Isopropanol)	TX	4895	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methacrylonitrile	TX	4925	10184802
Methyl acetate	TX	4940	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802
Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl methacrylate	TX	4990	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
Pentachloroethane	TX	5035	10184802
Propionitrile (Ethyl cyanide)	TX	5080	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
trans-1,4-Dichloro-2-butene	TX	4605	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

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Matrix: ***Non-Potable Water***

Method EPA 8270

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10185805
1,2,4-Trichlorobenzene	TX	5155	10185805
1,2-Dichlorobenzene	TX	4610	10185805
1,2-Dinitrobenzene	TX	6155	10185805
1,3-Dichlorobenzene	TX	4615	10185805
1,3-Dinitrobenzene (1,3-DNB)	TX	6160	10185805
1,4-Dichlorobenzene	TX	4620	10185805
1,4-Dinitrobenzene	TX	6165	10185805
1,4-Naphthoquinone	TX	6420	10185805
1-Chloronaphthalene	TX	5790	10185805
1-Naphthylamine	TX	6425	10185805
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10185805
2,3,4,6-Tetrachlorophenol	TX	6735	10185805
2,4,5-Trichlorophenol	TX	6835	10185805
2,4,6-Trichlorophenol	TX	6840	10185805
2,4-Dichlorophenol	TX	6000	10185805
2,4-Dimethylphenol	TX	6130	10185805
2,4-Dinitrophenol	TX	6175	10185805
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10185805
2,6-Dichlorophenol	TX	6005	10185805
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10185805
2-Acetylaminofluorene	TX	5515	10185805
2-Chloronaphthalene	TX	5795	10185805
2-Chlorophenol	TX	5800	10185805
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10185805
2-Methylaniline (o-Toluidine)	TX	5145	10185805
2-Methylnaphthalene	TX	6385	10185805
2-Methylphenol (o-Cresol)	TX	6400	10185805

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Matrix: ***Non-Potable Water***

2-Naphthylamine	TX	6430	10185805
2-Nitroaniline	TX	6460	10185805
2-Nitrophenol	TX	6490	10185805
2-Picoline (2-Methylpyridine)	TX	5050	10185805
3,3'-Dichlorobenzidine	TX	5945	10185805
3-Methylcholanthrene	TX	6355	10185805
3-Methylphenol (m-Cresol)	TX	6405	10185805
3-Nitroaniline	TX	6465	10185805
4-Aminobiphenyl	TX	5540	10185805
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10185805
4-Chloro-3-methylphenol	TX	5700	10185805
4-Chloroaniline	TX	5745	10185805
4-Chlorophenyl phenylether	TX	5825	10185805
4-Dimethyl aminoazobenzene	TX	6105	10185805
4-Methylphenol (p-Cresol)	TX	6410	10185805
4-Nitroaniline	TX	6470	10185805
4-Nitrobiphenyl	TX	6480	10185805
4-Nitrophenol	TX	6500	10185805
5,5-Diphenylhydantoin	TX	6215	10185805
5-Chloro-2-methylaniline	TX	5695	10185805
5-Nitroacenaphthene	TX	6455	10185805
5-Nitro-o-toluidine	TX	6570	10185805
7,12-Dimethylbenz(a) anthracene	TX	6115	10185805
Acenaphthene	TX	5500	10185805
Acenaphthylene	TX	5505	10185805
Acetophenone	TX	5510	10185805
Aminoazobenzene	TX	5535	10185805
Aniline	TX	5545	10185805
Anthracene	TX	5555	10185805
Azobenzene	TX	5562	10185805

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Matrix: ***Non-Potable Water***

Benzidine	TX	5595	10185805
Benzo(a)anthracene	TX	5575	10185805
Benzo(a)pyrene	TX	5580	10185805
Benzo(b)fluoranthene	TX	5585	10185805
Benzo(g,h,i)perylene	TX	5590	10185805
Benzo(k)fluoranthene	TX	5600	10185805
Benzoic acid	TX	5610	10185805
Benzyl alcohol	TX	5630	10185805
bis(2-Chloroethoxy)methane	TX	5760	10185805
bis(2-Chloroethyl) ether	TX	5765	10185805
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10185805
Butyl benzyl phthalate	TX	5670	10185805
Carbazole	TX	5680	10185805
Chrysene	TX	5855	10185805
Dibenz(a,h) anthracene	TX	5895	10185805
Dibenzofuran	TX	5905	10185805
Diethyl phthalate	TX	6070	10185805
Diethylstilbestrol	TX	6075	10185805
Dimethyl phthalate	TX	6135	10185805
Di-n-butyl phthalate	TX	5925	10185805
Di-n-octyl phthalate	TX	6200	10185805
Diphenylamine	TX	6205	10185805
Ethyl methanesulfonate	TX	6260	10185805
Fluoranthene	TX	6265	10185805
Fluorene	TX	6270	10185805
Hexachlorobenzene	TX	6275	10185805
Hexachlorobutadiene	TX	4835	10185805
Hexachlorocyclopentadiene	TX	6285	10185805
Hexachloroethane	TX	4840	10185805
Hexachloropropene	TX	6295	10185805

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Matrix: ***Non-Potable Water***

Indeno(1,2,3-cd) pyrene	TX	6315	10185805
Isodrin	TX	7725	10185805
Isophorone	TX	6320	10185805
Isosafrole	TX	6325	10185805
Mestranol	TX	6340	10185805
Methyl methanesulfonate	TX	6375	10185805
Naphthalene	TX	5005	10185805
Nitrobenzene	TX	5015	10185805
n-Nitrosodiethylamine	TX	6525	10185805
n-Nitrosodimethylamine	TX	6530	10185805
n-Nitrosodi-n-butylamine	TX	5025	10185805
n-Nitrosodi-n-propylamine	TX	6545	10185805
n-Nitrosodiphenylamine	TX	6535	10185805
n-Nitrosomethylethylamine	TX	6550	10185805
n-Nitrosomorpholine	TX	6555	10185805
n-Nitrosopiperidine	TX	6560	10185805
n-Nitrosopyrrolidine	TX	6565	10185805
o-Anisidine	TX	5550	10185805
p-Cresidine	TX	5860	10185805
Pentachlorobenzene	TX	6590	10185805
Pentachloronitrobenzene (PCNB)	TX	6600	10185805
Pentachlorophenol	TX	6605	10185805
Phenacetin	TX	6610	10185805
Phenanthrene	TX	6615	10185805
Phenol	TX	6625	10185805
Pronamide (Kerb)	TX	6650	10185805
Pyrene	TX	6665	10185805
Pyridine	TX	5095	10185805
Safrole	TX	6685	10185805

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Matrix: ***Non-Potable Water***

Method EPA 9014

Analyte	AB	Analyte ID	Method ID
Amenable cyanide	TX	1510	10193803
Total cyanide	TX	1645	10193803

Method EPA 9040

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	10196802

Method EPA 9050

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10198808

Method EPA 9056

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10199209
Chloride	TX	1575	10199209
Fluoride	TX	1730	10199209
Nitrate as N	TX	1810	10199209
Nitrate-nitrite	TX	1820	10199209
Nitrite as N	TX	1840	10199209
Sulfate	TX	2000	10199209

Method EPA 9060

Analyte	AB	Analyte ID	Method ID
Total Organic Carbon (TOC)	TX	2040	10200201

Method EPA 9065

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10200405

Method IDEXX Laboratories Colilert®

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	60002600

Method SM 2120 B

Analyte	AB	Analyte ID	Method ID
Color	TX	1605	20223807

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Matrix: ***Non-Potable Water***

Method SM 2130 B

Analyte	AB	Analyte ID	Method ID
Turbidity	TX	2055	20042200

Method SM 2320 B

Analyte	AB	Analyte ID	Method ID
Alkalinity as CaCO3	TX	1505	20045005

Method SM 2340 B

Analyte	AB	Analyte ID	Method ID
Total hardness as CaCO3	TX	1755	20046008

Method SM 2510 B

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	20048004

Method SM 2540 B

Analyte	AB	Analyte ID	Method ID
Residue-total (total solids)	TX	1950	20004608

Method SM 2540 C

Analyte	AB	Analyte ID	Method ID
Residue-filterable (TDS)	TX	1955	20049803

Method SM 2540 D

Analyte	AB	Analyte ID	Method ID
Residue-nonfilterable (TSS)	TX	1960	20004802

Method SM 2540 F

Analyte	AB	Analyte ID	Method ID
Residue-settleable	TX	1965	20005009

Method SM 3500-Cr B

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	20065809

Method SM 3500-Fe D

Analyte	AB	Analyte ID	Method ID
Iron	TX	1070	20009603

Method SM 4500-Cl G

Analyte	AB	Analyte ID	Method ID

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Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Total residual chlorine	TX	1940	20020604

Method SM 4500-CN¯ E

Analyte	AB	Analyte ID	Method ID
Total cyanide	TX	1645	20021209

Method SM 4500-CN¯ G

Analyte	AB	Analyte ID	Method ID
Amenable cyanide	TX	1510	20021607

Method SM 4500-H+ B

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	20104603

Method SM 4500-NH3 F

Analyte	AB	Analyte ID	Method ID
Kjeldahl Nitrogen (Total Kjeldahl Nitrogen-TKN)	TX	1790	20023001

Method SM 4500-NH3 H

Analyte	AB	Analyte ID	Method ID
Ammonia as N	TX	1515	20023409

Method SM 4500-O C

Analyte	AB	Analyte ID	Method ID
Oxygen, dissolved	TX	1880	20025201

Method SM 4500-P E

Analyte	AB	Analyte ID	Method ID
Orthophosphate as P	TX	1870	20025803
Phosphorus	TX	1910	20025803

Method SM 4500-S2¯ D

Analyte	AB	Analyte ID	Method ID
Sulfide	TX	2005	20125400

Method SM 4500-SO3¯ B

Analyte	AB	Analyte ID	Method ID
Sulfite	TX	2015	20026806

Method SM 5210 B

Analyte	AB	Analyte ID	Method ID
Biochemical oxygen demand (BOD)	TX	1530	20027401

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Matrix: ***Non-Potable Water***

Analyte	AB	Analyte ID	Method ID
Carbonaceous BOD, CBOD	TX	1555	20027401

Method SM 5220 D

Analyte	AB	Analyte ID	Method ID
Chemical oxygen demand (COD)	TX	1565	20027809

Method SM 5310 C

Analyte	AB	Analyte ID	Method ID
Total Organic Carbon (TOC)	TX	2040	20138209

Method SM 5540 C

Analyte	AB	Analyte ID	Method ID
Surfactants - MBAS	TX	2025	20144405

Method SM 9222 B

Analyte	AB	Analyte ID	Method ID
Total coliforms (enumeration)	TX	2500	20198009

Method SM 9222 D

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20037405

Method TCEQ 1005

Analyte	AB	Analyte ID	Method ID
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

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Matrix: ***Solid & Chemical Materials***

Method EPA 1010

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10116606

Method EPA 1030

Analyte	AB	Analyte ID	Method ID
Ignitability	TX	1780	10117201

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 300.0

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10053200
Chloride	TX	1575	10053200
Fluoride	TX	1730	10053200
Nitrate as N	TX	1810	10053200
Nitrate-nitrite	TX	1820	10053200
Nitrite as N	TX	1840	10053200
Sulfate	TX	2000	10053200

Method EPA 353.2

Analyte	AB	Analyte ID	Method ID
Nitrate as N	TX	1810	10067604
Nitrate-nitrite	TX	1820	10067604
Nitrite as N	TX	1840	10067604

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10155609
Antimony	TX	1005	10155609
Arsenic	TX	1010	10155609

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Matrix: ***Solid & Chemical Materials***

Barium	TX	1015	10155609
Beryllium	TX	1020	10155609
Boron	TX	1025	10155609
Cadmium	TX	1030	10155609
Calcium	TX	1035	10155609
Chromium	TX	1040	10155609
Cobalt	TX	1050	10155609
Copper	TX	1055	10155609
Iron	TX	1070	10155609
Lead	TX	1075	10155609
Magnesium	TX	1085	10155609
Molybdenum	TX	1100	10155609
Nickel	TX	1105	10155609
Potassium	TX	1125	10155609
Selenium	TX	1140	10155609
Silver	TX	1150	10155609
Strontium	TX	1160	10155609
Thallium	TX	1165	10155609
Tin	TX	1175	10155609
Titanium	TX	1180	10155609
Vanadium	TX	1185	10155609
Zinc	TX	1190	10155609

Method EPA 6020

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10156419
Antimony	TX	1005	10156419
Arsenic	TX	1010	10156419
Barium	TX	1015	10156419
Beryllium	TX	1020	10156419
Cadmium	TX	1030	10156419

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Matrix: ***Solid & Chemical Materials***

Calcium	TX	1035	10156419
Chromium	TX	1040	10156419
Cobalt	TX	1050	10156419
Copper	TX	1055	10156419
Iron	TX	1070	10156419
Lead	TX	1075	10156419
Magnesium	TX	1085	10156419
Manganese	TX	1090	10156419
Molybdenum	TX	1100	10156419
Nickel	TX	1105	10156419
Potassium	TX	1125	10156419
Selenium	TX	1140	10156419
Silver	TX	1150	10156419
Thallium	TX	1165	10156419
Vanadium	TX	1185	10156419
Zinc	TX	1190	10156419

Method EPA 7471

Analyte	**AB**	**Analyte ID**	**Method ID**
Mercury	TX	1095	10166208

Method EPA 8081

Analyte	**AB**	**Analyte ID**	**Method ID**
4,4'-DDD	TX	7355	10178606
4,4'-DDE	TX	7360	10178606
4,4'-DDT	TX	7365	10178606
Aldrin	TX	7025	10178606
alpha-BHC (alpha-Hexachlorocyclohexane)	TX	7110	10178606
alpha-Chlordane	TX	7240	10178606
beta-BHC (beta-Hexachlorocyclohexane)	TX	7115	10178606
Chlordane (tech.)	TX	7250	10178606
delta-BHC (delta-Hexachlorocyclohexane)	TX	7105	10178606
Dieldrin	TX	7470	10178606

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Matrix: ***Solid & Chemical Materials***

Analyte	AB	Analyte ID	Method ID
Endosulfan I	TX	7510	10178606
Endosulfan II	TX	7515	10178606
Endosulfan sulfate	TX	7520	10178606
Endrin	TX	7540	10178606
Endrin aldehyde	TX	7530	10178606
Endrin ketone	TX	7535	10178606
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	TX	7120	10178606
gamma-Chlordane	TX	7245	10178606
Heptachlor	TX	7685	10178606
Heptachlor epoxide	TX	7690	10178606
Methoxychlor	TX	7810	10178606
Mirex	TX	7870	10178606
Toxaphene (Chlorinated camphene)	TX	8250	10178606

Method EPA 8082

Analyte	AB	Analyte ID	Method ID
Aroclor-1016 (PCB-1016)	TX	8880	10179007
Aroclor-1221 (PCB-1221)	TX	8885	10179007
Aroclor-1232 (PCB-1232)	TX	8890	10179007
Aroclor-1242 (PCB-1242)	TX	8895	10179007
Aroclor-1248 (PCB-1248)	TX	8900	10179007
Aroclor-1254 (PCB-1254)	TX	8905	10179007
Aroclor-1260 (PCB-1260)	TX	8910	10179007
PCBs (total)	TX	8870	10179007

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	TX	5195	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802

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Matrix: ***Solid & Chemical Materials***

1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
1,4-Dioxane (1,4-Diethyleneoxide)	TX	4735	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802
4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acetonitrile	TX	4320	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Allyl chloride (3-Chloropropene)	TX	4355	10184802
Benzene	TX	4375	10184802

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Matrix: ***Solid & Chemical Materials***

Benzyl chloride	TX	5635	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
Chloroprene (2-Chloro-1,3-butadiene)	TX	4525	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	TX	4745	10184802
Ethyl acetate	TX	4755	10184802
Ethyl methacrylate	TX	4810	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Hexachloroethane	TX	4840	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802
Isobutyl alcohol (2-Methyl-1-propanol)	TX	4875	10184802
Isopropyl alcohol (2-Propanol, Isopropanol)	TX	4895	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methacrylonitrile	TX	4925	10184802
Methyl acetate	TX	4940	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802

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Matrix: ***Solid & Chemical Materials***

Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl methacrylate	TX	4990	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
Pentachloroethane	TX	5035	10184802
Propionitrile (Ethyl cyanide)	TX	5080	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
trans-1,4-Dichloro-2-butene	TX	4605	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

Method EPA 8270

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10185805
1,2,4-Trichlorobenzene	TX	5155	10185805
1,2-Dichlorobenzene	TX	4610	10185805
1,2-Dinitrobenzene	TX	6155	10185805
1,3-Dichlorobenzene	TX	4615	10185805

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Matrix: ***Solid & Chemical Materials***

1,3-Dinitrobenzene (1,3-DNB)	TX	6160	10185805
1,4-Dichlorobenzene	TX	4620	10185805
1,4-Dinitrobenzene	TX	6165	10185805
1,4-Naphthoquinone	TX	6420	10185805
1-Chloronaphthalene	TX	5790	10185805
1-Naphthylamine	TX	6425	10185805
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10185805
2,3,4,6-Tetrachlorophenol	TX	6735	10185805
2,4,5-Trichlorophenol	TX	6835	10185805
2,4,6-Trichlorophenol	TX	6840	10185805
2,4-Dichlorophenol	TX	6000	10185805
2,4-Dimethylphenol	TX	6130	10185805
2,4-Dinitrophenol	TX	6175	10185805
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10185805
2,6-Dichlorophenol	TX	6005	10185805
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10185805
2-Acetylaminofluorene	TX	5515	10185805
2-Chloronaphthalene	TX	5795	10185805
2-Chlorophenol	TX	5800	10185805
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10185805
2-Methylaniline (o-Toluidine)	TX	5145	10185805
2-Methylnaphthalene	TX	6385	10185805
2-Methylphenol (o-Cresol)	TX	6400	10185805
2-Naphthylamine	TX	6430	10185805
2-Nitroaniline	TX	6460	10185805
2-Nitrophenol	TX	6490	10185805
2-Picoline (2-Methylpyridine)	TX	5050	10185805
3,3'-Dichlorobenzidine	TX	5945	10185805
3-Methylcholanthrene	TX	6355	10185805
3-Methylphenol (m-Cresol)	TX	6405	10185805

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Matrix: ***Solid & Chemical Materials***

3-Nitroaniline	TX	6465	10185805
4-Aminobiphenyl	TX	5540	10185805
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10185805
4-Chloro-3-methylphenol	TX	5700	10185805
4-Chloroaniline	TX	5745	10185805
4-Chlorophenyl phenylether	TX	5825	10185805
4-Methylphenol (p-Cresol)	TX	6410	10185805
4-Nitroaniline	TX	6470	10185805
4-Nitrobiphenyl	TX	6480	10185805
4-Nitrophenol	TX	6500	10185805
5,5-Diphenylhydantoin	TX	6215	10185805
5-Chloro-2-methylaniline	TX	5695	10185805
5-Nitroacenaphthene	TX	6455	10185805
5-Nitro-o-toluidine	TX	6570	10185805
7,12-Dimethylbenz(a) anthracene	TX	6115	10185805
Acenaphthene	TX	5500	10185805
Acenaphthylene	TX	5505	10185805
Acetophenone	TX	5510	10185805
Aminoazobenzene	TX	5535	10185805
Aniline	TX	5545	10185805
Anthracene	TX	5555	10185805
Azobenzene	TX	5562	10185805
Benzidine	TX	5595	10185805
Benzo(a)anthracene	TX	5575	10185805
Benzo(a)pyrene	TX	5580	10185805
Benzo(b)fluoranthene	TX	5585	10185805
Benzo(g,h,i)perylene	TX	5590	10185805
Benzo(k)fluoranthene	TX	5600	10185805
Benzoic acid	TX	5610	10185805
Benzyl alcohol	TX	5630	10185805

Matrix: ***Solid & Chemical Materials***

bis(2-Chloroethoxy)methane	TX	5760	10185805
bis(2-Chloroethyl) ether	TX	5765	10185805
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10185805
Butyl benzyl phthalate	TX	5670	10185805
Carbazole	TX	5680	10185805
Chrysene	TX	5855	10185805
Dibenz(a,h) anthracene	TX	5895	10185805
Dibenzofuran	TX	5905	10185805
Diethyl phthalate	TX	6070	10185805
Diethyl sulfate	TX	6080	10185805
Diethylstilbestrol	TX	6075	10185805
Dimethyl phthalate	TX	6135	10185805
Di-n-butyl phthalate	TX	5925	10185805
Di-n-octyl phthalate	TX	6200	10185805
Diphenylamine	TX	6205	10185805
Ethyl methanesulfonate	TX	6260	10185805
Fluoranthene	TX	6265	10185805
Fluorene	TX	6270	10185805
Hexachlorobenzene	TX	6275	10185805
Hexachlorobutadiene	TX	4835	10185805
Hexachlorocyclopentadiene	TX	6285	10185805
Hexachloroethane	TX	4840	10185805
Hexachloropropene	TX	6295	10185805
Indeno(1,2,3-cd) pyrene	TX	6315	10185805
Isodrin	TX	7725	10185805
Isophorone	TX	6320	10185805
Isosafrole	TX	6325	10185805
Mestranol	TX	6340	10185805
Methyl methanesulfonate	TX	6375	10185805
Methylphenols, total	TX	10313	10185805

Matrix: ***Solid & Chemical Materials***

Naphthalene	TX	5005	10185805
Nitrobenzene	TX	5015	10185805
n-Nitrosodiethylamine	TX	6525	10185805
n-Nitrosodimethylamine	TX	6530	10185805
n-Nitrosodi-n-butylamine	TX	5025	10185805
n-Nitrosodi-n-propylamine	TX	6545	10185805
n-Nitrosodiphenylamine	TX	6535	10185805
n-Nitrosomethylethylamine	TX	6550	10185805
n-Nitrosomorpholine	TX	6555	10185805
n-Nitrosopiperidine	TX	6560	10185805
n-Nitrosopyrrolidine	TX	6565	10185805
o-Anisidine	TX	5550	10185805
p-Cresidine	TX	5860	10185805
Pentachlorobenzene	TX	6590	10185805
Pentachloronitrobenzene (PCNB)	TX	6600	10185805
Pentachlorophenol	TX	6605	10185805
Phenacetin	TX	6610	10185805
Phenanthrene	TX	6615	10185805
Phenol	TX	6625	10185805
Pronamide (Kerb)	TX	6650	10185805
Pyrene	TX	6665	10185805
Pyridine	TX	5095	10185805
Safrole	TX	6685	10185805

Method EPA 9014

Analyte	**AB**	**Analyte ID**	**Method ID**
Amenable cyanide	TX	1510	10193803
Total cyanide	TX	1645	10193803

Method EPA 9040

Analyte	**AB**	**Analyte ID**	**Method ID**
Corrosivity	TX	1615	10196802
pH	TX	1900	10196802

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Matrix: ***Solid & Chemical Materials***

Method EPA 9045

Analyte	AB	Analyte ID	Method ID
Corrosivity	TX	1615	10197805
pH	TX	1900	10197805

Method EPA 9050

Analyte	AB	Analyte ID	Method ID
Conductivity	TX	1610	10198808

Method EPA 9056

Analyte	AB	Analyte ID	Method ID
Bromide	TX	1540	10199209
Chloride	TX	1575	10199209
Fluoride	TX	1730	10199209
Nitrate as N	TX	1810	10199209
Nitrate-nitrite	TX	1820	10199209
Nitrite as N	TX	1840	10199209
Sulfate	TX	2000	10199209

Method EPA 9065

Analyte	AB	Analyte ID	Method ID
Total phenolics	TX	1905	10200405

Method EPA 9095

Analyte	AB	Analyte ID	Method ID
Paint Filter Liquids Test	TX	10312	10204009

Method EPA 9250

Analyte	AB	Analyte ID	Method ID
Chloride	TX	1575	10207202

Method SM 9221 C / 9221 E

Analyte	AB	Analyte ID	Method ID
Fecal coliforms (enumeration)	TX	2530	20195806

Method TCEQ 1005

Analyte	AB	Analyte ID	Method ID
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 18, 2021

Mr. Mike Kimmel
Eurofins Xenco, LLC - Dallas
9701 Harry Hines Boulevard
Dallas, TX 75220-5441

Subject: Accreditation withdrawal

Dear Mr. Kimmel:

Based on the withdrawal requests submitted on August 10 and 18, 2021, I am enclosing an updated NELAP accreditation certificate and Fields of Accreditation listing. They replace the previous ones issued on July 01, 2021.

I am enclosing an accreditation certificate and listing of your laboratory's fields of accreditation. Please review the enclosures for accuracy and completeness.

Please contact me by electronic-mail at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

NELAP-Recognized Laboratory Accreditation is hereby awarded to

Eurofins Xenco, LLC - Dallas

9701 Harry Hines Boulevard
Dallas, TX 75220-5441

in accordance with Texas Water Code Chapter 5, Subchapter R, Title 30 Texas Administrative Code Chapter 25, and the National Environmental Laboratory Accreditation Program.

The laboratory's scope of accreditation includes the fields of accreditation that accompany this certificate. Continued accreditation depends upon successful ongoing participation in the program. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current location(s) and accreditation status for particular methods and analyses (www.tceq.texas.gov/goto/lab). Accreditation does not imply that a product, process, system or person is approved by the Texas Commission on Environmental Quality.

Certificate Number: **T104704295-21-28**
Effective Date: **8/18/2021**
Expiration Date: **6/30/2022**

Executive Director Texas Commission on Environmental Quality

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Eurofins Xenco, LLC - Dallas		**Certificate:**	**T104704295-21-28**
9701 Harry Hines Boulevard		**Expiration Date:**	**6/30/2022**
Dallas, TX 75220-5441		**Issue Date:**	**8/18/2021**

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Drinking Water***

Method SM 9223-IDEXX Laboratories Colilert® Test

Analyte	AB	Analyte ID	Method ID
Total coliforms and E. coli (P/A)	TX	2502	20212413

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

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Issue Date: 8/18/2021

Eurofins Xenco, LLC - Dallas

9701 Harry Hines Boulevard
Dallas, TX 75220-5441

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Matrix: ***Non-Potable Water***

Method EPA 7196

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	10162400

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
Benzene	TX	4375	10184404
Ethylbenzene	TX	4765	10184404
m+p-xylene	TX	5240	10184404
Methyl tert-butyl ether (MTBE)	TX	5000	10184404
o-Xylene	TX	5250	10184404
Toluene	TX	5140	10184404
Xylene (total)	TX	5260	10184404

Method IDEXX Laboratories Colilert®

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	60002600

Method SM 3500-Cr B

Analyte	AB	Analyte ID	Method ID
Chromium (VI)	TX	1045	20065809

Method SM 4500-Cl^- C

Analyte	AB	Analyte ID	Method ID
Chloride	TX	1575	20084804

Method SM 4500-H+ B

Analyte	AB	Analyte ID	Method ID
pH	TX	1900	20104603

Method SM 9223 B

Analyte	AB	Analyte ID	Method ID
Escherichia coli (enumeration)	TX	2525	20211205

Method TCEQ 1005

Analyte	AB	Analyte ID	Method ID
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

Texas Commission on Environmental Quality

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Matrix: ***Solid & Chemical Materials***

Method EPA 8260

Analyte	**AB**	**Analyte ID**	**Method ID**
Benzene	TX	4375	10184404
Ethylbenzene	TX	4765	10184404
m+p-xylene	TX	5240	10184404
Methyl tert-butyl ether (MTBE)	TX	5000	10184404
o-Xylene	TX	5250	10184404
Toluene	TX	5140	10184404
Xylene (total)	TX	5260	10184404

Method EPA 9038

Analyte	**AB**	**Analyte ID**	**Method ID**
Sulfate	TX	2000	10196608

Method EPA 9045

Analyte	**AB**	**Analyte ID**	**Method ID**
Corrosivity	TX	1615	10197805
pH	TX	1900	10197805

Method SM 2540 G

Analyte	**AB**	**Analyte ID**	**Method ID**
Residue-total (total solids)	TX	1950	20005203

Method TCEQ 1005

Analyte	**AB**	**Analyte ID**	**Method ID**
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Certificate: T104704325-21-22
Expiration Date: 12/31/2022
Issue Date: 1/1/2022

Technical Testing International dba TTI Environmental Labs

800 106th Street
Arlington, TX 76011-5307

These fields of accreditation supercede all previous fields. The Texas Commission on Environmental Quality urges customers to verify the laboratory's current accreditation status for particular methods and analyses.

Matrix: ***Non-Potable Water***

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 200.7

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10013806
Antimony	TX	1005	10013806
Arsenic	TX	1010	10013806
Barium	TX	1015	10013806
Beryllium	TX	1020	10013806
Boron	TX	1025	10013806
Cadmium	TX	1030	10013806
Calcium	TX	1035	10013806
Chromium	TX	1040	10013806
Cobalt	TX	1050	10013806
Copper	TX	1055	10013806
Iron	TX	1070	10013806
Lead	TX	1075	10013806
Magnesium	TX	1085	10013806
Manganese	TX	1090	10013806
Molybdenum	TX	1100	10013806
Nickel	TX	1105	10013806
Phosphorus	TX	1910	10013806
Selenium	TX	1140	10013806
Silver	TX	1150	10013806
Strontium	TX	1160	10013806
Thallium	TX	1165	10013806
Tin	TX	1175	10013806

Texas Commission on Environmental Quality

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Matrix: ***Non-Potable Water***

Titanium	TX	1180	10013806
Vanadium	TX	1185	10013806
Zinc	TX	1190	10013806

Method EPA 6010

Analyte	**AB**	**Analyte ID**	**Method ID**
Aluminum	TX	1000	10155905
Antimony	TX	1005	10155905
Arsenic	TX	1010	10155905
Barium	TX	1015	10155905
Beryllium	TX	1020	10155905
Boron	TX	1025	10155905
Cadmium	TX	1030	10155905
Calcium	TX	1035	10155905
Chromium	TX	1040	10155905
Cobalt	TX	1050	10155905
Copper	TX	1055	10155905
Iron	TX	1070	10155905
Lead	TX	1075	10155905
Magnesium	TX	1085	10155905
Manganese	TX	1090	10155905
Molybdenum	TX	1100	10155905
Nickel	TX	1105	10155905
Phosphorus	TX	1910	10155905
Selenium	TX	1140	10155905
Silver	TX	1150	10155905
Strontium	TX	1160	10155905
Thallium	TX	1165	10155905
Tin	TX	1175	10155905
Titanium	TX	1180	10155905
Vanadium	TX	1185	10155905

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Matrix: ***Non-Potable Water***

Zinc	TX	1190	10155905

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802
1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802
2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802

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Matrix: ***Non-Potable Water***

Acetone (2-Propanone)	TX	4315	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Benzene	TX	4375	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802
Methyl chloride (Chloromethane)	TX	4960	10184802
Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802

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Matrix: ***Non-Potable Water***

o-Xylene	TX	5250	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

Method EPA 8270

Analyte	AB	Analyte ID	Method ID
1,2,4,5-Tetrachlorobenzene	TX	6715	10186002
1,2,4-Trichlorobenzene	TX	5155	10186002
1,2-Dichlorobenzene	TX	4610	10186002
1,2-Diphenylhydrazine	TX	6220	10186002
1,3-Dichlorobenzene	TX	4615	10186002
1,4-Dichlorobenzene	TX	4620	10186002
1-Chloronaphthalene	TX	5790	10186002
1-Naphthylamine	TX	6425	10186002
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10186002
2,3,4,6-Tetrachlorophenol	TX	6735	10186002
2,4,5-Trichlorophenol	TX	6835	10186002
2,4,6-Trichlorophenol	TX	6840	10186002
2,4-Dichlorophenol	TX	6000	10186002
2,4-Dimethylphenol	TX	6130	10186002
2,4-Dinitrophenol	TX	6175	10186002

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

		Certificate:	T104704325-21-22
Technical Testing International dba TTI Environmental Labs		Expiration Date:	12/31/2022
800 106th Street Arlington, TX 76011-5307		Issue Date:	1/1/2022

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Matrix: ***Non-Potable Water***

2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10186002
2,6-Dichlorophenol	TX	6005	10186002
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10186002
2-Chloronaphthalene	TX	5795	10186002
2-Chlorophenol	TX	5800	10186002
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10186002
2-Methylnaphthalene	TX	6385	10186002
2-Methylphenol (o-Cresol)	TX	6400	10186002
2-Naphthylamine	TX	6430	10186002
2-Nitroaniline	TX	6460	10186002
2-Nitrophenol	TX	6490	10186002
2-Picoline (2-Methylpyridine)	TX	5050	10186002
3,3'-Dichlorobenzidine	TX	5945	10186002
3-Methylcholanthrene	TX	6355	10186002
3-Nitroaniline	TX	6465	10186002
4-Aminobiphenyl	TX	5540	10186002
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10186002
4-Chloro-3-methylphenol	TX	5700	10186002
4-Chloroaniline	TX	5745	10186002
4-Chlorophenyl phenylether	TX	5825	10186002
4-Methylphenol (p-Cresol)	TX	6410	10186002
4-Nitroaniline	TX	6470	10186002
4-Nitrophenol	TX	6500	10186002
7,12-Dimethylbenz(a) anthracene	TX	6115	10186002
a-a-Dimethylphenethylamine	TX	6125	10186002
Acenaphthene	TX	5500	10186002
Acenaphthylene	TX	5505	10186002
Acetophenone	TX	5510	10186002
Aniline	TX	5545	10186002
Anthracene	TX	5555	10186002

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Matrix: ***Non-Potable Water***

Benzidine	TX	5595	10186002
Benzo(a)anthracene	TX	5575	10186002
Benzo(a)pyrene	TX	5580	10186002
Benzo(b)fluoranthene	TX	5585	10186002
Benzo(g,h,i)perylene	TX	5590	10186002
Benzo(k)fluoranthene	TX	5600	10186002
Benzoic acid	TX	5610	10186002
Benzyl alcohol	TX	5630	10186002
bis(2-Chloroethoxy)methane	TX	5760	10186002
bis(2-Chloroethyl) ether	TX	5765	10186002
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10186002
Butyl benzyl phthalate	TX	5670	10186002
Chrysene	TX	5855	10186002
Dibenz(a,h) anthracene	TX	5895	10186002
Dibenzofuran	TX	5905	10186002
Diethyl phthalate	TX	6070	10186002
Dimethyl phthalate	TX	6135	10186002
Di-n-butyl phthalate	TX	5925	10186002
Di-n-octyl phthalate	TX	6200	10186002
Diphenylamine	TX	6205	10186002
Ethyl methanesulfonate	TX	6260	10186002
Fluoranthene	TX	6265	10186002
Fluorene	TX	6270	10186002
Hexachlorobenzene	TX	6275	10186002
Hexachlorobutadiene	TX	4835	10186002
Hexachlorocyclopentadiene	TX	6285	10186002
Hexachloroethane	TX	4840	10186002
Indeno(1,2,3-cd) pyrene	TX	6315	10186002
Isophorone	TX	6320	10186002
Methyl methanesulfonate	TX	6375	10186002

Technical Testing International dba TTI Environmental Labs

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Arlington, TX 76011-5307

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Matrix: ***Non-Potable Water***

Naphthalene	TX	5005	10186002
Nitrobenzene	TX	5015	10186002
n-Nitrosodimethylamine	TX	6530	10186002
n-Nitrosodi-n-butylamine	TX	5025	10186002
n-Nitrosodi-n-propylamine	TX	6545	10186002
n-Nitrosodiphenylamine	TX	6535	10186002
n-Nitrosopiperidine	TX	6560	10186002
Pentachlorobenzene	TX	6590	10186002
Pentachloronitrobenzene (PCNB)	TX	6600	10186002
Pentachlorophenol	TX	6605	10186002
Phenacetin	TX	6610	10186002
Phenanthrene	TX	6615	10186002
Phenol	TX	6625	10186002
Pronamide (Kerb)	TX	6650	10186002
Pyrene	TX	6665	10186002
Pyridine	TX	5095	10186002

Method EPA 9040

Analyte	**AB**	**Analyte ID**	**Method ID**
pH	TX	1900	10197203

Method SM 2340 B

Analyte	**AB**	**Analyte ID**	**Method ID**
Total hardness as CaCO3	TX	1755	20046008

Method SM 4500-H+ B

Analyte	**AB**	**Analyte ID**	**Method ID**
pH	TX	1900	20104603

Method TCEQ 1005

Analyte	**AB**	**Analyte ID**	**Method ID**
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

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Matrix: ***Solid & Chemical Materials***

Method EPA 1311

Analyte	AB	Analyte ID	Method ID
TCLP	TX	849	10118806

Method EPA 1312

Analyte	AB	Analyte ID	Method ID
SPLP	TX	850	10119003

Method EPA 6010

Analyte	AB	Analyte ID	Method ID
Aluminum	TX	1000	10155905
Antimony	TX	1005	10155905
Arsenic	TX	1010	10155905
Barium	TX	1015	10155905
Beryllium	TX	1020	10155905
Boron	TX	1025	10155905
Cadmium	TX	1030	10155905
Calcium	TX	1035	10155905
Chromium	TX	1040	10155905
Cobalt	TX	1050	10155905
Copper	TX	1055	10155905
Iron	TX	1070	10155905
Lead	TX	1075	10155905
Magnesium	TX	1085	10155905
Manganese	TX	1090	10155905
Molybdenum	TX	1100	10155905
Nickel	TX	1105	10155905
Phosphorus	TX	1910	10155905
Potassium	TX	1125	10155905
Selenium	TX	1140	10155905
Silver	TX	1150	10155905
Sodium	TX	1155	10155905
Strontium	TX	1160	10155905

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Matrix: ***Solid & Chemical Materials***

Thallium	TX	1165	10155905
Tin	TX	1175	10155905
Titanium	TX	1180	10155905
Vanadium	TX	1185	10155905
Zinc	TX	1190	10155905

Method EPA 8260

Analyte	AB	Analyte ID	Method ID
1,1,1,2-Tetrachloroethane	TX	5105	10184802
1,1,1-Trichloroethane	TX	5160	10184802
1,1,2,2-Tetrachloroethane	TX	5110	10184802
1,1,2-Trichloroethane	TX	5165	10184802
1,1-Dichloroethane	TX	4630	10184802
1,1-Dichloroethylene	TX	4640	10184802
1,1-Dichloropropene	TX	4670	10184802
1,2,3-Trichlorobenzene	TX	5150	10184802
1,2,3-Trichloropropane	TX	5180	10184802
1,2,4-Trichlorobenzene	TX	5155	10184802
1,2,4-Trimethylbenzene	TX	5210	10184802
1,2-Dibromo-3-chloropropane (DBCP)	TX	4570	10184802
1,2-Dibromoethane (EDB, Ethylene dibromide)	TX	4585	10184802
1,2-Dichlorobenzene	TX	4610	10184802
1,2-Dichloroethane (Ethylene dichloride)	TX	4635	10184802
1,2-Dichloropropane	TX	4655	10184802
1,3,5-Trimethylbenzene	TX	5215	10184802
1,3-Dichlorobenzene	TX	4615	10184802
1,3-Dichloropropane	TX	4660	10184802
1,4-Dichlorobenzene	TX	4620	10184802
2,2-Dichloropropane	TX	4665	10184802
2-Butanone (Methyl ethyl ketone, MEK)	TX	4410	10184802
2-Chloroethyl vinyl ether	TX	4500	10184802

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Certificate: T104704325-21-22
Expiration Date: 12/31/2022
Issue Date: 1/1/2022

Technical Testing International dba TTI Environmental Labs

800 106th Street
Arlington, TX 76011-5307

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Matrix: ***Solid & Chemical Materials***

2-Chlorotoluene	TX	4535	10184802
2-Hexanone (MBK)	TX	4860	10184802
4-Chlorotoluene	TX	4540	10184802
4-Isopropyltoluene (p-Cymene)	TX	4915	10184802
4-Methyl-2-pentanone (MIBK)	TX	4995	10184802
Acetone (2-Propanone)	TX	4315	10184802
Acrolein (Propenal)	TX	4325	10184802
Acrylonitrile	TX	4340	10184802
Benzene	TX	4375	10184802
Bromobenzene	TX	4385	10184802
Bromochloromethane	TX	4390	10184802
Bromodichloromethane	TX	4395	10184802
Bromoform	TX	4400	10184802
Carbon disulfide	TX	4450	10184802
Carbon tetrachloride	TX	4455	10184802
Chlorobenzene	TX	4475	10184802
Chlorodibromomethane	TX	4575	10184802
Chloroethane (Ethyl chloride)	TX	4485	10184802
Chloroform	TX	4505	10184802
cis-1,2-Dichloroethylene	TX	4645	10184802
cis-1,3-Dichloropropene	TX	4680	10184802
Dibromomethane (Methylene bromide)	TX	4595	10184802
Dichlorodifluoromethane (Freon-12)	TX	4625	10184802
Ethylbenzene	TX	4765	10184802
Hexachlorobutadiene	TX	4835	10184802
Iodomethane (Methyl iodide)	TX	4870	10184802
Isopropylbenzene (Cumene)	TX	4900	10184802
m+p-xylene	TX	5240	10184802
Methyl bromide (Bromomethane)	TX	4950	10184802
Methyl chloride (Chloromethane)	TX	4960	10184802

Texas Commission on Environmental Quality

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Matrix: ***Solid & Chemical Materials***

Methyl tert-butyl ether (MTBE)	TX	5000	10184802
Methylene chloride (Dichloromethane)	TX	4975	10184802
Naphthalene	TX	5005	10184802
n-Butylbenzene	TX	4435	10184802
n-Propylbenzene	TX	5090	10184802
o-Xylene	TX	5250	10184802
sec-Butylbenzene	TX	4440	10184802
Styrene	TX	5100	10184802
tert-Butylbenzene	TX	4445	10184802
Tetrachloroethylene (Perchloroethylene)	TX	5115	10184802
Toluene	TX	5140	10184802
trans-1,2-Dichloroethylene	TX	4700	10184802
trans-1,3-Dichloropropylene	TX	4685	10184802
Trichloroethene (Trichloroethylene)	TX	5170	10184802
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	TX	5175	10184802
Vinyl acetate	TX	5225	10184802
Vinyl chloride	TX	5235	10184802
Xylene (total)	TX	5260	10184802

Method EPA 8270

Analyte	**AB**	**Analyte ID**	**Method ID**
1,2,4,5-Tetrachlorobenzene	TX	6715	10186002
1,2,4-Trichlorobenzene	TX	5155	10186002
1,2-Dichlorobenzene	TX	4610	10186002
1,2-Diphenylhydrazine	TX	6220	10186002
1,3-Dichlorobenzene	TX	4615	10186002
1,4-Dichlorobenzene	TX	4620	10186002
1-Chloronaphthalene	TX	5790	10186002
1-Naphthylamine	TX	6425	10186002
2,2'-Oxybis(1-chloropropane) (bis(2-Chloro-1-methylethyl)ether)	TX	4659	10186002
2,3,4,6-Tetrachlorophenol	TX	6735	10186002

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Arlington, TX 76011-5307

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Matrix: ***Solid & Chemical Materials***

2,4,5-Trichlorophenol	TX	6835	10186002
2,4,6-Trichlorophenol	TX	6840	10186002
2,4-Dichlorophenol	TX	6000	10186002
2,4-Dimethylphenol	TX	6130	10186002
2,4-Dinitrophenol	TX	6175	10186002
2,4-Dinitrotoluene (2,4-DNT)	TX	6185	10186002
2,6-Dichlorophenol	TX	6005	10186002
2,6-Dinitrotoluene (2,6-DNT)	TX	6190	10186002
2-Chloronaphthalene	TX	5795	10186002
2-Chlorophenol	TX	5800	10186002
2-Methyl-4,6-dinitrophenol (4,6-Dinitro-2-methylphenol)	TX	6360	10186002
2-Methylnaphthalene	TX	6385	10186002
2-Methylphenol (o-Cresol)	TX	6400	10186002
2-Naphthylamine	TX	6430	10186002
2-Nitroaniline	TX	6460	10186002
2-Nitrophenol	TX	6490	10186002
2-Picoline (2-Methylpyridine)	TX	5050	10186002
3,3'-Dichlorobenzidine	TX	5945	10186002
3-Methylcholanthrene	TX	6355	10186002
3-Nitroaniline	TX	6465	10186002
4-Aminobiphenyl	TX	5540	10186002
4-Bromophenyl phenyl ether (BDE-3)	TX	5660	10186002
4-Chloro-3-methylphenol	TX	5700	10186002
4-Chloroaniline	TX	5745	10186002
4-Chlorophenyl phenylether	TX	5825	10186002
4-Methylphenol (p-Cresol)	TX	6410	10186002
4-Nitroaniline	TX	6470	10186002
4-Nitrophenol	TX	6500	10186002
7,12-Dimethylbenz(a) anthracene	TX	6115	10186002
a-a-Dimethylphenethylamine	TX	6125	10186002

Texas Commission on Environmental Quality

NELAP - Recognized Laboratory Fields of Accreditation

Technical Testing International dba TTI Environmental Labs

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Matrix: ***Solid & Chemical Materials***

Acenaphthene	TX	5500	10186002
Acenaphthylene	TX	5505	10186002
Acetophenone	TX	5510	10186002
Aniline	TX	5545	10186002
Anthracene	TX	5555	10186002
Benzidine	TX	5595	10186002
Benzo(a)anthracene	TX	5575	10186002
Benzo(a)pyrene	TX	5580	10186002
Benzo(b)fluoranthene	TX	5585	10186002
Benzo(g,h,i)perylene	TX	5590	10186002
Benzo(k)fluoranthene	TX	5600	10186002
Benzoic acid	TX	5610	10186002
Benzyl alcohol	TX	5630	10186002
bis(2-Chloroethoxy)methane	TX	5760	10186002
bis(2-Chloroethyl) ether	TX	5765	10186002
bis(2-Ethylhexyl) phthalate (Di(2-Ethylhexyl) phthalate, DEHP)	TX	6065	10186002
Butyl benzyl phthalate	TX	5670	10186002
Chrysene	TX	5855	10186002
Dibenz(a,h) anthracene	TX	5895	10186002
Dibenzofuran	TX	5905	10186002
Diethyl phthalate	TX	6070	10186002
Dimethyl phthalate	TX	6135	10186002
Di-n-butyl phthalate	TX	5925	10186002
Di-n-octyl phthalate	TX	6200	10186002
Diphenylamine	TX	6205	10186002
Ethyl methanesulfonate	TX	6260	10186002
Fluoranthene	TX	6265	10186002
Fluorene	TX	6270	10186002
Hexachlorobenzene	TX	6275	10186002
Hexachlorobutadiene	TX	4835	10186002

Certificate:	T104704325-21-22
Expiration Date:	12/31/2022
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Matrix: ***Solid & Chemical Materials***

Hexachlorocyclopentadiene	TX	6285	10186002
Hexachloroethane	TX	4840	10186002
Indeno(1,2,3-cd) pyrene	TX	6315	10186002
Isophorone	TX	6320	10186002
Methyl methanesulfonate	TX	6375	10186002
Naphthalene	TX	5005	10186002
Nitrobenzene	TX	5015	10186002
n-Nitrosodimethylamine	TX	6530	10186002
n-Nitrosodi-n-butylamine	TX	5025	10186002
n-Nitrosodi-n-propylamine	TX	6545	10186002
n-Nitrosodiphenylamine	TX	6535	10186002
n-Nitrosopiperidine	TX	6560	10186002
Pentachlorobenzene	TX	6590	10186002
Pentachloronitrobenzene (PCNB)	TX	6600	10186002
Pentachlorophenol	TX	6605	10186002
Phenacetin	TX	6610	10186002
Phenanthrene	TX	6615	10186002
Phenol	TX	6625	10186002
Pronamide (Kerb)	TX	6650	10186002
Pyrene	TX	6665	10186002
Pyridine	TX	5095	10186002

Method EPA 9045

Analyte	**AB**	**Analyte ID**	**Method ID**
Corrosivity	TX	1615	10198400
pH	TX	1900	10198400

Method TCEQ 1005

Analyte	**AB**	**Analyte ID**	**Method ID**
Total Petroleum Hydrocarbons (TPH)	TX	2050	90019208

Appendix F:

Raw Sampling Data

Atkins 2021 Regional Spreadsheet

Monitoring Data Form

				Composite															Grab			
Station ID	COG ID	Storm ID	Sampling Date	TDS (mg/L)	TSS (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrogen Total (mg/L)	Nitrate N (mg/L)	Ammonia N (mg/L)	Ortho-phosphate (mg/L)	Phosphorus Dissolved (mg/L)	Phosphorus Total (mg/L)	Atrazine (µg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc Total (mg/L)	Oil and Grease (mg/L)	Spec. Cond. (µS/cm)	pH (su)	*E. coli* (MPN/100 mL)
AR2101	AR2101		1/25/2021	223	53.0	4.1	48.7	0.97	0.21	< 0.028	0.035	0.02	0.20	0.134	0.0014	0.0023	0.0051	0.0018	0.035	< 0.35	881	8.7	598.0
AR2102	AR2102		2/25/2021	253	162	7.5	82.1	2.0	0.32	0.13	0.091	0.03	0.35	3.47	0.0025	0.0052	0.0087	0.0051	0.048	2.5	869	8.9	2046.0
GA2101	GA2101		1/20/2021	469	16.4	< 2	23.6 J	6.1	5.7	0.19	0.31	0.088	0.13	0.227	0.00096	0.00088	0.0034	0.0004	0.011	0.53	858	8.40	187.0
GA2102	GA2102		1/20/2021	417	13.9	3.6	< 16.1	3.3	3.0	< 0.028	0.062	0.04	0.081	0.916	0.0011	0.001	0.0028	0.00045	0.011	2	745	8.61	213.0
GA2103	GA2103		1/20/2021	435	23.4	3.3	21.5 J	4.1	3.7	< 0.028	0.060	0.041	0.10	0.332	0.0012	0.0013	0.0029	0.00064	0.013	0.94	844	8.67	226.0
IR2101	IR2101		3/1/2021	328	84.0	2.4	37.2	7.7	0.35	< 0.028	< 0.02	0.028	0.039	< 0.1	0.0028	0.0054	0.0087	0.0021	0.036	4.4	587	9.0	583.0
IR2102	IR2102		1/20/2021	171	82.5	21.2	71.7	1.8	0.65	0.16	0.10	0.056	0.061	0.056	0.0017	0.011	0.0096	0.0028	0.065	1.4	638	9.1	> 24196.0
MS2101	MS2101		2/25/2021	398	65.1	6.7	50.0	1.5	0.53	< 0.028	< 0.02	< 0.015	0.14	0.772	0.0020	0.0025	0.0058	0.0019	0.022	0.6	727	8.8	41.0
MS2102	MS2102		2/26/2021	431	16.8	< 2	22.2 J	1.2	0.47	0.10	< 0.02	< 0.015	0.044	0.183	0.0010	0.0014	0.0027	0.0005	0.0061	< 0.35	881	8.6	30.0
PL2101	PL2101		1/24/2021	418	6.8	2.6	< 16.1	2.1	1.5	0.38	< 0.02	< 0.015	0.025	0.101	0.00069	0.00061	0.002	< 0.00014	0.0033 J	1	768	8.69	315.0
PL2102	PL2102		1/24/2021	398	16.1	2.0	< 16.1	1.9	1.3	< 0.028	< 0.02	< 0.015	< 0.015	0.156	0.00086	0.0009	0.002	0.000	0.0072	< 0.35	809	8.70	414.0
NT2101	NT2101		1/20/2021	124	112	4.9	80.0	1.8	0.60	0.20	0.091	0.047	0.24	0.057	0.0015	0.0069	0.016	0.0040	0.14	1.2	432	9.5	2755.0
NT2102	NT2102		2/25/2021	812	212	13.0	99.2	2.7	0.75	0.32	0.35	0.68	1.7	0.121	0.0039	0.015	0.020	0.0084	0.23	0.6	1489	8.5	213.0

Atkins 2021 Regional Spreadsheet

Monitoring Data Form

				Composite																Grab			
Station ID	COG ID	Storm ID	Sampling Date	TDS (mg/L)	TSS (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrogen Total (mg/L)	Nitrate N (mg/L)	Ammonia N (mg/L)	Ortho-phosphate (mg/L)	Phosphorus Dissolved (mg/L)	Phosphorus Total (mg/L)	Atrazine (µg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc Total (mg/L)	Oil and Grease (mg/L)	Spec. Cond. (µS/cm)	pH (su)	*E. coli* (MPN/100 mL)
AR2101	AR2101		4/23/2021	229	47.2	5.89	35.8	0.966	0.253	0.006 J	0.175	0.0713	0.176	2.18	0.00164	0.00272 J	0.00595	0.00165	0.0246	13.4	783	9.1	> 2419.6
AR2102	AR2102		10/27/2021	N/A*	23.5	11.5	34.8 J	0.963	0.215	< 0.0280	0.0342 J	0.0187 J	0.117	0.112 J	0.000841	0.000868 J	0.00311	0.000592	0.00961	< 0.350 J3, Q	623	8.6	115
GA2101	GA2101		4/13/2021	493	3.70	2.44	< 16.1	4.88	4.28	< 0.117	0.112	0.117	0.145	0.227	0.00116	< 0.000510	0.00171 J	< 0.000140	0.00726	< 0.350	978	7.77	126
GA2102	GA2102		4/13/2021	481	28.8	4.37	< 16.1	6.19	5.66	< 0.117	0.0994	0.100	0.164	0.171	0.00130	0.00103 J	0.00265	0.000435 J	0.00764	7.45	907	7.98	285
GA2103	GA2103		4/13/2021	498	7.08	2.74	< 16.1	5.93	5.48	< 0.117	0.104	0.117	0.144	0.150	0.00111	0.000559 J	0.00152 J	0.000142 J	0.00368 J	< 0.350	978	8.07	31.5
IR2101	IR2101		4/13/2021	364	31.3	6.20	< 16.1	0.821	0.632	< 0.117	< 0.0200	0.0510	0.122	0.163	0.00192	0.00262 J	0.00605	0.00120	0.0249	0.690 J	475	9.2	> 2419.6
IR2102	IR2102		4/23/2021	137	171	5.71	53.0	0.953	0.333	0.154	0.222	0.0934	0.276	0.055	0.00264	0.00772	0.00858	0.00319	0.0460	0.400 J	240	9.3	687
MS2101	MS2101		4/23/2021	365	23.8	3.96	31.5 J	0.482	0.283	0.148	0.0515	0.0330 J	0.0725	1.36	0.00139	0.00219 J	0.00399	0.00101	0.0154	15.2	561	8.7	365
MS2102	MS2102		4/23/2021	378	22.0	35.9	113	1.21	0.536	< 0.00336	0.0869	0.0620	0.141	1.52	0.00262	0.00152 J	0.00380	0.000912	0.0147	< 0.350	650	7.8	> 2419.6
PL2101	PL2101		4/23/2021	254	78.4	5.38	31.5 J	1.28	0.674	0.144	0.129	0.0388 J	0.161	0.517	0.00217	0.00512	0.00733	0.00211	0.0274	10.3	482	7.98	> 2419.6
PL2102	PL2102		4/13/2021	452	4.86	4.23	< 16.1	0.518	0.518	< 0.117	< 0.0200	0.0231 J	< 0.0152	0.127	0.000960	< 0.000510	0.00164 J	< 0.000140	< 0.00265	< 0.350	915	8.08	1050
NT2101	NT2101		4/13/2021	137	24.0	21.3	50.4	2.63	1.19	0.558	0.0267 J	0.233	0.324	0.192	0.00108	0.00308	0.0139	0.00123	0.0648	0.780 J	227	8.4	816
NT2102	NT2102		4/13/2021	186	15.5	9.37	33.2 J	1.93	1.31	0.279	0.0473	0.653	0.167	0.521	0.00650	0.00431	0.00719	0.00102	0.0329	< 0.350	350	8.0	1300

Atkins 2021 Regional Spreadsheet

Monitoring Data Form

				Composite																Grab			
Station ID	COG ID	Storm ID	Sampling Date	TDS (mg/L)	TSS (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrogen Total (mg/L)	Nitrate N (mg/L)	Ammonia N (mg/L)	Ortho-phosphate (mg/L)	Phosphorus Dissolved (mg/L)	Phosphorus Total (mg/L)	Atrazine (µg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc Total (mg/L)	Oil and Grease (mg/L)	Spec. Cond. (µS/cm)	pH (su)	*E. coli* (MPN/100 mL)
AR2101	AR2101		8/1/2021	160	85.4	12.2 B	51.3	1.68	0.413	0.0877 J	0.0720	0.100	0.238	< 0.100	0.00259	0.00478	0.00799	0.00270	0.0306	1.90 J	477	8.9	> 2419.6
AR2102	AR2102		7/11/2021	313	97.0	6.08 B1	39.6	1.11	0.306	0.0592 J	< 0.0200	0.0395 J	0.159	0.134	0.00231	0.00334	0.00529	0.00254	0.0222	< 0.350	813	8.2	517
GA2101	GA2101		7/11/2021	411	41.3	3.96 B1, K9	24.7 J	4.73	3.82	0.106	0.0224 J	0.0750	0.0877	0.088 J	0.00217	0.00182 J	0.00197 J	0.000689	0.0286	1.10 J	691	7.5	1050
GA2102	GA2102		7/19/2021	50.0	74.0 Q	5.16 B, K9	21.9 J	1.82	1.07	0.116	< 0.0200	0.0360 J	0.127	< 0.100	0.00213	0.00284 J	0.00300	0.00134	0.0107	2.30 J	476	7.84	1410
GA2103	GA2103		7/11/2021	411	63.3	3.91 B1, K9	33.2 J	5.74	4.66	< 0.0280	< 0.0200	0.0659	0.101	0.088 J	0.00188	0.00316	0.00283	0.00124	0.0130	0.600 J	813	7.82	579
IR2101	IR2101		7/11/2021	170	48.7	5.60 B1	37.5	0.899	0.378	0.103	0.0224 J	0.0292 J	0.0559	< 0.100	0.00198	0.00269 J	0.00475	0.00139	0.0282	< 0.365	384	8.8	1550
IR2102	IR2102		7/11/2021	128	68.0	5.97 B1	46.0	0.910	0.436	0.103	< 0.0200	0.0372 J	0.122	< 0.105	0.00190	0.00559	0.00473	0.00182	0.0175	< 0.365	813	8.2	> 2419.6
MS2101	MS2101		7/11/2021	126	122	5.33 B1	39.6	0.804	0.248	0.0406 J	< 0.0200	0.0830	0.116	0.07 J	0.00236	0.00592	0.00479	0.00435	0.0268	0.870 J	368	8.1	613
MS2102	MS2102		7/19/2021	121	68.0	5.47 B, J3, K9	57.6	1.44	0.431	0.0877 J	0.0758 J6	0.0684	0.231	< 0.100	0.00343	0.00391	0.00508	0.00255	0.0200	3.60 J	199	6.34	> 2419.6
PL2101	PL2101		7/11/2021	193	112	6.20 B1	39.6	1.44	0.737	0.0464 J	< 0.0200	0.0327 J	0.122	0.094 J	0.00237	0.00536	0.00525	0.00190	0.0202	0.730 J	775	7.34	770
PL2102	PL2102		8/1/2021	195	338	7.77 B	74.4	1.33	0.713	0.0794 J	< 0.0200 J6	< 0.0152	0.342	< 0.100	0.00320	0.00627	0.00842	0.00360	0.0304	< 0.350	602	8.4	161
NT2101	NT2101		7/11/2021	121	14.5	5.37 B1	35.3	1.66	0.596	0.172	0.153	0.129	0.145	< 0.100	0.00105	0.00251 J	0.00505	0.000726	0.0266	0.410 J	458	8.0	46.4
NT2102	NT2102		7/11/2021	145	20.3	5.52 B1	50.3	0.880	0.255	0.0411 J	< 0.0200	< 0.0152	0.0457 J	0.052 J	0.00253	0.00192 J	0.00231	0.000771	0.0139	0.710 J	191	8.6	2420

Atkins 2021 Regional Spreadsheet

Monitoring Data Form

				Composite																Grab			
Station ID	COG ID	Storm ID	Sampling Date	TDS (mg/L)	TSS (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrogen Total (mg/L)	Nitrate N (mg/L)	Ammonia N (mg/L)	Ortho-phosphate (mg/L)	Phosphorus Dissolved (mg/L)	Phosphorus Total (mg/L)	Atrazine (µg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc Total (mg/L)	Oil and Grease (mg/L)	Spec. Cond. (µS/cm)	pH (su)	*E. coli* (MPN/100 mL)
AR2101	AR2101		10/1/2021	321 T8	17.8	10.4	33.8 J	0.854	0.274	< 0.0280	0.0418	0.0189 J	0.140	< 0.100	0.00733	0.00124 J	0.0504	0.000666	0.0106	0.800 J	506	8.5	> 2419.6
AR2102	AR2102		10/1/2021	276 T8	11.4	9.51	25.2 J	1.17	0.304	0.0340 J	0.0544	0.0338 J	0.130	0.197*	0.00502	0.00104 J	0.0232	0.000737	0.00815	< 0.357	804	8.2	17.5
GA2101	GA2101		10/10/2021	405	58.3	7.85 B1	29.5 J	6.58	4.97	0.882	0.0527	< 0.0152	0.0295 J	0.071	0.00700	0.00136 J	0.00265 B	0.000712	0.0102 B	< 0.350	804	6.9	687
GA2102	GA2102		10/10/2021	272	49.7	8.05 B1	29.5 J	6.82	6.08	0.131 B	0.0356 B, J	0.0522	0.113	0.233	0.00180	0.00288 J	0.00806 B	0.00139	0.0148 B	< 0.350	392	7.3	> 2419.6
GA2103	GA2103		10/10/2021	445	30.3	4.26 B1	< 16.1	10.7	10.7	0.0705 B, J	0.0489 B	0.0592	0.0927	0.090	0.00164	0.000946 J	0.00290 B	0.000660	0.00919 B	< 0.365	714	7.6	1550
IR2101	IR2101		10/10/2021	229	118	9.01 B1, K9, P1	38.1	0.780	0.324	0.0983 B, J	< 0.0200	0.0162 J	0.0433 J	< 0.033	0.00311	0.00586	0.00736 B	0.00273	0.0332 B	< 0.350	144	9.2	461
IR2102	IR2102		10/1/2021	266 T8	34.3	10.7	38.1	2.07	0.742	0.0487 J	< 0.0200	0.0269 J	0.137	< 0.033*	0.00487	0.00547	0.0151	0.00107	0.0153	0.700 J	645	8.9	> 2419.6
MS2101	MS2101		10/10/2021	255	111	10.5 B1	57.5	0.826	0.0680	0.0397 B, J	< 0.0200	< 0.0152	0.0651	0.051	0.00205	0.00518	0.00541 B	0.00420	0.0294 B	< 0.350	433	8.1	288
MS2102	MS2102		10/1/2021	472 T8	14.5	16.1	40.3	1.10	0.220	< 0.0280	< 0.0200	< 0.0152	0.0488 J	0.108*	0.0163	0.000688 J	0.0972	0.000276 J	0.00290 J	8.92	770	7.83	53.7
PL2101	PL2101		10/10/2021	188	97.3	10.5 B1	40.3	1.35	0.510	0.0996 B, J	< 0.0200	0.0778	0.0514	0.070	0.00262	0.00685	0.00800 B	0.00251	0.0299 B	< 0.350	504	7.2	> 2419.6
PL2102	PL2102		10/10/2021	267	131	3.95 B1	29.5 J	0.987	0.448	< 0.0280	< 0.0200	0.0801	0.0261 J	0.056	0.00336	0.0112	0.00672 B	0.00375	0.250	< 0.350	489	8.0	2420
NT2101	NT2101		10/1/2021	175	10.8	14.3	76.9	3.47	1.16	0.312	0.128	0.0876	0.221	< 0.033*	0.00444	0.00239 J	0.0198	0.00103	0.0404	0.900 J	245	8.32	1990
NT2102	NT2102		10/1/2021	135	12.8	8.49	25.2	1.47	0.693	0.0771 J	< 0.0200	< 0.0152 J3, J6	0.0914	< 0.033*	0.00413	0.00273 J	0.00895	0.000695	0.0163	1.60 J	330	8.02	86.2

Chemical Monitoring Data Form

Station ID	Sampling Date	Storm Summary: Storm Duration (hrs)	Storm Summary: Rainfall Total (in)	Storm Summary: Antecedent Dry Period (hrs)	1st Aliquot Collected	Last Aliquot Collected	# Aliquots Collected	Sample Volume (gal)	Ambient Air Temp (ºF)	Water Temp (ºF)	Sample Comments
WRC-100-1	2/26/2021	5.0	0.88	762	1:50 AM	3:09 AM	5	4	48.0	54.0	
WRC-200-1	2/26/2021	5.0	0.88	762	1:52 AM	3:12 AM	5	4	48.0	50.2	
WRC-300-1	2/26/2021	5.0	0.88	762	1:01 AM	2:33 AM	5	4	48.0	50.5	
FMC-100-1	3/17/2021	1.0	0.28	454	5:16 AM	6:37 AM	5	4	61.0	66.2	
FMC-200-1	3/17/2021	1.0	0.28	454	5:14 AM	6:34 AM	5	4	59.0	63.7	
FMC-300-1	3/17/2021	1.0	0.28	454	5:11 AM	6:30 AM	5	4	59.0	63.5	
WRC-100-2	4/15/2021	4.5	0.56	227	6:23 PM	7:57 PM	5	4	59.0	68.5	
WRC-200-2	4/15/2021	4.5	0.56	227	6:14 PM	7:34 PM	5	4	59.0	64.9	
WRC-300-2	4/15/2021	4.5	0.56	227	5:42 PM	6:35 PM	5	4	57.2	64.6	
WRC-100-2 (Field Dup)	4/15/2021	4.5	0.56	227	6:23 PM	7:57 PM	5	4	59.0	68.5	
FMC-100-2	4/23/2021	1.5	0.24	175	3:52 PM	5:15 PM	5	4	66.2	65.3	
FMC-200-2	4/23/2021	1.5	0.24	175	3:59 PM	5:20 PM	5	4	69.8	65.8	
FMC-300-2	4/23/2021	1.5	0.24	175	3:42 PM	5:13 PM	5	4	69.8	66.9	
WRC-100-3	7/11/2021	2.9	0.55	138	3:47 AM	5:22 AM	5	4	69.8	79.2	
WRC-200-3	7/11/2021	2.9	0.99	36	3:34 AM	4:45 AM	5	4	69.8	78.8	
WRC-300-3	7/11/2021	2.9	0.95	108	3:34 AM	7:19 AM	5	4	71.6	77.4	
FMC-100-3	8/2/2021	5.0	0.59	109.5	5:52 AM	6:52 AM	5	4	75.2	78.6	
FMC-200-3	8/2/2021	5.0	0.70	109.5	2:34 AM	3:52 AM	5	4	75.2	76.8	
FMC-300-3	8/1/2021	5.0	0.82	109.5	5:44 PM	7:06 PM	5	4	75.2	78.4	flowmeter malfunctioned
FMC-100-3 (Field Dup)	8/2/2021	5.0	0.59	109.5	5:52 AM	6:52 AM	5	4	75.2	78.6	
WRC-100-4	10/27/2021	6.0	0.76	310	7:35 AM	7:40 AM	5	4	60.8	72.0	
WRC-200-4	10/27/2021	6.0	0.8	310	8:24 AM	8:32 AM	5	4	61.7	71.2	
WRC-300-4	10/27/2021	6.0	0.6	310	9:14 AM	9:20 AM	5	4	62.1	70.5	
FMC-100-4	10/1/2021	2.0	0.44	1025	4:25 AM	5:25 AM	5	4	68.0	73.0	
FMC-200-4	10/1/2021	2.5	0.36	1025	1:41 AM	3:03 AM	5	4	68.0	71.6	
FMC-300-4	10/1/2021	2.5	0.28	1025	1:39 AM	3:01 AM	5	4	69.8	71.1	flowmeter malfunctioned

Station ID	Composite: TDS (mg/L)	TSS (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrogen Total (mg/L)	Phosphorus Dissolved (mg/L)	Phosphorus Total (mg/L)	Orthophosphate (mg/L)	Ammonia Nitrogen (mg/L)	Nitrate Nitrogen (mg/L)	Atrazine (µg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc Total (mg/L)	Grab: Oil and Grease (mg/L)	Spec. Cond. (uS/cm)	pH Field (su)	E. coli (MPN/100 mL)
WRC-100-1	280	55	3.2	37.2	1.7	<0.050	0.15	0.049	0.11	0.44	0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.0	371	7.67	882
WRC-200-1	298	70	5	37.2	1.2	<0.050	0.14	<0.040	<0.10	0.40	<0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.0	398	7.57	52
WRC-300-1	321	27	2.5	<35.0	1.9	<0.050	0.094	<0.040	<0.10	0.48	0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.0	393	7.77	108
FMC-100-1	256	444	10	71.4	1.8	0.060	0.42	0.097	<0.10	0.38	<0.1	<0.020	0.0093	<0.020	0.022	0.056	<5.0	564	7.45	123.6
FMC-200-1	332	111	10.1	41.5	1.2	<0.050	0.18	0.041	<0.10	0.2	<0.1	<0.020	<0.0070	<0.020	<0.010	0.029	<5.0	664	7.37	980.4
FMC-300-1	248	237	6.0	50	1.6	0.064	0.22	0.079	0.22	0.46	<0.1	<0.020	<0.0070	<0.020	0.023	0.087	<5.0	659	7.85	648.8
WRC-100-2	282	27	6.78	<35.0	0.38	<0.050	0.104	<0.040	<0.250	0.0706	0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.10	453	8.06	1200
WRC-200-2	268	20	3.78	<35.0	0.67	<0.050	<0.050	<0.040	<0.250	0.169	<0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.0	457	8.18	240
WRC-300-2	276	30	4.01	<35.0	2.15	<0.050	0.07	<0.040	<0.250	1.87	0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.0	515	7.88	1990
WRC-100-2 (Field Dup)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5.10	462	8.12	1300
FMC-100-2	390	44	3.88	<35.0	1.024	<0.050	0.132	0.127	<0.250	0.813	0.3	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.32	581	7.99	770
FMC-200-2	407	43	3.12	<35.0	0.831	<0.050	0.12	0.115	<0.250	0.59	0.3	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.00	616	7.72	1120
FMC-300-2	431	34	3.43	<35.0	0.689	<0.050	0.106	0.0759	<0.250	0.256	0.2	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.00	634	7.28	>2419.6
WRC-100-3	224	191	5.56	63.1	0.102	0.0659	0.242	<0.040	0.102	0.102	0.1	<0.020	<0.0070	<0.020	0.014	0.0285	<5.0	331	7.94	2420
WRC-200-3	168	84	9.63	<35.0	0.128	<0.050	0.111	<0.040	0.117	0.128	<0.1	<0.020	<0.0070	<0.020	<0.010	<0.025	<5.0	322	7.76	411
WRC-300-3	188	38	3.63	39.6	0.109	<0.050	0.0828	<0.040	<0.100	0.109	0.1	<0.020	<0.0070	<0.020	<0.010	0.0456	<5.0	326	7.93	461
FMC-100-3	136	218	7.23	66	1.1	0.267	0.404	<0.040	<0.10	0.47	<0.1	<0.020	<0.0070	<0.020	0.0188	0.0418	<5.0	154.3	7.97	>2419.6
FMC-200-3	561	56	7.91	<35.0	0.3	<0.050	0.131	<0.040	<0.10	0.298	<0.1	<0.020	<0.0070	<0.020	0.0102	<0.025	<5.0	546	7.67	>2419.6
FMC-300-3	214	100	19	82.8	2	0.0549	0.348	<0.040	<0.10	0.421	<0.1	<0.020	<0.0070	<0.020	<0.010	0.0444	<5.0	208.5	7.37	>2419.6
FMC-100-3 (Field Dup)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<5.0	154.6	7.96	>2419.6
WRC-100-4	194	34	5	27	0.79	0.062	0.11	<0.01	0.51	0.01	<4.2	<0.0068	<0.0045	0.0449	0.004	0.0422	<5.0	324	7.15	2510.3
WRC-200-4	194	40	5	33	1.07	0.088	0.12	0.14	0.4	0.08	<4.2	<0.0068	<0.0045	0.036	0.0044	<0.0351	<5.0	315	7.13	180
WRC-300-4	794	53	2	22	0.8	0.068	0.12	<0.01	0.3	0.1	<4.2	<0.0068	<0.0045	0.036	0.0044	<0.0351	<5.0	373	7.08	320
FMC-100-4	9760	154	81.3	198.3	2.7	0.564	0.638	0.09	1.59	0.44	<5.600	0.0238	0.012	0.079	0.0102	0.092	<1.4	267	6.86	2500*
FMC-200-4	10020	79	56.7	165.47	2.3	0.595	0.654	0.25	1.67	0.5	<5.600	0.0134	0.0058	0.084	0.0059	0.073	<1.4	192.1	6.69	9900*
FMC-300-4	9450	34	8.6	36.19	0.84	0.202	0.191	0.08	0.4	0.4	<5.800	0.0156	0.1236	0.07	0.0044	0.0843	1.64	669	7.19	2400*

* E. Coli sample results were measured in CFU/100 mL

Table E-2 Wet Weather Data - Regional Watershed Program

HUC Watershed	Sample ID	Collection Date	Water Temperature (°C)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Nitrogen Total (mg/L)	Nitrate Nitrogen (mg/L)	Ammonia (mg/L)	Total Phosphorus (mg/L)	Dissolved Phosphorus (mg/L)	Ortho-Phosphorus (mg/L)	Chemical Oxygen Demand (mg/L)	Biochemical Oxygen Demand (mg/L)
Turtle Creek-Trinity River	TCTR-100	10/23/2020	21.2	161	589	1.6	0.73	<0.10	0.17	<0.050	0.13	95.2	35.4
	TCTR-200	10/23/2020	20.0	222	352	1.4	0.54	0.11	0.32	<0.050	0.20	88.8	22.6
	TCTR-300	10/23/2020	19.5	182	100	0.44	0.41	0.14	0.26	0.11	0.18	52.5	10.3
Headwaters Turtle Creek	HTC-100	12/11/2020	15.4	40	478	2.1	2.1	0.12	0.12	0.063	0.074	<35.0	6.2
	HTC-200	12/11/2020	15.6	53	505	1.9	1.9	<0.10	0.11	<0.050	0.072	37.5	7.0
	HTC-300	12/11/2020	14.9	82	513	1.5	1.5	<0.10	0.11	<0.050	0.064	37.5	5.2
White Rock Creek-White Rock Lake	WRC-100	2/26/2021	12.2	55	280	1.7	0.44	0.11	0.15	<0.050	0.049	37.2	3.2
		4/15/2021	20.3	27	282	0.380	0.0706	<0.25	0.104	<0.050	<0.040	<35.0	6.78
		7/11/2021	26.2	191	224	0.102	0.102	0.102	0.242	0.0659	<0.040	63.1	5.56
	WRC-200	2/26/2021	10.1	70	298	1.2	0.40	<0.10	0.14	<0.050	<0.040	37.2	5
		4/15/2021	18.3	20	268	0.669	0.169	<0.25	<0.050	<0.050	<0.040	<35.0	3.78
		7/11/2021	26.0	84	168	0.128	0.128	0.117	0.111	<0.050	<0.040	<35.0	9.63
	WRC-300	2/26/2021	10.3	27	321	1.9	0.48	<0.10	0.094	<0.050	<0.040	<35.0	2.5
		4/15/2021	18.1	30	276	2.15	1.87	<0.25	0.0682	<0.050	<0.040	<35.0	4.01
		7/11/2021	25.2	38	188	0.109	0.109	<0.10	0.0828	<0.050	<0.040	39.6	3.63
Five Mile Creek-Trinity River	FMC-100	3/17/2021	19.0	444	256	1.8	0.38	<0.10	0.42	0.060	0.097	71.4	10
		4/23/2021	18.5	44	390	1.024	0.813	<0.25	0.132	<0.050	0.127	<35.0	3.88
		8/2/2021	25.9	218	136	1.1	0.469	<0.10	0.404	0.267	<0.040	66.0	7.23

	FMC-200	3/17/2021	17.6	111	332	1.2	0.20	<0.10	0.18	<0.050	0.041	41.5	10.1
		4/23/2021	18.8	43	407	0.831	0.590	<0.25	0.120	<0.050	0.115	<35.0	3.12
		8/2/2021	24.9	56	561	0.3	0.298	<0.10	0.131	<0.050	<0.040	<35.0	7.91
	FMC-300	3/17/2021	17.5	237	248	1.6	0.46	0.22	0.22	0.064	0.079	50.0	6.0
		4/23/2021	19.4	34	431	0.689	0.256	<0.25	0.106	<0.050	0.0759	<35.0	3.43
		8/2/2021	25.8	100	214	2.0	0.421	<0.10	0.348	0.0549	<0.040	82.8	19.0

Table E-3 Wet Weather Data - Regional Watershed Program

HUC Watershed	Sample ID	Collection Date	pH	Conductivity (µS/cm)	Oil & Grease (mg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc total (mg/L)	Total Coliform (MPN/100 mg)	E. Coli (MPN/100 mg)
Turtle Creek-Trinity River	TCTR-100	10/23/2020	6.46	659	<5.0	<0.020	0.0093	<0.020	0.010	0.067	>2419.6	10462.0
	TCTR-200	10/23/2020	8.36	140.3	<5.10	<0.020	0.0093	<0.020	0.018	0.0088	>2419.6	>2419.6
	TCTR-300	10/23/2020	9.08	204.2	<5.0	<0.020	0.035	<0.020	0.013	0.083	>2419.6	4352.0
Headwaters Turtle Creek	HTC-100	12/11/2020	7.34	716	<5.10	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	488.4
	HTC-200	12/11/2020	7.98	693	<5.0	<0.020	<0.0070	<0.020	<0.010	0.032	>2419.6	2419.6
	HTC-300	12/11/2020	7.89	784	<5.10	<0.020	<0.0070	<0.020	0.018	0.036	>2419.6	>2419.6
White Rock Creek-White Rock Lake	WRC-100	2/26/2021	7.67	371	<5.0	<0.020	<0.0070	<0.020	<0.010	<0.025	24196	882
		4/15/2021	8.06	453	<5.10	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	1200

		7/11/2021	7.94	331	<5.00	<0.020	<0.0070	<0.020	0.0137	0.0285	>2419.6	2420
	WRC-200	2/26/2021	7.57	398	<5.0	<0.020	<0.0070	<0.020	<0.010	<0.025	2359	52
		4/15/2021	8.18	457	<5.00	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	240
		7/11/2021	7.76	322	<5.00	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	411
	WRC-300	2/26/2021	7.77	393	<5.0	<0.020	<0.0070	<0.020	<0.010	<0.025	6131	108
		4/15/2021	7.88	515	<5.00	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	1900
		7/11/2021	7.93	326	<5.00	<0.020	<0.0070	<0.020	<0.010	0.0456	>2419.6	461
Five Mile Creek-Trinity River	FMC-100	3/17/2021	7.45	564	<5.00	<0.020	0.0093	<0.020	0.022	0.056	>2419.6	123.6
		4/23/2021	7.99	581	<5.32	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	770
		8/2/2021	7.97	154.3	<5.00	<0.020	<0.0070	<0.020	0.0188	0.0418	>2419.6	>2419.6
	FMC-200	3/17/2021	7.37	664	<5.00	<0.020	<0.0070	<0.020	<0.010	0.029	>2419.6	980.4
		4/23/2021	7.72	616	<5.00	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	1120
		8/2/2021	7.67	546	<5.00	<0.020	<0.0070	<0.020	0.0102	<0.025	>2419.6	>2419.6
	FMC-300	3/17/2021	7.85	659	<5.00	<0.020	<0.0070	<0.020	0.023	0.087	>2419.6	648.8
		4/23/2021	7.28	634	<5.00	<0.020	<0.0070	<0.020	<0.010	<0.025	>2419.6	>2419.6
		8/2/2021	7.37	208.5	<5.00	<0.020	<0.0070	<0.020	<0.010	0.0444	>2419.6	>2419.6

Table E-3 cont., Pesticides	Wet Weather Data - Regional		
HUC Watershed	Sample ID	Collection Date	Atrazine (ug/L)
	TCTR-100	10/23/2020	<0.1

Turtle Creek-Trinity River	TCTR-200	10/23/2020	<0.1
	TCTR-300	10/23/2020	<0.1
Headwaters Turtle Creek	HTC-100	12/11/2020	<0.1
	HTC-200	12/11/2020	<0.1
	HTC-300	12/11/2020	<0.1
White Rock Creek-White Rock Lake	WRC-100	2/26/2021	0.1
		4/15/2021	1.2
		7/11/2021	0.1
	WRC-200	2/26/2021	<0.1
		4/15/2021	1.1
		7/11/2021	<0.1
	WRC-300	2/26/2021	0.1
		4/15/2021	1.3
		7/11/2021	0.1
Five Mile Creek-Trinity River	FMC-100	3/17/2021	<0.1
		4/23/2021	0.3
		8/2/2021	<0.1
	FMC-200	3/17/2021	<0.1
		4/23/2021	0.3
		8/2/2021	<0.1
	FMC-300	3/17/2021	<0.1
		4/23/2021	0.2
		8/2/2021	<0.1

2021 Fort Worth Regional Wet Weather Characterization Plan Monitoring Data Spreadsheet

Station ID	Sampling Date	Rainfall Total (in)	Ambient Air Temp (^{o}F)	pH (su)	Spec. Cond. (uS/cm)	TDS (mg/L)	TSS (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrogen Total (mg/L)	Ammonia Nitrogen (mg/L)	Phosphorus Dissolved (mg/L)	Phosphorus Total (mg/L)	Atrazine (ug/L)	Nitrate (mg/L)	Nitrite (mg/L)	Orthophosphate (mg/L)	Arsenic Total (mg/L)	Chromium Total (mg/L)	Copper Total (mg/L)	Lead Total (mg/L)	Zinc Total (mg/L)	Oil and Grease (mg/L)	Total coliforms (MPN/100mL)	E. coli (MPN/100 mL)
OVR1*	21/Oct/21	0	21.1	7.91	500	282	ND	ND	ND	1.19	ND	ND	0.0513	<0.10	0.71	ND	ND	ND	ND	ND	ND	ND	ND	>2420	461
OVR3*	15/Sep/21	0	22.6	8.4	410	230	ND	4.52	ND	0.42	ND	ND	ND	<0.097	ND	ND	ND	0.00252	ND	ND	ND	ND	ND	>2420	67
OVR1	17/Mar/21	0.1	12.8	7.82	640	169	75.2	11.7	97.1	1.70	0.22	0.100	0.33	1.5	0.47	ND	0.098	1.5	3.2	11.3	6.3	63	ND	>2420	461
OVR3	17/Mar/21	0.1	12.8	8.39	610	282	94.4	5.3	50	1.60	ND	ND	0.11	0.8	0.21	ND	ND	1.6	ND	5.6	3.6	27	ND	1733	60
SYC1*	26/Oct/21	0	24.3	8.09	420	219	ND	10.4	ND	0.26	ND	ND	ND	<0.10	0.058	ND	ND	0.00261	ND	ND	ND	ND	ND	>2420	6.3
SYC3*	26/Oct/21	0	22.9	8.31	490	252	3.6	1.37	ND	0.33	ND	ND	ND	<0.10	0.0999	ND	ND	0.00169	ND	0.00212	0.000523	ND	ND	>2420	142

*ambient stream sample

After multiple attempts, SYC3 and SYC1 were not successfully sampled due to limited fall/winter rains, homeless population prevalence in sampling area, and lack of laboratory staffing availability on requested weekends. These samples will be collected at the next available opportunity and the data sent to NCTCOG.

Appendix G:

Sample Collection Reports

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100072752
City of Arlington 2021

Sample Collection Report
Event Date: January 25, 2021

Storm Summary

Storm description: Moderate rain moving from west to east.

Rain event start time and date:	0515 01/25/21	Rainfall total:	0.2 in
Rain event end time and date:	0545 01/25/21	Peak 1-hr rate:	0.2 in/hr

Rainfall station: Rush Creek @ West Sublett Road (6650)
Antecedent dry period: 107 hrs

Comments: Antecedent dry period determined by Rush Creek @ West Sublett Road (6650) from https://gptx.onerain.com/home.php.

AR 2101

Station location description: Rush Creek @ West Sublett Road

Flow start time and date:	0525 01/25/21	Time first aliquot collected:	0613 01/25/21
Flow end time and date:	0445 01/26/21	Time last aliquot collected:	0834 01/25/21

Peak depth:	0.90 ft	Aliquots collected:	6
Average depth:	0.285 ft	Total sample volume:	3.5 gal

Comments: None

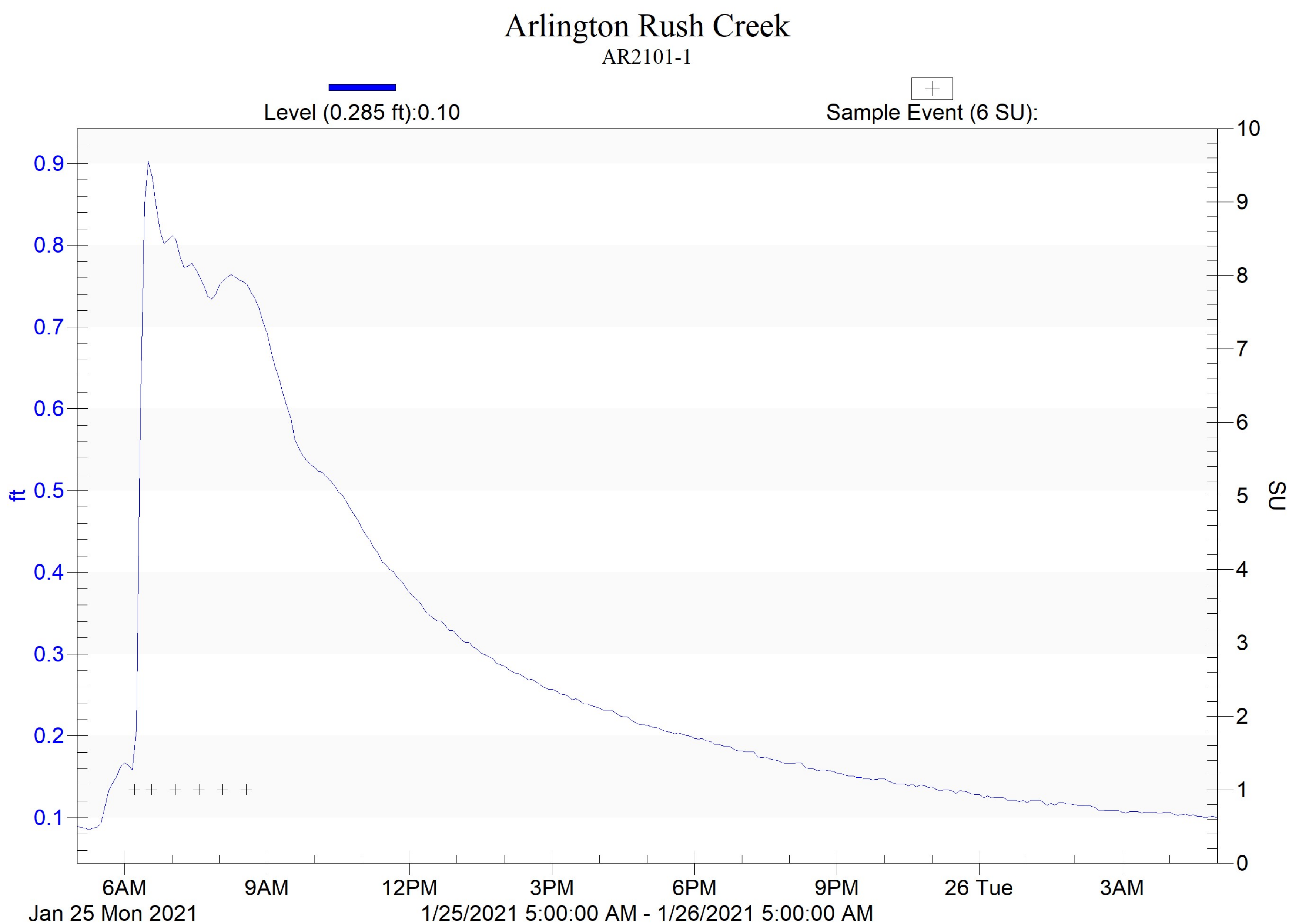
AR 2102

Station location description: Rush Creek @ Woodland Park Blvd.

Comments: AR2102 was not sampled during this storm event.

Prepared By: Ryan Deal Date: 4/2/2021

Checked By: Charles P Dobby Date: 4/5/2021



Arlington Rush Creek
AR2101-1
Level (0.285 ft):0.10
Sample Event (6 SU):
ft
SU
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
10
9
8
7
6
5
4
3
2
1
0
6AM
9AM
12PM
3PM
6PM
9PM
26 Tue
3AM
Jan 25 Mon 2021
1/25/2021 5:00:00 AM - 1/26/2021 5:00:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF ARLINGTON 2021

Storm Event: 1/25/2021 Project Number: 100072752	AR2101	AR2102	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	223 R1	NA	mg/L
Total Suspended Solids (TSS)	53.0	NA	mg/L
Biochemical Oxygen Demand (BOD)	4.1	NA	mg/L
Chemical Oxygen Demand (COD)	48.7	NA	mg/L
Total Nitrogen	0.97	NA	mg/L
Nitrate N	0.21	NA	mg/L
Ammonia N	< 0.028	NA	mg/L
Orthophosphate	0.035 J	NA	mg/L
Phosphorus, Dissolved	0.020 J	NA	mg/L
Phosphorus, Total	0.20	NA	mg/L
Atrazine	0.134	NA	µg/L
Arsenic, Total	0.0014	NA	mg/L
Chromium, Total	0.0023 J	NA	mg/L
Copper, Total	0.0051	NA	mg/L
Lead, Total	0.0018	NA	mg/L
Zinc, Total	0.035	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.35	NA	mg/L
pH	8.7	NA	su
Ambient Air Temperature (field)	48	NA	°F
Water Temperature (field)	55.1	NA	°F
E. Coli	598.0 1t, D6	NA	MPN/100 mL
Specific Conductivity	881	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
1t - Calculated RPD is 50%. RPD limit is 20%
D6 - The precision between the sample and sample duplicate exceeded laboratory control limits.
R1 - RPD value was outside control limits.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100072752
City of Arlington 2021

Sample Collection Report
Event Date: February 25-26, 2021

Storm Summary
Storm description: Heavy rain moving from southwest to northeast.

AR 2101
Station location description: Rush Creek @ West Sublett Road

Comments: AR2101 was previously sampled on January 25, 2021.

AR 2102
Station location description: Rush Creek @ Woodland Park Blvd.

Rain event start time and date:	1759 02/25/21	Rainfall total:	1.88 in
Rain event end time and date:	0514 02/26/21	Peak 1-hr rate:	1.01 in/hr

Rainfall station: KTXARLIN305
Antecedent dry period: 756 hrs

Comments: Antecedent dry period determined by KTXARLIN305 from https://www.wunderground.com/dashboard/pws/KTXARLIN305/graph/2021-02-26/2021-02-26/weekly.

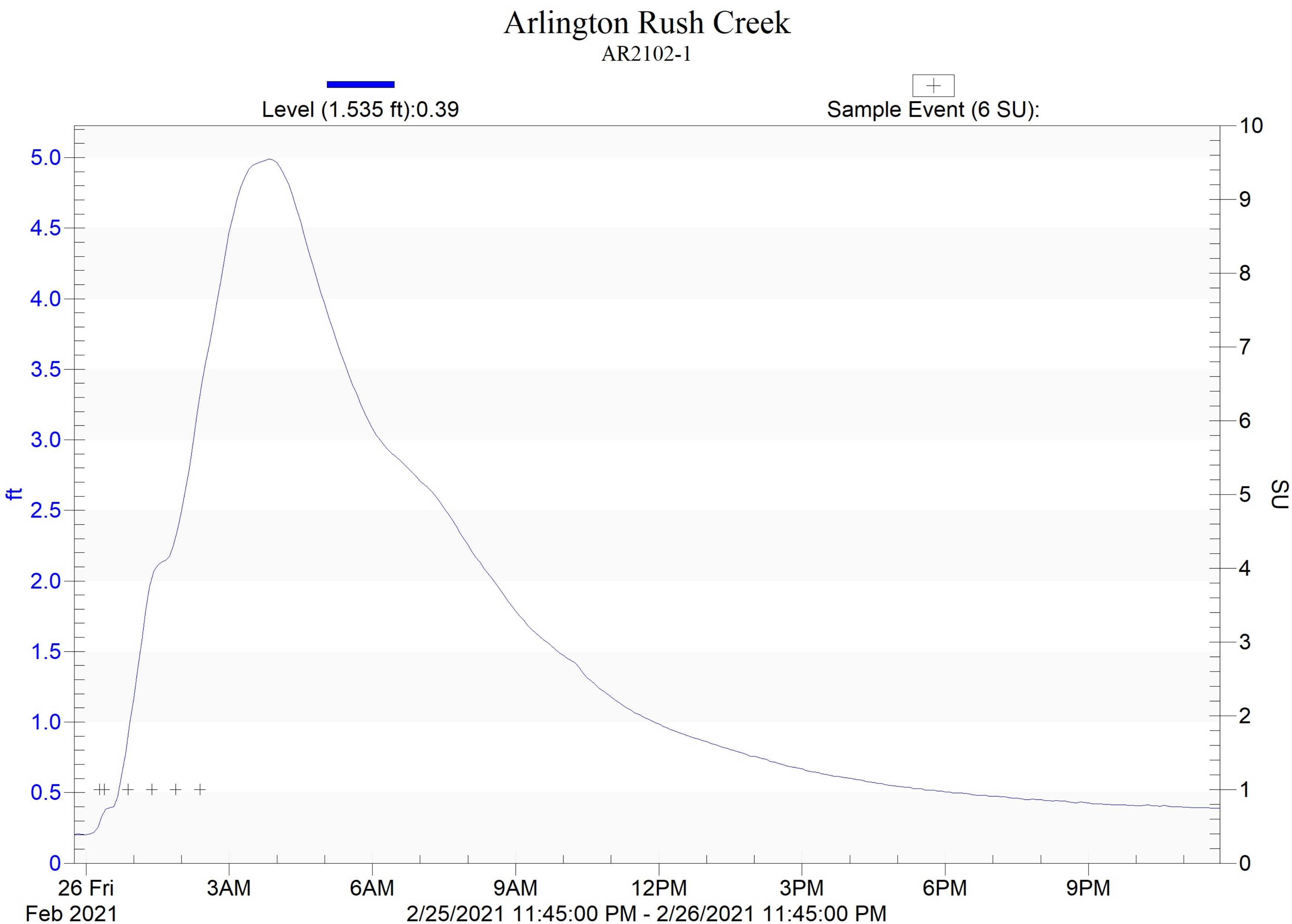
Flow start time and date:	0000 02/26/21	Time first aliquot collected:	0017 02/26/21
Flow end time and date:	2335 02/26/21	Time last aliquot collected:	0223 02/26/21

Peak depth:	4.99 ft	Aliquots collected:	6
Average depth:	1.535 ft	Total sample volume:	3.5 gal

Comments: None

Prepared By: Ryan Deal Date: 4/15/21

Checked By: Charles P Dobby Date: 4/15/21



Arlington Rush Creek
AR2102-1
Level (1.535 ft):0.39
Sample Event (6 SU):
ft
SU
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
1
2
3
4
5
6
7
8
9
10
26 Fri
Feb 2021
3AM
6AM
9AM
12PM
3PM
6PM
9PM
2/25/2021 11:45:00 PM - 2/26/2021 11:45:00 PM

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF ARLINGTON 2021

Storm Event: 2/25/2021 Project Number: 100072752	**AR2101**	**AR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	253	mg/L
Total Suspended Solids (TSS)	NA	162	mg/L
Biochemical Oxygen Demand (BOD)	NA	7.5	mg/L
Chemical Oxygen Demand (COD)	NA	82.1	mg/L
Total Nitrogen	NA	2.0	mg/L
Nitrate N	NA	0.32	mg/L
Ammonia N	NA	0.13	mg/L
Orthophosphate	NA	0.091	mg/L
Phosphorus, Dissolved	NA	0.030 J	mg/L
Phosphorus, Total	NA	0.35	mg/L
Atrazine	NA	3.47	µg/L
Arsenic, Total	NA	0.0025	mg/L
Chromium, Total	NA	0.0052	mg/L
Copper, Total	NA	0.0087	mg/L
Lead, Total	NA	0.0051	mg/L
Zinc, Total	NA	0.048	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	2.5 J	mg/L
pH	NA	8.9	su
Ambient Air Temperature (field)	NA	47	°F
Water Temperature (field)	NA	52.5	°F
E. Coli	NA	2046.0	MPN/100 mL
Specific Conductivity	NA	869	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF GARLAND

Sample Collection Report
Event Date: January 20, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east

Rain event start time and date:	1535 01/20/21	Rainfall total:	0.64 in
Rain event end time and date:	1855 01/20/21	Peak 1-hr rate:	0.44 in/hr

Rainfall station: GA2102
Antecedent dry period: 501 hrs

Comments: The antecedent dry period was calculated using a combination of data from GA 2102 and the KTXGARLA94 weather station located at Beacon Hill (www.wunderground.com/weatherstation).

GA 2101

Station location description: Rowlett Creek at Ben Davis Bridge

Flow start time and date: 1820 01/20/21
Flow end time and date: 2115 01/20/21

Time first aliquot collected: 1824 01/20/21
Time last aliquot collected: 2027 01/20/21

Peak depth:	3.1 ft	Aliquots collected:	6
Average depth:	1.8 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities. The last aliquot shown on the graph does not represent a sample being collected.

GA 2102

Station location description:	Rowlett Creek at Centerville Road/Castle Drive		
Flow start time and date:	1850 01/20/21		
Flow end time and date:	2130 01/20/21		
Time first aliquot collected:	1921 01/20/21		
Time last aliquot collected:	2127 01/20/21		
Peak depth:	2.6 ft	Aliquots collected:	6
Average depth:	2.1 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities. The first four aliquots shown on the graph do not represent a sample being collected.

GA 2103

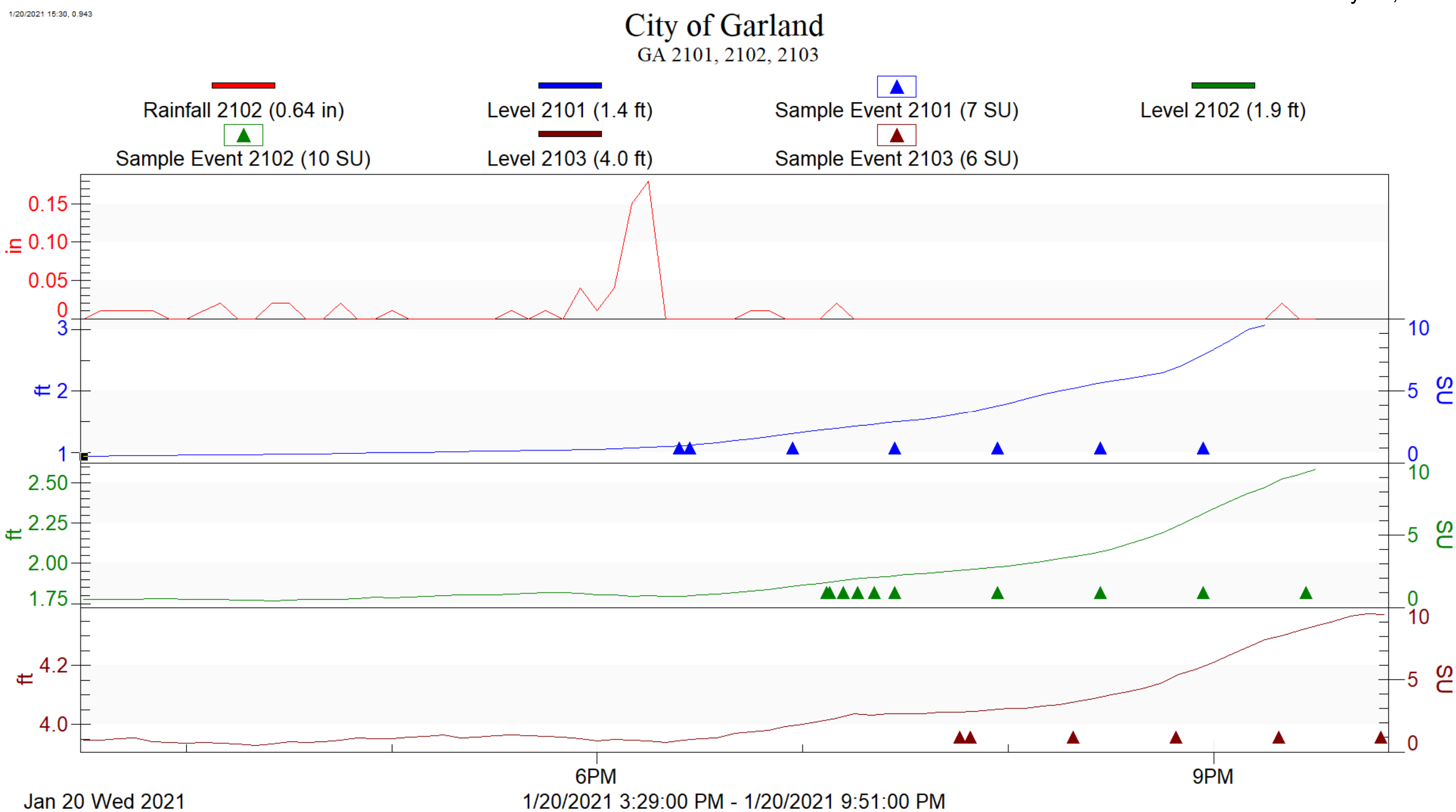
Station location description:	Rowlett Creek at Highway 66		
Flow start time and date:	1915 01/20/21		
Flow end time and date:	2150 01/20/21		
Time first aliquot collected:	1946 01/20/21		
Time last aliquot collected:	2149 01/20/21		
Peak depth:	4.4 ft	Aliquots collected:	6
Average depth:	4.2 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb   Date: March 26, 2021

Checked By: Kyle McKee   Date: March 29, 2021

Sample Collection Report
City of Garland
Event Date: January 20, 2021



Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program

NCTCOG Project 100072752

CITY OF GARLAND 2021

Storm Event: 1/20/2021 Project Number: 100072752	**GA2101**	**GA2102**	**GA2103**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	469	417	435	mg/L
Total Suspended Solids (TSS)	16.4	13.9	23.4	mg/L
Biochemical Oxygen Demand (BOD)	< 2.0	3.6	3.3	mg/L
Chemical Oxygen Demand (COD)	23.6 J	< 16.1	21.5 J	mg/L
Total Nitrogen	6.1	3.3	4.1	mg/L
Nitrate N	5.7	3.0	3.7	mg/L
Ammonia N	0.19	< 0.028	< 0.028	mg/L
Orthophosphate	0.31 F6	0.062 F6	0.060 F6	mg/L
Phosphorus, Dissolved	0.088	0.040 J	0.041 J	mg/L
Phosphorus, Total	0.13	0.081	0.10	mg/L
Atrazine	0.227	0.916	0.332	µg/L
Arsenic, Total	0.00096	0.0011	0.0012	mg/L
Chromium, Total	0.00088 J B	0.0010 J B	0.0013 J B	mg/L
Copper, Total	0.0034	0.0028	0.0029	mg/L
Lead, Total	0.00037 J	0.00045 J	0.00064	mg/L
Zinc, Total	0.011	0.011	0.013	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.53 J	2.0 J	0.94 J	mg/L
pH	8.4	8.61	8.67	su
Ambient Air Temperature (field)	45	45	45	°F
Water Temperature (field)	51.6	51.1	49.8	°F
E. Coli	187.0	213.0 1t, D6	226.0	MPN/100 mL
Specific Conductivity	858	745	844	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
1t - Calculated RPD is 50%. RPD limit is 20%
D6 - The precision between the sample and sample duplicate exceeded laboratory control limits.
B - Analyte was detected in the associated method blank.
F6 - Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory requirements.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100072752
City of Irving 2021

Sample Collection Report
Event Date: January 20, 2021

Storm Summary
Storm description: Heavy rain moving from west to east.

Rain event start time and date:	0953 01/20/21	Rainfall total:	0.42 in
Rain event end time and date:	1853 01/20/21	Peak 1-hr rate:	0.25 in/hr

Rainfall station:	KDFW – DFW International Airport
Antecedent dry period:	245 hrs

Comments: Antecedent dry period determined from DFW International Airport (KDFW) from http://texmesonet.org/HistoricalData/?station=KDFW.

IR 2101
Station location description: Grapevine Creek @ North Royal Lane

Comments: During the January 20, 2021 storm event, IR2101 malfunctioned while trying to sample. No samples were collected at IR2101 during the January 20, 2021 storm event.

IR 2102
Station location description: Estelle Branch @ Rochelle Road

Flow start time and date:	1540 01/20/21	Time first aliquot collected:	1550 01/20/21
Flow end time and date:	2145 01/20/21	Time last aliquot collected:	1755 01/20/21

Peak depth:	0.82 ft	Aliquots collected:	6
Average depth:	0.156 ft	Total sample volume:	3.5 gal

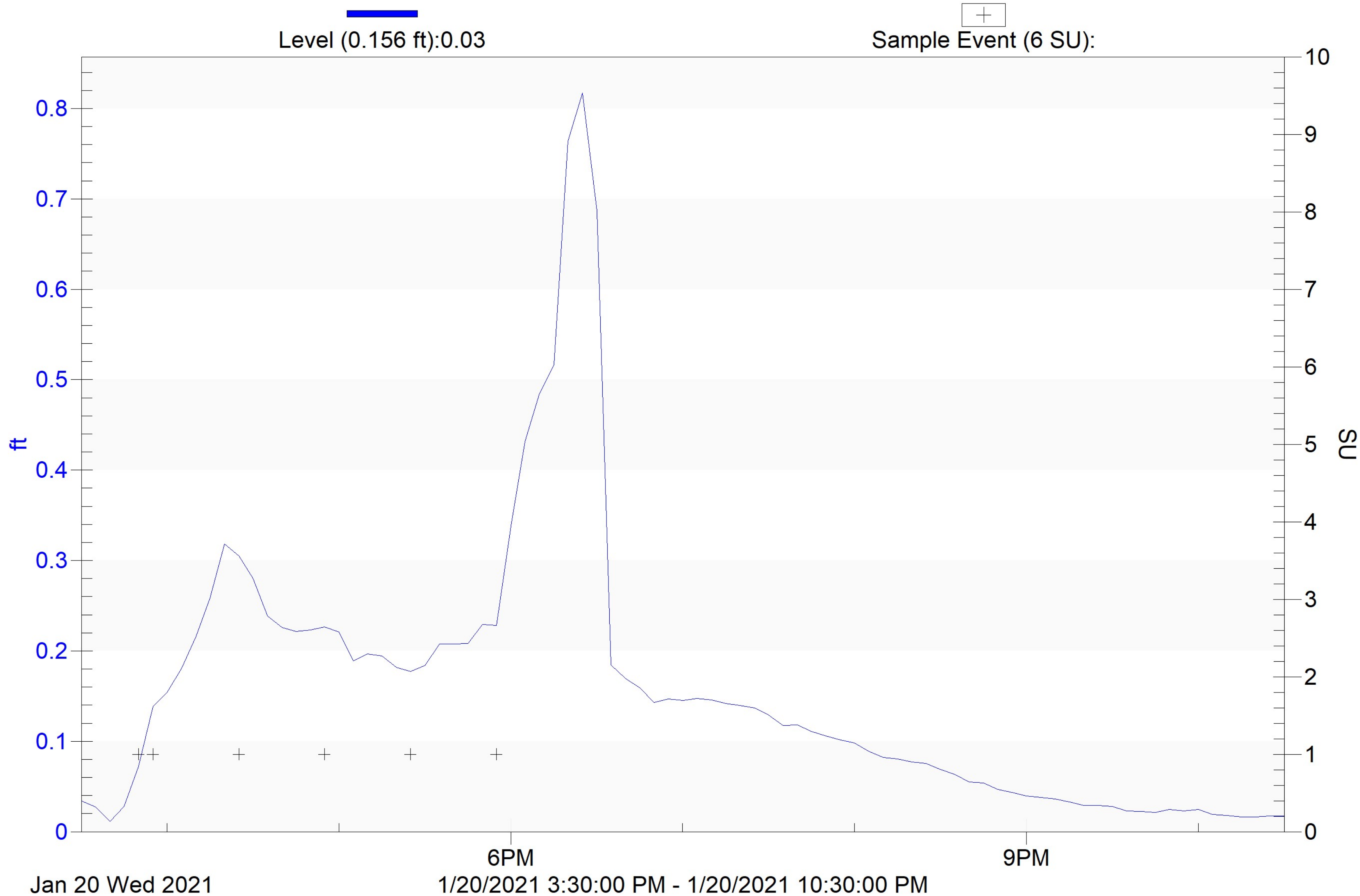
Comments: None

Prepared By: Ryan Deal Date: 4/15/21

Checked By: Charles P Dobby Date: 4/15/21

Irving Estelle Branch

IR2102-1



Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF IRVING 2021

Storm Event: 1/20/2021 Project Number: 100072752	**IR2101**	**IR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	171	mg/L
Total Suspended Solids (TSS)	NA	82.5	mg/L
Biochemical Oxygen Demand (BOD)	NA	21.2	mg/L
Chemical Oxygen Demand (COD)	NA	71.7	mg/L
Total Nitrogen	NA	1.8	mg/L
Nitrate N	NA	0.65	mg/L
Ammonia N	NA	0.16	mg/L
Orthophosphate	NA	0.10 F6	mg/L
Phosphorus, Dissolved	NA	0.056	mg/L
Phosphorus, Total	NA	0.061	mg/L
Atrazine	NA	0.056 J	µg/L
Arsenic, Total	NA	0.0017	mg/L
Chromium, Total	NA	0.011	mg/L
Copper, Total	NA	0.0096	mg/L
Lead, Total	NA	0.0028	mg/L
Zinc, Total	NA	0.065	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	1.4 J	mg/L
pH	NA	9.1	su
Ambient Air Temperature (field)	NA	44	°F
Water Temperature (field)	NA	49.8	°F
E. Coli	NA	> 24196.0	MPN/100 mL
Specific Conductivity	NA	638	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
F6 - Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory rec

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100072752
City of Irving 2021

Sample Collection Report
Event Date: March 1, 2021

Storm Summary
Storm description: Light rain moving from southwest to northeast.

Rain event start time and date: 0805 03/01/21 Rainfall total: 0.11 in
Rain event end time and date: 0853 03/01/21 Peak 1-hr rate: 0.11 in/hr

Rainfall station: KDFW – DFW International Airport
Antecedent dry period: 72 hrs

Comments: Antecedent dry period determined from DFW International Airport (KDFW) from http://texmesonet.org/HistoricalData/?station=KDFW.

IR 2101
Station location description: Grapevine Creek @ North Royal Lane

Flow start time and date: 0840 03/01/21 Time first aliquot collected: 0854 03/01/21
Flow end time and date: 1550 03/01/21 Time last aliquot collected: 1059 03/01/21

Peak depth: 0.59 ft Aliquots collected: 6
Average depth: 0.351 ft Total sample volume: 3.5 gal

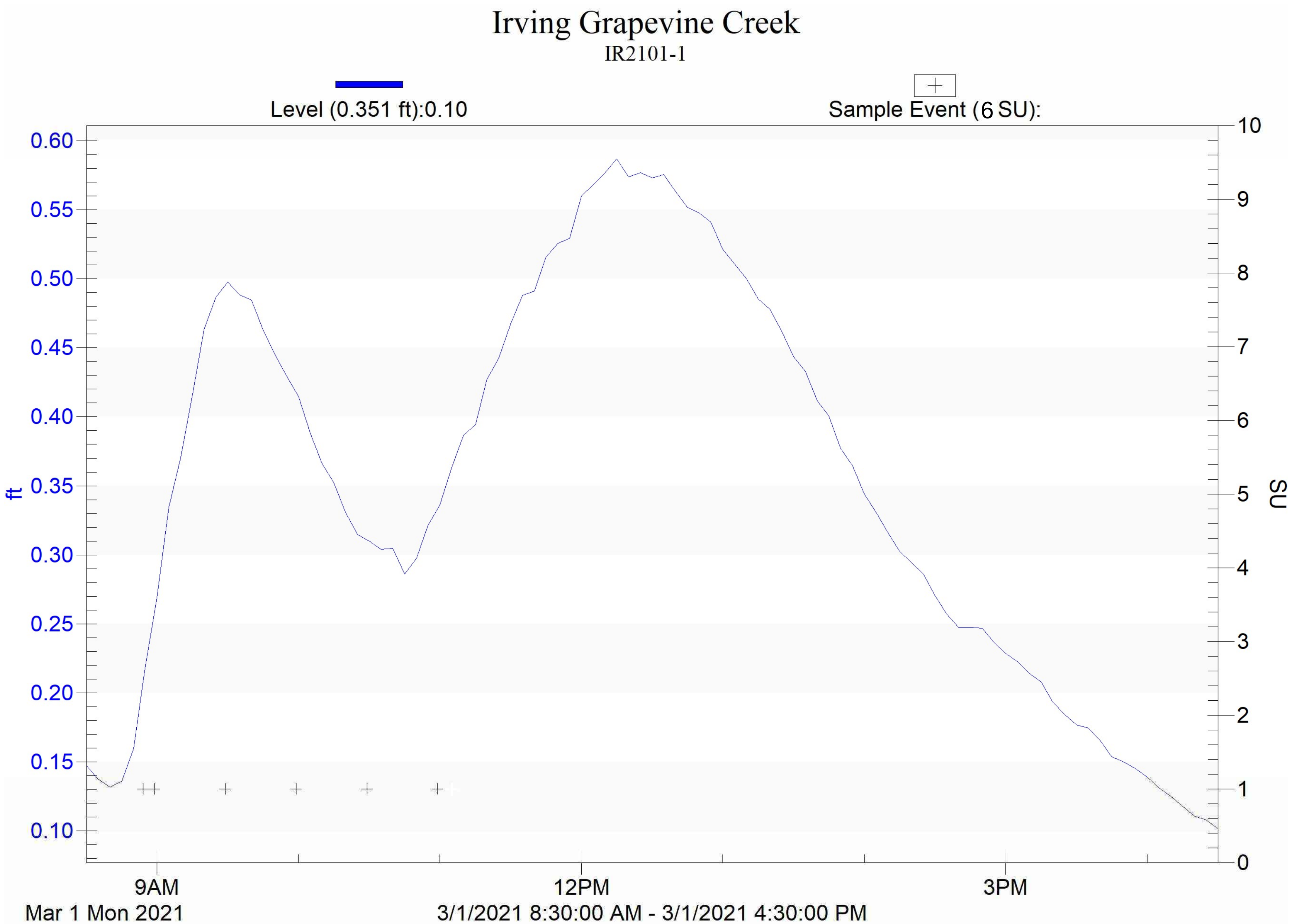
Comments: None

IR 2102
Station location description: Estelle Branch @ Rochelle Road

Comments: IR2102 was collected on January 20, 2021.

Prepared By: Ryan Deal Date: 4/2/2021

Checked By: Charles Daddy Date: 4/5/2021



Irving Grapevine Creek
IR2101-1
Level (0.351 ft):0.10
Sample Event (6 SU):
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
ft
10
9
8
7
6
5
4
3
2
1
0
SU
9AM
12PM
3PM
Mar 1 Mon 2021
3/1/2021 8:30:00 AM - 3/1/2021 4:30:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF IRVING 2021			
Storm Event: 3/1/2021 Project Number: 100072752	**IR2101**	**IR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	328	NA	mg/L
Total Suspended Solids (TSS)	84.0	NA	mg/L
Biochemical Oxygen Demand (BOD)	2.4	NA	mg/L
Chemical Oxygen Demand (COD)	37.2	NA	mg/L
Total Nitrogen	7.7	NA	mg/L
Nitrate N	0.35	NA	mg/L
Ammonia N	< 0.028	NA	mg/L
Orthophosphate	< 0.020 F6	NA	mg/L
Phosphorus, Dissolved	0.028 J	NA	mg/L
Phosphorus, Total	0.039 J	NA	mg/L
Atrazine	< 0.100	NA	µg/L
Arsenic, Total	0.0028	NA	mg/L
Chromium, Total	0.0054	NA	mg/L
Copper, Total	0.0087	NA	mg/L
Lead, Total	0.0021	NA	mg/L
Zinc, Total	0.036	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	4.4 J	NA	mg/L
pH	9.0	NA	su
Ambient Air Temperature (field)	43	NA	°F
Water Temperature (field)	52.1	NA	°F
E. Coli	583.0	NA	MPN/100 mL
Specific Conductivity	587	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
F6 - Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory rec

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF MESQUITE

Sample Collection Report
Event Date: February 25, 2021

Storm Summary

Storm description: Light rain formed in the west and moved east.

Rain event start time and date:	2150 02/25/21	Rainfall total:	0.63 in
Rain event end time and date:	0255 02/26/21	Peak 1-hr rate:	0.48 in/hr

Rainfall station: MS 2102
Antecedent dry period: 759 hrs

Comments: None

MS 2101

Station location description: North of New Market Road

Flow start time and date: 2240 02/25/21
Flow end time and date: 0225 02/26/21

Time first aliquot collected: 2303 02/25/21
Time last aliquot collected: 0107 02/26/21

Peak depth:	5.4 ft	Aliquots collected:	6
Average depth:	2.8 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

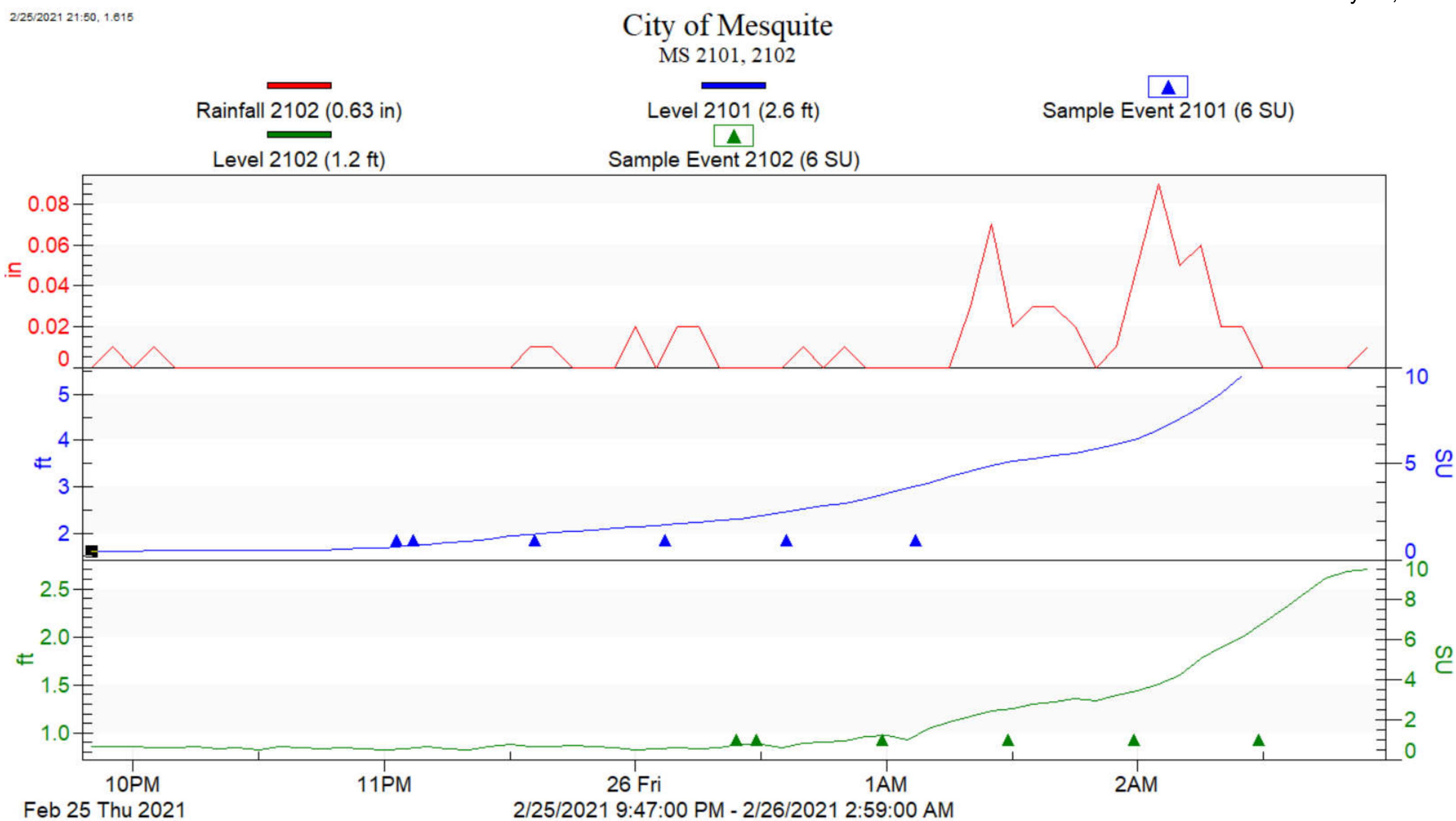
MS 2102

Station location description:	North Mesquite Creek at Edward's Church		
Flow start time and date:	0015 02/26/21		
Flow end time and date:	0255 02/26/21		
Time first aliquot collected:	0024 02/26/21		
Time last aliquot collected:	0229 02/26/21		
Peak depth:	2.7 ft	Aliquots collected:	6
Average depth:	1.4 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb Date: March 26, 2021

Checked By: Kyle McKee Date: March 29, 2021


2/25/2021 21:50, 1.615
City of Mesquite
MS 2101, 2102
Rainfall 2102 (0.63 in)
Level 2101 (2.6 ft)
Sample Event 2101 (6 SU)
Level 2102 (1.2 ft)
Sample Event 2102 (6 SU)
in
0.08
0.06
0.04
0.02
0
ft
5
4
3
2
SU
10
5
0
ft
2.5
2.0
1.5
1.0
SU
10
8
6
4
2
0
10PM
Feb 25 Thu 2021
11PM
26 Fri
1AM
2AM
2/25/2021 9:47:00 PM - 2/26/2021 2:59:00 AM

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF MESQUITE 2021

Storm Event: 2/25/2021 Project Number: 100072752	**MS2101**	**MS2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	398	431	mg/L
Total Suspended Solids (TSS)	65.1	16.8	mg/L
Biochemical Oxygen Demand (BOD)	6.7	< 2.0	mg/L
Chemical Oxygen Demand (COD)	50.0	22.2 J	mg/L
Total Nitrogen	1.5	1.2	mg/L
Nitrate N	0.53	0.47	mg/L
Ammonia N	< 0.028	0.10	mg/L
Orthophosphate	< 0.020	< 0.020	mg/L
Phosphorus, Dissolved	< 0.015	< 0.015	mg/L
Phosphorus, Total	0.14	0.044 J	mg/L
Atrazine	0.772	0.183	µg/L
Arsenic, Total	0.0020	0.0010	mg/L
Chromium, Total	0.0025 J	0.0014 J	mg/L
Copper, Total	0.0058	0.0027	mg/L
Lead, Total	0.0019	0.00050 J	mg/L
Zinc, Total	0.022	0.0061	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.60 J	< 0.35	mg/L
pH	8.8	8.6	su
Ambient Air Temperature (field)	50	50	°F
Water Temperature (field)	53.1	51.2	°F
E. Coli	41.0	30.0	MPN/100 mL
Specific Conductivity	727	881	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
NORTH TEXAS TOLLWAY AUTHORITY

Sample Collection Report
Event Date: January 20, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	1505 01/20/21	Rainfall total:	0.24 in
Rain event end time and date:	1705 01/20/21	Peak 1-hr rate:	0.21 in/hr

Rainfall station: NTTA 2101
Antecedent dry period: 497 hrs

Comments: The antecedent dry period was calculated using data from NTTA 2101 and the DTX 7035 weather station located on Elm Fork at California Crossing (http://www.ci.dallas.tx.us/sts/html/fc.html).

NTTA 2101

Station location description: Unnamed Tributary at SH 161 N. of Gateway Dr.

Flow start time and date: 1510 01/20/21
Flow end time and date: 1720 01/20/21

Time first aliquot collected: 1514 01/20/21
Time last aliquot collected: 1717 01/20/21

Peak depth:	1.3 ft	Aliquots collected:	6
Average depth:	1.1 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

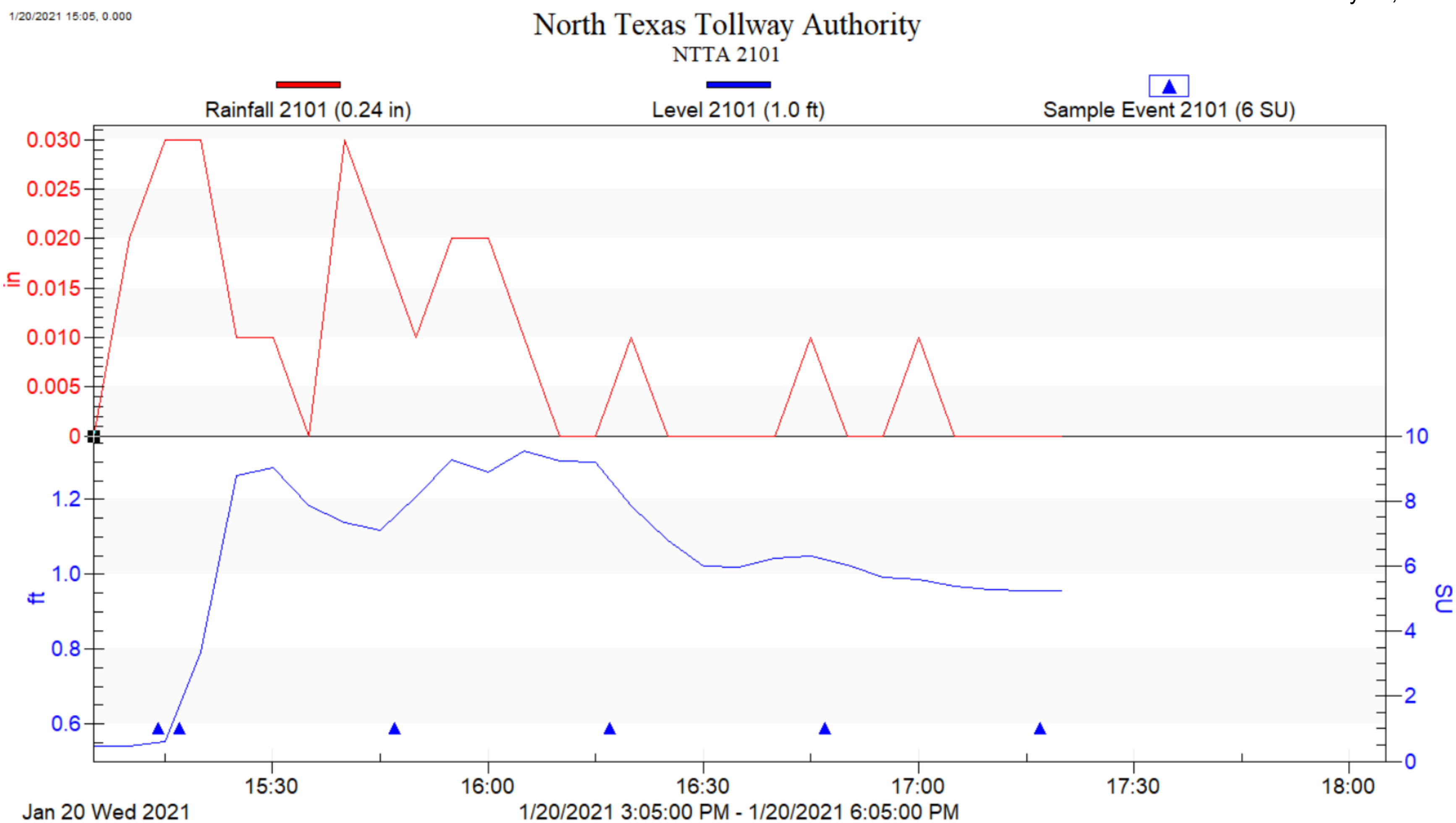
NTTA 2102

Station location description: Cottonwood Creek at SH 161 S. of Dickey Road

Comments: A qualifying rise did not occur at NTTA 2102 and therefore no sample was collected.

Prepared By: Adam Gottlieb Date: March 26, 2021

Checked By: Kyle McKee Date: March 29, 2021


1/20/2021 15:05, 0.000
North Texas Tollway Authority
NTTA 2101
Rainfall 2101 (0.24 in)
Level 2101 (1.0 ft)
Sample Event 2101 (6 SU)
0.030
0.025
0.020
0.015
0.010
0.005
0
in
1.2
1.0
0.8
0.6
ft
10
8
6
4
2
0
SU
15:30
16:00
16:30
17:00
17:30
18:00
Jan 20 Wed 2021
1/20/2021 3:05:00 PM - 1/20/2021 6:05:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

NORTH TEXAS TOLLWAY AUTHORITY 2021

Storm Event: 1/20/2021 Project Number: 100072752	NT2101	NT2102	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	124	NA	mg/L
Total Suspended Solids (TSS)	112	NA	mg/L
Biochemical Oxygen Demand (BOD)	4.9 R6	NA	mg/L
Chemical Oxygen Demand (COD)	80.0	NA	mg/L
Total Nitrogen	1.8	NA	mg/L
Nitrate N	0.60	NA	mg/L
Ammonia N	0.20	NA	mg/L
Orthophosphate	0.091 F6	NA	mg/L
Phosphorus, Dissolved	0.047 J	NA	mg/L
Phosphorus, Total	0.24	NA	mg/L
Atrazine	0.057 J	NA	µg/L
Arsenic, Total	0.0015	NA	mg/L
Chromium, Total	0.0069 B	NA	mg/L
Copper, Total	0.016	NA	mg/L
Lead, Total	0.0040	NA	mg/L
Zinc, Total	0.14	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	1.2 J	NA	mg/L
pH	9.5	NA	su
Ambient Air Temperature (field)	45	NA	°F
Water Temperature (field)	52.7	NA	°F
E. Coli	2755.0	NA	MPN/100 mL
Specific Conductivity	432	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - Analyte was detected in the associated method blank.
F6 - Sample was not filtered within 15 minutes of collection and does not meet sampling and/or regulatory requirer

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
NORTH TEXAS TOLLWAY AUTHORITY

Sample Collection Report
Event Date: February 25, 2021

Storm Summary

Storm description: Light rain formed in the west and moved east.

Rain event start time and date:	1735 2/25/21	Rainfall total:	0.12 in
Rain event end time and date:	1845 2/25/21	Peak 1-hr rate:	0.12 in/hr

Rainfall station: NTTA 2102
Antecedent dry period: 756 hrs

Comments: None

NTTA 2101

Station location description: Unnamed Tributary at SH 161 N. of Gateway Dr.
Comments: A successful sample was collected on January 20, 2021

NTTA 2102

Station location description: Cottonwood Creek at SH 161 S. of Dickey Road

Flow start time and date: 1755 2/25/21
Flow end time and date: 2020 2/25/21

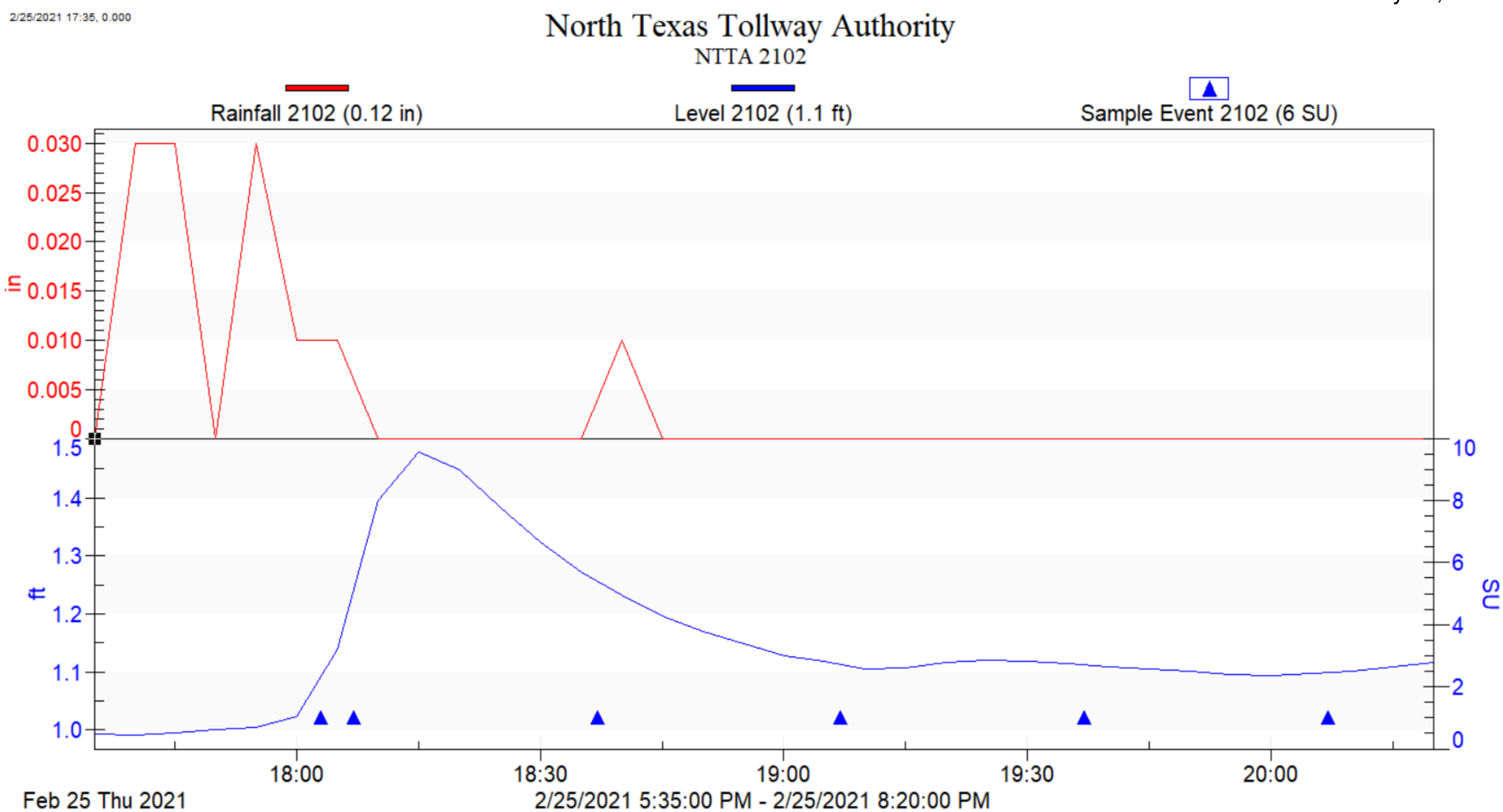
Time first aliquot collected: 1803 2/25/21
Time last aliquot collected: 2007 2/25/21

Peak depth:	1.5 ft	Aliquots collected:	6
Average depth:	1.2 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb Date: March 26, 2021

Checked By: Kyle McKee Date: March 29, 2021


2/25/2021 17:35, 0.000
North Texas Tollway Authority
NTTA 2102
Rainfall 2102 (0.12 in)
Level 2102 (1.1 ft)
Sample Event 2102 (6 SU)
in
0.030
0.025
0.020
0.015
0.010
0.005
0
ft
1.5
1.4
1.3
1.2
1.1
1.0
SU
10
8
6
4
2
0
18:00
18:30
19:00
19:30
20:00
Feb 25 Thu 2021
2/25/2021 5:35:00 PM - 2/25/2021 8:20:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

NORTH TEXAS TOLLWAY AUTHORITY 2021

Storm Event: 2/25/2021 Project Number: 100072752	**NT2101**	**NT2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	812	mg/L
Total Suspended Solids (TSS)	NA	212	mg/L
Biochemical Oxygen Demand (BOD)	NA	13.0	mg/L
Chemical Oxygen Demand (COD)	NA	99.2	mg/L
Total Nitrogen	NA	2.7	mg/L
Nitrate N	NA	0.75	mg/L
Ammonia N	NA	0.32	mg/L
Orthophosphate	NA	0.35	mg/L
Phosphorus, Dissolved	NA	0.68	mg/L
Phosphorus, Total	NA	1.7	mg/L
Atrazine	NA	0.121	µg/L
Arsenic, Total	NA	0.0039	mg/L
Chromium, Total	NA	0.015	mg/L
Copper, Total	NA	0.020	mg/L
Lead, Total	NA	0.0084	mg/L
Zinc, Total	NA	0.23	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	0.60 J	mg/L
pH	NA	8.5	su
Ambient Air Temperature (field)	NA	50	°F
Water Temperature (field)	NA	50.6	°F
E. Coli	NA	213.0 2t, D6	MPN/100 mL
Specific Conductivity	NA	1489	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
2t - Calculated RPD is 37%. RPD limit is 20%
D6 - The precision between the sample and sample duplicate exceeded laboratory control limits.

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF PLANO

Sample Collection Report
Event Date: January 24, 2021

Storm Summary

Storm description: Light rain formed in the northwest and moved southeast.

Rain event start time and date:	1349 01/24/21	Rainfall total:	0.13 in
Rain event end time and date:	2229 01/24/21	Peak 1-hr rate:	0.04 in/hr

Rainfall station: KTXPLANO44
Antecedent dry period: 92 hrs

Comments: The storm summary was calculated using data from the KTXPLANO44 weather station located in Alma/Hedgcoxe, Plano (www.wunderground.com/weatherstation).

PL 2101

Station location description: Rowlett Creek at Alma Drive

Flow start time and date: 1910 01/24/21
Flow end time and date: 2155 01/24/21

Time first aliquot collected: 1949 01/24/21
Time last aliquot collected: 2152 01/24/21

Peak depth:	1.6 ft	Aliquots collected:	6
Average depth:	1.5 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of sampling activities.

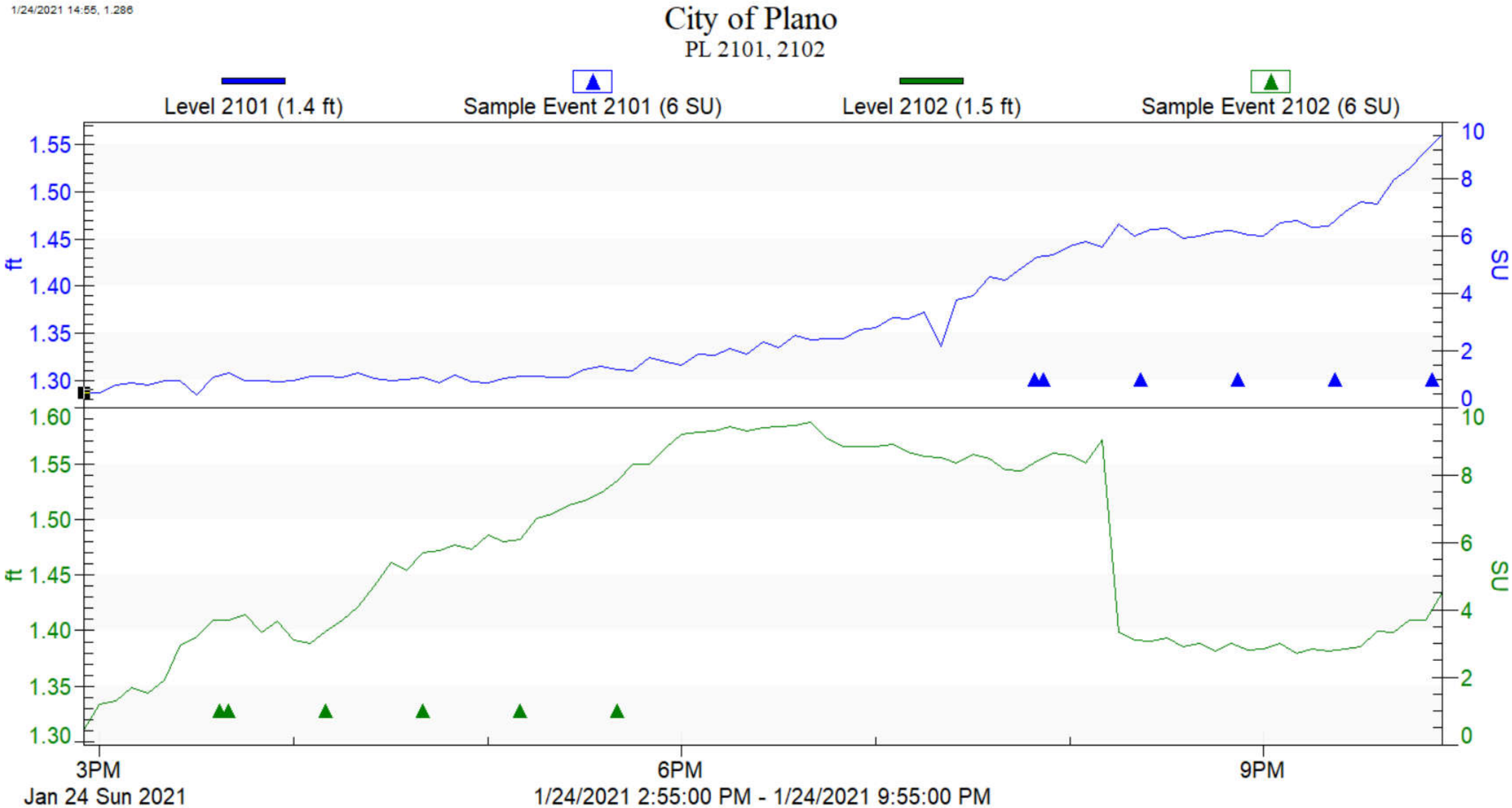
PL 2102

Station location description:	Rowlett Creek in Oak Point Park		
Flow start time and date:	1455 01/24/21		
Flow end time and date:	2015 01/24/21		
Time first aliquot collected:	1537 01/24/21		
Time last aliquot collected:	1740 01/24/21		
Peak depth:	1.6 ft	Aliquots collected:	6
Average depth:	1.5 ft	Total sample volume:	3.5 gal

Comments: None

Prepared By: Adam Gottlieb Date: March 26, 2021

Checked By: Kyle McKee Date: March 29, 2021


1/24/2021 14:55, 1.286
City of Plano
PL 2101, 2102
Level 2101 (1.4 ft)
Sample Event 2101 (6 SU)
Level 2102 (1.5 ft)
Sample Event 2102 (6 SU)
1.55
1.50
1.45
1.40
1.35
1.30
ft
10
8
6
4
2
0
SU
1.60
1.55
1.50
1.45
1.40
1.35
1.30
ft
10
8
6
4
2
0
SU
3PM
Jan 24 Sun 2021
6PM
1/24/2021 2:55:00 PM - 1/24/2021 9:55:00 PM
9PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF PLANO 2021

Storm Event: 1/24/2021 Project Number: 100072752	**PL2101**	**PL2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	418	398	mg/L
Total Suspended Solids (TSS)	6.8	16.1	mg/L
Biochemical Oxygen Demand (BOD)	2.6	2.0	mg/L
Chemical Oxygen Demand (COD)	< 16.1	< 16.1	mg/L
Total Nitrogen	2.1	1.9	mg/L
Nitrate N	1.5	1.3	mg/L
Ammonia N	0.38	< 0.028	mg/L
Orthophosphate	< 0.020	< 0.020	mg/L
Phosphorus, Dissolved	< 0.015	< 0.015	mg/L
Phosphorus, Total	0.025 J	< 0.015	mg/L
Atrazine	0.101	0.156	µg/L
Arsenic, Total	0.00069	0.00086	mg/L
Chromium, Total	0.00061 J	0.00090 J	mg/L
Copper, Total	0.0016 J	0.0020 J	mg/L
Lead, Total	< 0.00014	0.00032 J	mg/L
Zinc, Total	0.0033 J	0.0072	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	1.0 J	< 0.35	mg/L
pH	8.69	8.70	su
Ambient Air Temperature (field)	56	55	°F
Water Temperature (field)	54.6	54.1	°F
E. Coli	315.0	414.0 1t, D6	MPN/100 mL
Specific Conductivity	768	809	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
1t - Calculated RPD is 50%. RPD limit is 20%
D6 - The precision between the sample and sample duplicate exceeded laboratory control limits.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100077363
City of Arlington 2021

Sample Collection Report
Event Date: October 27, 2021

Storm Summary

Storm description: Moderate rain moving from west to east.

Rain event start time and date:	0310 10/27/21	Rainfall total:	0.60 in
Rain event end time and date:	0745 10/27/21	Peak 1-hr rate:	0.20 in/hr

Rainfall station: Rush Creek @ Woodland Park (6610)
Antecedent dry period: 314.6 hrs

Comments: Storm summary determined by Rush Creek @ Woodland Park Blvd. (6610) from https://gptx.onerain.com/map/?view=24ffe2cd-8893-4c38-9337-a29860a31ed2#.

AR 2101

Station location description: Rush Creek @ West Sublett Road

Comments: AR2101 was not sampled during this event.

AR 2102-2M

Station location description: Rush Creek @ Woodland Park Blvd.

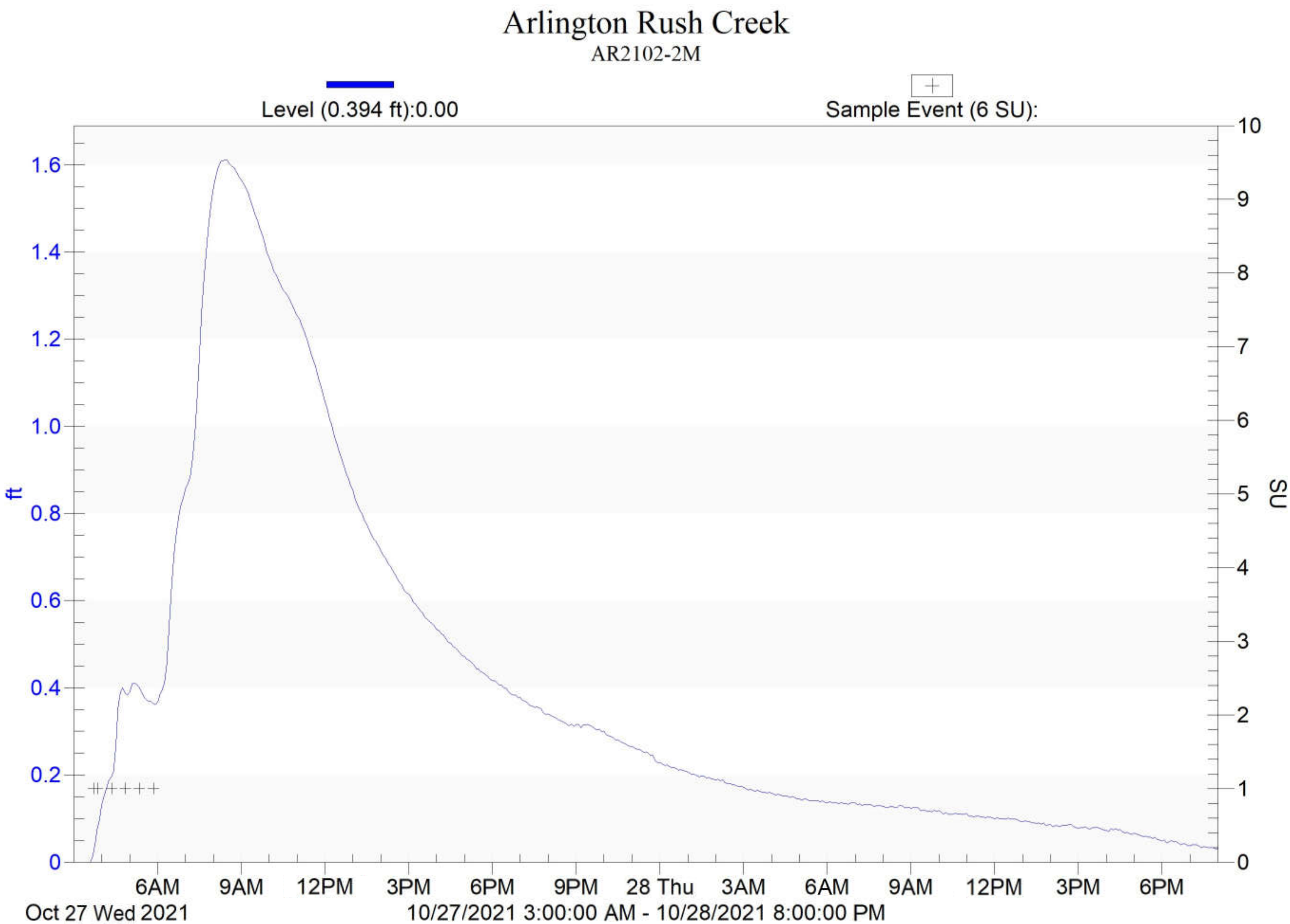
Flow start time and date:	0335 10/27/21	Time first aliquot collected:	0342 10/27/21
Flow end time and date:	2000 10/28/21	Time last aliquot collected:	0551 10/27/21

Peak depth:	1.610 ft	Aliquots collected:	6
Average depth:	0.394 ft	Total sample volume:	3 gal

Comments: None

Prepared By: S. Connor Kee Digitally signed by S. Connor Kee 2022.01.20 15:46:32-06'00' Date: 2022-01-20

Checked By: Ryan Deal Digitally signed by Ryan Deal Date: 2022.01.20 15:50:37-06'00' Date: 2022-01-20


Arlington Rush Creek
AR2102-2M
Level (0.394 ft):0.00
Sample Event (6 SU):
ft
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
SU
10
9
8
7
6
5
4
3
2
1
0
6AM
9AM
12PM
3PM
6PM
9PM
28 Thu
3AM
6AM
9AM
12PM
3PM
6PM
Oct 27 Wed 2021
10/27/2021 3:00:00 AM - 10/28/2021 8:00:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF ARLINGTON 2021

Storm Event: 10/27/2021 Project Number: 100072752	**AR2101**	**AR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	N/A*	mg/L
Total Suspended Solids (TSS)	NA	23.5	mg/L
Biochemical Oxygen Demand (BOD)	NA	11.5	mg/L
Chemical Oxygen Demand (COD)	NA	34.8 J	mg/L
Total Nitrogen	NA	0.963	mg/L
Nitrate N	NA	0.215	mg/L
Ammonia N	NA	< 0.0280	mg/L
Orthophosphate	NA	0.0342 J	mg/L
Phosphorus, Dissolved	NA	0.0187 J	mg/L
Phosphorus, Total	NA	0.117	mg/L
Atrazine	NA	0.112 J	µg/L
Arsenic, Total	NA	0.000841	mg/L
Chromium, Total	NA	0.000868 J	mg/L
Copper, Total	NA	0.00311	mg/L
Lead, Total	NA	0.000592	mg/L
Zinc, Total	NA	0.00961	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	< 0.350 J3, Q	mg/L
pH	NA	8.6	su
Ambient Air Temperature (field)	NA	68	°F
Water Temperature (field)	NA	72.4	°F
E. Coli	NA	115	MPN/100 mL
Specific Conductivity	NA	623	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
* - Laboratory discarded TDS make-up sample

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100072752
City of Arlington 2021

Sample Collection Report
Event Date: April 23, 2021

Storm Summary
Storm description: Moderate rain moving from southwest to northeast.

Rain event start time and date: 1520 04/23/21 Rainfall total: 0.32 in
Rain event end time and date: 1809 04/23/21 Peak 1-hr rate: 0.28 in/hr

Rainfall station: Rush Creek @ West Sublett Road (6650)
Antecedent dry period: 163 hrs

Comments: Antecedent dry period determined by Rush Creek @ West Sublett Road (6650) from https://gptx.onerain.com/map/?view=24ffe2cd-8893-4c38-9337-a29860a31ed2#.

AR 2101
Station location description: Rush Creek @ West Sublett Road

Flow start time and date: 1800 04/23/21 Time first aliquot collected: 1805 04/23/21
Flow end time and date: 0935 04/24/21 Time last aliquot collected: 2034 04/23/21

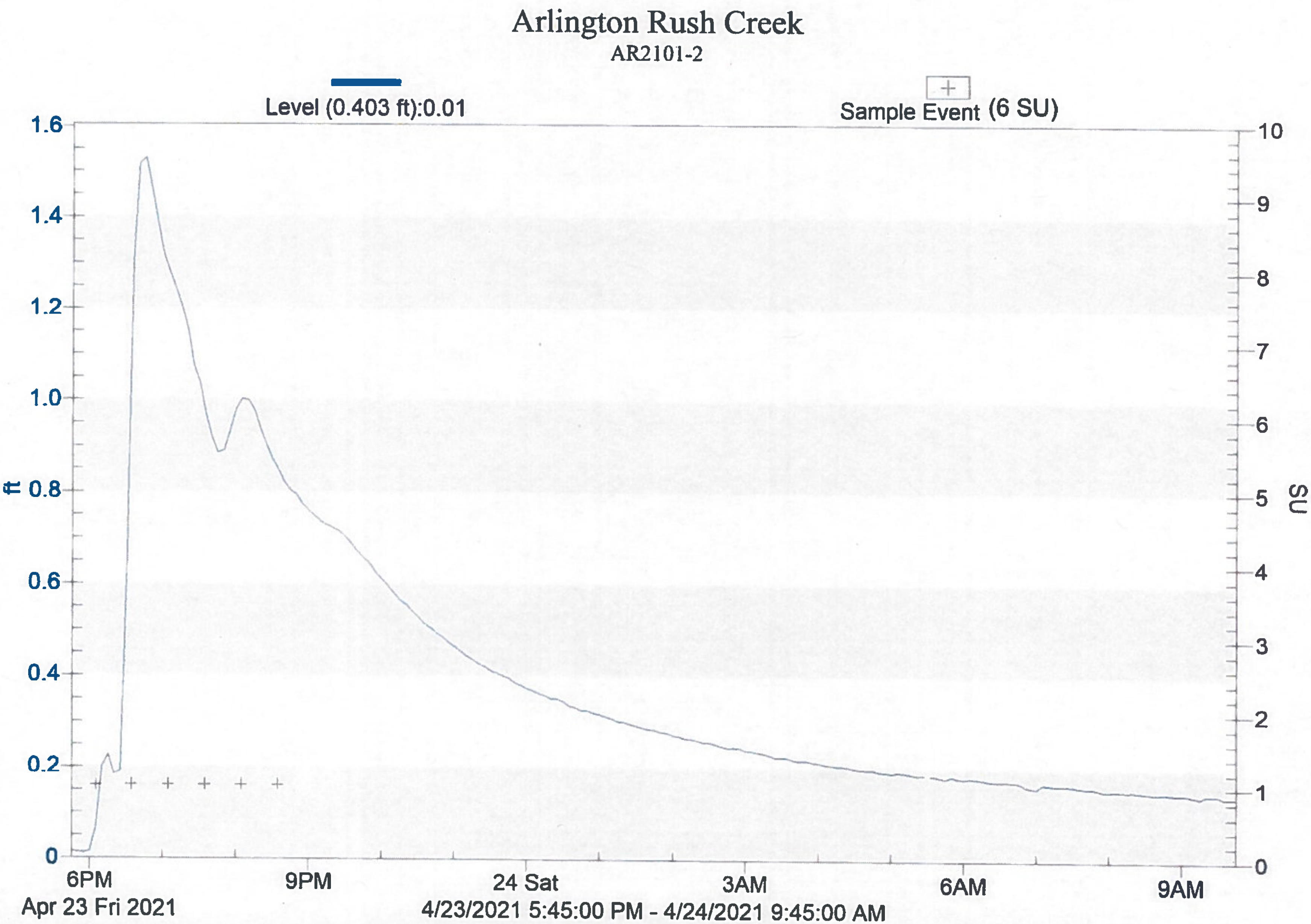
Peak depth: 1.530 ft Aliquots collected: 6
Average depth: 0.403 ft Total sample volume: 3.25 gal

Comments: None

AR 2102
Station location description: Rush Creek @ Woodland Park Blvd.

Comments: AR2102 was successfully collected on April 13, 2021. However, the sample was inadvertently canceled by the laboratory. A make up sample for AR2102-2 will be collected.

Prepared By: E Kelley Date: 7/23/21
Checked By: Ryan Deal Date: 7/23/21



Arlington Rush Creek
AR2101-2
Level (0.403 ft):0.01
Sample Event (6 SU)
ft
SU
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
10
9
8
7
6
5
4
3
2
1
0
6PM
Apr 23 Fri 2021
9PM
24 Sat
3AM
6AM
9AM
4/23/2021 5:45:00 PM - 4/24/2021 9:45:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF ARLINGTON 2021			
Storm Event: 4/23/2021 Project Number: 100072752	**AR2101**	**AR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	229	NA	mg/L
Total Suspended Solids (TSS)	47.2	NA	mg/L
Biochemical Oxygen Demand (BOD)	5.89	NA	mg/L
Chemical Oxygen Demand (COD)	35.8	NA	mg/L
Total Nitrogen	0.966	NA	mg/L
Nitrate N	0.253	NA	mg/L
Ammonia N	0.006 J	NA	mg/L
Orthophosphate	0.175	NA	mg/L
Phosphorus, Dissolved	0.0713	NA	mg/L
Phosphorus, Total	0.176	NA	mg/L
Atrazine	2.18	NA	µg/L
Arsenic, Total	0.00164	NA	mg/L
Chromium, Total	0.00272 J	NA	mg/L
Copper, Total	0.00595	NA	mg/L
Lead, Total	0.00165	NA	mg/L
Zinc, Total	0.0246	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	13.4	NA	mg/L
pH	9.1	NA	su
Ambient Air Temperature (field)	68	NA	°F
Water Temperature (field)	64.7	NA	°F
E. Coli	> 2419.6	NA	MPN/100 mL
Specific Conductivity	783	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF GARLAND

Sample Collection Report
Event Date: April 13, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	0150 04/13/21	Rainfall total:	0.27 in
Rain event end time and date:	0840 04/13/21	Peak 1-hr rate:	0.10 in/hr

Rainfall station:	GA 2102
Antecedent dry period:	451 hrs

Comments: None

GA 2101

Station location description:	Rowlett Creek at Ben Davis Bridge		
Flow start time and date:	0520 04/13/21		
Flow end time and date:	0920 04/13/21		
Time first aliquot collected:	0552 04/13/21		
Time last aliquot collected:	0756 04/13/21		
Peak depth:	1.7 ft	Aliquots collected:	6
Average depth:	1.2 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities. The last aliquot shown on the graph does not represent a sample being collected.

GA 2102

Station location description:	Rowlett Creek at Centerville Road/Castle Drive

Flow start time and date:	0510 04/13/21		
Flow end time and date:	0840 04/13/21		
Time first aliquot collected:	0627 04/13/21		
Time last aliquot collected:	0830 04/13/21		
Peak depth:	2.2 ft	Aliquots collected:	6
Average depth:	2.1 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities. The last two aliquots shown on the graph do not represent a sample being collected.

GA 2103

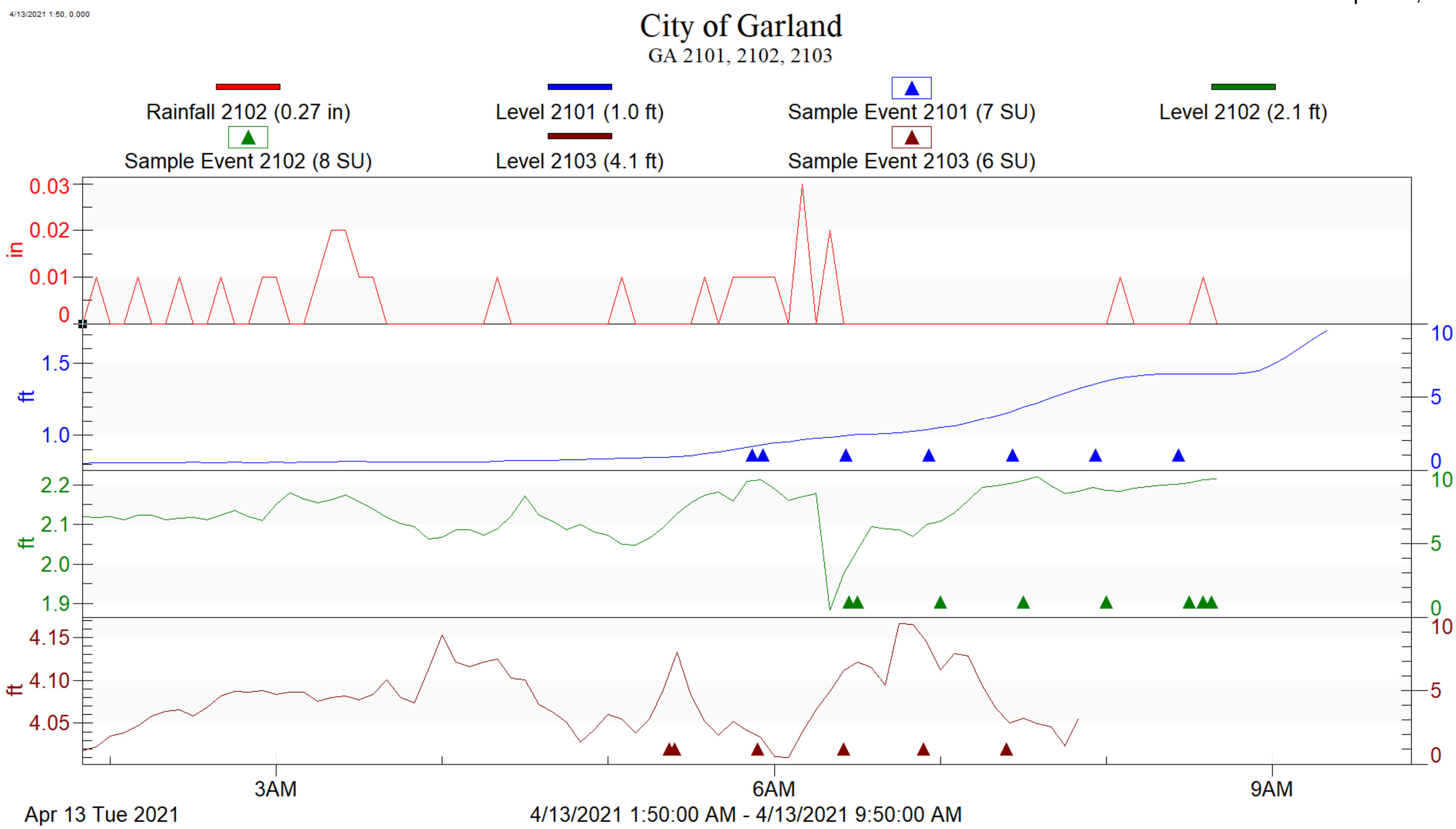
Station location description:	Rowlett Creek at Highway 66

Flow start time and date:	0510 04/13/21		
Flow end time and date:	0750 04/13/21		
Time first aliquot collected:	0522 04/13/21		
Time last aliquot collected:	0724 04/13/21		
Peak depth:	4.2 ft	Aliquots collected:	6
Average depth:	4.1 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb Date: June 4, 2021

Checked By: Kyle McKee Date: June 7, 2021


4/13/2021 1:50, 0.000
City of Garland
GA 2101, 2102, 2103
Rainfall 2102 (0.27 in)
Level 2101 (1.0 ft)
Sample Event 2101 (7 SU)
Level 2102 (2.1 ft)
Sample Event 2102 (8 SU)
Level 2103 (4.1 ft)
Sample Event 2103 (6 SU)
0.03
0.02
0.01
0
in
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1.0
ft
10
5
0
SU
2.2
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1.9
ft
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SU
4.15
4.10
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SU
3AM
6AM
9AM
Apr 13 Tue 2021
4/13/2021 1:50:00 AM - 4/13/2021 9:50:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF GARLAND 2021

Storm Event: 4/13/2021 Project Number: 100072752	**GA2101**	**GA2102**	**GA2103**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	493	481	498	mg/L
Total Suspended Solids (TSS)	3.70	28.8	7.08	mg/L
Biochemical Oxygen Demand (BOD)	2.44	4.37	2.74	mg/L
Chemical Oxygen Demand (COD)	< 16.1	< 16.1	< 16.1	mg/L
Total Nitrogen	4.88	6.19	5.93	mg/L
Nitrate N	4.28	5.66	5.48	mg/L
Ammonia N	< 0.117	< 0.117	< 0.117	mg/L
Orthophosphate	0.112	0.099	0.104	mg/L
Phosphorus, Dissolved	0.117	0.100	0.117	mg/L
Phosphorus, Total	0.145	0.164	0.144	mg/L
Atrazine	0.227	0.171	0.150	µg/L
Arsenic, Total	0.00116	0.0013	0.00111	mg/L
Chromium, Total	< 0.000510	0.00103 J	0.000559 J	mg/L
Copper, Total	0.00171 J	0.00265	0.00152 J	mg/L
Lead, Total	< 0.000140	0.000435 J	0.000142 J	mg/L
Zinc, Total	0.00726	0.00764	0.00368 J	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.350	7.45	< 0.350	mg/L
pH	7.77	7.98	8.07	su
Ambient Air Temperature (field)	55	55	55	°F
Water Temperature (field)	63.9	64	65.3	°F
E. Coli	126	285	31.5	MPN/100 mL
Specific Conductivity	978	907	978	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100072752
City of Irving 2021

Sample Collection Report
Event Date: April 13, 2021

Storm Summary
Storm description: Moderate rain moving from southwest to northeast.

Rain event start time and date: 0120 04/13/21 Rainfall total: 0.32 in
Rain event end time and date: 0710 04/13/21 Peak 1-hr rate: 0.14 in/hr

Rainfall station: KDFW – DFW International Airport
Antecedent dry period: 450.5 hrs

Comments: Antecedent dry period determined from DFW International Airport (KDFW) from http://texmesonet.org/HistoricalData/?station=KDFW.

IR 2101
Station location description: Grapevine Creek @ North Royal Lane

Flow start time and date: 0245 04/13/21 Time first aliquot collected: 0248 04/13/21
Flow end time and date: 1200 04/13/21 Time last aliquot collected: 0453 04/13/21

Peak depth:	0.77 ft	Aliquots collected:	6
Average depth:	0.331 ft	Total sample volume:	3 gal

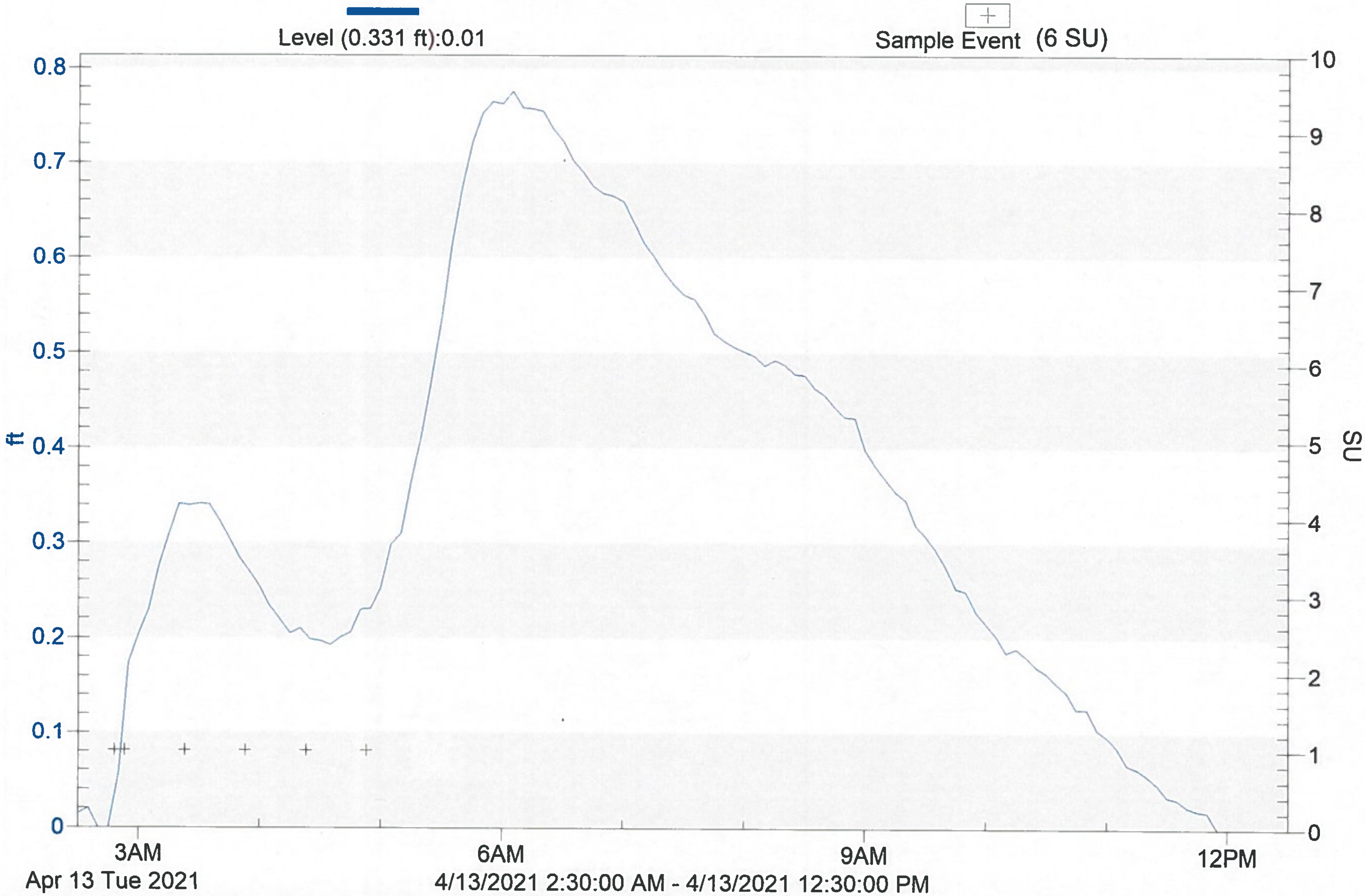
Comments: None

IR 2102
Station location description: Estelle Branch @ Rochelle Road

Comments: IR2102 was not sampled during this event.

Prepared By: E Kelly Date: 7/23/21
Checked By: Ryan Dod Date: 7/23/21

Irving Grapevine Creek
IR2101-2



Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF IRVING 2021			
Storm Event: 4/13/2021 Project Number: 100072752	**IR2101**	**IR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	364	NA	mg/L
Total Suspended Solids (TSS)	31.3	NA	mg/L
Biochemical Oxygen Demand (BOD)	6.20	NA	mg/L
Chemical Oxygen Demand (COD)	< 16.1	NA	mg/L
Total Nitrogen	0.821	NA	mg/L
Nitrate N	0.632	NA	mg/L
Ammonia N	< 0.117	NA	mg/L
Orthophosphate	< 0.0200	NA	mg/L
Phosphorus, Dissolved	0.0510	NA	mg/L
Phosphorus, Total	0.122	NA	mg/L
Atrazine	0.163	NA	µg/L
Arsenic, Total	0.00192	NA	mg/L
Chromium, Total	0.00262 J	NA	mg/L
Copper, Total	0.00605	NA	mg/L
Lead, Total	0.00120	NA	mg/L
Zinc, Total	0.0249	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.690 J	NA	mg/L
pH	9.2	NA	su
Ambient Air Temperature (field)	61	NA	°F
Water Temperature (field)	64.9	NA	°F
E. Coli	> 2419.6	NA	MPN/100 mL
Specific Conductivity	475	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100072752
City of Irving 2021

Sample Collection Report
Event Date: April 23, 2021

Storm Summary
Storm description: Heavy rain moving from southwest to northeast.

Rain event start time and date:	1349 04/23/21	Rainfall total:	0.44 in
Rain event end time and date:	1420 04/23/21	Peak 1-hr rate:	0.44 in/hr

Rainfall station: KDFW – DFW International Airport
Antecedent dry period: 170.5 hrs

Comments: Antecedent dry period determined from DFW International Airport (KDFW) from http://texmesonet.org/HistoricalData/?station=KDFW.

IR 2101
Station location description: Grapevine Creek @ North Royal Lane

Comments: Samples were previously collected for IR2101 on April 13, 2021.

IR 2102
Station location description: Estelle Branch @ Rochelle Road

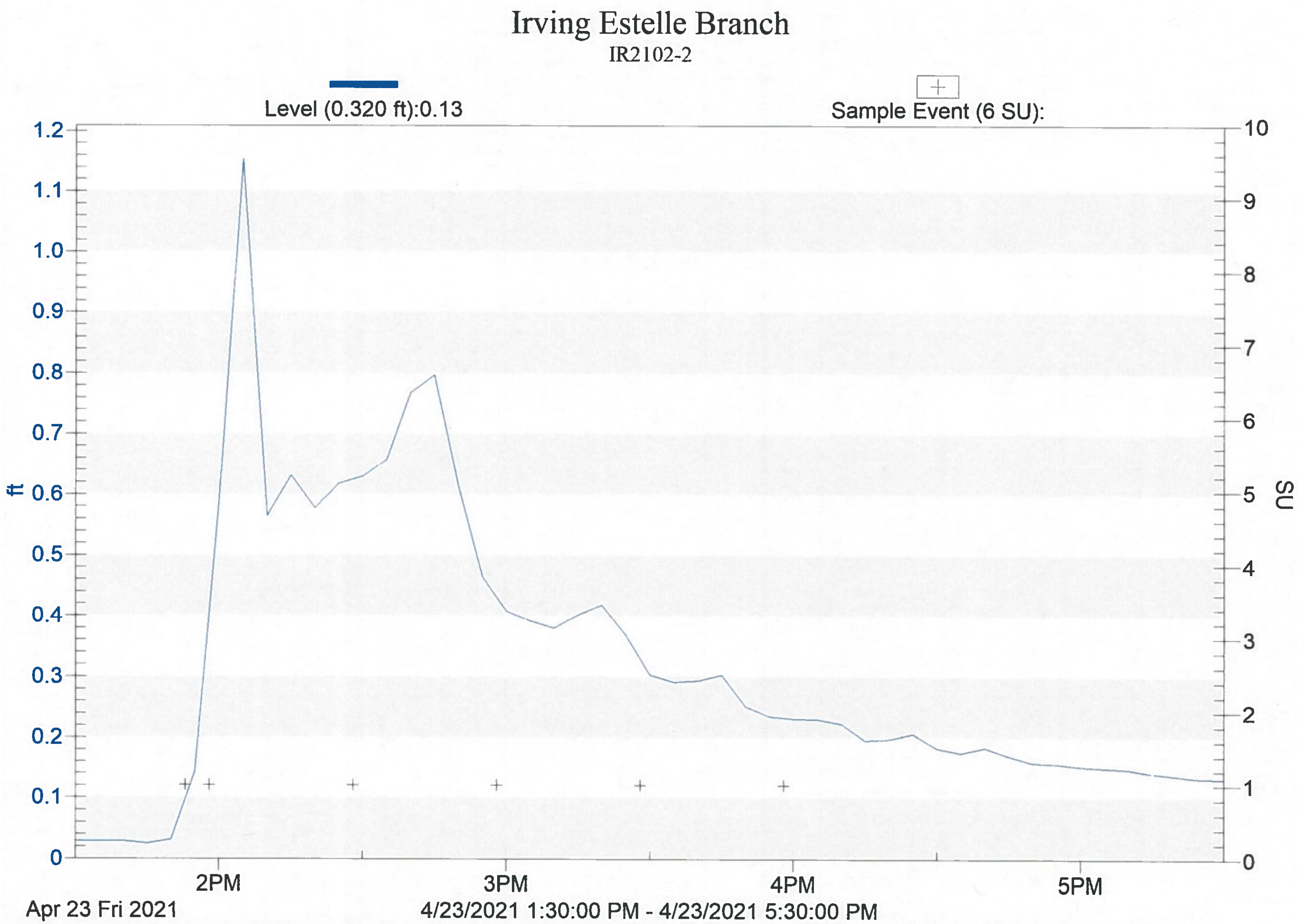
Flow start time and date:	1350 04/23/21	Time first aliquot collected:	1353 04/23/21
Flow end time and date:	1755 04/23/21	Time last aliquot collected:	1558 04/23/21

Peak depth:	1.15 ft	Aliquots collected:	6
Average depth:	0.320 ft	Total sample volume:	3.5 gal

Comments: None

Prepared By: E Kelly Date: 7/23/21

Checked By: Ryan Deal Date: 7/23/21


Irving Estelle Branch
IR2102-2
Level (0.320 ft):0.13
Sample Event (6 SU):
ft
SU
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
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3PM
4PM
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Apr 23 Fri 2021
4/23/2021 1:30:00 PM - 4/23/2021 5:30:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF IRVING 2021			
Storm Event: 4/23/2021 Project Number: 100072752	**IR2101**	**IR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	137	mg/L
Total Suspended Solids (TSS)	NA	171	mg/L
Biochemical Oxygen Demand (BOD)	NA	5.71	mg/L
Chemical Oxygen Demand (COD)	NA	53.0	mg/L
Total Nitrogen	NA	0.953	mg/L
Nitrate N	NA	0.333	mg/L
Ammonia N	NA	0.154	mg/L
Orthophosphate	NA	0.222	mg/L
Phosphorus, Dissolved	NA	0.0934	mg/L
Phosphorus, Total	NA	0.276	mg/L
Atrazine	NA	0.055	µg/L
Arsenic, Total	NA	0.00264	mg/L
Chromium, Total	NA	0.00772	mg/L
Copper, Total	NA	0.00858	mg/L
Lead, Total	NA	0.00319	mg/L
Zinc, Total	NA	0.046	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	0.400 J	mg/L
pH	NA	9.3	su
Ambient Air Temperature (field)	NA	70	°F
Water Temperature (field)	NA	67.6	°F
E. Coli	NA	687.0	MPN/100 mL
Specific Conductivity	NA	240	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF MESQUITE

Sample Collection Report
Event Date: April 23, 2021

Storm Summary

Storm description: Moderate rain formed in the southwest and moved northeast.

Rain event start time and date:	1530 04/23/21	Rainfall total:	0.41 in
Rain event end time and date:	2100 04/23/21	Peak 1-hr rate:	0.21 in/hr

Rainfall station: KTXMESQU27
Antecedent dry period: 172 hrs

Comments: The storm summary was calculated using data from the KTXMESQU27 weather station located at the Municipal Center (www.wunderground.com/weatherstation).

MS 2101

Station location description: North of New Market Road

Flow start time and date: 1720 04/23/21
Flow end time and date: 2010 04/23/21

Time first aliquot collected: 1724 04/23/21
Time last aliquot collected: 1927 04/23/21

Peak depth:	3.1 ft	Aliquots collected:	6
Average depth:	2.6 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

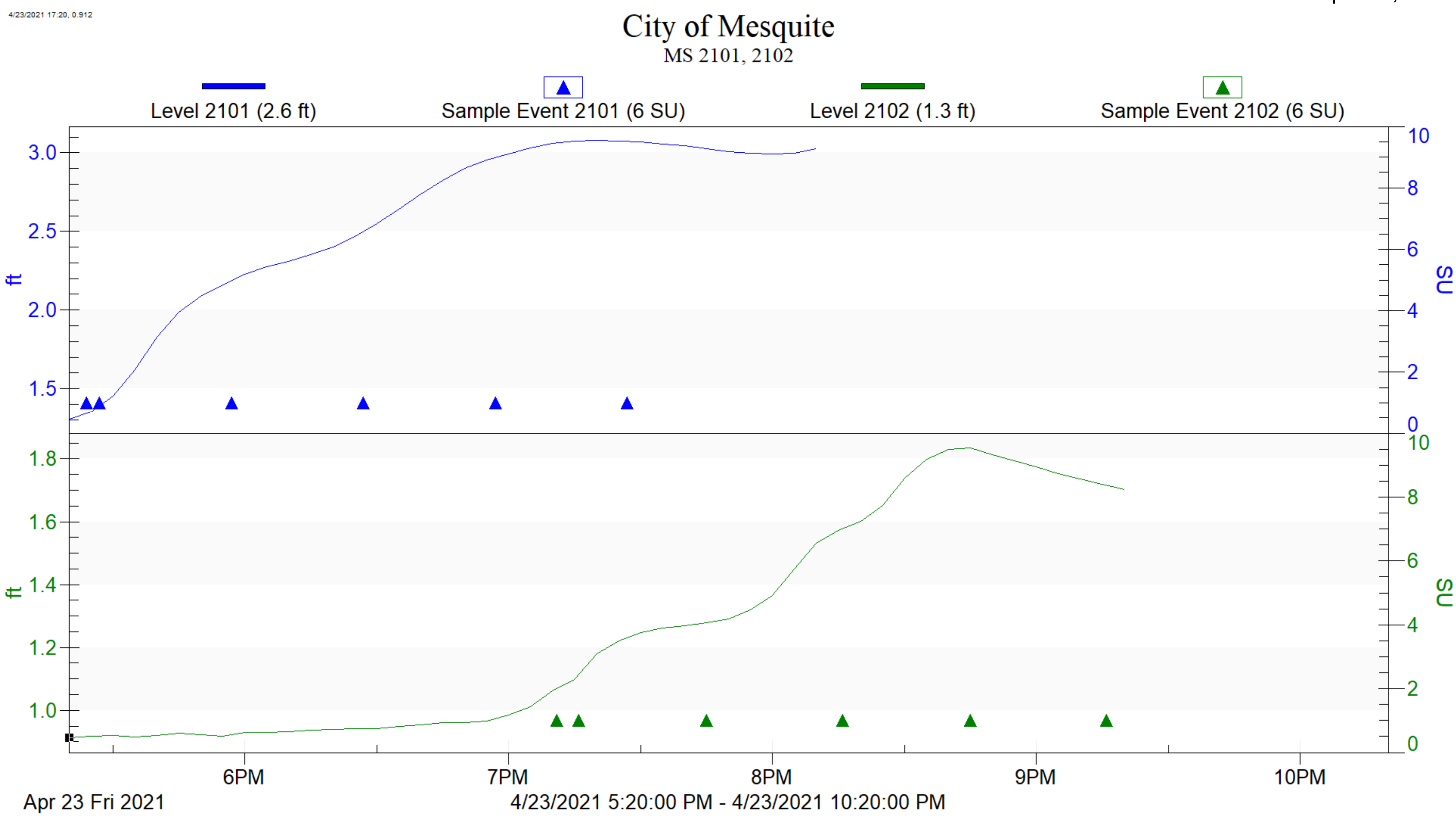
MS 2102

Station location description:	North Mesquite Creek at Edward's Church		
Flow start time and date:	1855 04/23/21		
Flow end time and date:	2120 04/23/21		
Time first aliquot collected:	1911 04/23/21		
Time last aliquot collected:	2116 04/23/21		
Peak depth:	1.8 ft	Aliquots collected:	6
Average depth:	1.5 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb   Date: June 4, 2021

Checked By: Kyle McKee   Date: June 7, 2021


4/23/2021 17:20, 0.912
City of Mesquite
MS 2101, 2102
Level 2101 (2.6 ft)
Sample Event 2101 (6 SU)
Level 2102 (1.3 ft)
Sample Event 2102 (6 SU)
ft
SU
3.0
2.5
2.0
1.5
1.8
1.6
1.4
1.2
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10
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6PM
7PM
8PM
9PM
10PM
Apr 23 Fri 2021
4/23/2021 5:20:00 PM - 4/23/2021 10:20:00 PM

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program

NCTCOG Project 100072752

CITY OF MESQUITE 2021

Storm Event: 4/23/2021 Project Number: 100072752	**MS2101**	**MS2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	365	378	mg/L
Total Suspended Solids (TSS)	23.8	22.0	mg/L
Biochemical Oxygen Demand (BOD)	3.96	35.9	mg/L
Chemical Oxygen Demand (COD)	31.5 J	113	mg/L
Total Nitrogen	0.482	1.21	mg/L
Nitrate N	0.283	0.536	mg/L
Ammonia N	0.148	<0.00336	mg/L
Orthophosphate	0.0515	0.0869	mg/L
Phosphorus, Dissolved	0.0330 J	0.0620	mg/L
Phosphorus, Total	0.0725	0.141	mg/L
Atrazine	1.36	1.52	µg/L
Arsenic, Total	0.00139	0.00262	mg/L
Chromium, Total	0.00219 J	0.00152 J	mg/L
Copper, Total	0.00399	0.00380	mg/L
Lead, Total	0.00101	0.000912	mg/L
Zinc, Total	0.0154	0.0147	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	15.2	< 0.350	mg/L
pH	8.7	7.8	su
Ambient Air Temperature (field)	66	70	°F
Water Temperature (field)	62.6	63.9	°F
E. Coli	365.0	> 2419.6	MPN/100 mL
Specific Conductivity	561	650	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
NORTH TEXAS TOLLWAY AUTHORITY

Sample Collection Report
Event Date: April 13, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	0220 04/13/21	Rainfall total:	0.18 in
Rain event end time and date:	0605 04/13/21	Peak 1-hr rate:	0.11 in/hr

Rainfall station: NTTA 2101
Antecedent dry period: 451 hrs

Comments: The antecedent dry period was calculated using data from NTTA 2101 and the DTX 7035 weather station located on Elm Fork at California Crossing (http://www.ci.dallas.tx.us/sts/html/fc.html).

NTTA 2101

Station location description: Unnamed Tributary at SH 161 N. of Gateway Dr.

Flow start time and date: 0250 04/13/21
Flow end time and date: 0610 04/13/21

Time first aliquot collected: 0337 04/13/21
Time last aliquot collected: 0540 04/13/21

Peak depth:	1.1 ft	Aliquots collected:	6
Average depth:	0.7 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	0300 04/13/21	Rainfall total:	0.11 in
Rain event end time and date:	0530 04/13/21	Peak 1-hr rate:	0.07 in/hr

Rainfall station: ATK1
Antecedent dry period: 452 hrs

Comments: The antecedent dry period was calculated using data from an Atkins rainfall station (ATK1) and the GPTX 26080 weather station located at N Cottonwood and Great Southwest Parkway (https://gptx.onerain.com/home.php).

NTTA 2102

Station location description: Cottonwood Creek at SH 161 S. of Dickey Road

Flow start time and date: 0335 04/13/21
Flow end time and date: 0745 04/13/21

Time first aliquot collected: 0510 04/13/21
Time last aliquot collected: 0713 04/13/21

Peak depth:	1.2 ft	Aliquots collected:	6
Average depth:	1.1 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

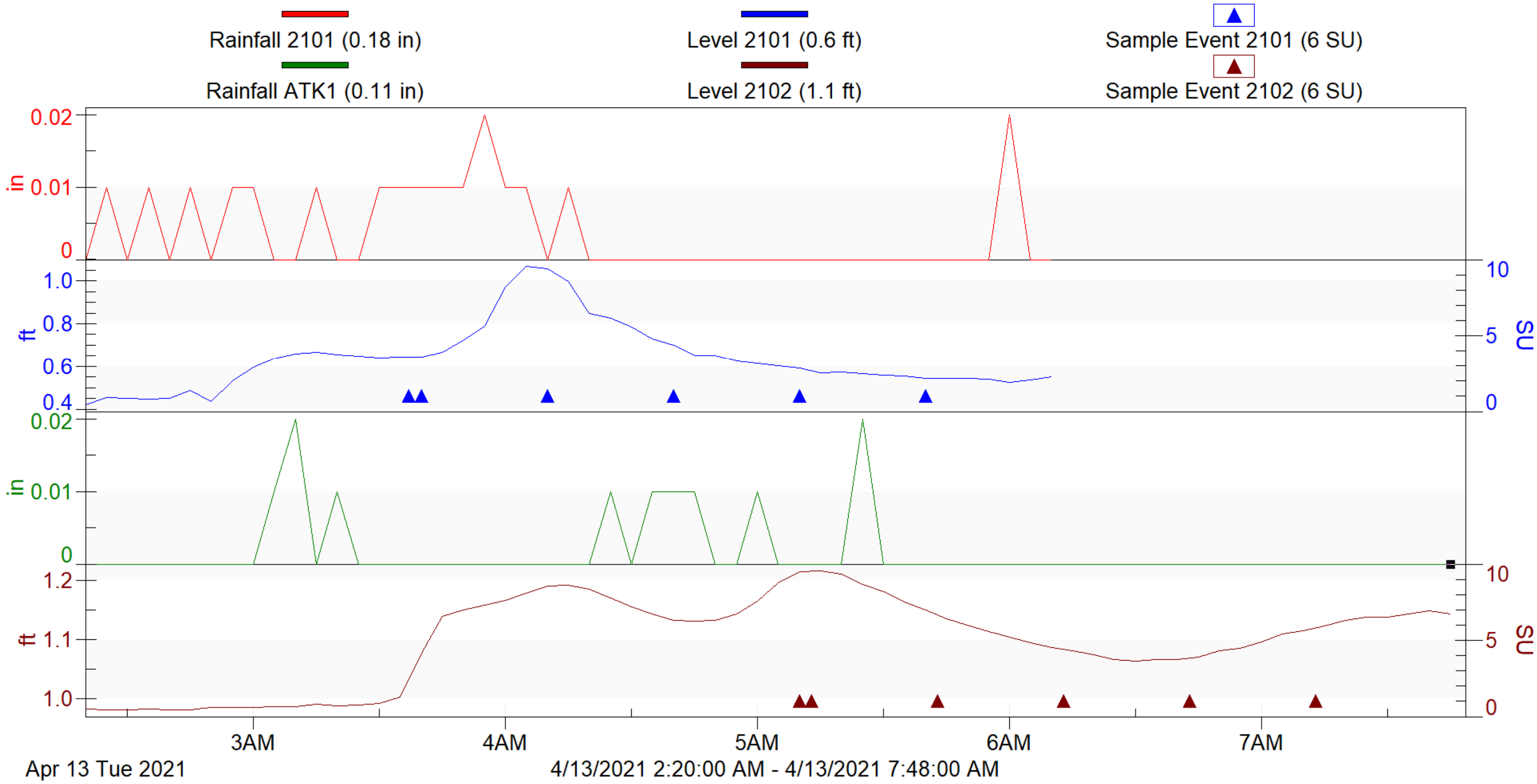
Prepared By: Adam Gottlieb Date: June 4, 2021

Checked By: Kyle McKee Date: June 7, 2021

4/13/2021 7:45, 0.000

North Texas Tollway Authority

NTTA 2101, 2102



Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

NORTH TEXAS TOLLWAY AUTHORITY 2021

Storm Event: 4/13/2021 Project Number: 100072752	**NT2101**	**NT2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	137	186	mg/L
Total Suspended Solids (TSS)	24.0	15.5	mg/L
Biochemical Oxygen Demand (BOD)	21.3	9.37	mg/L
Chemical Oxygen Demand (COD)	50.4	33.2 J	mg/L
Total Nitrogen	2.63	1.93	mg/L
Nitrate N	1.19	1.31	mg/L
Ammonia N	0.558	0.279	mg/L
Orthophosphate	0.0267 J	0.0473	mg/L
Phosphorus, Dissolved	0.233	0.653	mg/L
Phosphorus, Total	0.324	0.167	mg/L
Atrazine	0.192	0.521	µg/L
Arsenic, Total	0.00108	0.00650	mg/L
Chromium, Total	0.00308	0.00431	mg/L
Copper, Total	0.0139	0.00719	mg/L
Lead, Total	0.00123	0.00102	mg/L
Zinc, Total	0.0648	0.0329	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.780 J	< 0.350	mg/L
pH	8.4	8.0	su
Ambient Air Temperature (field)	58	58	°F
Water Temperature (field)	62.7	64.4	°F
E. Coli	816	1300	MPN/100 mL
Specific Conductivity	227	350	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF PLANO

Sample Collection Report
Event Date: April 23, 2021

Storm Summary

Storm description: Moderate rain formed in the southwest and moved northeast.

Rain event start time and date:	1409 04/23/21	Rainfall total:	0.68 in
Rain event end time and date:	1449 04/23/21	Peak 1-hr rate:	0.68 in/hr

Rainfall station: KTXPLANO563
Antecedent dry period: 170 hrs

Comments: The storm summary was calculated using data from the KTXPLANO563 weather station located in Alma/Hedgecoxe, Plano (www.wunderground.com/weatherstation).

PL 2101

Station location description: Rowlett Creek at Alma Drive

Flow start time and date: 1425 04/23/21
Flow end time and date: 1635 04/23/21

Time first aliquot collected: 1427 04/23/21
Time last aliquot collected: 1631 04/23/21

Peak depth:	4.3 ft	Aliquots collected:	6
Average depth:	3.2 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

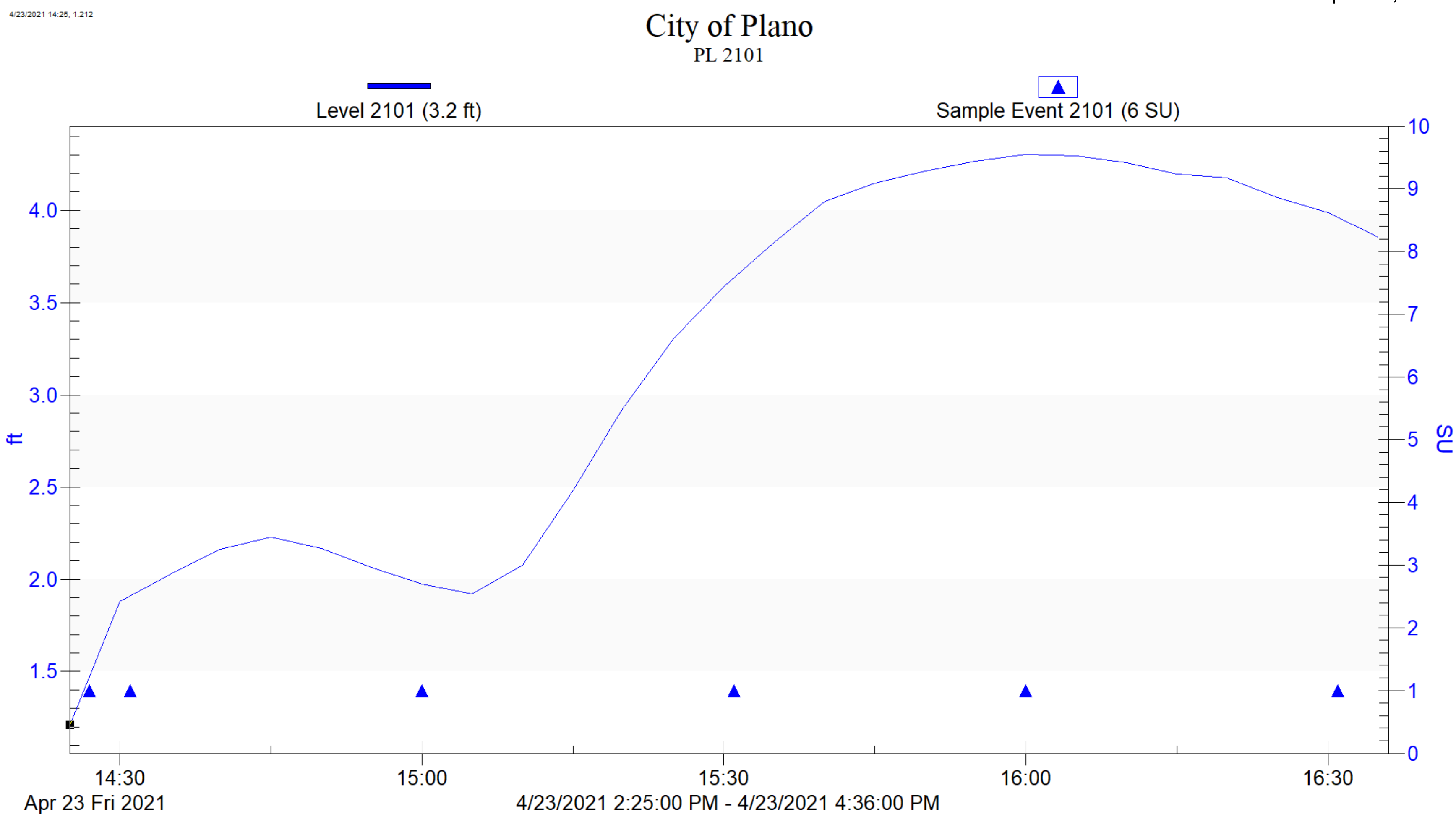
PL 2102

Station location description: Rowlett Creek in Oak Point Park

Comments: A successful sample was collected on April 13, 2021

Prepared By: Adam Gottlieb Date: June 4, 2021

Checked By: Kyle McKee Date: June 7, 2021


4/23/2021 14:25, 1.212
City of Plano
PL 2101
Level 2101 (3.2 ft)
Sample Event 2101 (6 SU)
ft
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3.0
2.5
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1.5
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14:30
Apr 23 Fri 2021
15:00
15:30
16:00
16:30
4/23/2021 2:25:00 PM - 4/23/2021 4:36:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF PLANO 2021

Storm Event: 4/23/2021 Project Number: 100072752	**PL2101**	**PL2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	254	NA	mg/L
Total Suspended Solids (TSS)	78.4	NA	mg/L
Biochemical Oxygen Demand (BOD)	5.38	NA	mg/L
Chemical Oxygen Demand (COD)	31.5 J	NA	mg/L
Total Nitrogen	1.28	NA	mg/L
Nitrate N	0.674	NA	mg/L
Ammonia N	0.144	NA	mg/L
Orthophosphate	0.129	NA	mg/L
Phosphorus, Dissolved	0.0388 J	NA	mg/L
Phosphorus, Total	0.161	NA	mg/L
Atrazine	0.517	NA	µg/L
Arsenic, Total	0.00217	NA	mg/L
Chromium, Total	0.00512	NA	mg/L
Copper, Total	0.00733	NA	mg/L
Lead, Total	0.00211	NA	mg/L
Zinc, Total	0.0274	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	10.3	NA	mg/L
pH	7.98	NA	su
Ambient Air Temperature (field)	65	NA	°F
Water Temperature (field)	63.5	NA	°F
E. Coli	> 2419.6	NA	MPN/100 mL
Specific Conductivity	482	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF PLANO

Sample Collection Report
Event Date: April 13, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	0239 04/13/21	Rainfall total:	0.23 in
Rain event end time and date:	0414 04/13/21	Peak 1-hr rate:	0.19 in/hr

Rainfall station:	KTXPLANO563
Antecedent dry period:	316 hrs

Comments: The storm summary was calculated using data from the KTXPLANO563 weather station located in Alma/Hedgecoxe, Plano (www.wunderground.com/weatherstation).

PL 2101

Station location description: Rowlett Creek at Alma Drive

Comments: The automatic sampler did not trigger during the event.

PL 2102

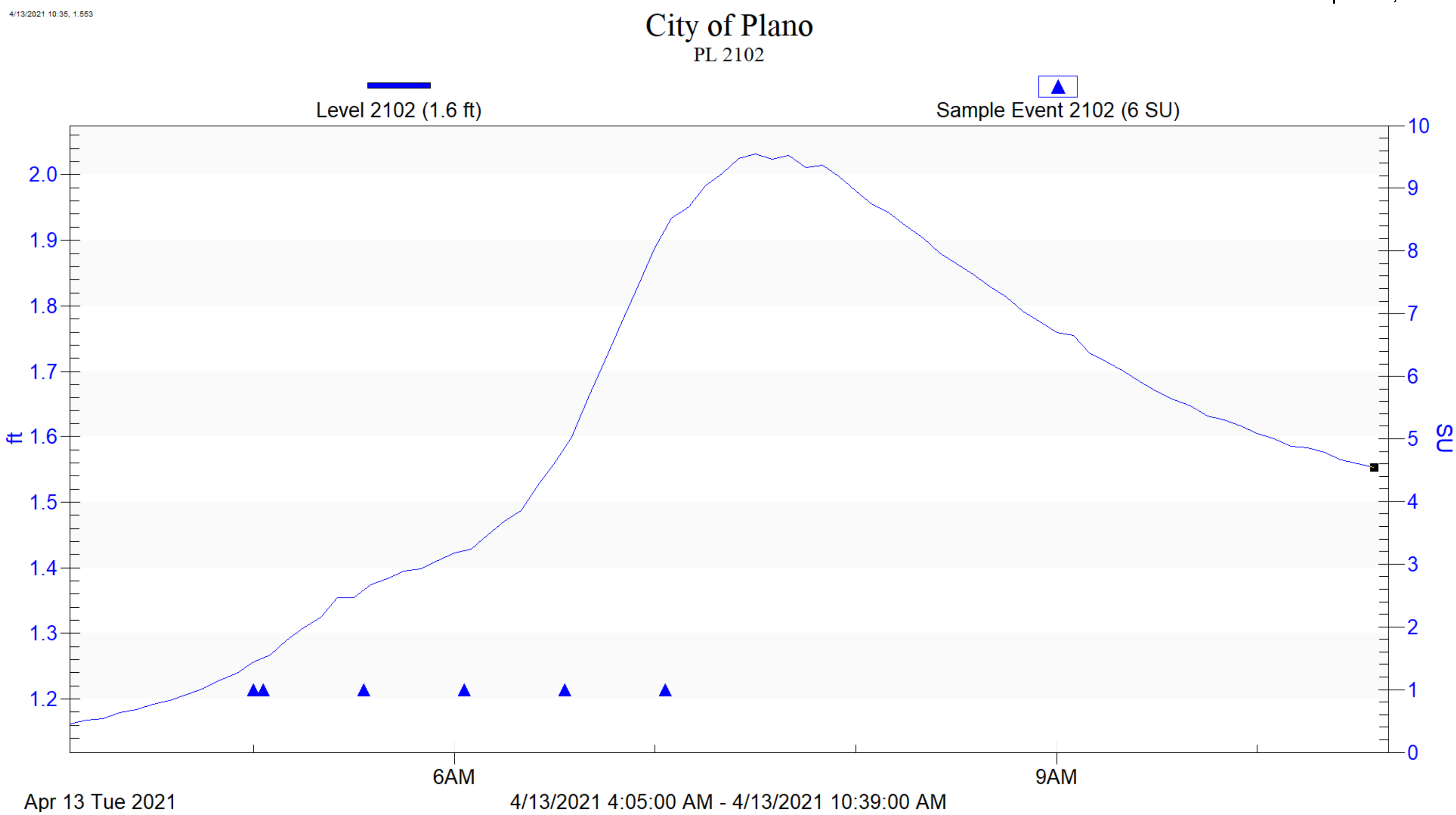
Station location description:	Rowlett Creek in Oak Point Park		
Flow start time and date:	0405 04/13/21		
Flow end time and date:	1035 04/13/21		
Time first aliquot collected:	0500 04/13/21		
Time last aliquot collected:	0703 04/13/21		
Peak depth:	2.0 ft	Aliquots collected:	6
Average depth:	1.6 ft	Total sample volume:	3.5 gal

Comments: : Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb Date: June 4, 2021

Checked By: Kyle McKee Date: June 7, 2021

4/13/2021 10:35, 1.553



Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF PLANO 2021			
Storm Event: 4/23/2021 Project Number: 100072752	**PL2101**	**PL2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	452	mg/L
Total Suspended Solids (TSS)	NA	4.86	mg/L
Biochemical Oxygen Demand (BOD)	NA	4.23	mg/L
Chemical Oxygen Demand (COD)	NA	< 16.1	mg/L
Total Nitrogen	NA	0.518	mg/L
Nitrate N	NA	0.518	mg/L
Ammonia N	NA	< 0.117	mg/L
Orthophosphate	NA	< 0.0200	mg/L
Phosphorus, Dissolved	NA	0.0231 J	mg/L
Phosphorus, Total	NA	< 0.0152	mg/L
Atrazine	NA	0.127	µg/L
Arsenic, Total	NA	0.000960	mg/L
Chromium, Total	NA	< 0.000510	mg/L
Copper, Total	NA	0.00164 J	mg/L
Lead, Total	NA	< 0.000140	mg/L
Zinc, Total	NA	< 0.00265	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	< 0.350	mg/L
pH	NA	8.08	su
Ambient Air Temperature (field)	NA	55	°F
Water Temperature (field)	NA	62.7	°F
E. Coli	NA	1050	MPN/100 mL
Specific Conductivity	NA	915	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100072752
City of Arlington 2021

Sample Collection Report
Event Date: July 11, 2021

Storm Summary
Storm description: Heavy rain moving from northwest to southeast.

AR 2101
Station location description: Rush Creek @ West Sublett Road

Comments: AR2101 was not sampled during this event.

AR 2102
Station location description: Rush Creek @ Woodland Park Blvd.

Rain event start time and date: 0445 07/11/21 Rainfall total: 0.40 in
Rain event end time and date: 0610 07/11/21 Peak 1-hr rate: 0.36 in/hr

Rainfall station: Rush Creek @ Woodland Park (6610)
Antecedent dry period: 106 hrs

Comments: Storm summary determined by Rush Creek @ Woodland Park (6610) from https://gptx.onerain.com/map/?view=24ffe2cd-8893-4c38-9337-a29860a31ed2#.

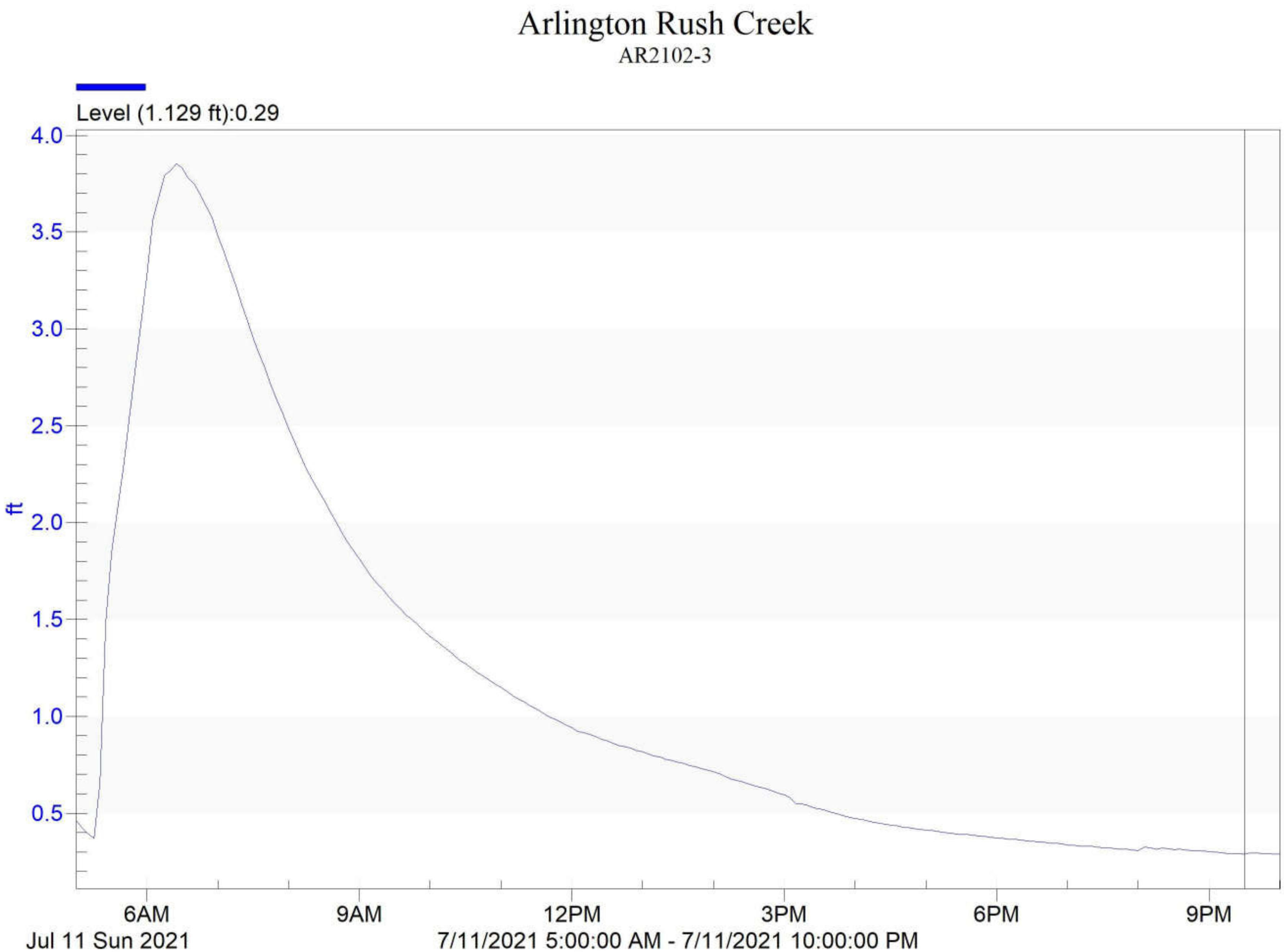
Flow start time and date: 0505 07/11/21 Time first aliquot collected: 0507 07/11/21
Flow end time and date: 2130 07/11/21 Time last aliquot collected: 0713 07/11/21

Peak depth: 3.853 ft Aliquots collected: 6
Average depth: 1.129 ft Total sample volume: 3.5 gal

Comments: During data collection, the sample event data was unable to be retrieved. Stream level date was recovered and is included in this report.

Prepared By: Alyxes Martinez Digitally signed by Alyxes Martinez DN: C=US, E=alyxes.martinez@freese.com, O="Freese and Nichols, Inc. ", OU=1170 Environmental Science, CN=Alyxes Martinez Reason: I agree to the terms defined by the placement of my signature on this document Date: 2021.11.30 10:32:35-06'00' Date: 11-30-2021

Checked By: Ryan Deal Digitally signed by Ryan Deal Date: 2021.11.30 10:33:49-06'00' Date: 11-30-2021



Arlington Rush Creek
AR2102-3
Level (1.129 ft):0.29
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
ft
6AM
9AM
12PM
3PM
6PM
9PM
Jul 11 Sun 2021
7/11/2021 5:00:00 AM - 7/11/2021 10:00:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF ARLINGTON 2021

Storm Event: 7/11/2021 Project Number: 100072752	**AR2101**	**AR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	313	mg/L
Total Suspended Solids (TSS)	NA	97.0	mg/L
Biochemical Oxygen Demand (BOD)	NA	6.08 B1	mg/L
Chemical Oxygen Demand (COD)	NA	39.6	mg/L
Total Nitrogen	NA	1.11	mg/L
Nitrate N	NA	0.306	mg/L
Ammonia N	NA	0.0592 J	mg/L
Orthophosphate	NA	< 0.0200	mg/L
Phosphorus, Dissolved	NA	0.0395 J	mg/L
Phosphorus, Total	NA	0.159	mg/L
Atrazine	NA	0.134	µg/L
Arsenic, Total	NA	0.00231	mg/L
Chromium, Total	NA	0.00334	mg/L
Copper, Total	NA	0.00529	mg/L
Lead, Total	NA	0.00254	mg/L
Zinc, Total	NA	0.0222	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	< 0.350	mg/L
pH	NA	8.2	su
Ambient Air Temperature (field)	NA	73	°F
Water Temperature (field)	NA	81.4	°F
E. Coli	NA	517.0	MPN/100 mL
Specific Conductivity	NA	813	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100072752
City of Arlington 2021

Sample Collection Report
Event Date: August 1, 2021

Storm Summary

Storm description: Heavy rain nearly stationary, with slight motion toward the south.

Rain event start time and date: 1600 08/01/21 Rainfall total: 2.84 in
Rain event end time and date: 2235 08/01/21 Peak 1-hr rate: 2.56 in/hr

Rainfall station: Rush Creek @ West Sublett Road (6650)
Antecedent dry period: 513.5 hrs

Comments: Storm summary determined by Rush Creek @ West Sublett Road (6550) from https://gptx.onerain.com/map/?view=24ffe2cd-8893-4c38-9337-a29860a31ed2#.

AR 2101

Station location description: Rush Creek @ West Sublett Road

Flow start time and date: 1605 08/01/21 Time first aliquot collected: 1617 08/01/21
Flow end time and date: 0255 08/02/21 Time last aliquot collected: 1828 08/01/21

Peak depth: 5.672 ft Aliquots collected: 6
Average depth: 1.471 ft Total sample volume: 3.5 gal

Comments: None

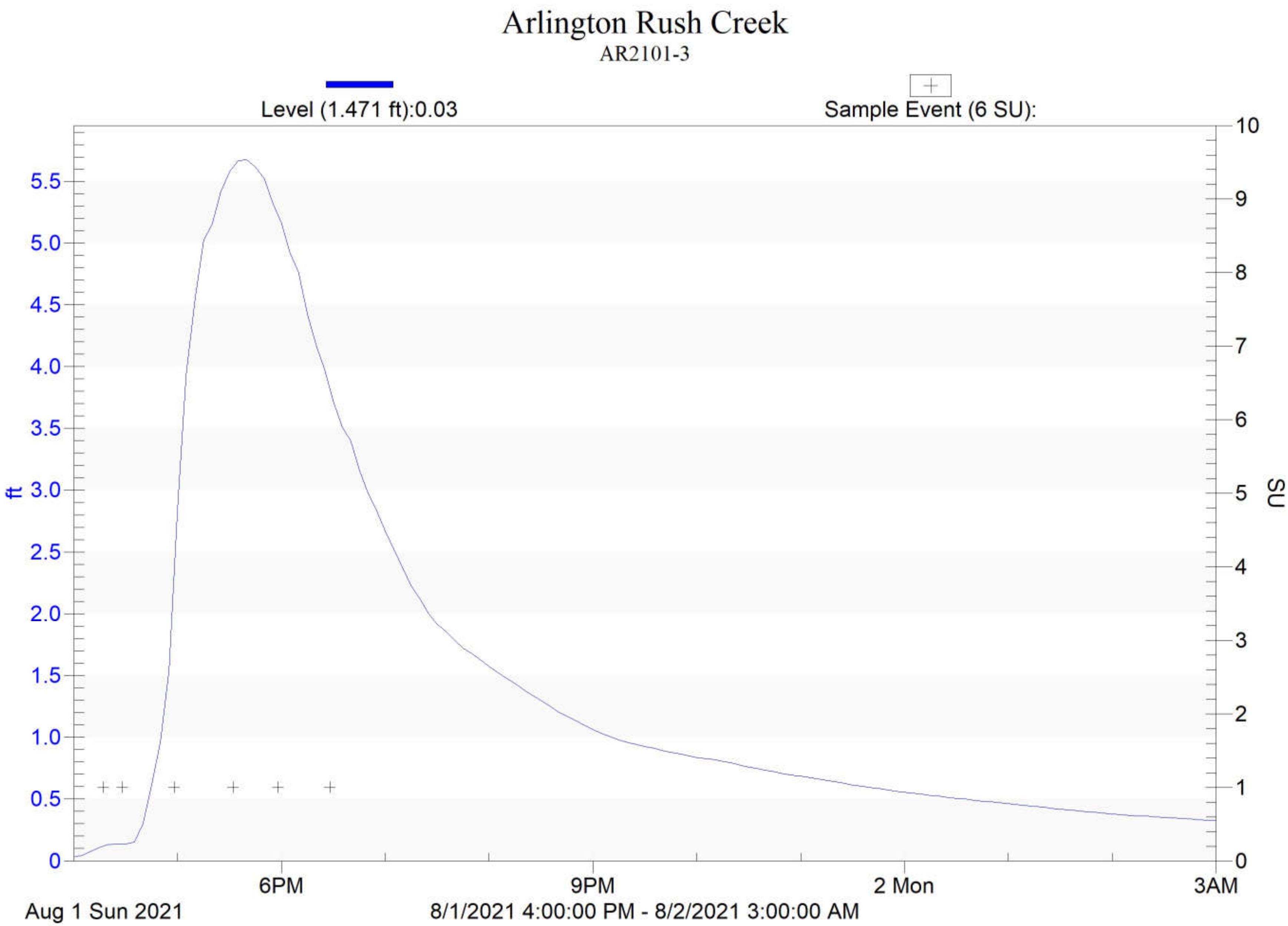
AR 2102

Station location description: Rush Creek @ Woodland Park Blvd.

Comments: AR2102 was previously sampled on July 11, 2021.

Prepared By: Alyxes Martinez Digitally signed by Alyxes Martinez
DN: C=US, E=alyxes.martinez@freese.com, O="Freese and Nichols, Inc. ", OU=1170 Environmental Science, CN=Alyxes Martinez
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2021.11.08 14:56:55-06'00' Date: 11-8-2021

Checked By: Ryan Deal Digitally signed by Ryan Deal
Date: 2021.11.09 09:04:17-06'00' Date: 11-8-2021



Arlington Rush Creek
AR2101-3
Level (1.471 ft):0.03
Sample Event (6 SU):
ft
SU
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
9
8
7
6
5
4
3
2
1
0
6PM
9PM
2 Mon
3AM
Aug 1 Sun 2021
8/1/2021 4:00:00 PM - 8/2/2021 3:00:00 AM

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF ARLINGTON 2021

Storm Event: 8/1/2021 Project Number: 100072752	**AR2101**	**AR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	160	NA	mg/L
Total Suspended Solids (TSS)	85.4	NA	mg/L
Biochemical Oxygen Demand (BOD)	12.2 B	NA	mg/L
Chemical Oxygen Demand (COD)	51.3	NA	mg/L
Total Nitrogen	1.68	NA	mg/L
Nitrate N	0.413	NA	mg/L
Ammonia N	0.0877 J	NA	mg/L
Orthophosphate	0.0720	NA	mg/L
Phosphorus, Dissolved	0.100	NA	mg/L
Phosphorus, Total	0.238	NA	mg/L
Atrazine	< 0.100	NA	µg/L
Arsenic, Total	0.00259	NA	mg/L
Chromium, Total	0.00478	NA	mg/L
Copper, Total	0.00799	NA	mg/L
Lead, Total	0.00270	NA	mg/L
Zinc, Total	0.0306	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	1.90 J	NA	mg/L
pH	8.9	NA	su
Ambient Air Temperature (field)	76	NA	°F
Water Temperature (field)	90	NA	°F
E. Coli	> 2419.6	NA	MPN/100 mL
Specific Conductivity	477	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF GARLAND

Sample Collection Report
Event Date: July 11, 2021

Storm Summary

Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	0330 07/11/21	Rainfall total:	0.48 in
Rain event end time and date:	0550 07/11/21	Peak 1-hr rate:	0.40 in/hr

Rainfall station: GA 2102
Antecedent dry period: 207 hrs

Comments: The storm summary was calculated using a combination of data from GA 2102 and the KTXROWLE114 weather station located at the Columbus Drive, Rowlett (www.wunderground.com/weatherstation).

GA 2101

Station location description: Rowlett Creek at Ben Davis Bridge

Flow start time and date: 0505 07/11/21
Flow end time and date: 0730 07/11/21

Time first aliquot collected: 0507 07/11/21
Time last aliquot collected: 0710 07/11/21

Peak depth:	4.9 ft	Aliquots collected:	6
Average depth:	2.7 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

GA 2102

Station location description: Rowlett Creek at Centerville Road/Castle Drive

Comments: The automatic sampler distributor arm because jammed during the event.

GA 2103

Station location description: Rowlett Creek at Highway 66

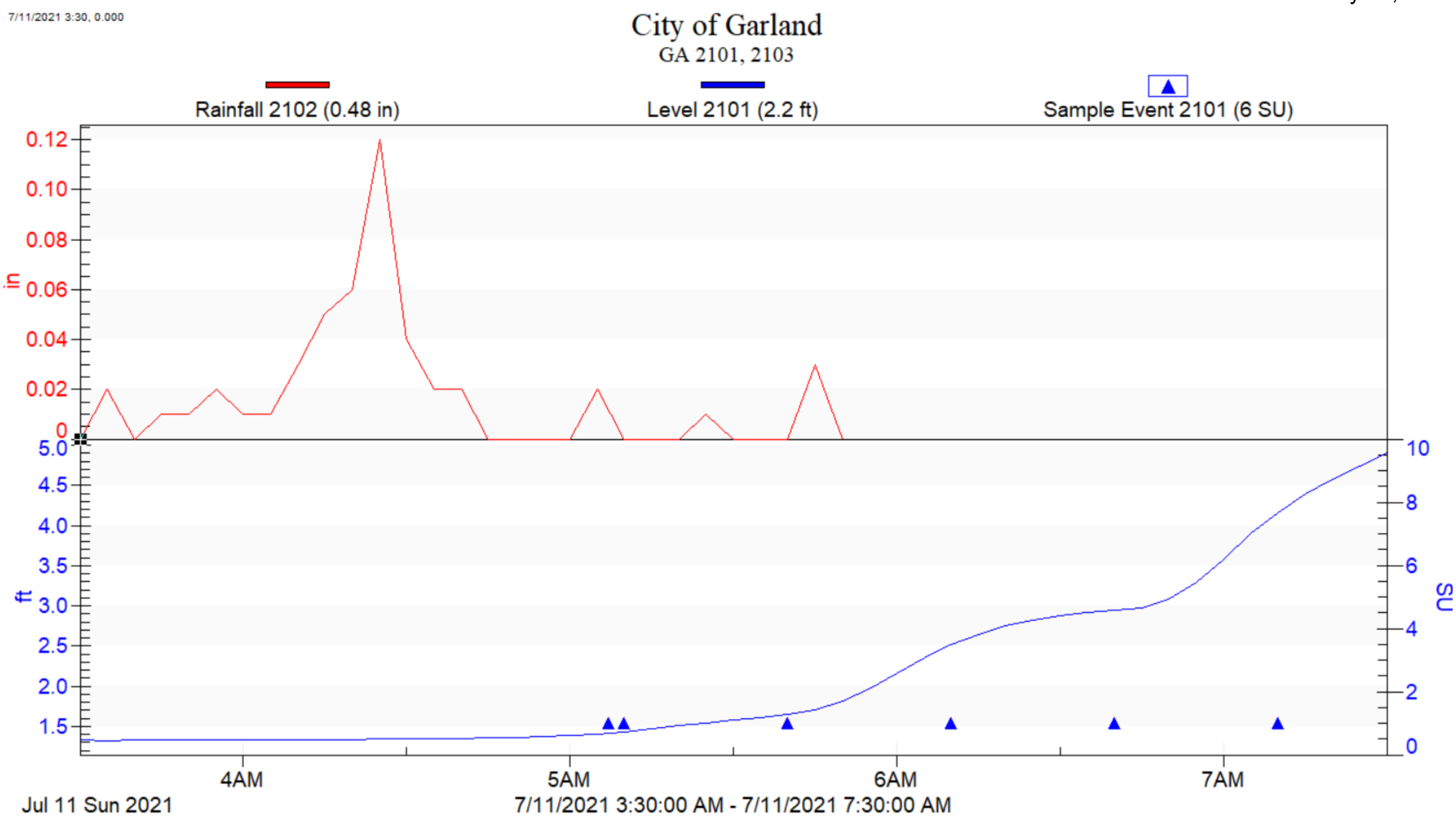
Flow start time and date:	0406 07/11/21
Flow end time and date:	Unknown
Time first aliquot collected:	0406 07/11/21
Time last aliquot collected:	0608 07/11/21

Peak depth:	2.5 ft (est.)	Aliquots collected:	6
Average depth:	Unknown	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are unknown due to a bubbler that was clogged during the event.

Prepared By: Adam Gottlieb Date: October 5, 2021

Checked By: Kyle McKee Date: October 11, 2021


7/11/2021 3:30, 0.000
City of Garland
GA 2101, 2103
Rainfall 2102 (0.48 in)
Level 2101 (2.2 ft)
Sample Event 2101 (6 SU)
in
0.12
0.10
0.08
0.06
0.04
0.02
0
ft
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
SU
10
8
6
4
2
0
4AM
5AM
6AM
7AM
Jul 11 Sun 2021
7/11/2021 3:30:00 AM - 7/11/2021 7:30:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752
CITY OF GARLAND 2021

Storm Event: 7/11/2021 Project Number: 100072752	GA2101	GA2102	GA2103	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	411	NA	411	mg/L
Total Suspended Solids (TSS)	41.3	NA	63.3	mg/L
Biochemical Oxygen Demand (BOD)	3.96 B1, K9	NA	3.91 B1, K9	mg/L
Chemical Oxygen Demand (COD)	24.7 J	NA	33.2 J	mg/L
Total Nitrogen	4.73	NA	5.74	mg/L
Nitrate N	3.82	NA	4.66	mg/L
Ammonia N	0.106	NA	< 0.0280	mg/L
Orthophosphate	0.0224 J	NA	< 0.0200	mg/L
Phosphorus, Dissolved	0.0750	NA	0.0659	mg/L
Phosphorus, Total	0.0877	NA	0.101	mg/L
Atrazine	0.088 J	NA	0.088 J	µg/L
Arsenic, Total	0.00217	NA	0.00188	mg/L
Chromium, Total	0.00182 J	NA	0.00316	mg/L
Copper, Total	0.00197 J	NA	0.00283	mg/L
Lead, Total	0.000689	NA	0.00124	mg/L
Zinc, Total	0.0286	NA	0.0130	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	1.10 J	NA	0.600 J	mg/L
pH	7.5	NA	7.82	su
Ambient Air Temperature (field)	70	NA	70	°F
Water Temperature (field)	77.3	NA	78.3	°F
E. Coli	1050	NA	579	MPN/100 mL
Specific Conductivity	691	NA	813	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L
K9 - Test replicates show more than 30% difference between high and low values

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF GARLAND

Sample Collection Report
Event Date: July 19, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	1010 07/19/21	Rainfall total:	0.82 in
Rain event end time and date:	1145 07/19/21	Peak 1-hr rate:	0.79 in/hr

Rainfall station: GA 2102
Antecedent dry period: 196 hrs

Comments: None

GA 2101

Station location description: Rowlett Creek at Ben Davis Bridge

Comments: A successful sample was collected on July 11, 2021.

GA 2102

Station location description: Rowlett Creek at Centerville Road/Castle Drive

Flow start time and date: 1030 07/19/21
Flow end time and date: 1245 07/19/21

Time first aliquot collected: 1037 07/19/21
Time last aliquot collected: 1238 07/19/21

Peak depth:	2.9 ft	Aliquots collected:	6
Average depth:	2.5 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities. Aliquots were collected manually.

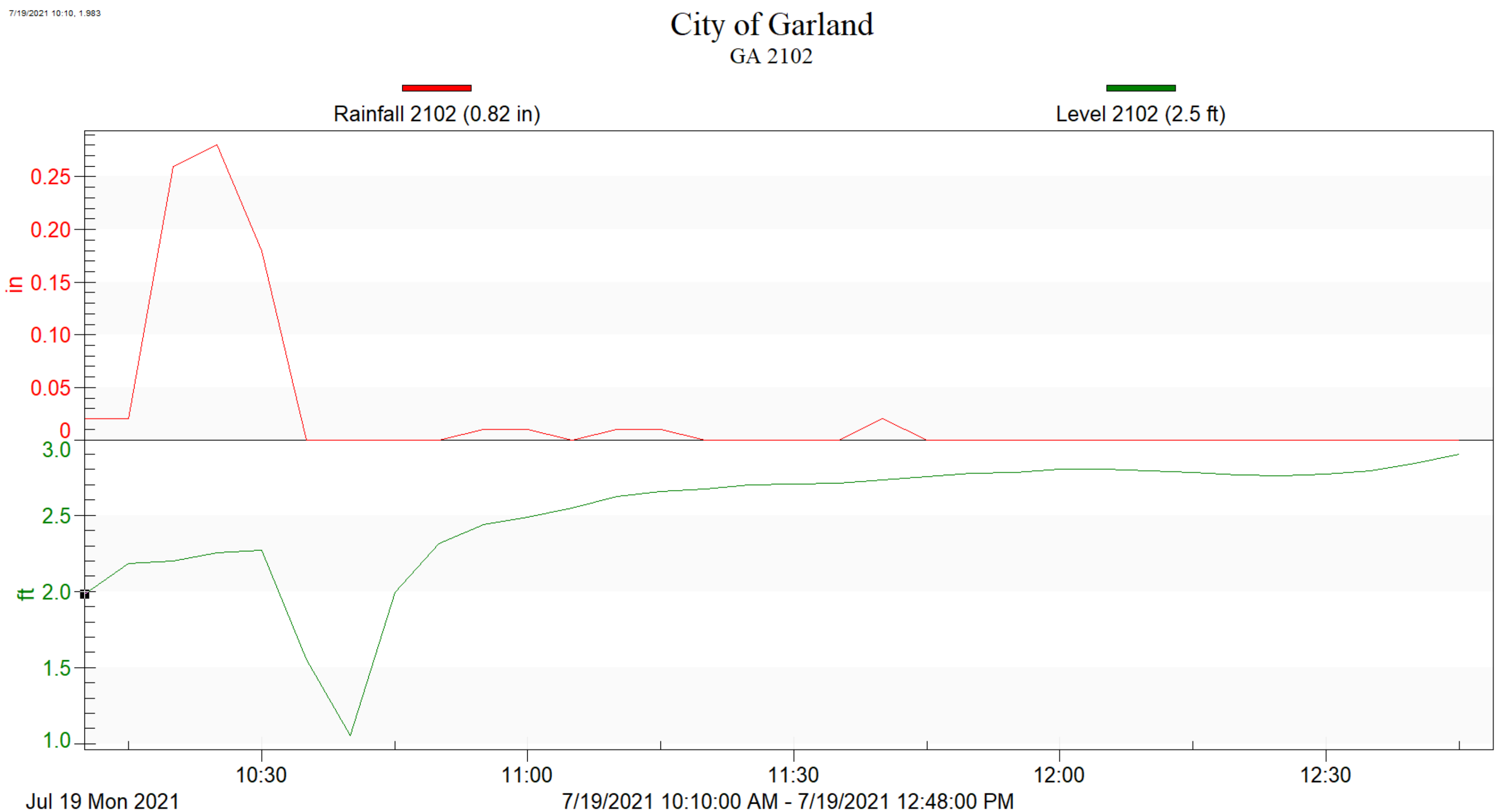
GA 2103

Station location description: Rowlett Creek at Highway 66

Comments: A successful sample was collected on July 11, 2021.

Prepared By: Adam Gottlieb Date: October 5, 2021

Checked By: Kyle McKee Date: October 11, 2021


7/19/2021 10:10, 1.983
City of Garland
GA 2102
Rainfall 2102 (0.82 in)
Level 2102 (2.5 ft)
in
0.25
0.20
0.15
0.10
0.05
0
ft
3.0
2.5
2.0
1.5
1.0
10:30
11:00
11:30
12:00
12:30
Jul 19 Mon 2021
7/19/2021 10:10:00 AM - 7/19/2021 12:48:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF GARLAND 2021				
Storm Event: 7/19/2021 Project Number: 100072752	**GA2101**	**GA2102**	**GA2103**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	50.0	NA	mg/L
Total Suspended Solids (TSS)	NA	74.0 Q	NA	mg/L
Biochemical Oxygen Demand (BOD)	NA	5.16 B, K9	NA	mg/L
Chemical Oxygen Demand (COD)	NA	21.9 J	NA	mg/L
Total Nitrogen	NA	1.82	NA	mg/L
Nitrate N	NA	1.07	NA	mg/L
Ammonia N	NA	0.116	NA	mg/L
Orthophosphate	NA	< 0.0200	NA	mg/L
Phosphorus, Dissolved	NA	0.0360 J	NA	mg/L
Phosphorus, Total	NA	0.127	NA	mg/L
Atrazine	NA	< 0.100	NA	µg/L
Arsenic, Total	NA	0.00213	NA	mg/L
Chromium, Total	NA	0.00284 J	NA	mg/L
Copper, Total	NA	0.00300	NA	mg/L
Lead, Total	NA	0.00134	NA	mg/L
Zinc, Total	NA	0.0107	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	2.30 J	NA	mg/L
pH	NA	7.84	NA	su
Ambient Air Temperature (field)	NA	75	NA	°F
Water Temperature (field)	NA	79.3	NA	°F
E. Coli	NA	1410	NA	MPN/100 mL
Specific Conductivity	NA	476	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank
K9 - Test replicates show more than 30% difference between high and low values
Q - Sample was prepared and/or analyzed past holding time as defined in the method. Concentrations should be considered minimum values

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100072752
City of Irving 2021

Sample Collection Report
Event Date: July 11, 2021

Storm Summary
Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	0350 07/11/21	Rainfall total:	0.53 in
Rain event end time and date:	0815 07/11/21	Peak 1-hr rate:	0.46 in/hr

Rainfall station: Grapevine Fire Station 1 – KTXGRAPE129
Antecedent dry period: 103 hrs

Comments: Antecedent dry period determined from Grapevine Fire Station 1 – KTXGRAPE129 from https://www.wunderground.com/dashboard/pws/KTXGRAPE129.

IR 2101
Station location description: Grapevine Creek @ North Royal Lane

Flow start time and date:	0415 07/11/21	Time first aliquot collected:	0415 07/11/21
Flow end time and date:	1050 07/11/21	Time last aliquot collected:	0619 07/11/21

Peak depth:	0.82 ft	Aliquots collected:	6
Average depth:	0.369 ft	Total sample volume:	3.5 gal

IR 2102
Station location description: Estelle Branch @ Rochelle Road

Flow start time and date:	0350 07/11/21	Time first aliquot collected:	0407 07/11/21
Flow end time and date:	1120 07/11/21	Time last aliquot collected:	0613 07/11/21

Peak depth:	0.56 ft	Aliquots collected:	6
Average depth:	0.137 ft	Total sample volume:	3.5 gal

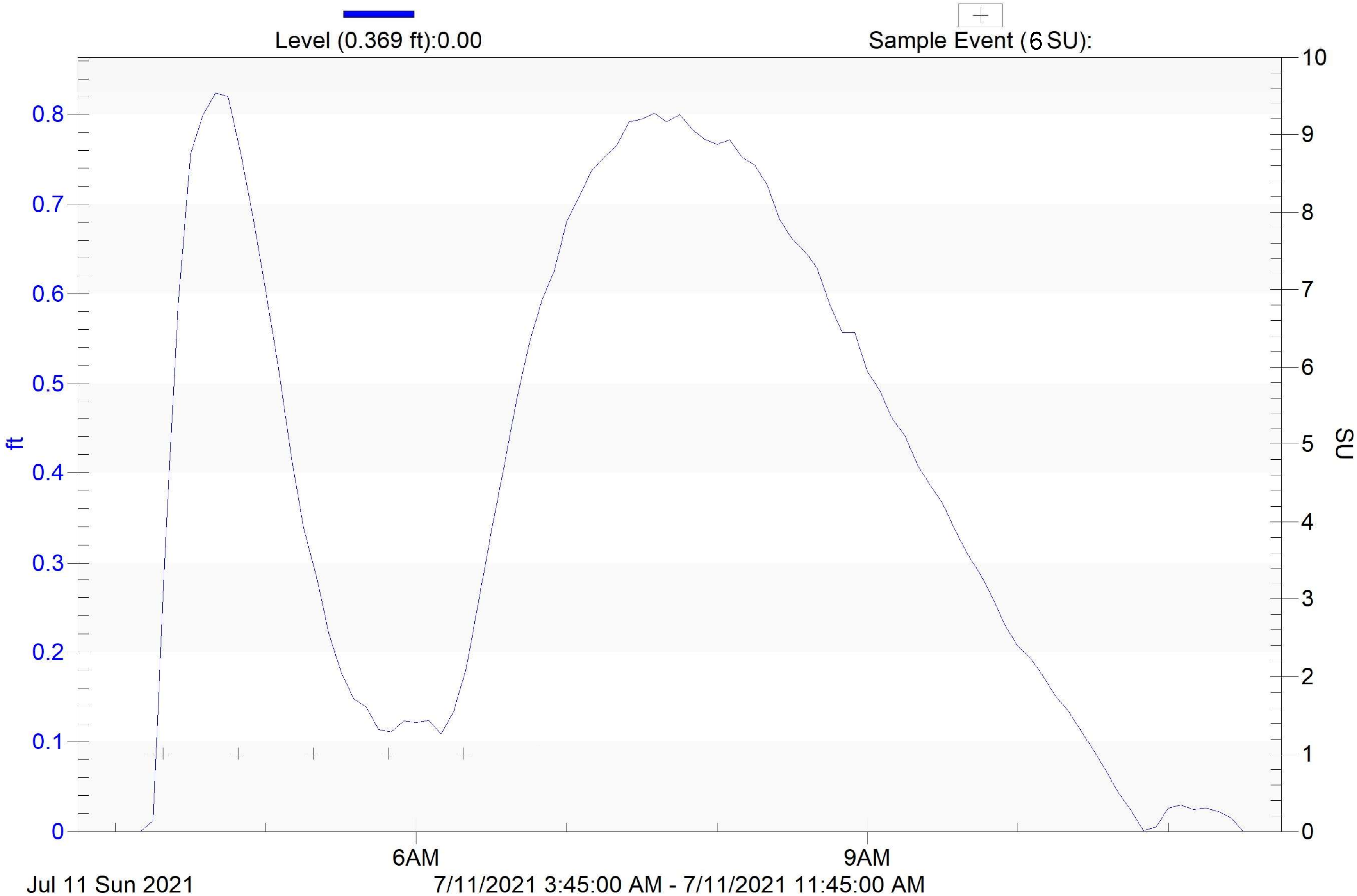
Comments: None

Prepared By: Alyssa Martin Date: 9/30/2021

Checked By: Ryan Deal Digitally signed by Ryan Deal Date: 2021.09.30 14:11:32-05'00' Date: 09/30/21

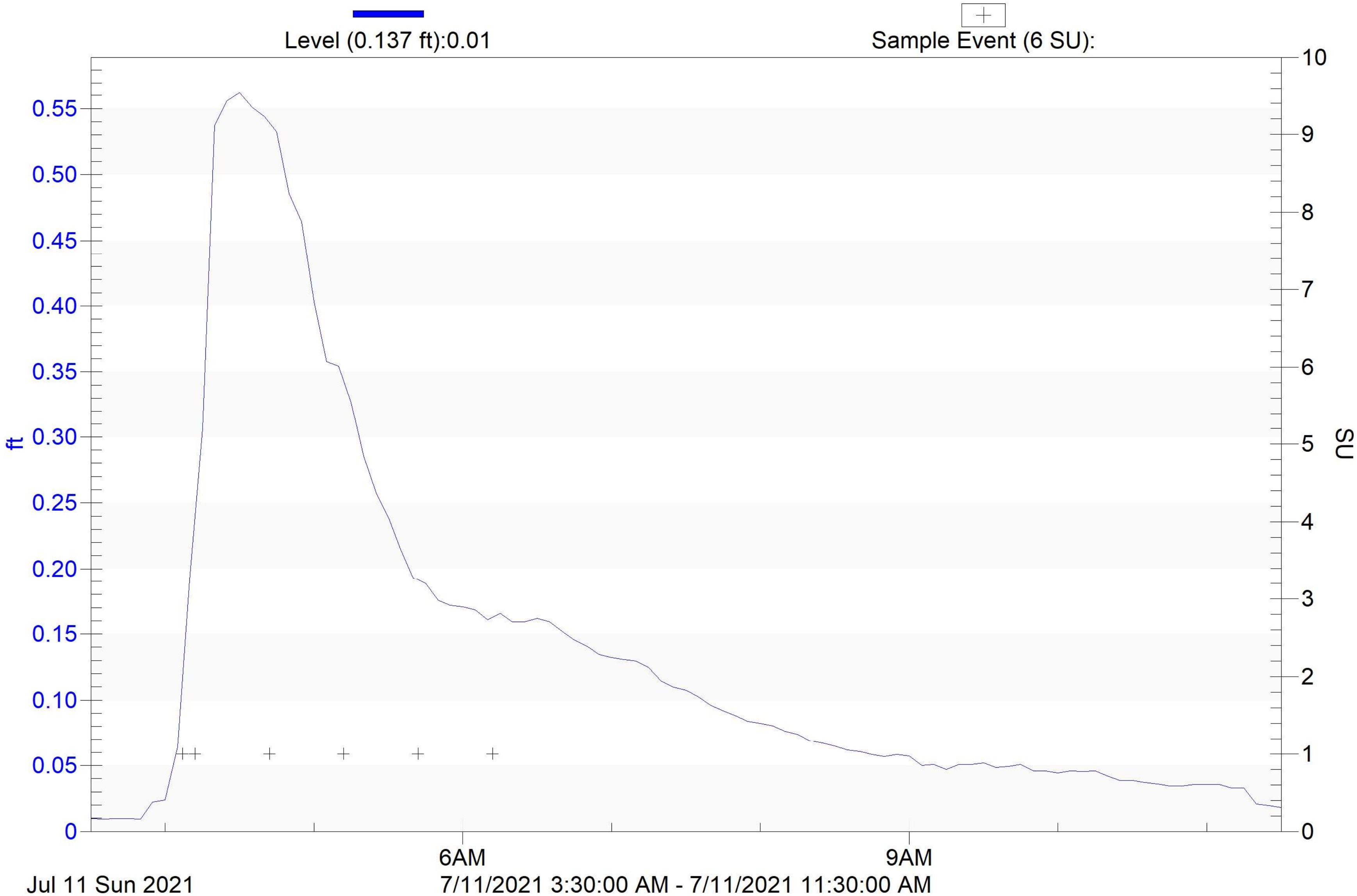
Irving Grapevine Creek

IR2101-3



Irving Grapevine Creek

IR2102-3



Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF IRVING 2021			
Storm Event: 7/11/2021 Project Number: 100072752	**IR2101**	**IR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	170	128	mg/L
Total Suspended Solids (TSS)	48.7	68.0	mg/L
Biochemical Oxygen Demand (BOD)	5.60 B1	5.97 B1	mg/L
Chemical Oxygen Demand (COD)	37.5	46.0	mg/L
Total Nitrogen	0.899	0.910	mg/L
Nitrate N	0.378	0.436	mg/L
Ammonia N	0.103	0.103	mg/L
Orthophosphate	0.0224 J	< 0.0200	mg/L
Phosphorus, Dissolved	0.0292 J	0.0372 J	mg/L
Phosphorus, Total	0.0559	0.122	mg/L
Atrazine	< 0.100	< 0.105	µg/L
Arsenic, Total	0.00198	0.00190	mg/L
Chromium, Total	0.00269 J	0.00559	mg/L
Copper, Total	0.00475	0.00473	mg/L
Lead, Total	0.00139	0.00182	mg/L
Zinc, Total	0.0282	0.0175	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.365	< 0.365	mg/L
pH	8.8	8.2	su
Ambient Air Temperature (field)	73	73	°F
Water Temperature (field)	77.4	81.4	°F
E. Coli	1550	> 2419.6	MPN/100 mL
Specific Conductivity	384	813	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF MESQUITE

Sample Collection Report
Event Date: July 11, 2021

Storm Summary

Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	0335 07/11/21	Rainfall total:	0.85 in
Rain event end time and date:	0645 07/11/21	Peak 1-hr rate:	0.75 in/hr

Rainfall station:	MS 2102
Antecedent dry period:	104 hrs

Comments: The storm summary was calculated using a combination of data from MS 2102 and the KTXMESQU27 weather station located at the Municipal Center (www.wunderground.com/weatherstation).

MS 2101

Station location description: North of New Market Road

Flow start time and date:	0420 07/11/21
Flow end time and date:	0705 07/11/21
Time first aliquot collected:	0431 07/11/21
Time last aliquot collected:	0634 07/11/21

Peak depth:	6.4 ft	Aliquots collected:	6
Average depth:	4.7 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

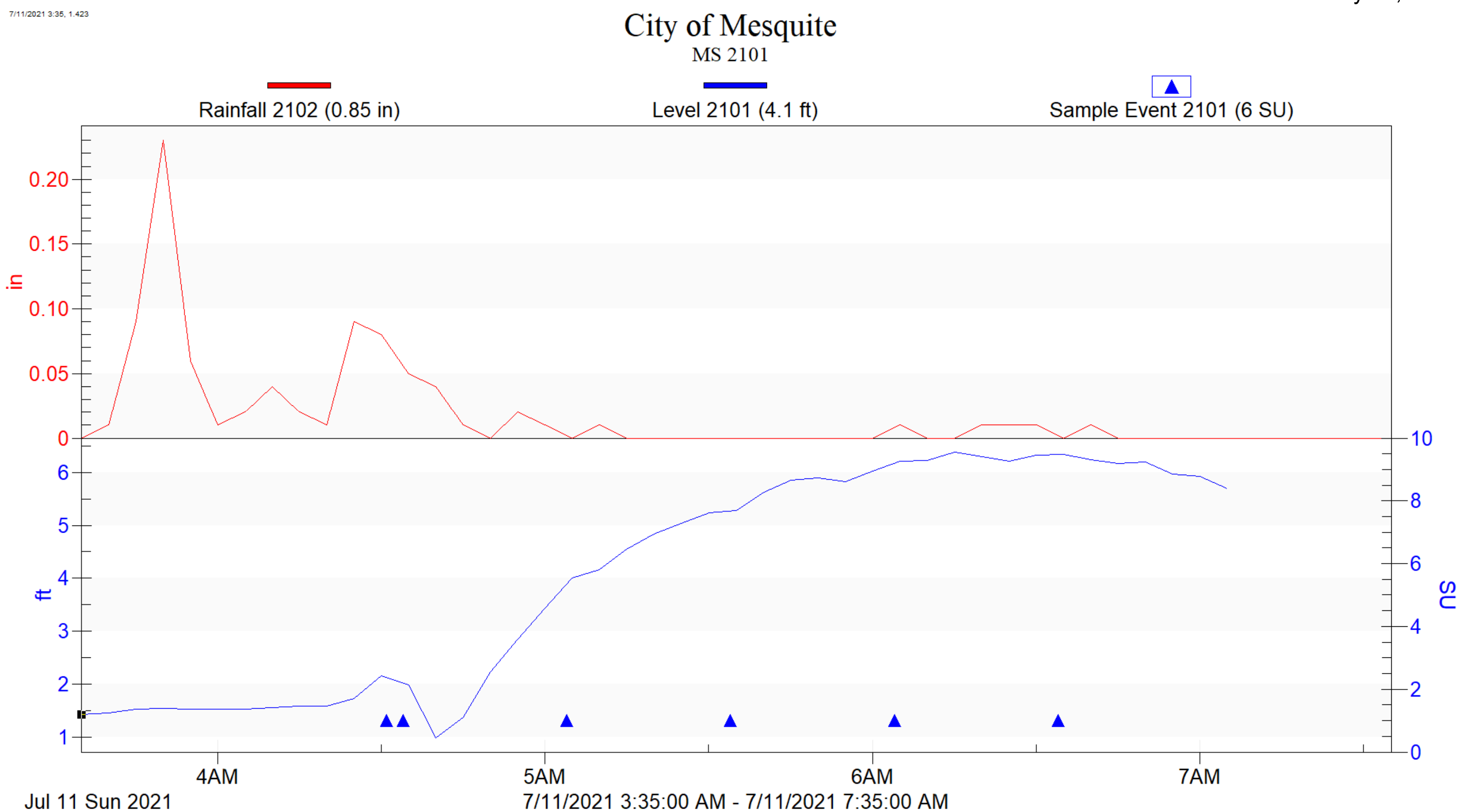
MS 2102

Station location description: North Mesquite Creek at Edward's Church

Comments: A sample could not be collected due to the 72-hour antecedent dry period not being met based on MS 2102 rain gauge data.

Prepared By: Adam Gottlieb   Date: October 5, 2021

Checked By: Kyle McKee   Date: October 11, 2021


7/11/2021 3:35, 1.423
City of Mesquite
MS 2101
Rainfall 2102 (0.85 in)
Level 2101 (4.1 ft)
Sample Event 2101 (6 SU)
in
0.20
0.15
0.10
0.05
0
ft
6
5
4
3
2
1
SU
10
8
6
4
2
0
4AM
5AM
6AM
7AM
Jul 11 Sun 2021
7/11/2021 3:35:00 AM - 7/11/2021 7:35:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF MESQUITE 2021

Storm Event: 7/11/2021 Project Number: 100072752	**MS2101**	**MS2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	126	NA	mg/L
Total Suspended Solids (TSS)	122	NA	mg/L
Biochemical Oxygen Demand (BOD)	5.33 B1	NA	mg/L
Chemical Oxygen Demand (COD)	39.6	NA	mg/L
Total Nitrogen	0.804	NA	mg/L
Nitrate N	0.248	NA	mg/L
Ammonia N	0.0406 J	NA	mg/L
Orthophosphate	< 0.0200	NA	mg/L
Phosphorus, Dissolved	0.0830	NA	mg/L
Phosphorus, Total	0.116	NA	mg/L
Atrazine	0.07 J	NA	µg/L
Arsenic, Total	0.00236	NA	mg/L
Chromium, Total	0.00592	NA	mg/L
Copper, Total	0.00479	NA	mg/L
Lead, Total	0.00435	NA	mg/L
Zinc, Total	0.0268	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.870 J	NA	mg/L
pH	8.1	NA	su
Ambient Air Temperature (field)	71	NA	°F
Water Temperature (field)	76.9	NA	°F
E. Coli	613	NA	MPN/100 mL
Specific Conductivity	368	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF MESQUITE

Sample Collection Report
Event Date: July 19, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	1045 07/19/21	Rainfall total:	0.68 in
Rain event end time and date:	1235 07/19/21	Peak 1-hr rate:	0.67 in/hr

Rainfall station: MS 2102
Antecedent dry period: 165 hrs

Comments: None.

MS 2101

Station location description: North of New Market Road

Comments: A sample was successfully collected on July 11, 2021.

MS 2102

Station location description: North Mesquite Creek at Edward's Church

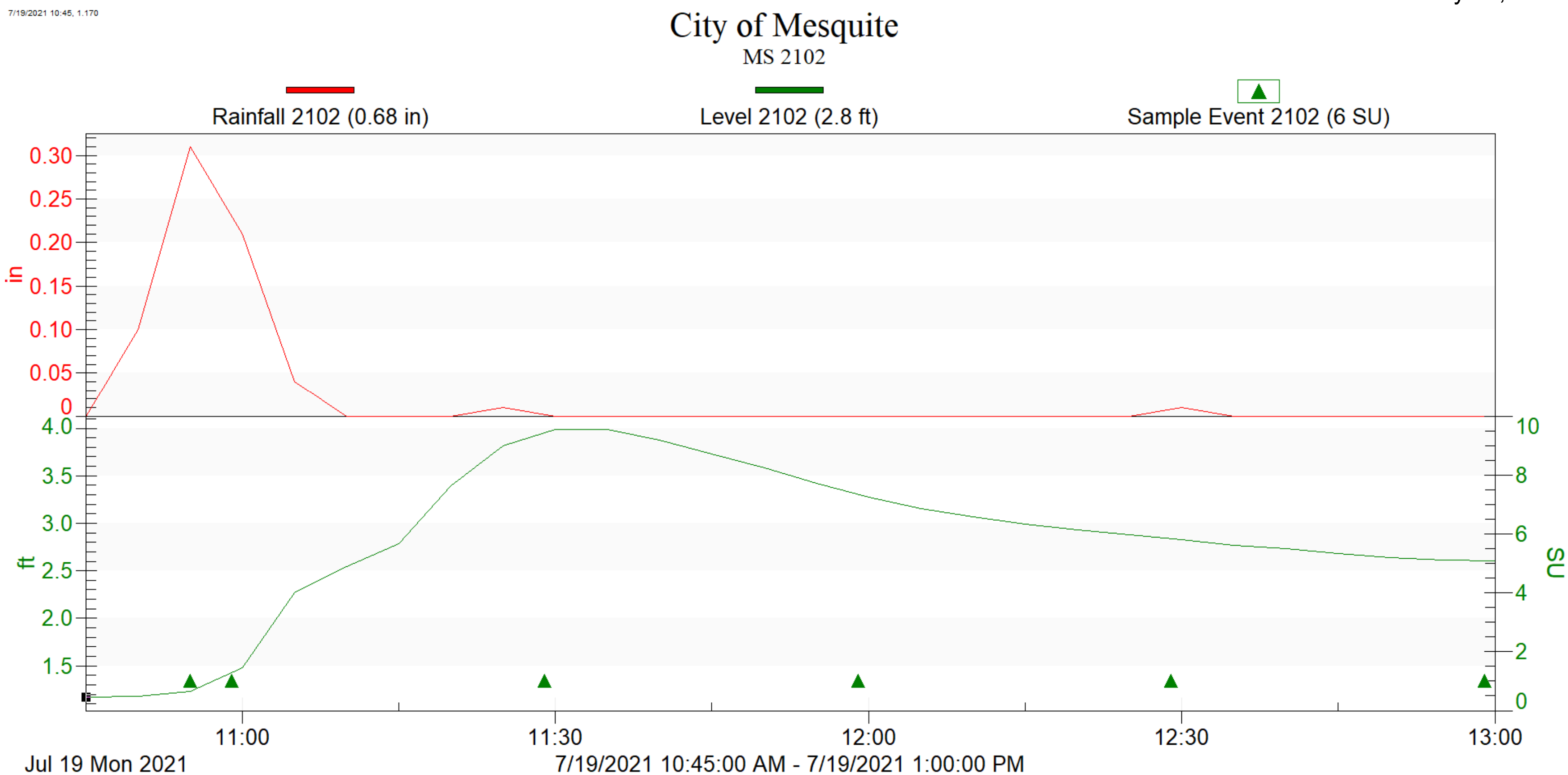
Flow start time and date: 1050 07/19/21
Flow end time and date: 1300 07/19/21

Time first aliquot collected: 1055 07/19/21
Time last aliquot collected: 1259 07/19/21

Peak depth:	4.0 ft	Aliquots collected:	6
Average depth:	2.9 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb Date: October 5, 2021
Checked By: Kyle McKee Date: October 11, 2021


7/19/2021 10:45, 1.170
City of Mesquite
MS 2102
Rainfall 2102 (0.68 in)
Level 2102 (2.8 ft)
Sample Event 2102 (6 SU)
in
0.30
0.25
0.20
0.15
0.10
0.05
0
ft
4.0
3.5
3.0
2.5
2.0
1.5
SU
10
8
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11:00
11:30
12:00
12:30
13:00
Jul 19 Mon 2021
7/19/2021 10:45:00 AM - 7/19/2021 1:00:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF MESQUITE 2021			
Storm Event: 7/19/2021 Project Number: 100072752	**MS2101**	**MS2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	121	mg/L
Total Suspended Solids (TSS)	NA	68.0	mg/L
Biochemical Oxygen Demand (BOD)	NA	5.47 B, J3, K9	mg/L
Chemical Oxygen Demand (COD)	NA	57.6	mg/L
Total Nitrogen	NA	1.44	mg/L
Nitrate N	NA	0.431	mg/L
Ammonia N	NA	0.0877 J	mg/L
Orthophosphate	NA	0.0758 J6	mg/L
Phosphorus, Dissolved	NA	0.0684	mg/L
Phosphorus, Total	NA	0.231	mg/L
Atrazine	NA	< 0.100	µg/L
Arsenic, Total	NA	0.00343	mg/L
Chromium, Total	NA	0.00391	mg/L
Copper, Total	NA	0.00508	mg/L
Lead, Total	NA	0.00255	mg/L
Zinc, Total	NA	0.0200	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	3.60 J	mg/L
pH	NA	6.34	su
Ambient Air Temperature (field)	NA	73	°F
Water Temperature (field)	NA	78.3	°F
E. Coli	NA	> 2419.6	MPN/100 mL
Specific Conductivity	NA	199	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank
K9 - Test replicates show more than 30% difference between high and low values
J3 - The associated batch QC was outside the established quality control range for precision
J6 - The sample matrix interfered with the ability to make any accurate determination; spike value is low

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
NORTH TEXAS TOLLWAY AUTHORITY

Sample Collection Report
Event Date: July 11, 2021

Storm Summary

Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	0350 07/11/21	Rainfall total:	0.62 in
Rain event end time and date:	0605 07/11/21	Peak 1-hr rate:	0.58 in/hr

Rainfall station: NTTA 2101
Antecedent dry period: 295 hrs

Comments: None.

NTTA 2101

Station location description: Unnamed Tributary at SH 161 N. of Gateway Dr.

Flow start time and date: 0355 07/11/21
Flow end time and date: 0705 07/11/21

Time first aliquot collected: 0355 07/11/21
Time last aliquot collected: 0558 07/11/21

Peak depth:	3.0 ft	Aliquots collected:	6
Average depth:	1.1 ft	Total sample volume:	3.5 gal

Comments: None.

Storm Summary

Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	0400 07/11/21	Rainfall total:	0.44 in
Rain event end time and date:	0610 07/11/21	Peak 1-hr rate:	0.41 in/hr

Rainfall station: ATK1
Antecedent dry period: 271 hrs

Comments: None.

NTTA 2102

Station location description: Cottonwood Creek at SH 161 S. of Dickey Road

Flow start time and date: 0415 07/11/21
Flow end time and date: 0850 07/11/21

Time first aliquot collected: 0419 07/11/21
Time last aliquot collected: 0622 07/11/21

Peak depth:	2.5 ft	Aliquots collected:	6
Average depth:	2.2 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

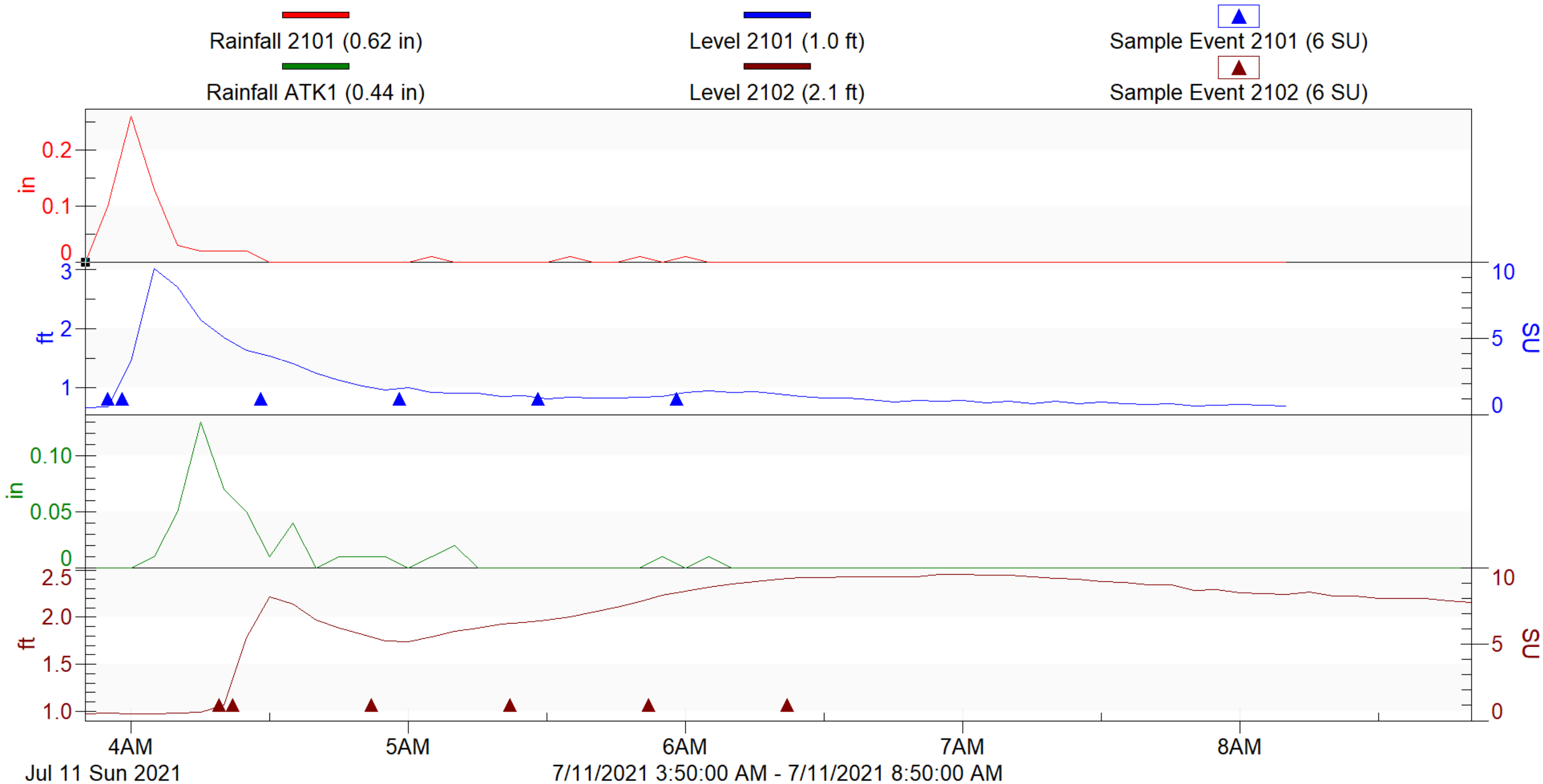
Prepared By: Adam Gottlieb Date: October 5, 2021

Checked By: Kyle McKee Date: October 11, 2021

7/11/2021 3:50, 0.000

North Texas Tollway Authority

NTTA 2101, 2102



Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

NORTH TEXAS TOLLWAY AUTHORITY 2021

Storm Event: 7/11/2021 Project Number: 100072752	NT2101	NT2102	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	121	145	mg/L
Total Suspended Solids (TSS)	14.5	20.3	mg/L
Biochemical Oxygen Demand (BOD)	5.37 B1	5.52 B1	mg/L
Chemical Oxygen Demand (COD)	35.3	50.3	mg/L
Total Nitrogen	1.66	0.880	mg/L
Nitrate N	0.596	0.255	mg/L
Ammonia N	0.172	0.0411 J	mg/L
Orthophosphate	0.153	< 0.0200	mg/L
Phosphorus, Dissolved	0.129	< 0.0152	mg/L
Phosphorus, Total	0.145	0.0457 J	mg/L
Atrazine	< 0.100	0.052 J	µg/L
Arsenic, Total	0.00105	0.00253	mg/L
Chromium, Total	0.00251 J	0.00192 J	mg/L
Copper, Total	0.00505	0.00231	mg/L
Lead, Total	0.000726	0.000771	mg/L
Zinc, Total	0.0266	0.0139	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.410 J	0.710 J	mg/L
pH	8.0	8.6	su
Ambient Air Temperature (field)	71	71	°F
Water Temperature (field)	76.4	76.4	°F
E. Coli	46.4	2420	MPN/100 mL
Specific Conductivity	458	191	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF PLANO

Sample Collection Report
Event Date: July 11, 2021

Storm Summary

Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	0259 07/11/21	Rainfall total:	0.71 in
Rain event end time and date:	0619 07/11/21	Peak 1-hr rate:	0.64 in/hr

Rainfall station: KTXPLANO563
Antecedent dry period: 206 hrs

Comments: The storm summary was calculated using data from the KTXPLANO563 weather station located in Alma/Hedgecoxe, Plano (www.wunderground.com/weatherstation).

PL 2101

Station location description: Rowlett Creek at Alma Drive

Flow start time and date: 0315 07/11/21
Flow end time and date: 0535 07/11/21

Time first aliquot collected: 0315 07/11/21
Time last aliquot collected: 0517 07/11/21

Peak depth:	8.9 ft	Aliquots collected:	6
Average depth:	5.7 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of sampling activities.

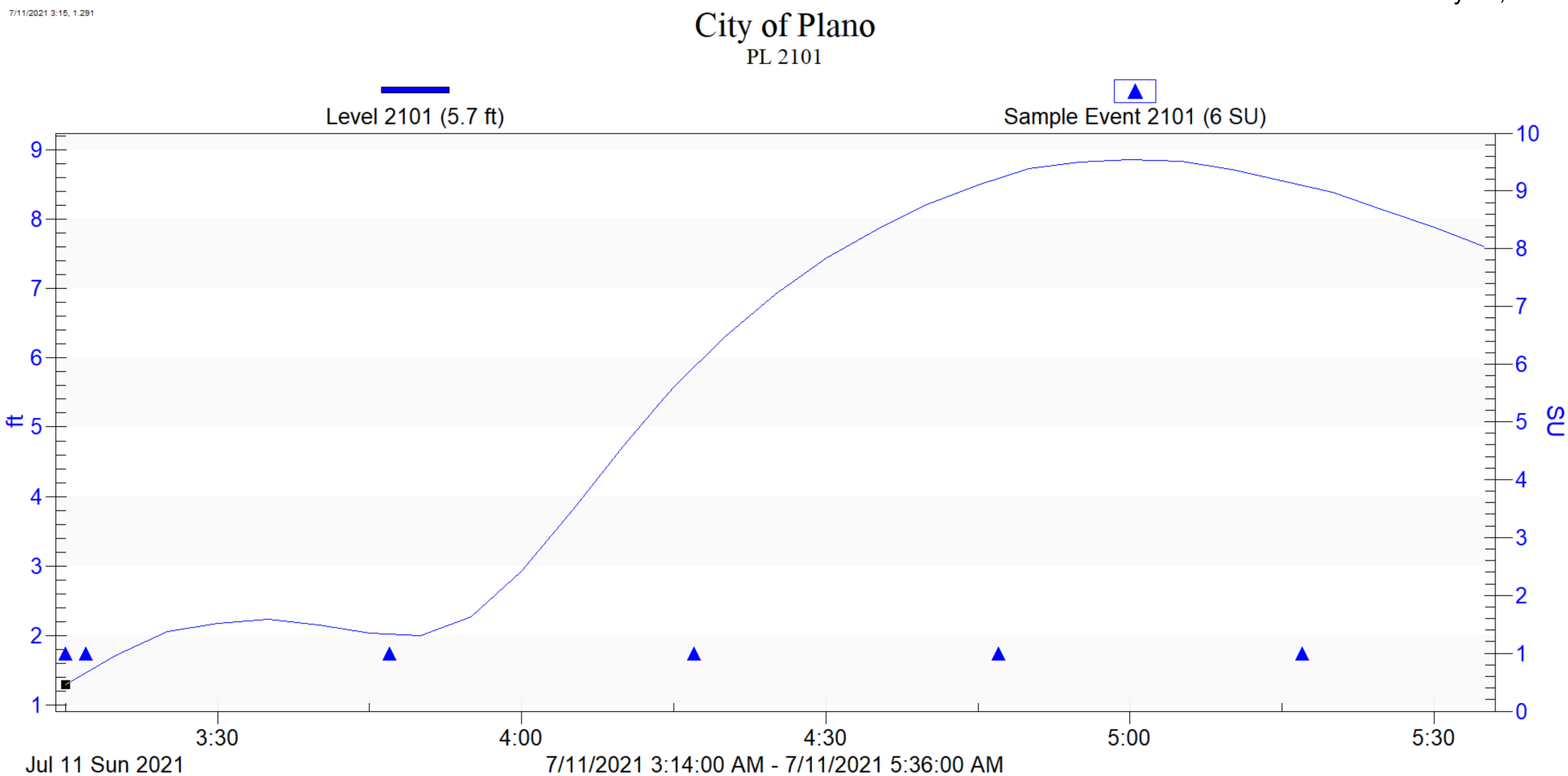
PL 2102

Station location description: Rowlett Creek in Oak Point Park

Comments: A successful sample was not collected due to construction blocking access to the site.

Prepared By: Adam Gottlieb Date: October 5, 2021

Checked By: Kyle McKee Date: October 11, 2021


7/11/2021 3:15, 1.291
City of Plano
PL 2101
Level 2101 (5.7 ft)
Sample Event 2101 (6 SU)
ft
SU
9
8
7
6
5
4
3
2
1
10
0
3:30
4:00
4:30
5:00
5:30
Jul 11 Sun 2021
7/11/2021 3:14:00 AM - 7/11/2021 5:36:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752

CITY OF PLANO 2021

Storm Event: 7/11/2021 Project Number: 100072752	**PL2101**	**PL2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	193	NA	mg/L
Total Suspended Solids (TSS)	112	NA	mg/L
Biochemical Oxygen Demand (BOD)	6.20 B1	NA	mg/L
Chemical Oxygen Demand (COD)	39.6	NA	mg/L
Total Nitrogen	1.44	NA	mg/L
Nitrate N	0.737	NA	mg/L
Ammonia N	0.0464 J	NA	mg/L
Orthophosphate	< 0.0200	NA	mg/L
Phosphorus, Dissolved	0.0327 J	NA	mg/L
Phosphorus, Total	0.122	NA	mg/L
Atrazine	0.094 J	NA	µg/L
Arsenic, Total	0.00237	NA	mg/L
Chromium, Total	0.00536	NA	mg/L
Copper, Total	0.00525	NA	mg/L
Lead, Total	0.00190	NA	mg/L
Zinc, Total	0.0202	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.730 J	NA	mg/L
pH	7.34	NA	su
Ambient Air Temperature (field)	70	NA	°F
Water Temperature (field)	76.1	NA	°F
E. Coli	770	NA	MPN/100 mL
Specific Conductivity	775	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100072752
CITY OF PLANO

Sample Collection Report
Event Date: August 1, 2021

Storm Summary

Storm description: Heavy rain moving from northwest to southeast.

Rain event start time and date:	1634 08/01/21	Rainfall total:	1.15 in
Rain event end time and date:	1729 08/01/21	Peak 1-hr rate:	1.15 in/hr

Rainfall station: KTXPLANO563
Antecedent dry period: 311 hrs

Comments: The storm summary was calculated using data from the KTXPLANO563 weather station located in Alma/Hedgecoxe, Plano (www.wunderground.com/weatherstation).

PL 2101

Station location description: Rowlett Creek at Alma Drive

Comments: A successful sample was collected on July 11, 2021.

PL 2102

Station location description: Rowlett Creek in Oak Point Park

Flow start time and date: 1800 08/01/21 (est.)
Flow end time and date: Unknown

Time first aliquot collected: 1800 08/01/21
Time last aliquot collected: 2006 08/01/21

Peak depth:	5 ft (est.)	Aliquots collected:	6
Average depth:	Unknown	Total sample volume:	3.5 gal

Comments: The automatic sampler and associated data was lost during transit. A replacement sampler and bubbler module will be provided to Plano at the end of the monitoring term.

Prepared By: Adam Gottlieb Date: October 5, 2021

Checked By: Kyle McKee Date: October 11, 2021

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100072752
CITY OF PLANO 2021

Storm Event: 8/1/2021 Project Number: 100072752	**PL2101**	**PL2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	195	mg/L
Total Suspended Solids (TSS)	NA	338	mg/L
Biochemical Oxygen Demand (BOD)	NA	7.77 B	mg/L
Chemical Oxygen Demand (COD)	NA	74.4	mg/L
Total Nitrogen	NA	1.33	mg/L
Nitrate N	NA	0.713	mg/L
Ammonia N	NA	0.0794 J	mg/L
Orthophosphate	NA	< 0.0200 J6	mg/L
Phosphorus, Dissolved	NA	< 0.0152	mg/L
Phosphorus, Total	NA	0.342	mg/L
Atrazine	NA	< 0.100	µg/L
Arsenic, Total	NA	0.00320	mg/L
Chromium, Total	NA	0.00627	mg/L
Copper, Total	NA	0.00842	mg/L
Lead, Total	NA	0.00360	mg/L
Zinc, Total	NA	0.0304	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	< 0.350	mg/L
pH	NA	8.40	su
Ambient Air Temperature (field)	NA	76	°F
Water Temperature (field)	NA	82.5	°F
E. Coli	NA	161	MPN/100 mL
Specific Conductivity	NA	602	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank
J6 - The sample matrix interfered with the ability to make any accurate determination; spike value is low

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG Regional Stormwater Monitoring Program
NCTCOG PROJECT ID 100077363
City of Arlington 2021

Sample Collection Report
Event Date: October 1, 2021

Storm Summary (AR2101)
Storm description: Moderate rain moving from southwest to northeast.

Rain event start time and date:	2315 09/30/21	Rainfall total:	0.52 in
Rain event end time and date:	0235 10/01/21	Peak 1-hr rate:	0.28 in/hr

Rainfall station: Rush Creek @ West Sublett Road (6650)
Antecedent dry period: 542 hrs

Comments: Storm summary determined by Rush Creek @ West Sublett Road (6650) from https://gptx.onerain.com/map/?view=24ffe2cd-8893-4c38-9337-a29860a31ed2#.

AR 2101
Station location description: Rush Creek @ West Sublett Road

Flow start time and date:	0050 10/01/21	Time first aliquot collected:	0054 10/01/21
Flow end time and date:	0740 10/01/21	Time last aliquot collected:	0304 10/01/21

Peak depth:	0.51 ft	Aliquots collected:	6
Average depth:	0.155 ft	Total sample volume:	3.5 gal

Comments: None

Storm Summary (AR2102)
Storm description: Moderate rain moving from southwest to northeast.

Rain event start time and date:	2240 09/30/21	Rainfall total:	0.56 in
Rain event end time and date:	0120 10/01/21	Peak 1-hr rate:	0.36 in/hr

Rainfall station: Rush Creek @ Woodland Park (6610)
Antecedent dry period: 542 hrs

Comments: Storm summary determined by Rush Creek @ Woodland Park (6610) from https://gptx.onerain.com/map/?view=24ffe2cd-8893-4c38-9337-a29860a31ed2#.

AR 2102
Station location description: Rush Creek @ Woodland Park Blvd.

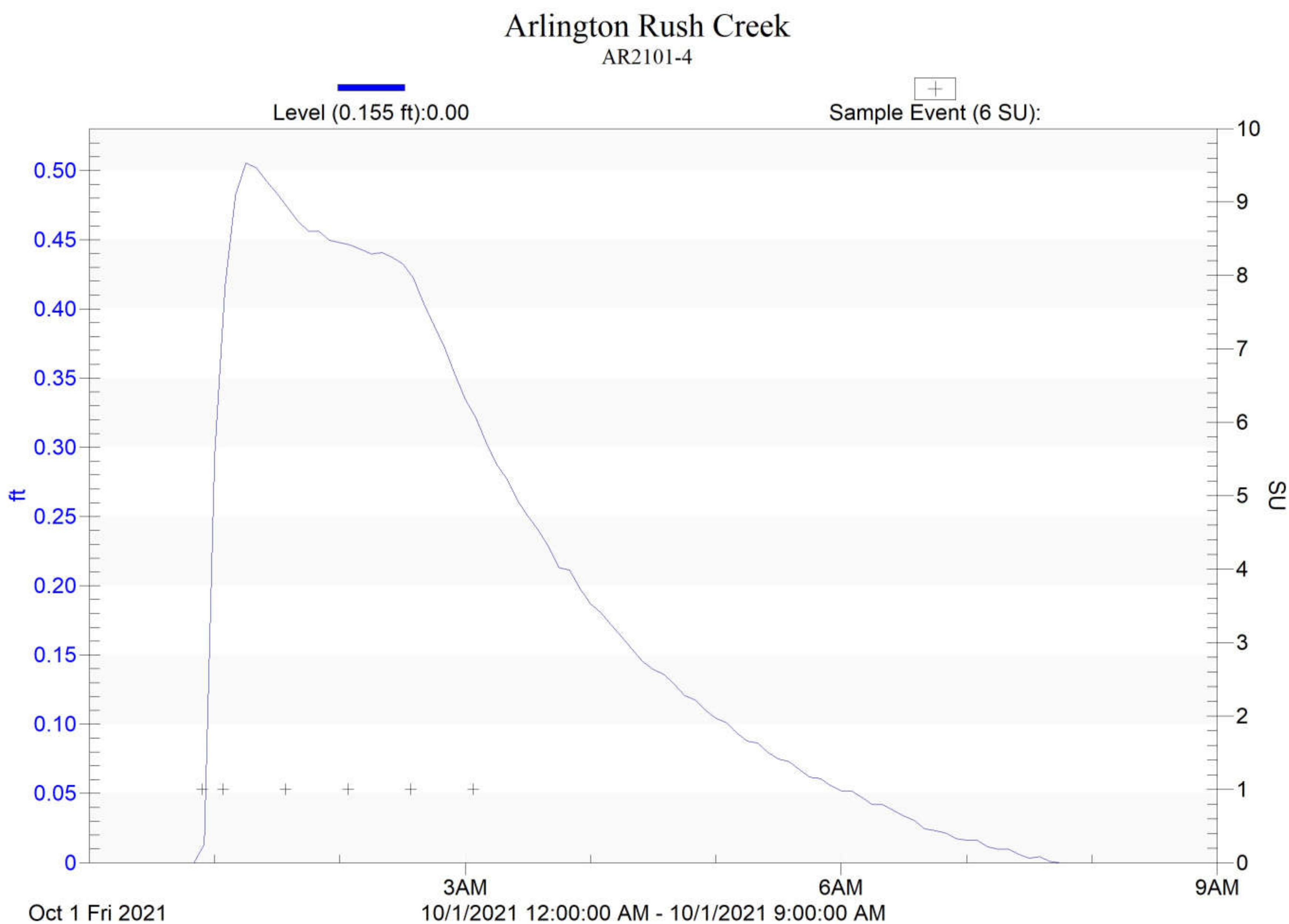
Flow start time and date: 0005 09/30/21 Time first aliquot collected: 0012 10/01/21
Flow end time and date: 1410 10/01/21 Time last aliquot collected: 0216 10/01/21

Peak depth:	1.084 ft	Aliquots collected:	6
Average depth:	0.534 ft	Total sample volume:	3.5 gal

Comments: Time on the AR2102 sampler was incorrect due to daylight savings time. Therefore, the hydrograph x-axis is one hour behind the official time of sample collection. Flow end time as defined in the QAPP was not reached due to additional storm events increasing stream flow before <2% of the peak flow could be reached.

Prepared By: Alyxes Martinez Digitally signed by Alyxes Martinez
DN: C=US, E=alyxes.martinez@freese.com, O="Freese and Nichols, Inc. ", OU=1170 Environmental Science, CN=Alyxes Martinez
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2022.01.07 16:47:03-06'00'
Date: January 7, 2022

Checked By: Ryan Deal Digitally signed by Ryan Deal
Date: 2022.01.07
16:47:54-06'00'
Date: January 7, 2022



Arlington Rush Creek
AR2101-4
Level (0.155 ft):0.00
Sample Event (6 SU):
0.50
0.45
0.40
0.35
0.30
0.25
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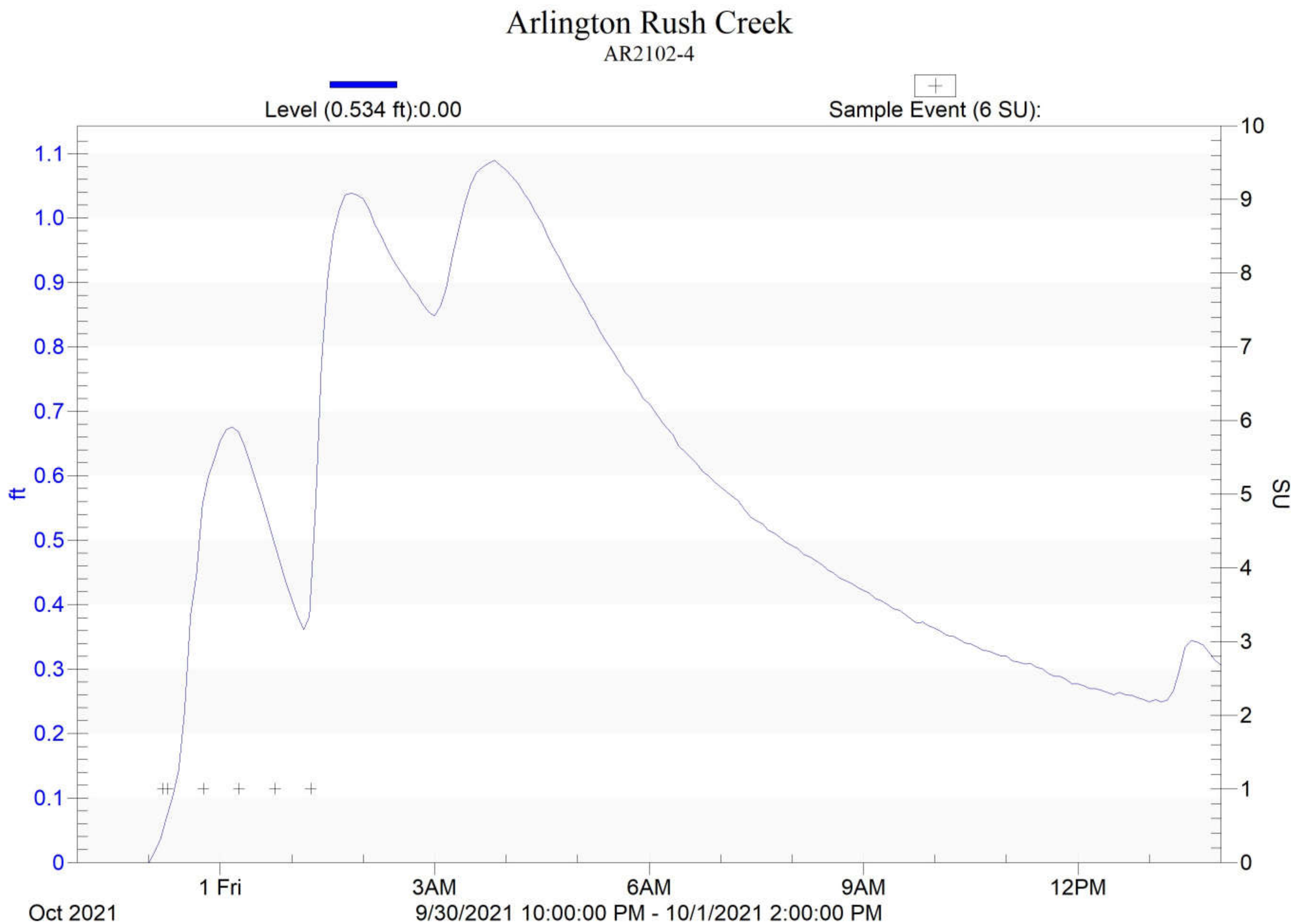
Oct 1 Fri 2021
10/1/2021 12:00:00 AM - 10/1/2021 9:00:00 AM



Arlington Rush Creek
AR2102-4
Level (0.534 ft):0.00
Sample Event (6 SU):
ft
SU
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
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3AM
6AM
9AM
12PM
Oct 2021
9/30/2021 10:00:00 PM - 10/1/2021 2:00:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100077363

CITY OF ARLINGTON 2021

Storm Event: 10/1/2021 Project Number: 100077363	**AR2101**	**AR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	321 T8	276 T8	mg/L
Total Suspended Solids (TSS)	17.8	11.4	mg/L
Biochemical Oxygen Demand (BOD)	10.4	9.51	mg/L
Chemical Oxygen Demand (COD)	33.8 J	25.2 J	mg/L
Total Nitrogen	0.854	1.17	mg/L
Nitrate N	0.274	0.304	mg/L
Ammonia N	< 0.0280	0.0340 J	mg/L
Orthophosphate	0.0418	0.0544	mg/L
Phosphorus, Dissolved	0.0189 J	0.0338 J	mg/L
Phosphorus, Total	0.140	0.130	mg/L
Atrazine	< 0.100	0.197*	µg/L
Arsenic, Total	0.00733	0.00502	mg/L
Chromium, Total	0.00124 J	0.00104 J	mg/L
Copper, Total	0.0504	0.0232	mg/L
Lead, Total	0.000666	0.000737	mg/L
Zinc, Total	0.0106	0.00815	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.800 J	< 0.357	mg/L
pH	8.5	8.2	su
Ambient Air Temperature (field)	69.4	69.4	°F
Water Temperature (field)	73.6	73.9	°F
E. Coli	> 2419.6	17.5	MPN/100 mL
Specific Conductivity	506	804	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
T8 - Sample(s) received past/too close to holding time expiration
* - Atrazine was collected on 10/11/2021 as a make-up due to the original sample bottle being broken in custody of the laboratory.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100077363
CITY OF GARLAND

Sample Collection Report
Event Date: October 10, 2021

Storm Summary

Storm description: Heavy rain moving from west to east.

Rain event start time and date:	2205 10/10/21	Rainfall total:	0.66 in
Rain event end time and date:	2245 10/10/21	Peak 1-hr rate:	0.66 in/hr

Rainfall station:	GA 2102
Antecedent dry period:	219 hrs

Comments: None

GA 2101

Station location description:	Rowlett Creek at Ben Davis Bridge		
Flow start time and date:	2220 10/10/21		
Flow end time and date:	0125 10/11/21		
Time first aliquot collected:	2233 10/10/21		
Time last aliquot collected:	0036 10/11/21		
Peak depth:	3.8 ft	Aliquots collected:	6
Average depth:	2.2 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities. The 7th aliquot shown on the graph does not represent a sample collection.

GA 2102

Station location description:	Rowlett Creek at Centerville Road/Castle Drive		
Flow start time and date:	2220 10/10/21		
Flow end time and date:	0055 10/11/21		
Time first aliquot collected:	2220 10/10/21		
Time last aliquot collected:	0023 10/11/21		
Peak depth:	1.4 ft	Aliquots collected:	6
Average depth:	1.0 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, peak depth, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

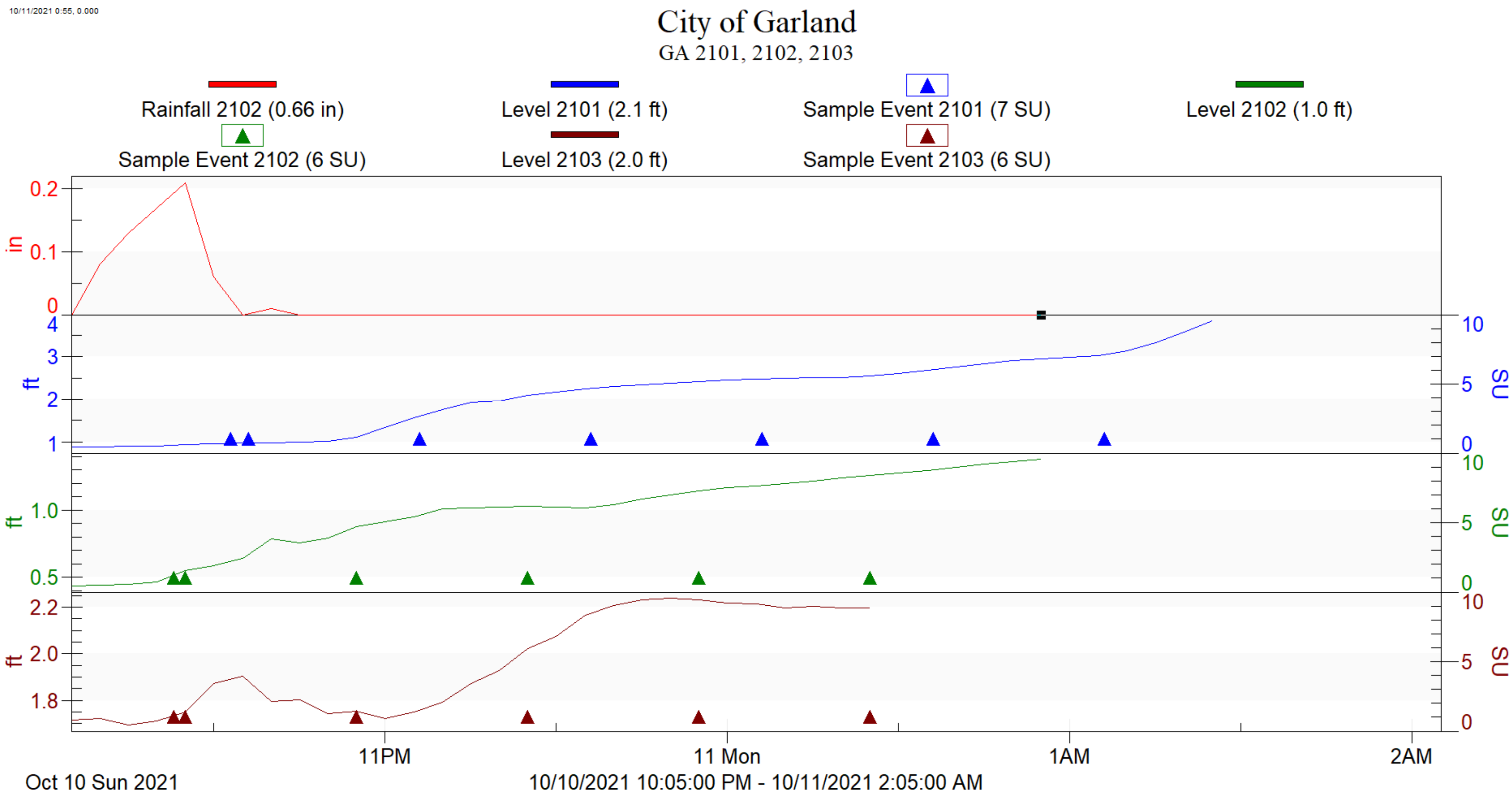
GA 2103

Station location description:	Rowlett Creek at Highway 66		
Flow start time and date:	2220 10/10/21		
Flow end time and date:	0025 10/11/21		
Time first aliquot collected:	2223 10/10/21		
Time last aliquot collected:	0025 10/11/21		
Peak depth:	2.2 ft	Aliquots collected:	6
Average depth:	2.0 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb Date: November 8, 2021

Checked By: Randolph Colby Date: November 15, 2021


10/11/2021 0:55, 0.000
City of Garland
GA 2101, 2102, 2103
Rainfall 2102 (0.66 in)
Level 2101 (2.1 ft)
Sample Event 2101 (7 SU)
Level 2102 (1.0 ft)
Sample Event 2102 (6 SU)
Level 2103 (2.0 ft)
Sample Event 2103 (6 SU)
in
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Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program

NCTCOG Project 100077363

CITY OF GARLAND 2021

Storm Event: 10/10/2021 Project Number: 100077363	**GA2101**	**GA2102**	**GA2103**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	405	272	445	mg/L
Total Suspended Solids (TSS)	58.3	49.7	30.3	mg/L
Biochemical Oxygen Demand (BOD)	7.85 B1	8.05 B1	4.26 B1	mg/L
Chemical Oxygen Demand (COD)	29.5 J	29.5 J	< 16.1	mg/L
Total Nitrogen	6.58	6.82	10.7	mg/L
Nitrate N	4.97	6.08	10.7	mg/L
Ammonia N	0.882	0.131 B	0.0705 B, J	mg/L
Orthophosphate	0.0527	0.0356 B, J	0.0489 B	mg/L
Phosphorus, Dissolved	< 0.0152	0.0522	0.0592	mg/L
Phosphorus, Total	0.0295 J	0.113	0.0927	mg/L
Atrazine	0.071	0.233	0.090	µg/L
Arsenic, Total	0.00700	0.00180	0.00164	mg/L
Chromium, Total	0.00136 J	0.00288 J	0.000946 J	mg/L
Copper, Total	0.00265 B	0.00806 B	0.00290 B	mg/L
Lead, Total	0.000712	0.00139	0.000660	mg/L
Zinc, Total	0.0102 B	0.0148 B	0.00919 B	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.350	< 0.350	< 0.365	mg/L
pH	6.9	7.3	7.6	su
Ambient Air Temperature (field)	67	67	67	°F
Water Temperature (field)	75.4	75.3	75.2	°F
E. Coli	687	> 2419.6	1550	MPN/100 mL
Specific Conductivity	804	392	714	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100077363
City of Irving 2021

Sample Collection Report
Event Date: October 10, 2021

Storm Summary

Storm description: Moderate rain moving from west to east.

Rain event start time and date:	2135 10/10/21	Rainfall total:	0.77 in
Rain event end time and date:	2205 10/10/21	Peak 1-hr rate:	0.77 in/hr

Rainfall station: KDFW – DFW International Airport
Antecedent dry period: 222 hrs

Comments: Antecedent dry period determined from DFW International Airport (KDFW) from http://texmesonet.org/HistoricalData/?station=KDFW.

IR 2101

Station location description: Grapevine Creek @ North Royal Lane

Flow start time and date:	2140 10/10/21	Time first aliquot collected:	2147 10/10/21
Flow end time and date:	1800 10/11/21	Time last aliquot collected:	2351 10/10/21

Peak depth:	3.55 ft	Aliquots collected:	6
Average depth:	1.115 ft	Total sample volume:	3 gal

IR 2102

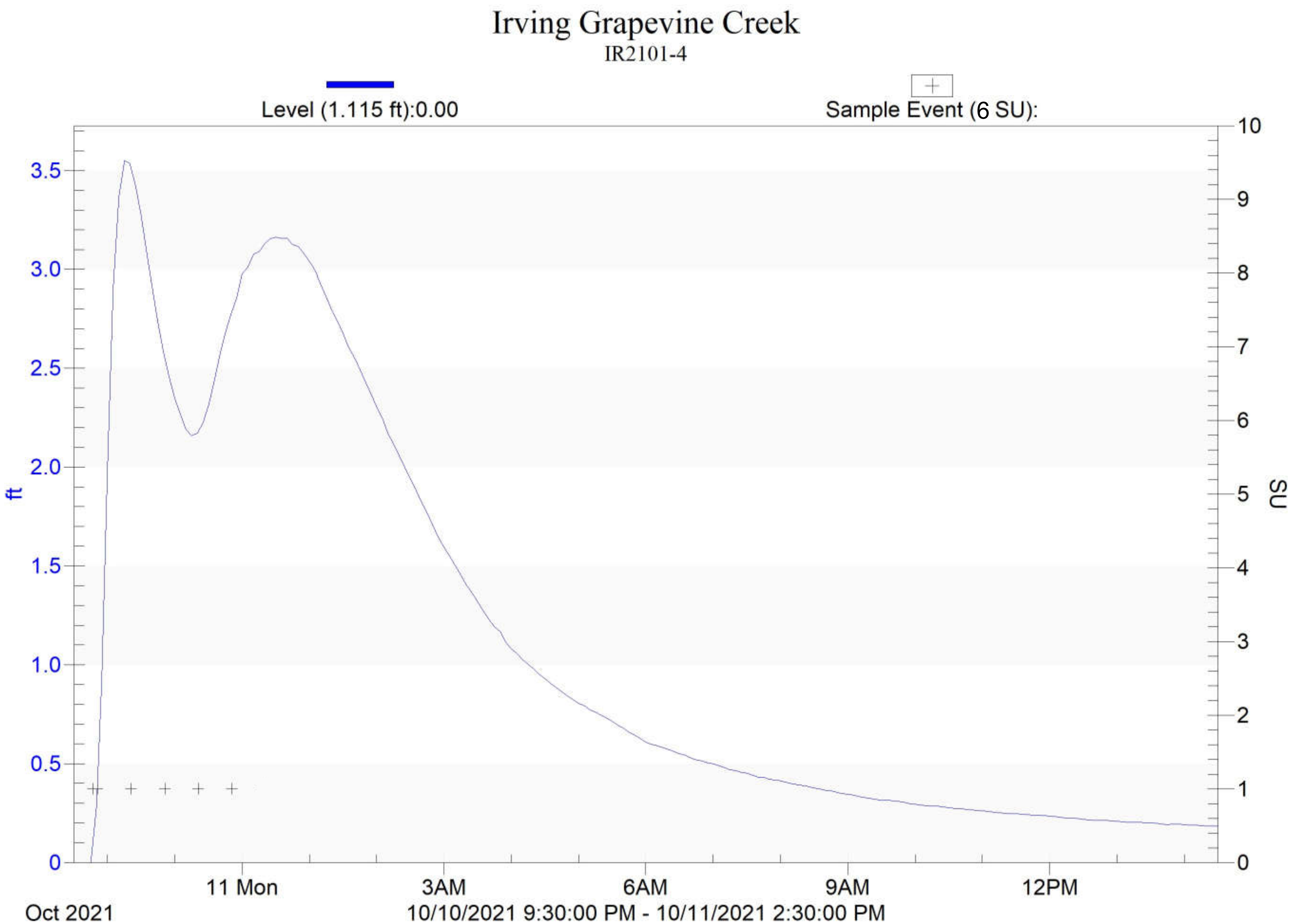
Station location description: Estelle Branch @ Rochelle Road

Comments: Samples were previously collected for IR2102 on October 1, 2021.

Comments: None

Prepared By: Alyxes Martinez
Digitally signed by Alyxes Martinez
DN: C=US, E=alyxes.martinez@freese.com, O="Freese and Nichols, Inc. ", OU=1170 Environmental Science, CN=Alyxes Martinez
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2022.01.07 16:50:00-06'00'
Date: January 7, 2021

Checked By: Ryan Deal
Digitally signed by Ryan Deal
Date: 2022.01.07 16:53:39-06'00'
Date: January 7, 2021



Irving Grapevine Creek
IR2101-4
Level (1.115 ft):0.00
Sample Event (6 SU):
ft
SU
3.5
3.0
2.5
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Oct 2021
10/10/2021 9:30:00 PM - 10/11/2021 2:30:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100077363

CITY OF IRVING 2021

Storm Event: 10/10/2021 Project Number: 100077363	**IR2101**	**IR2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	229	NA	mg/L
Total Suspended Solids (TSS)	118	NA	mg/L
Biochemical Oxygen Demand (BOD)	9.01 B1, K9, P1	NA	mg/L
Chemical Oxygen Demand (COD)	38.1	NA	mg/L
Total Nitrogen	0.780	NA	mg/L
Nitrate N	0.324	NA	mg/L
Ammonia N	0.0983 B, J	NA	mg/L
Orthophosphate	< 0.0200	NA	mg/L
Phosphorus, Dissolved	0.0162 J	NA	mg/L
Phosphorus, Total	0.0433 J	NA	mg/L
Atrazine	< 0.033	NA	µg/L
Arsenic, Total	0.00311	NA	mg/L
Chromium, Total	0.00586	NA	mg/L
Copper, Total	0.00736 B	NA	mg/L
Lead, Total	0.00273	NA	mg/L
Zinc, Total	0.0332 B	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.350	NA	mg/L
pH	9.2	NA	su
Ambient Air Temperature (field)	67	NA	°F
Water Temperature (field)	74	NA	°F
E. Coli	461	NA	MPN/100 mL
Specific Conductivity	144	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG STORMWATER QUALITY MONITORING PROJECT
NCTCOG PROJECT ID 100077363
City of Irving 2021

Sample Collection Report
Event Date: October 1, 2021

Storm Summary

Storm description: Light rain moving from southwest to northeast.

Rain event start time and date:	2353 09/30/21	Rainfall total:	0.13 in
Rain event end time and date:	0153 10/01/21	Peak 1-hr rate:	0.10 in/hr

Rainfall station: KDFW – DFW International Airport
Antecedent dry period: 543 hrs

Comments: Antecedent dry period determined from DFW International Airport (KDFW) from http://texmesonet.org/HistoricalData/?station=KDFW.

IR 2101

Station location description: Grapevine Creek @ North Royal Lane

Comments: IR2101 was not sampled during this event.

IR 2102

Station location description: Estelle Branch @ Rochelle Road

Flow start time and date:	0050 10/01/21	Time first aliquot collected:	0104 10/01/21
Flow end time and date:	1000 10/01/21	Time last aliquot collected:	0309 10/01/21

Peak depth:	0.26 ft	Aliquots collected:	6
Average depth:	0.049 ft	Total sample volume:	3.5 gal

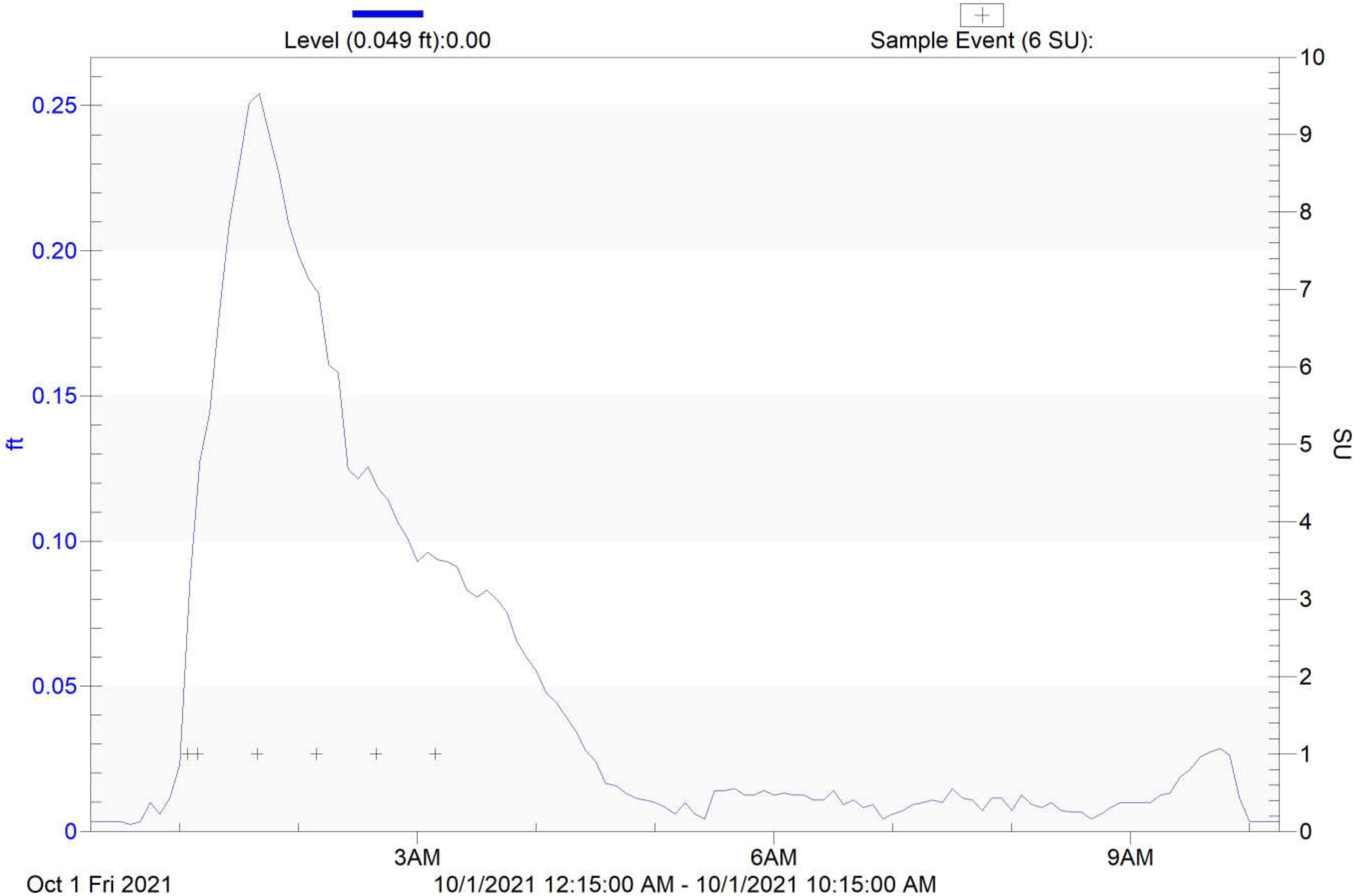
Comments: None

Prepared By: Alyxes Martinez Digitally signed by Alyxes Martinez DN: C=US, E=alyxes.martinez@freese.com, O="Freese and Nichols, Inc. ", OU=1170 Environmental Science, CN=Alyxes Martinez Reason: I agree to the terms defined by the placement of my signature on this document Date: 2022.01.07 16:50:24-06'00' Date: January 7, 2021

Checked By: Ryan Deal Digitally signed by Ryan Deal Date: 2022.01.07 16:54:16-06'00' Date: January 7, 2021

Irving Estelle Branch

IR2102-4



Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100077363

CITY OF IRVING 2021

Storm Event: 10/1/2021 Project Number: 100077363	IR2101	IR2102	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	266 T8	mg/L
Total Suspended Solids (TSS)	NA	34.3	mg/L
Biochemical Oxygen Demand (BOD)	NA	10.7	mg/L
Chemical Oxygen Demand (COD)	NA	38.1	mg/L
Total Nitrogen	NA	2.07	mg/L
Nitrate N	NA	0.742	mg/L
Ammonia N	NA	0.0487 J	mg/L
Orthophosphate	NA	< 0.0200	mg/L
Phosphorus, Dissolved	NA	0.0269 J	mg/L
Phosphorus, Total	NA	0.137	mg/L
Atrazine	NA	< 0.033*	µg/L
Arsenic, Total	NA	0.00487	mg/L
Chromium, Total	NA	0.00547	mg/L
Copper, Total	NA	0.0151	mg/L
Lead, Total	NA	0.00107	mg/L
Zinc, Total	NA	0.0153	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	0.700 J	mg/L
pH	NA	8.9	su
Ambient Air Temperature (field)	NA	69	°F
Water Temperature (field)	NA	74.5	°F
E. Coli	NA	> 2419.6	MPN/100 mL
Specific Conductivity	NA	645	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
T8 - Sample(s) received past/too close to holding time expiration
* - Atrazine was collected on 10/11/2021 as a make-up due to the original sample bottle being broken in custody of the laboratory.

ATKINS
Member of the SNC-Lavalin Group

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100077363
CITY OF MESQUITE

Sample Collection Report
Event Date: October 10, 2021

Storm Summary

Storm description: Heavy rain moving from west to east.

Rain event start time and date:	2215 10/10/21	Rainfall total:	0.33 in
Rain event end time and date:	2300 10/10/21	Peak 1-hr rate:	0.33 in/hr

Rainfall station:	KTXMESQU27
Antecedent dry period:	198 hrs

Comments: The storm summary was calculated using data from the KTXMESQU27 weather station located at the Municipal Center (www.wunderground.com/weatherstation).

MS 2101

Station location description: North of New Market Road

Flow start time and date:	2215 10/10/21		
Flow end time and date:	1350 10/11/21		
Time first aliquot collected:	2235 10/10/21		
Time last aliquot collected:	0038 10/11/21		
Peak depth:	6.7 ft	Aliquots collected:	6
Average depth:	2.8 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

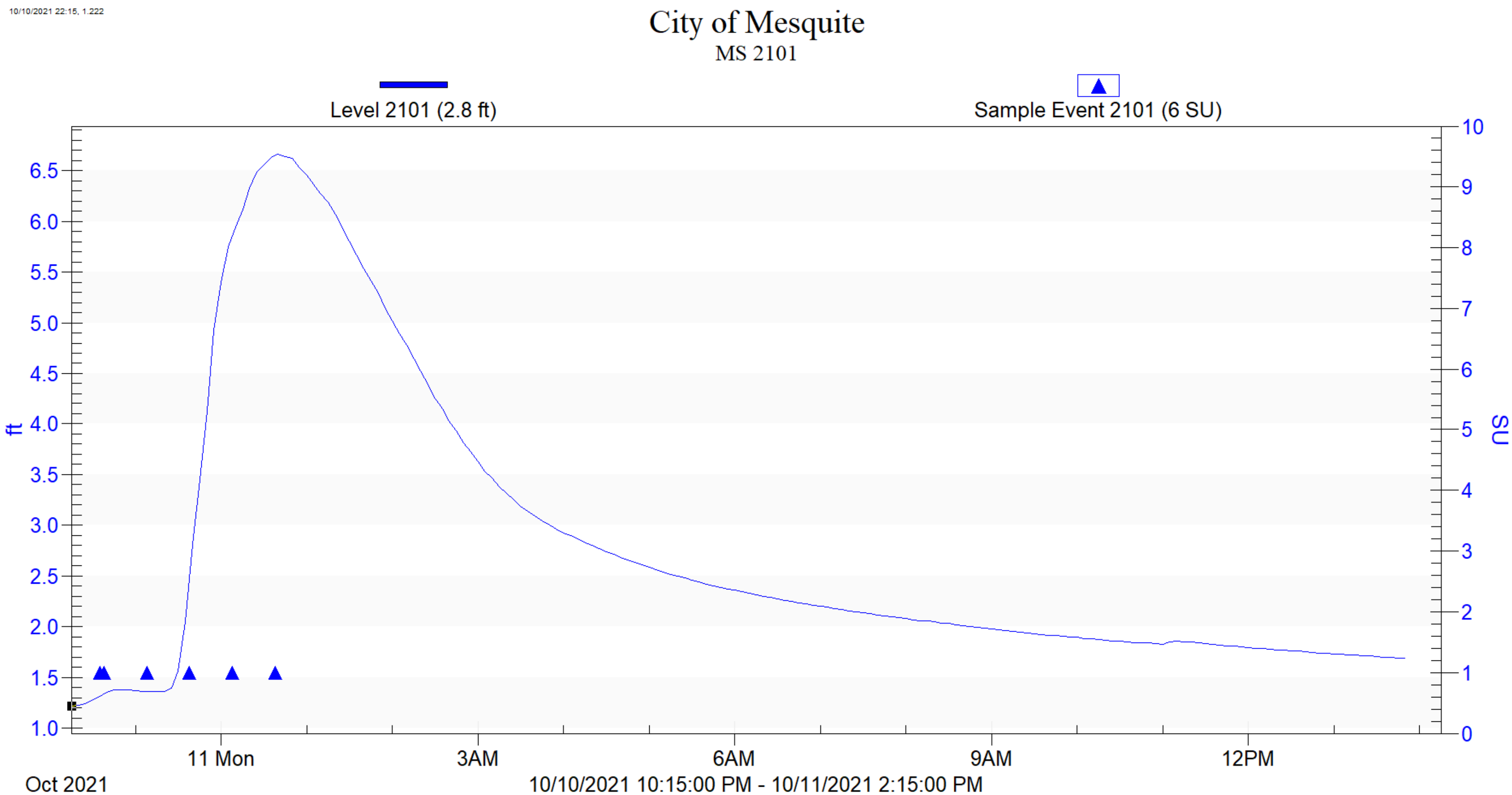
MS 2102

Station location description: North Mesquite Creek at Edward's Church

Comments: A sample was successfully collected on October 1, 2021.

Prepared By: Adam Gottlieb Date: November 8, 2021

Checked By: Randolph Colby Date: November 15, 2021


10/10/2021 22:15, 1.222
City of Mesquite
MS 2101
Level 2101 (2.8 ft)
Sample Event 2101 (6 SU)
ft
6.5
6.0
5.5
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4.5
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Oct 2021
10/10/2021 10:15:00 PM - 10/11/2021 2:15:00 PM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100077363

CITY OF MESQUITE 2021			
Storm Event: 10/10/2021 Project Number: 100077363	**MS2101**	**MS2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	255	NA	mg/L
Total Suspended Solids (TSS)	111	NA	mg/L
Biochemical Oxygen Demand (BOD)	10.5 B1	NA	mg/L
Chemical Oxygen Demand (COD)	57.5	NA	mg/L
Total Nitrogen	0.826	NA	mg/L
Nitrate N	0.0680	NA	mg/L
Ammonia N	0.0397 B, J	NA	mg/L
Orthophosphate	< 0.0200	NA	mg/L
Phosphorus, Dissolved	< 0.0152	NA	mg/L
Phosphorus, Total	0.0651	NA	mg/L
Atrazine	0.051	NA	µg/L
Arsenic, Total	0.00205	NA	mg/L
Chromium, Total	0.00518	NA	mg/L
Copper, Total	0.00541 B	NA	mg/L
Lead, Total	0.00420	NA	mg/L
Zinc, Total	0.0294 B	NA	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.350	NA	mg/L
pH	8.1	NA	su
Ambient Air Temperature (field)	69	NA	°F
Water Temperature (field)	74.8	NA	°F
E. Coli	288	NA	MPN/100 mL
Specific Conductivity	433	NA	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100077363
CITY OF MESQUITE

Sample Collection Report
Event Date: October 1, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	0159 10/01/21	Rainfall total:	0.12 in
Rain event end time and date:	0319 10/01/21	Peak 1-hr rate:	0.10 in/hr

Rainfall station: KTXMESQU49
Antecedent dry period: 1043 hrs

Comments: The storm summary was calculated using data from the KTXMESQU49 weather station located at Creek Crossing, Mesquite (www.wunderground.com/weatherstation).

MS 2101

Station location description: North of New Market Road

Comments: A sample was not able to be collected at this site for this event.

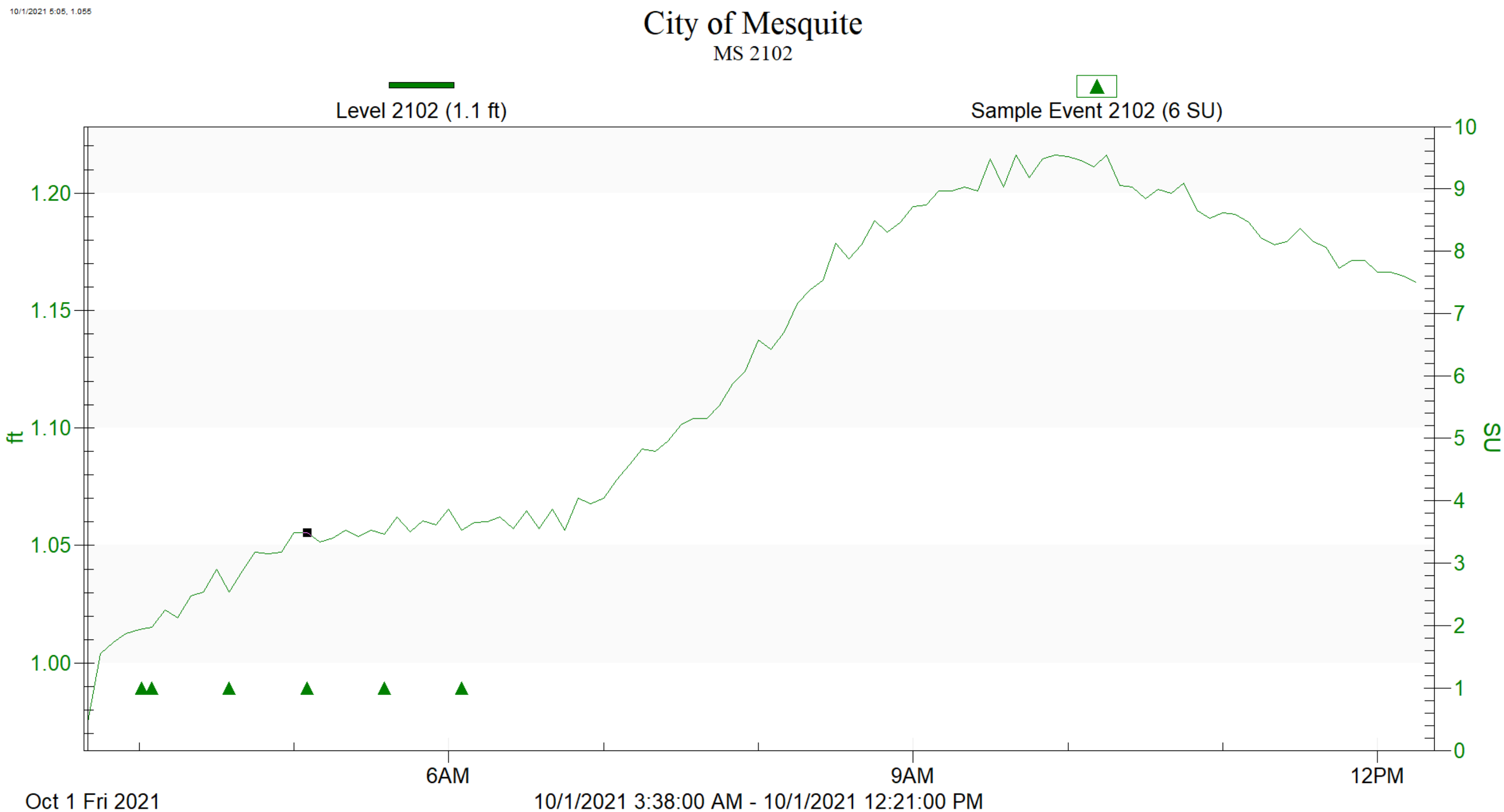
MS 2102

Station location description:	North Mesquite Creek at Edward’s Church		
Flow start time and date:	0340 10/01/21		
Flow end time and date:	1215 10/01/21		
Time first aliquot collected:	0401 10/01/21		
Time last aliquot collected:	0605 10/01/21		
Peak depth:	1.2 ft	Aliquots collected:	6
Average depth:	1.1 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of the sampling activities.

Prepared By: Adam Gottlieb   Date: November 8, 2021

Checked By: Randolph Colby   Date: November 15, 2021


10/1/2021 5:05, 1.055
City of Mesquite
MS 2102
Level 2102 (1.1 ft)
Sample Event 2102 (6 SU)
ft
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6AM
9AM
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Oct 1 Fri 2021
10/1/2021 3:38:00 AM - 10/1/2021 12:21:00 PM

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program

NCTCOG Project 100077363

CITY OF MESQUITE 2021

Storm Event: 10/1/2021 Project Number: 100077363	MS2101	MS2102	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	NA	472 T8	mg/L
Total Suspended Solids (TSS)	NA	14.5	mg/L
Biochemical Oxygen Demand (BOD)	NA	16.1	mg/L
Chemical Oxygen Demand (COD)	NA	40.3	mg/L
Total Nitrogen	NA	1.10	mg/L
Nitrate N	NA	0.220	mg/L
Ammonia N	NA	< 0.0280	mg/L
Orthophosphate	NA	< 0.0200	mg/L
Phosphorus, Dissolved	NA	< 0.0152	mg/L
Phosphorus, Total	NA	0.0488 J	mg/L
Atrazine	NA	0.108*	µg/L
Arsenic, Total	NA	0.0163	mg/L
Chromium, Total	NA	0.000688 J	mg/L
Copper, Total	NA	0.0972	mg/L
Lead, Total	NA	0.000276 J	mg/L
Zinc, Total	NA	0.00290 J	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	NA	8.92	mg/L
pH	NA	7.83	su
Ambient Air Temperature (field)	NA	67	°F
Water Temperature (field)	NA	71.2	°F
E. Coli	NA	53.7	MPN/100 mL
Specific Conductivity	NA	770	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
T8 - Sample(s) received past/too close to holding time expiration
* - Atrazine was collected on 10/11/2021 as a make-up due to the original sample bottle being broken in custody of the laboratory.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100077363
NORTH TEXAS TOLLWAY AUTHORITY

Sample Collection Report
Event Date: October 1, 2021

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	0010 10/01/21	Rainfall total:	0.13 in
Rain event end time and date:	0410 10/01/21	Peak 1-hr rate:	0.08 in/hr

Rainfall station: NTTA 2101
Antecedent dry period: 543 hrs

Comments: The antecedent dry period was calculated using data from NTTA 2101 and the DTX 7035 weather station located on Elm Fork at California Crossing (http://www.ci.dallas.tx.us/sts/html/fc.html).

NTTA 2101

Station location description: Unnamed Tributary at SH 161 N. of Gateway Dr.

Flow start time and date: 0040 10/01/21
Flow end time and date: 0525 10/01/21

Time first aliquot collected: 0120 10/01/21
Time last aliquot collected: 0323 10/01/21

Peak depth:	1.0 ft	Aliquots collected:	6
Average depth:	0.8 ft	Total sample volume:	3.5 gal

Comments: None.

Storm Summary

Storm description: Moderate rain formed in the west and moved east.

Rain event start time and date:	2320 9/30/21	Rainfall total:	0.34 in
Rain event end time and date:	0400 10/01/21	Peak 1-hr rate:	0.25 in/hr

Rainfall station: ATK1
Antecedent dry period: 1038 hrs

Comments: The antecedent dry period was calculated using a combination of data from ATK1 and the 26080 weather station located at N Cottonwood and Great Southwest Parkway (https://gptx.onerain.com/home.php).

NTTA 2102

Station location description: Cottonwood Creek at SH 161 S. of Dickey Road

Flow start time and date: 0025 10/01/21
Flow end time and date: 1320 10/01/21

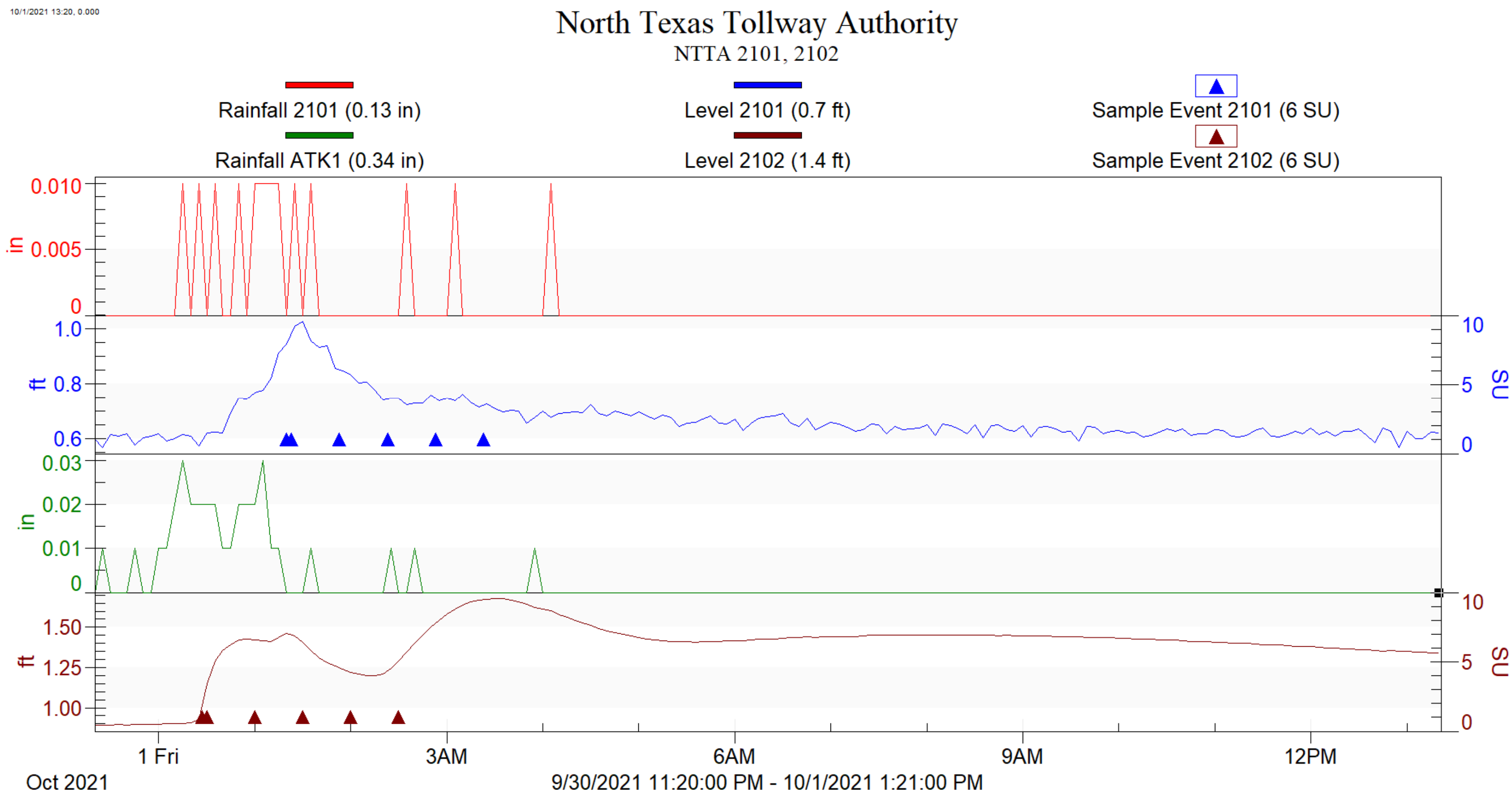
Time first aliquot collected: 0027 10/01/21
Time last aliquot collected: 0230 10/01/21

Peak depth:	1.7 ft	Aliquots collected:	6
Average depth:	1.4 ft	Total sample volume:	3.5 gal

Comments: None.

Prepared By: Adam Gottlieb   Date: November 8, 2021

Checked By: Randolph Colby   Date: November 15, 2021


10/1/2021 13:20, 0.000
North Texas Tollway Authority
NTTA 2101, 2102
Rainfall 2101 (0.13 in)
Level 2101 (0.7 ft)
Sample Event 2101 (6 SU)
Rainfall ATK1 (0.34 in)
Level 2102 (1.4 ft)
Sample Event 2102 (6 SU)
0.010
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SU
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Oct 2021
9/30/2021 11:20:00 PM - 10/1/2021 1:21:00 PM

Analytical Results Summary

NCTCOG Regional Stormwater Monitoring Program

NCTCOG Project 100077363

NORTH TEXAS TOLLWAY AUTHORITY 2021

Storm Event: 10/1/2021 Project Number: 100077363	**NT2101**	**NT2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	175	135	mg/L
Total Suspended Solids (TSS)	10.8	12.8	mg/L
Biochemical Oxygen Demand (BOD)	14.3	8.49	mg/L
Chemical Oxygen Demand (COD)	76.9	25.2	mg/L
Total Nitrogen	3.47	1.47	mg/L
Nitrate N	1.16	0.693	mg/L
Ammonia N	0.312	0.0771 J	mg/L
Orthophosphate	0.128	< 0.0200	mg/L
Phosphorus, Dissolved	0.0876	< 0.0152 J3, J6	mg/L
Phosphorus, Total	0.221	0.0914	mg/L
Atrazine	< 0.033*	< 0.033*	µg/L
Arsenic, Total	0.00444	0.00413	mg/L
Chromium, Total	0.00239 J	0.00273 J	mg/L
Copper, Total	0.0198	0.00895	mg/L
Lead, Total	0.00103	0.000695	mg/L
Zinc, Total	0.0404	0.0163	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	0.900 J	1.60 J	mg/L
pH	8.32	8.02	su
Ambient Air Temperature (field)	64	68	°F
Water Temperature (field)	74.6	74.2	°F
E. Coli	1990	86.2	MPN/100 mL
Specific Conductivity	245	330	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
J3 - The associated batch QC was outside the established quality control range for precision
J6 - The sample matrix interfered with the ability to make any accurate determination; spike value is low
* - Atrazine was collected on 10/11/2021 as a make-up due to the original sample bottle being broken in custody of the laboratory.

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
NCTCOG REGIONAL STORMWATER MONITORING PROGRAM
PROJECT ID 100077363
CITY OF PLANO

Sample Collection Report
Event Date: October 10, 2021

Storm Summary

Storm description: Heavy rain moving from west to east.

Rain event start time and date:	2149 10/10/21	Rainfall total:	0.77 in
Rain event end time and date:	2224 10/10/21	Peak 1-hr rate:	0.77 in/hr

Rainfall station:	KTXPLANO563
Antecedent dry period:	199 hrs

Comments: The storm summary was calculated using data from the KTXPLANO563 weather station located in Alma/Hedgecoxe, Plano (www.wunderground.com/weatherstation).

PL 2101

Station location description: Rowlett Creek at Alma Drive

Flow start time and date:	2155 10/10/21
Flow end time and date:	0255 10/11/21

Time first aliquot collected:	2159 10/10/21
Time last aliquot collected:	0002 10/11/21

Peak depth:	8.5 ft	Aliquots collected:	6
Average depth:	4.7 ft	Total sample volume:	3.5 gal

Comments: Flow end time and date, and average depth are a result of the sampling equipment being removed at the conclusion of sampling activities.

PL 2102

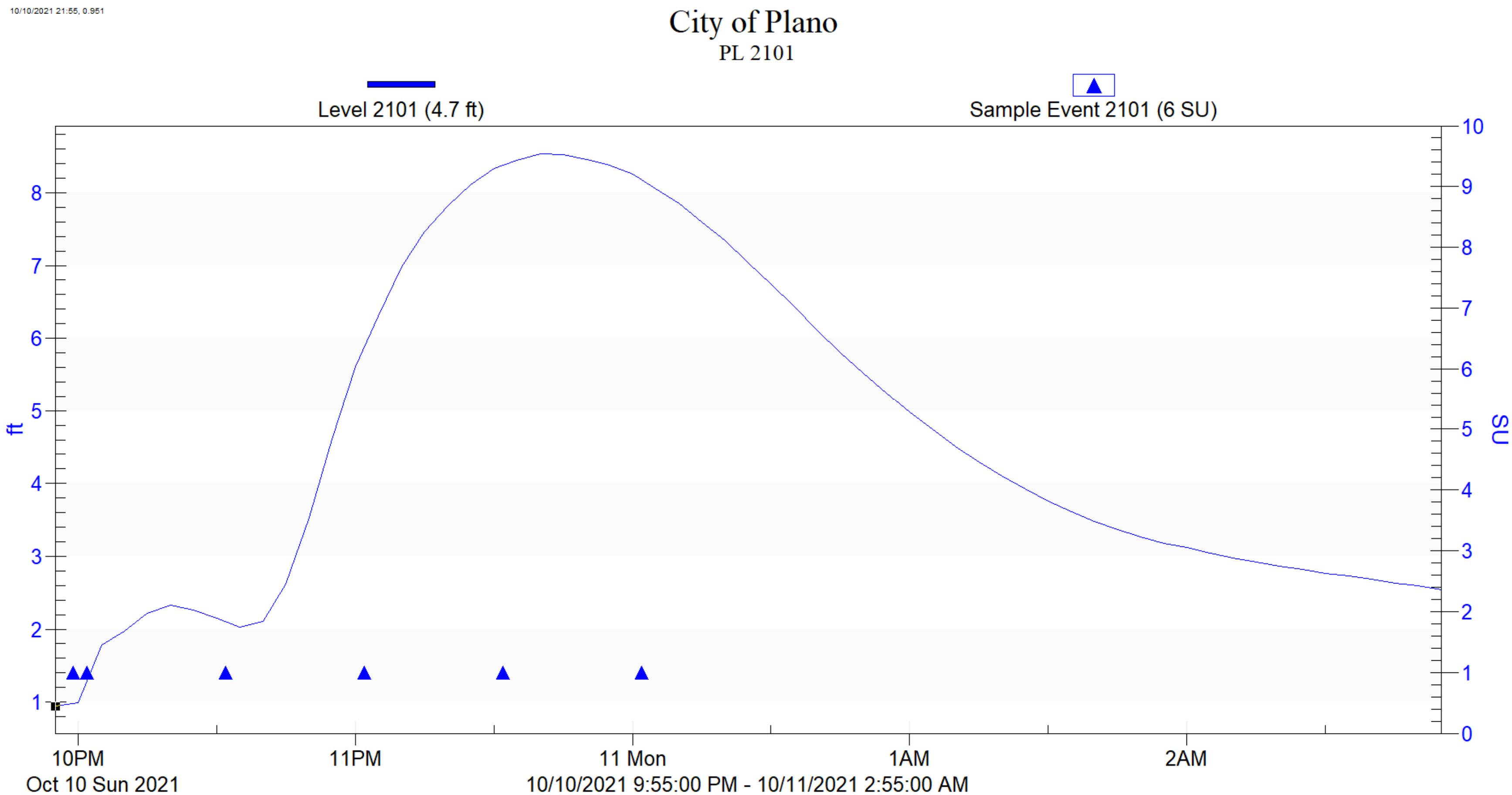
Station location description: Rowlett Creek in Oak Point Park

Flow start time and date:	2212 10/10/21 (est.)		
Flow end time and date:	Unknown		
Time first aliquot collected:	2212 10/10/21		
Time last aliquot collected:	0015 10/10/21		
Peak depth:	8.6 ft (est.)	Aliquots collected:	6
Average depth:	Unknown	Total sample volume:	3.5 gal

Comments: The sampler data was lost during the data transfer.

Prepared By: Adam Gottlieb Date: November 8, 2021

Checked By: Randolph Colby Date: November 15, 2021


10/10/2021 21:55, 0.951
City of Plano
PL 2101
Level 2101 (4.7 ft)
Sample Event 2101 (6 SU)
ft
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10/10/2021 9:55:00 PM - 10/11/2021 2:55:00 AM

Analytical Results Summary
NCTCOG Regional Stormwater Monitoring Program
NCTCOG Project 100077363

CITY OF PLANO 2021

Storm Event: 10/10/2021 Project Number: 100077363	**PL2101**	**PL2102**	
PARAMETER NAME	**COMPOSITE**	**COMPOSITE**	**UNIT**
Total Dissolved Solids (TDS)	188	267	mg/L
Total Suspended Solids (TSS)	97.3	131	mg/L
Biochemical Oxygen Demand (BOD)	10.5 B1	3.95 B1	mg/L
Chemical Oxygen Demand (COD)	40.3	29.5 J	mg/L
Total Nitrogen	1.35	0.987	mg/L
Nitrate N	0.510	0.448	mg/L
Ammonia N	0.0996 B, J	< 0.0280	mg/L
Orthophosphate	< 0.0200	< 0.0200	mg/L
Phosphorus, Dissolved	0.0778	0.0801	mg/L
Phosphorus, Total	0.0514	0.0261 J	mg/L
Atrazine	0.070	0.056	µg/L
Arsenic, Total	0.00262	0.00336	mg/L
Chromium, Total	0.00685	0.0112	mg/L
Copper, Total	0.00800 B	0.00672 B	mg/L
Lead, Total	0.00251	0.00375	mg/L
Zinc, Total	0.0299 B	0.250	mg/L
PARAMETER NAME	**GRAB**	**GRAB**	**UNIT**
Oil & Grease (HEM)	< 0.350	< 0.350	mg/L
pH	7.2	8.0	su
Ambient Air Temperature (field)	65	65	°F
Water Temperature (field)	71.8	71.9	°F
E. Coli	> 2419.6	2420	MPN/100 mL
Specific Conductivity	504	489	µS/cm

">" - Not Identified Above the Upper Detection Limit
"<" - Not Identified Below the Lower Detection Limit
J - Positively Identified Below the Lower Detection Limit
B - The same analyte is found in the associated blank
B1 - The blank depletion was greater than the recommended maximum depletion of 0.2 mg/L

Appendix H:

Dallas Bioassessment Report

Table E-4 Reference Sites Used for Rapid Bioassessment Program

	Site	Reference Site
Bachman Branch – Elm Fork Trinity River	BAB-B – Bachman Branch site B	SMCA - South Mesquite Creek site A
White Rock Creek – White Rock Lake	DIX-A – Dixon Branch site A	SMCA - South Mesquite Creek site A
Five Mile Creek – Trinity River	FIV-A – Five Mile Creek site A	SMCA - South Mesquite Creek site A
Headwaters Turtle Creek	KNI-A – Knights Branch site A	SMCA - South Mesquite Creek site A

Table E-4a **Rapid Bioassessment Protocol – Habitat Assessment Data 1**

HUC Watershed	Sample ID	Collection Date	Habitat Score	Average Stream Depth (meters)	Average Stream Width (meters)	Channel Alteration	Channel Sinuosity	Embeddedness
Bachman Branch - Elm Fork Trinity River	JOES-1	3/29/2021	78	0.69	13.41	6	10	5
		7/19/2021	148	Unwadable		11	7	5
	BAB-B	3/16/2021	177	0.21	7.92	9	10	16
		7/15/2021	181	0.12	6.07	13	15	16
	NWDA-1	3/29/2021	78	0.35	13.87	5	5	5
		7/19/2021	96	Unwadable		10	6	5
	RIB-A	3/30/2021	151	0.21	2.74	16	8	10
		7/14/2021	178	0.06	2.26	15	15	16
Delaware Creek - West Fork Trinity River	MOC-A	3/15/2021	119	0.21	12.50	12	9	5
		7/22/2021	145	Unwadable		13	10	15
Farmer's Branch - Elm Fork Trinity River	FARM-1	3/30/2021	187	0.29	32.92	17	11	16
		7/19/2021	172	0.34	30.18	15	10	13
Five Mile Creek – Trinity River	FIV-A	3/16/2021	DRY					
		7/15/2021	121	Unwadable		13	11	3
	FIV-B	3/16/2021	157	0.34	16.15	14	10	9
		7/15/2021	136	0.24	11.58	12	11	8
	NEW-A	3/15/2021	131	0.30	6.71	7	12	7
		7/22/2021	184	0.23	5.18	12	12	14
	SEDA-1	3/29/2021	110	0.12	2.13	6	10	6

		7/19/2021	133	0.07	1.55	12	7	9
Floyd Branch - White Rock Creek	FLO-A	3/22/2021	125	0.11	6.71	11	6	8
		7/22/2021	179	0.18	8.84	13	12	16
	MCK-C	3/16/2021	105	0.24	0.98	13	12	6
		7/15/2021	154	0.16	4.88	11	10	15

Table E-4a (continued)	Rapid Bioassessment Protocol – Habitat Assessment Data 1							
HUC Watershed	Sample ID	Collection Date	Habitat Score	Average Stream Depth (meters)	Average Stream Width (meters)	Channel Alteration	Channel Sinuosity	Embeddedness
Headwaters Five Mile Creek	FIV-D	3/22/2021	138	0.18	4.27	11	10	13
		7/22/2021	131	0.16	4.21	12	7	12
	TEN-B	3/15/2021	152	0.26	13.41	12	11	12

Headwaters Ten Mile Creek		7/22/2021	183	0.26	10.97	16	7	14
	TEN-D	3/22/2021	126	0.17	9.75	6	9	11
		7/22/2021	173	0.12	14.94	12	7	16
Headwaters Turtle Creek	CEB-B	3/16/2021	141	0.28	3.66	11	16	7
		7/15/2021	161	0.06	2.35	15	10	15
	KNI-A	3/16/2021	140	0.23	11.58	7	8	12
		7/15/2021	142	0.28	11.70	6	5	12
	TRO-A	3/30/2021	155	0.25	3.96	17	15	7
		7/14/2021	136	0.09	3.84	11	13	6
	TUR-A	3/30/2021	195	0.08	3.02	13	15	14
		7/14/2021	168	0.24	4.27	14	12	13
Prairie Creek - Trinity River	PRA-A	3/15/2021	171	0.20	7.32	17	7	14
		7/22/2021	Unsafe					
South Mesquite Creek	SMC-A	3/16/2021	163	0.14	8.11	11	10	15
		7/15/2021	186	0.12	5.79	14	10	13
	SMC-B	3/30/2021	116	0.27	7.01	10	12	5
		7/14/2021	165	0.21	6.10	13	13	10
	SMC-C	3/30/2021	120	0.30	5.49	11	10	9
		7/14/2021	143	0.16	6.10	11	8	6
Turtle Creek - Trinity River	CEDR-1	3/29/2021	136	0.25	4.88	14	12	6
		7/19/2021	112	0.27	5.06	13	8	4
	COO-A	3/30/2021	152	0.29	6.07	12	11	11
		7/14/2021	172	0.20	6.16	9	10	11

White Rock Creek - White Rock Lake	DIX-A	3/16/2021	107	0.28	8.23	8	10	5
		7/15/2021	150	0.39	5.49	15	12	16

Table E-4a (continued) Rapid Bioassessment Protocol – Habitat Assessment Data 1

HUC Watershed	Sample ID	Collection Date	Epifaunal Substrate / Available Cover	Frequency of Riffles	Left Bank Stability	Right Bank Stability	Left Bank Vegetative Protection	Right Bank Vegetative Protection	Pool Substrate Characterization
Bachman Branch - Elm Fork Trinity River	JOES-1	3/29/2021	4	3	3	3	2	2	6
		7/19/2021	15	5	7	8	7	8	13
	BAB-B	3/16/2021	12	14	8	8	6	8	17
		7/15/2021	15	15	8	8	8	8	15
	NWDA-1	3/29/2021	5	5	4	4	2	2	6
		7/19/2021	5	6	3	4	2	3	6
	RIB-A	3/30/2021	11	5	5	5	7	7	8
		7/14/2021	14	6	8	6	7	6	16
Delaware Creek - West Fork Trinity River	MOC-A	3/15/2021	5	8	7	7	5	5	7
		7/22/2021	3	16	6	5	3	3	5

Farmer's Branch - Elm Fork Trinity	FARM-1	3/30/2021	16	2	9	9	9	9	17
		7/19/2021	13	3	9	8	9	9	14
Five Mile Creek – Trinity River	FIV-A	3/16/2021	DRY						
		7/15/2021	11	3	5	5	3	4	11
	FIV-B	3/16/2021	11	11	4	4	5	5	12
		7/15/2021	5	6	6	7	6	5	9
	NEW-A	3/15/2021	6	6	3	3	3	3	7
		7/22/2021	12	16	6	8	7	9	12
	SEDA-1	3/29/2021	7	12	1	4	1	4	12
		7/19/2021	9	16	4	4	3	4	13
Floyd Branch - White Rock Creek	FLO-A	3/22/2021	10	18	0	0	3	3	3
		7/22/2021	12	19	6	5	5	4	5
	MCK-C	3/16/2021	6	14	4	4	3	3	3
		7/15/2021	7	19	7	9	8	6	5

Table E-4a (continued) **Rapid Bioassessment Protocol – Habitat Assessment Data 1**

HUC Watershed	Sample ID	Collection Date	Epifaunal Substrate / Available Cover	Frequency of Riffles	Left Bank Stability	Right Bank Stability	Left Bank Vegetative Protection	Right Bank Vegetative Protection	Pool Substrate Characterization
Headwaters Five Mile Creek	FIV-D	3/22/2021	8	9	6	6	4	4	5
		7/22/2021	5	10	7	7	7	8	10

Headwaters Ten Mile Creek	TEN-B	3/15/2021	11	11	7	7	5	5	9
		7/22/2021	14	16	5	9	7	8	5
	TEN-D	3/22/2021	6	17	8	8	1	1	1
		7/22/2021	1	18	7	6	8	7	2
Headwaters Turtle Creek	CEB-B	3/16/2021	8	5	3	3	5	5	14
		7/15/2021	12	15	5	6	5	8	17
	KNI-A	3/16/2021	7	3	8	8	5	5	13
		7/15/2021	12	5	8	8	8	6	13
	TRO-A	3/30/2021	12	11	3	3	9	9	7
		7/14/2021	12	9	4	4	4	5	11
	TUR-A	3/30/2021	16	15	9	9	8	8	15
		7/14/2021	14	3	9	9	6	6	16
Prairie Creek - Trinity River	PRA-A	3/15/2021	11	12	9	9	9	9	8
		7/22/2021	Unsafe						
South Mesquite Creek	SMC-A	3/16/2021	10	12	5	5	5	5	18
		7/15/2021	13	16	7	7	8	6	16
	SMC-B	3/30/2021	10	11	6	5	4	4	7
		7/14/2021	14	11	5	7	3	8	12
	SMC-C	3/30/2021	9	7	6	6	6	6	7
		7/14/2021	12	11	5	6	6	6	13
Turtle Creek - Trinity River	CEDR-1	3/29/2021	10	13	2	2	4	4	8
		7/19/2021	11	6	3	3	8	8	6

	COO-A	3/30/2021	10	15	5	5	4	4	12
		7/14/2021	13	18	9	7	6	5	12
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	7	13	5	5	2	2	2
		7/15/2021	13	2	2	2	4	4	14

Table E-4a (continued) **Rapid Bioassessment Protocol – Habitat Assessment Data 1**

HUC Watershed	Sample ID	Collection Date	Pool Variability	Channel Flow Status	Riparian Vegetative Zone Width-Left	Riparian Vegetative Zone Width-Right	Sediment Deposition	Velocity / Depth Regime
Bachman Branch - Elm Fork Trinity River	JOES-1	3/29/2021	9	10	3	3	6	3
		7/19/2021	13	16	7	6	16	4
	BAB-B	3/16/2021	15	14	6	8	11	15
		7/15/2021	16	10	5	6	8	15
	NWDA-1	3/29/2021	12	7	3	3	5	5
		7/19/2021	12	11	3	3	11	6
	RIB-A	3/30/2021	15	17	3	5	15	14
		7/14/2021	15	13	5	5	16	15
Delaware Creek - West Fork Trinity River	MOC-A	3/15/2021	8	13	5	5	11	7
		7/22/2021	13	14	6	6	16	11
Farmer's Branch - Elm Fork Trinity River	FARM-1	3/30/2021	17	18	8	8	15	6
		7/19/2021	14	16	8	8	18	5

Five Mile Creek – Trinity River	FIV-A	3/16/2021	DRY					
		7/15/2021	11	12	4	5	17	3
	FIV-B	3/16/2021	14	16	8	8	13	13
		7/15/2021	12	11	5	8	10	15
	NEW-A	3/15/2021	12	18	9	9	14	12
		7/22/2021	15	16	7	7	16	15
	SEDA-1	3/29/2021	5	14	4	4	11	9
		7/19/2021	9	7	5	6	10	15
Floyd Branch - White Rock Creek	FLO-A	3/22/2021	14	13	4	5	14	13
		7/22/2021	17	15	8	8	17	17
	MCK-C	3/16/2021	7	6	5	5	7	7
		7/15/2021	8	13	4	6	15	11

Table E-4a (continued) **Rapid Bioassessment Protocol – Habitat Assessment Data 1**

HUC Watershed	Sample ID	Collection Date	Pool Variability	Channel Flow Status	Riparian Vegetative Zone Width-Left	Riparian Vegetative Zone Width-Right	Sediment Deposition	Velocity / Depth Regime
	FIV-D	3/22/2021	12	10	7	7	16	10

Headwaters Five Mile Creek		7/22/2021	4	9	7	8	10	8
Headwaters Ten Mile Creek	TEN-B	3/15/2021	13	14	7	7	9	12
		7/22/2021	16	16	8	8	16	18
	TEN-D	3/22/2021	4	16	6	7	17	8
		7/22/2021	17	19	9	9	19	16
Headwaters Turtle Creek	CEB-B	3/16/2021	14	16	5	7	10	12
		7/15/2021	11	8	4	4	12	14
	KNI-A	3/16/2021	14	18	3	6	16	7
		7/15/2021	13	16	4	3	15	8
	TRO-A	3/30/2021	15	16	5	5	8	13
		7/14/2021	15	15	5	4	8	10
	TUR-A	3/30/2021	10	16	8	8	16	15
		7/14/2021	15	18	5	5	17	6
Prairie Creek - Trinity River	PRA-A	3/15/2021	7	17	8	8	16	10
		7/22/2021	Unsafe					
South Mesquite Creek	SMC-A	3/16/2021	16	10	5	5	15	16
		7/15/2021	17	14	7	6	16	16
	SMC-B	3/30/2021	9	9	5	5	6	8
		7/14/2021	13	16	6	8	16	10
	SMC-C	3/30/2021	11	8	6	6	6	6
		7/14/2021	17	11	5	4	8	14

Turtle Creek - Trinity River	CEDR-1	3/29/2021	9	13	8	8	12	11
		7/19/2021	8	9	3	5	5	12
	COO-A	3/30/2021	15	11	5	6	11	15
		7/14/2021	16	15	5	5	13	18
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	9	8	5	5	8	13
		7/15/2021	17	12	9	8	7	13

Table E-5 Aquatic Life Use Rating Data

HUC Watershed	Sample ID	Spring 2021		Summer 2021	
Bachman Branch - Elm Fork Trinity River	JOES-1	23	Intermediate		Unsafe
	BAB-B	22	Intermediate	24	Intermediate
	NWDA-1	23	Intermediate	26	Intermediate
	RIB-A	24	Intermediate	28	Intermediate
Delaware Creek - West Fork Trinity River	MOC-A	24	Intermediate		Unwadable
Farmer's Branch - Elm Fork Trinity River	FARM-1	24	Intermediate	27	Intermediate
Five Mile Creek – Trinity River	FIV-A		DRY	25	Intermediate
	FIV-B	20	Limited	26	Intermediate
	NEW-A	23	Intermediate	27	Intermediate
	SEDA-1	27	Intermediate	26	Intermediate
Floyd Branch - White Rock Creek	FLO-A	24	Intermediate	26	Intermediate
	MCK-C	27	Intermediate	29	High

Headwaters Five Mile Creek	FIV-D	24	Intermediate	24	Intermediate
Headwaters Ten Mile Creek	TEN-B	24	Intermediate	27	Intermediate
	TEN-D	26	Intermediate	30	High
Headwaters Turtle Creek	CEB-B	23	Intermediate	21	Limited
	KNI-A	26	Intermediate	26	Intermediate
	TRO-A	26	Intermediate	26	Intermediate
	TUR-A	28	Intermediate	19	Limited
Prairie Creek - Trinity River	PRA-A	24	Intermediate		Unsafe
South Mesquite Creek	SMC-A	17	Limited	28	Intermediate
	SMC-B	25	Intermediate	27	Intermediate
	SMC-C	25	Intermediate	23	Intermediate
Turtle Creek - Trinity River	CEDR-1	28	Intermediate	27	Intermediate
	COO-A	26	Intermediate	27	Intermediate
White Rock Creek-White Rock Lake	DIX-A	17	Limited	24	Intermediate

Table E-6a Water Quality Data 1

HUC Watershed	Sample ID	Collection Date	Temperature (°C)	pH	Turbidity (NTU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (as N) (mg/L)	Nitrate + Nitrite (as N) (mg/L)	Total Phosphorus (as P) (mg/L)	Chemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)
	ELMT-1	4/8/2021	17.1	7.74	5	1783	5.83	<0.10	<0.050	<0.050	<35.0	4

		7/26/2021	28.3	7.92	12	1849	0.92	<0.100	<0.050	0.182	45	9
		7/26/2021	28.7	7.96	13	1832	1.18	<0.100	<0.050	0.168	42.9	9
	JOES-1	3/29/2021	14.9	7.93	12	787	7.50	<0.10	0.94	<0.050	<35.0	8
		7/19/2021	28.3	7.54	23	585	3.85	0.272	0.161	0.0773	<35.0	24
	BAB-B	3/16/2021	18.6	7.95	7	816	7.63	<0.10	0.22	<0.050	<35.0	6
		7/15/2021	26.2	7.93	4	636	6.37	<0.100	0.302	<0.050	<35.0	2
	LBAC-1	4/8/2021	17.3	7.93	15	539	6.69	<0.10	0.33	<0.050	<35.0	13
		7/26/2021	29.5	7.52	19	475	4.58	<0.100	0.332	0.0669	<35.0	18
	CAC-A	4/5/2021	17.4	7.77	33	1256	6.40	0.50	0.3	0.13	37.5	31
Bachman Branch - Elm Fork Trinity River		7/26/2021	30.9	7.48	14	651	5.57	1.98	0.118	0.182	55.5	17
	DAN-A	4/5/2021	16.6	7.50	29	860	0.32	7.6	<0.050	0.87	54.7	22
		7/26/2021	29.2	7.31	40	685	0.38	7.87	<0.050	1.06	47.1	41
	NWD-5	4/5/2021	16.7	9.32	3	964	15.54	<0.10	<0.050	<0.050	<35.0	6
		7/26/2021	27.9	8.81	17	1440	9.88	<0.100	<0.050	0.19	66	20
	NWDA-1	3/29/2021	17.9	7.86	21	817	10.47	0.18	0.28	<0.050	<35.0	19
		7/19/2021	29.0	7.76	16	783	8.04	0.313	0.146	0.0695	<35.0	12
	RIB-A	3/30/2021	16.6	7.65	15	960	7.14	0.23	<0.050	0.064	<35.0	14
		7/14/2021	25.2	7.44	8	859	3.91	0.116	0.137	0.0776	46.2	8
	BAB-C	4/5/2021	16.7	7.99	4	751	7.75	<0.10	0.61	<0.050	<35.0	6
		7/26/2021	28.1	7.69	10	599	4.76	<0.100	0.212	0.0723	<35.0	8
City of Dallas - White Rock Creek	ASH-A	4/8/2021	18.9	7.71	7	650	4.83	<0.10	0.1	<0.050	<35.0	6
		4/8/2021	18.9	7.71	7	651	4.80	<0.10	0.11	<0.050	<35.0	6
		7/27/2021	30.7	7.37	7	537	5.45	<0.100	0.184	0.0702	<35.0	2
	WHC-A	4/8/2021	18.7	8.28	19	463	8.59	<0.10	0.18	0.06	<35.0	26

		7/27/2021	31.2	7.63	44	345	6.12	<0.100	0.064	0.0882	<35.0	40

Table E-6a (continued) Water Quality Data 1

HUC Watershed	Sample ID	Collection Date	Temperature (°C)	pH	Turbidity (NTU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (as N) (mg/L)	Nitrate + Nitrite (as N) (mg/L)	Total Phosphorus (as P) (mg/L)	Chemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)
Delaware Creek - West Fork Trinity River	DELA-1	4/8/2021	16.9	7.84	5	521	6.11	<0.10	0.076	<0.050	<35.0	5
		7/26/2021	28.2	7.74	9	508	5.40	<0.100	0.17	0.0669	<35.0	5
	LMOC-1	4/8/2021	19.4	8.22	23	493	7.90	<0.10	<0.050	<0.015	<35.0	23
		7/26/2021	31.6	7.79	47	531	6.69	<0.100	0.0525	0.135	<35.0	44
	MOC-A	3/15/2021	19.1	9.47	38	520	8.08	<0.10	<0.050	<0.050	<35.0	33
		7/22/2021	30.5	8.19	72	488	7.80	<0.100	<0.050	0.0665	<35.0	72
Duck Creek	LON-B	4/6/2021	18.8	7.83	16	626	6.38	<0.10	0.26	<0.050	<35.0	12
		7/27/2021	27.6	7.53	9	477	3.09	<0.100	0.0967	<0.050	<35.0	7
Farmer's Branch - Elm Fork Trinity River	EFCB-1	4/5/2021	18.8	8.02	46	443	6.63	<0.10	<0.050	0.12	<35.0	43
		7/26/2021	29.8	7.28	53	412	2.42	0.125	<0.050	0.738	<35.0	48
	FARM-1	3/30/2021	18.0	7.86	32	420	6.46	0.14	0.2	0.068	<35.0	29
		7/19/2021	28.9	7.71	23	462	5.73	<0.100	<0.050	0.0575	<35.0	24
		7/19/2021	29.2	7.89	26	458	5.60	<0.100	<0.050	<0.050	<35.0	25
	ART-A	4/7/2021	19.2	8.22	0	693	7.58	<0.10	0.19	<0.050	<35.0	5

Fish Creek - Mountain Creek Lake		7/28/2021	30.1	7.82	40	841	4.04	<0.100	<0.050	0.0645	<35.0	38
		7/28/2021	29.3	7.79	40	839	3.26	<0.100	<0.050	0.0792	<35.0	39
	MOC-B	4/7/2021	18.8	8.20	37	451	8.13	<0.10	0.17	0.088	<35.0	38
		7/28/2021	27.8	7.90	26	452	6.48	0.114	0.0605	0.0657	<35.0	24
Five Mile Creek - Trinity River	ELA-A	4/8/2021	17.7	7.79	8	718	6.36	<0.10	0.46	<0.050	<35.0	6
		7/27/2021	25.4	7.60	0	744	5.87	<0.100	0.823	<0.050	47.1	0
	ELA-B	4/8/2021	19.2	7.83	8	645	7.03	<0.10	0.1	0.07	<35.0	7
		7/27/2021	26.8	7.68	0	619	6.13	<0.100	<0.050	<0.050	<35.0	0
	FIV-A	3/16/2021	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
		7/15/2021	26.8	7.62	17	495	3.67	<0.100	<0.05	0.406	56.8	12
	FIV-B	3/16/2021	18.5	8.29	3	564	10.69	<0.10	0.33	<0.050	<35.0	2
		7/15/2021	28.7	8.03	1	444	8.60	<0.100	0.475	<0.050	<35.0	0
	NEW-A	3/15/2021	16.5	7.89	0	498	8.29	0.10	0.38	<0.050	<35.0	0
		7/22/2021	24.7	7.86	7	482	7.35	<0.100	0.218	<0.050	<35.0	4
		7/22/2021	24.8	8.02	13	482	7.88	<0.100	0.204	<0.050	<35.0	15

Table E-6a (continued) Water Quality Data 1

HUC Watershed	Sample ID	Collection Date	Temperature (°C)	pH	Turbidity (NTU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (as N) (mg/L)	Nitrate + Nitrite (as N) (mg/L)	Total Phosphorus (as P) (mg/L)	Chemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)
Five Mile Creek - Trinity River	SDAL-1	4/8/2021	21.3	7.18	57	796	2.44	6.9	1.4	0.96	149	54
		7/27/2021	27.6	7.74	7	769	6.91	<0.100	2.86	<0.050	<35.0	9
	SEDA-1	3/29/2021	16.1	8.04	8	728	9.01	<0.10	0.72	0.085	<35.0	6

		7/19/2021	24.0	7.68	6	805	6.93	<0.100	0.389	<0.050	<35.0	6
Floyd Branch - White Rock Creek	COT-C	4/5/2021	17.3	8.10	2	757	9.56	<0.10	0.62	<0.050	<35.0	8
		7/27/2021	27.9	7.87	0	647	5.95	<0.100	0.532	<0.050	<35.0	0
	FLO-A	3/22/2021	16.7	8.41	3	829	11.27	<0.10	6	1.2	<35.0	6
		7/22/2021	25.7	8.43	3	670	8.73	<0.100	5.42	1.4	<35.0	0
	MCK-C	3/16/2021	17.3	7.75	5	613	9.32	<0.10	0.32	0.1	<35.0	3
		3/16/2021	16.7	7.89	3	606	9.42	0.26	0.31	<0.050	<35.0	2
		7/15/2021	25.0	8.20	5	611	8.25	<0.100	0.524	<0.050	<35.0	3
Grapevine Creek - Elm Fork Trinity River	HUTT-1	4/5/2021	20.6	8.01	0	563	9.31	<0.10	<0.050	<0.050	<35.0	3
		7/26/2021	30.0	7.63	9	607	7.93	<0.100	<0.050	<0.050	<35.0	7
Headwaters Five Mile Creek	CRO-A	4/7/2021	19.8	8.01	5	535	8.00	<0.10	0.38	<0.050	<35.0	0
		7/28/2021	29.6	8.16	6	546	7.52	<0.100	0.382	<0.050	<35.0	0
	FIV-C	4/7/2021	20.5	8.08	4	578	8.30	<0.10	0.46	<0.050	<35.0	1
		7/28/2021	29.2	7.89	4	497	6.79	<0.100	0.475	0.0645	<35.0	5
	FIV-D	3/22/2021	14.7	8.28	0	599	8.51	<0.10	0.4	<0.050	<35.0	4
		3/22/2021	14.6	8.23	0	603	8.48	<0.10	0.4	<0.050	<35.0	4
		7/22/2021	26.1	7.75	7	509	5.40	<0.100	0.244	<0.050	<35.0	7
	FIV-E	4/7/2021	19.4	8.31	2	649	8.46	<0.10	0.33	<0.050	<35.0	0
		7/28/2021	28.6	8.04	0	798	7.43	<0.100	0.223	<0.050	<35.0	0
	RIC-B	4/7/2021	19.8	8.18	0	575	9.45	<0.10	0.62	0.056	<35.0	0
		7/28/2021	28.8	8.26	0	480	8.22	<0.100	0.414	<0.050	<35.0	0
	WOO-A	4/7/2021	19.9	7.95	4	595	8.33	<0.10	0.4	<0.050	<35.0	2
		7/28/2021	30.8	7.65	4	518	8.41	<0.100	0.424	0.0746	<35.0	2

Table E-6a (continued) Water Quality Data 1

HUC Watershed	Sample ID	Collection Date	Temperature (°C)	pH	Turbidity (NTU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (as N) (mg/L)	Nitrate + Nitrite (as N) (mg/L)	Total Phosphorus (as P) (mg/L)	Chemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)
Headwaters Ten Mile Creek	TEN-B	3/15/2021	15.9	7.79	8	560	8.53	<0.10	0.1	<0.050	<35.0	9
		7/22/2021	25.0	8.07	5	347	7.37	<0.100	0.331	<0.050	45	3
	TEN-D	3/22/2021	15.5	8.38	1	559	9.13	<0.10	0.095	<0.050	<35.0	2
		7/22/2021	25.3	7.93	4	377	7.46	<0.100	0.301	<0.050	<35.0	4
Headwaters Turtle Creek	DAEB-1	4/8/2021	17.2	7.80	13	827	6.27	<0.10	0.86	0.062	<35.0	14
		4/8/2021	17.1	7.84	12	830	6.26	<0.10	0.88	0.067	<35.0	17
		7/28/2021	28.2	7.58	20	741	5.28	<0.100	0.325	0.0916	<35.0	17
	DAEB-2	4/5/2021	18.1	7.88	35	903	7.41	<0.10	1.3	0.091	<35.0	34
		7/28/2021	28.3	7.49	40	813	3.51	0.270	0.616	0.125	<35.0	40
	CBD-2	4/7/2021	17.8	8.05	4	847	7.55	<0.10	1.3	0.12	<35.0	0
		7/28/2021	26.5	7.75	10	800	6.86	0.270	1.62	0.173	<35.0	15
	CEB-B	3/16/2021	19.7	7.52	8	841	9.17	<0.10	1.4	0.12	<35.0	6
		7/15/2021	25.6	7.78	0	734	6.72	<0.100	1.71	0.0886	<35.0	0
	KNI-A	3/16/2021	19.6	8.74	9	771	14.04	<0.10	0.96	<0.050	<35.0	4
		7/15/2021	26.0	8.31	4	728	9.50	<0.100	0.819	<0.050	<35.0	2
	TRO-A	3/30/2021	17.4	7.75	18	769	5.82	0.44	0.32	0.11	<35.0	17
		7/14/2021	27.3	7.98	15	583	4.44	0.205	0.161	0.139	<35.0	13
	TRO-C	4/8/2021	17.5	8.08	17	953	7.01	<0.10	0.14	0.25	<35.0	16

		7/26/2021	30.0	7.95	7	113	7.14	<0.100	0.268	<0.050	<35.0	5
	TUR-A	3/30/2021	17.2	7.75	3	764	6.97	<0.10	2.2	0.076	<35.0	2
		3/30/2021	17.0	7.80	3	779	6.97	<0.10	2.1	0.15	<35.0	2
		7/14/2021	25.7	7.94	4	718	6.23	0.159	1.94	0.0842	<35.0	2
	TUR-C	4/8/2021	18.7	8.34	11	707	9.09	<0.10	0.072	0.11	46.1	12
		7/27/2021	31.0	8.05	8	503	5.95	<0.100	0.187	0.0668	<35.0	7
Headwaters White Rock Creek	UWRC-1	4/5/2021	17.8	8.34	15	633	9.11	<0.10	0.36	<0.050	<35.0	10
		7/27/2021	29.3	8.27	8	399	7.10	<0.100	0.0919	0.0566	<35.0	11
Hickory Creek - Parsons Slough	HIC-D	4/7/2021	19.2	7.76	8	951	6.67	<0.10	<0.050	0.22	<35.0	5
		4/7/2021	19.1	7.77	8	956	6.68	<0.10	<0.050	0.063	<35.0	8
		7/28/2021	27.0	7.45	13	1041	4.94	<0.100	<0.050	<0.050	<35.0	12
	ATEN-1	4/7/2021	19.7	7.91	81	722	5.82	<0.10	<0.050	0.21	35.4	80
		7/28/2021	27.4	7.72	19	615	5.06	<0.100	<0.050	0.0758	<35.0	16
		7/28/2021	27.4	7.60	17	613	4.68	<0.100	<0.050	0.0711	<35.0	10

Table E-6a (continued) Water Quality Data 1

HUC Watershed	Sample ID	Collection Date	Temperature (°C)	pH	Turbidity (NTU)	Conductivity (μS/cm)	Dissolved Oxygen (mg/L)	Ammonia (as N) (mg/L)	Nitrate + Nitrite (as N) (mg/L)	Total Phosphorus (as P) (mg/L)	Chemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)
Indian Creek - Elm Fork Trinity River	FUR-A	4/5/2021	17.3	8.33	4	671	9.18	<0.10	0.068	<0.050	<35.0	0
		4/5/2021	17.4	8.30	4	672	9.19	<0.10	0.064	<0.050	<35.0	2
		7/26/2021	28.3	7.92	14	511	7.52	<0.100	<0.050	0.0847	<35.0	11

Pitman Creek - Spring Creek	SPC-A	4/6/2021	20.0	7.97	6	733	7.77	<0.10	0.99	<0.050	<35.0	4
		7/27/2021	29.1	7.88	6	629	6.29	<0.100	0.507	0.0532	<35.0	5
		7/27/2021	29.2	7.93	4	628	6.28	<0.100	0.596	<0.050	<35.0	4
Prairie Creek – Trinity River	PRA-A	3/15/2021	15.9	8.01	4	605	7.89	<0.10	<0.050	<0.050	<35.0	5
		7/22/2021	28.1	7.82	1	611	7.59	0.227	<0.050	<0.050	<35.0	0
	PRAI-2	4/8/2021	16.7	7.87	4	579	7.44	<0.10	0.074	<0.050	<35.0	2
		7/27/2021	27.4	7.79	0	449	6.47	<0.100	0.0772	<0.050	<35.0	2
		7/27/2021	27.3	7.81	1	452	6.42	<0.100	0.0775	<0.050	38.7	2
South Mesquite Creek	SMC-A	3/16/2021	17.7	8.04	6	830	7.94	<0.10	<0.050	0.085	<35.0	2
		7/15/2021	26.7	7.88	9	331	6.48	<0.100	0.226	0.0579	<35.0	29
	SMC-B	3/30/2021	16.6	7.88	7	643	7.62	0.22	0.28	0.053	<35.0	5
		7/14/2021	25.7	7.69	19	344	5.46	<0.100	0.325	<0.050	<35.0	35
	SMC-C	3/30/2021	17.7	8.36	14	591	8.92	<0.10	0.08	<0.050	<35.0	7
		7/14/2021	26.4	7.96	14	342	6.53	<0.100	0.254	<0.050	<35.0	19
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	17.9	7.85	4	763	9.83	<0.10	0.32	<0.050	54.3	0
		7/15/2021	26.7	7.67	7	475	5.41	<0.100	0.361	<0.050	<35.0	7
		7/15/2021	26.9	7.66	8	475	5.41	<0.100	0.36	<0.050	<35.0	8
	JAC-A	4/6/2021	19.8	7.74	6	685	7.39	<0.10	0.87	<0.050	<35.0	5
		7/27/2021	29.7	7.77	81	524	6.35	<0.100	0.451	0.0702	<35.0	84
	MCC-A	4/6/2021	20.5	7.59	16	533	6.69	<0.10	0.31	0.064	<35.0	15
		7/27/2021	30.4	7.55	12	429	4.70	<0.100	0.0654	<0.050	<35.0	6
	WIL-A	4/6/2021	19.3	7.64	21	791	5.63	<0.10	0.86	0.1	<35.0	28
		7/27/2021	30.6	7.52	29	370	3.52	<0.100	<0.050	0.0826	<35.0	28
	WHC-C	4/6/2021	19.8	8.14	4	717	8.87	<0.10	1	0.35	<35.0	4

		7/27/2021	29.5	8.14	0	573	7.31	<0.100	2.44	0.646	<35.0	6

Table E-6a (continued) Water Quality Data 1

HUC Watershed	Sample ID	Collection Date	Temperature (°C)	pH	Turbidity (NTU)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Ammonia (as N) (mg/L)	Nitrate + Nitrite (as N) (mg/L)	Total Phosphorus (as P) (mg/L)	Chemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)
Turtle Creek-Trinity River	CEC-B	4/7/2021	19.9	8.28	5	616	9.50	<0.10	1.8	<0.050	<35.0	4
		7/28/2021	32.1	8.60	0	560	11.80	<0.100	0.897	0.12	<35.0	4
	CEDR-1	3/29/2021	15.8	8.12	2	673	8.06	<0.10	2	0.12	<35.0	3
		7/19/2021	27.1	7.85	2	591	5.75	<0.100	0.962	0.055	<35.0	2
	COO-A	3/30/2021	17.0	8.10	6	722	9.23	<0.10	2.9	<0.050	<35.0	8
		7/14/2021	26.6	7.90	10	483	7.21	0.222	0.828	0.136	<35.0	14
	DAWB-3	4/5/2021	21.5	8.46	0	718	11.49	<0.10	1.5	<0.050	<35.0	0
		7/28/2021	29.0	7.91	6	829	10.63	<0.100	0.468	0.0826	<35.0	1
	FIL-A	4/8/2021	16.2	7.91	3	663	6.95	<0.10	0.075	<0.050	<35.0	2
		7/26/2021	34.0	7.84	23	759	9.65	<0.100	<0.050	0.0723	<35.0	24
	LAC-A	4/8/2021	19.8	7.68	19	351	4.81	<0.10	0.086	0.19	48.3	19
		7/28/2021	32.4	8.16	11	285	9.51	<0.100	0.775	<0.050	<35.0	15
	LAC-B	4/8/2021	18.4	7.77	5	781	9.01	<0.10	2.9	<0.050	<35.0	4
		7/28/2021	30.9	7.59	5	330	6.45	<0.100	0.23	0.0532	<35.0	5
	WDAL-1	4/8/2021	19.5	8.09	16	916	10.23	<0.10	0.69	<0.050	<35.0	16
		7/26/2021	31.2	7.98	35	843	7.37	0.663	7.54	0.186	76.5	35

	WDAL-2	4/8/2021	19.8	7.39	6	946	8.00	<0.10	6.2	<0.050	<35.0	4
		7/26/2021	24.9	7.01	11	1103	6.92	<0.100	8.34	0.412	36.6	5

Table E-6b Water Quality Data 2

HUC Watershed	Sample ID	Collection Date	E. coli *(MPN / 100ml)*	Total Coliform (MPN / 100ml)	Surfactants (mg/L)	Copper (mg/L)	Iron (mg/L)	Hardness (mg/L)	Flow (cu ft / sec)
Bachman Branch - Elm Fork Trinity River	ELMT-1	4/8/2021	344.8	>2419.6	<0.50	<0.020	<0.50	402	0
		7/26/2021	1410	>2419.6	<0.50	<0.020	<0.50	373	
		7/26/2021	1410	>2419.6	<0.50	<0.020	<0.50	360	0
	JOES-1	3/29/2021	135.4	>2419.6	<0.50	<0.020	<0.50	312	0
		7/19/2021	249	>2419.6	<0.50	<0.020	0.631	222	Unwadable
	BAB-B	3/16/2021	260.3	>2419.6	<0.50	<0.020	<0.50	302	1.2
		7/15/2021	172	>2419.6	<0.50	<0.020	<0.50	213	0.24
	LBAC-1	4/8/2021	61.3	>2419.6	<0.50	<0.020	<0.50	208	0.26
		7/26/2021	77.1	>2419.6	<0.50	<0.020	<0.50	170	0.28
	CAC-A	4/5/2021	178.5	>2419.6	<0.50	<0.020	0.89	335	Unwadable
		7/26/2021	127	>2419.6	<0.50	<0.020	<0.50	210	Unwadable
	DAN-A	4/5/2021	>2419.6	>2419.6	<0.50	<0.020	0.6	336	Unwadable
		7/26/2021	>2419.6	>2419.6	0.724	<0.020	<0.50	240	Unwadable
	NWD-5	4/5/2021	248.1	>2419.6	<0.50	<0.020	<0.50	272	Not Enough Water
		7/26/2021	>2419.6	>2419.6	<0.50	<0.020	<0.50	279	0.06
	NWDA-1	3/29/2021	36.8	>2419.6	<0.50	<0.020	0.88	266	0
		7/19/2021	548	>2419.6	<0.50	<0.020	0.865	243	Unwadable
	RIB-A	3/30/2021	66.3	>2419.6	<0.50	<0.020	0.53	266	0.48
		7/14/2021	457	>2419.6	<0.50	<0.020	<0.50	230	0.16

	BAB-C	4/5/2021	435.2	>2419.6	<0.50	<0.020	<0.50	303	Unwadable
		7/26/2021	461	>2419.6	<0.50	<0.020	<0.50	220	Unwadable
City of Dallas - White Rock Creek	ASH-A	4/8/2021	4.1	1732.9	<0.50	<0.020	<0.50	305	0.84
		4/8/2021	4.1	1986.3	<0.50	<0.020	<0.50	300	
		7/27/2021	167	>2419.6	<0.50	<0.020	<0.50	223	0
	WHC-A	4/8/2021	39.3	>2419.6	<0.50	<0.020	<0.50	199	Unwadable
		7/27/2021	29.4	>2419.6	<0.50	<0.020	0.615	149	Unwadable

Table E-6b (continued) Water Quality Data 2

HUC Watershed	Sample ID	Collection Date	E. coli *(MPN / 100ml)*	Total Coliform (MPN / 100ml)	Surfactants (mg/L)	Copper (mg/L)	Iron (mg/L)	Hardness (mg/L)	Flow (cu ft / sec)
Delaware Creek - West Fork Trinity River	DELA-1	4/8/2021	816.4	>2419.6	<0.50	<0.020	<0.50	174	1.22
		7/26/2021	435	>2419.6	<0.50	<0.020	<0.50	118	0.56
	LMOC-1	4/8/2021	156.5	2419.6	<0.50	<0.020	0.62	194	Unwadable
		7/26/2021	37.3	>2419.6	<0.50	<0.020	0.822	164	Unwadable
	MOC-A	3/15/2021	7.4	686.7	<0.50	<0.020	0.504	188	0.78
		7/22/2021	6.3	>2419.6	<0.50	<0.020	1.39	168	Unwadable
Duck Creek	LON-B	4/6/2021	648.8	>2419.6	<0.50	<0.020	<0.50	237	0.4
		7/27/2021	1730	>2419.6	<0.50	<0.020	<0.50	162	0.04
Farmer's Branch - Elm Fork Trinity River	EFCB-1	4/5/2021	11.9	>2419.6	<0.50	<0.020	1.3	197	Unwadable
		7/26/2021	9.6	>2419.6	<0.50	<0.020	1.18	146	Unwadable
	FARM-1	3/30/2021	50.4	>2419.6	<0.50	<0.020	<0.50	147	0.2

		7/19/2021	33.6	>2419.6	<0.50	<0.020	0.505	152	No Flow
		7/19/2021	39.3	>2419.6	<0.50	<0.020	0.829	153	
Fish Creek - Mountain Creek Lake	ART-A	4/7/2021	579.4	>2419.6	<0.50	<0.020	<0.50	347	Unwadable
		7/28/2021	32.7	>2419.6	<0.50	0.0237	0.598	221	Unwadable
		7/28/2021	30.9	>2419.6	<0.50	0.0209	0.599	209	
	MOC-B	4/7/2021	19.5	>2419.6	<0.50	<0.020	1	170	Unwadable
		7/28/2021	22.6	>2419.6	<0.50	<0.020	0.53	146	Active Construction
Five Mile Creek - Trinity River	ELA-A	4/8/2021	686.7	>2419.6	<0.50	<0.020	<0.50	297	0
		7/27/2021	172	>2419.6	<0.50	<0.020	<0.50	314	0.6
	ELA-B	4/8/2021	123.6	>2419.6	<0.50	<0.020	0.5	243	0.52
		7/27/2021	85.5	>2419.6	<0.50	<0.020	<0.50	249	No Flow
	FIV-A	3/16/2021	DRY	DRY	DRY	DRY	DRY	DRY	DRY
		7/15/2021	5.2	>2419.6	<0.50	<0.020	<0.50	245	Unwadable
	FIV-B	3/16/2021	83.6	>2419.6	<0.50	<0.020	<0.50	279	0.68
		7/15/2021	231	>2419.6	<0.50	<0.020	<0.50	201	0.32
	NEW-A	3/15/2021	178.9	>2419.6	<0.50	<0.020	<0.50	236	0.2
		7/22/2021	238	>2419.6	<0.50	<0.020	<0.50	231	0.82
		7/22/2021	228	>2419.6	<0.50	<0.020	<0.50	240	

Table E-6b (continued) Water Quality Data 2

HUC Watershed	Sample ID	Collection Date	E. coli *(MPN / 100ml)*	Total Coliform (MPN / 100ml)	Surfactants (mg/L)	Copper (mg/L)	Iron (mg/L)	Hardness (mg/L)	Flow (cu ft / sec)
Five Mile Creek - Trinity River	SDAL-1	4/8/2021	>2419.6	>2419.6	1	<0.020	<0.50	346	SSO Contamination
		7/27/2021	488	>2419.6	<0.50	<0.020	<0.50	376	No Flow
	SEDA-1	3/29/2021	124.6	>2419.6	<0.50	<0.020	<0.50	339	1.18
		7/19/2021	150	>2419.6	<0.50	<0.020	<0.50	342	0.28
Floyd Branch - White Rock Creek	COT-C	4/5/2021	686.7	>2419.6	<0.50	<0.020	<0.50	380	0.62
		7/27/2021	435	>2419.6	<0.50	<0.020	<0.50	256	0.04
	FLO-A	3/22/2021	1119.9	>2419.6	<0.50	<0.020	<0.50	291	1.52
		7/22/2021	579	>2419.6	<0.50	<0.020	<0.50	237	1.28
	MCK-C	3/16/2021	387.3	>2419.6	<0.50	<0.020	<0.50	264	0.6
		3/16/2021	307.6	>2419.6	<0.50	<0.020	<0.50	265	
		7/15/2021	816	>2419.6	<0.50	<0.020	<0.50	259	0.84
Grapevine Creek - Elm Fork Trinity River	HUTT-1	4/5/2021	23.1	>2419.6	<0.50	<0.020	<0.50	208	1.46
		7/26/2021	46.5	>2419.6	<0.50	<0.020	<0.50	178	0.04
Headwaters Five Mile Creek	CRO-A	4/7/2021	298.7	>2419.6	<0.50	<0.020	<0.50	266	0.2
		7/28/2021	435	>2419.6	<0.50	<0.020	<0.50	253	Unwadable
	FIV-C	4/7/2021	64.4	1986.3	<0.50	<0.020	<0.50	261	1.34
		7/28/2021	308	>2419.6	<0.50	<0.020	<0.50	230	27.425
	FIV-D	3/22/2021	83	1986.3	<0.50	<0.020	<0.50	285	0.9
		3/22/2021	41	>2419.6	<0.50	<0.020	<0.50	283	
		7/22/2021	276	>2419.6	<0.50	<0.020	<0.50	212	0.2

	FIV-E	4/7/2021	613.1	>2419.6	<0.50	<0.020	<0.50	297	Unwadable
		7/28/2021	59.1	>2419.6	<0.50	<0.020	<0.50	271	Flowmeter Malfunction
	RIC-B	4/7/2021	142.1	>2419.6	<0.50	<0.020	<0.50	269	0.36
		7/28/2021	108	>2419.6	<0.50	<0.020	<0.50	226	9.591
	WOO-A	4/7/2021	178.5	>2419.6	<0.50	<0.020	<0.50	274	1.16
		7/28/2021	192	>2419.6	<0.50	<0.020	<0.50	245	17.691

Table E-6b (continued) Water Quality Data 2

HUC Watershed	Sample ID	Collection Date	E. coli	Total Coliform	Surfactants (mg/L)	Copper (mg/L)	Iron (mg/L)	Hardness (mg/L)	Flow
			(MPN / 100ml)	(MPN / 100ml)					(cu ft / sec)
Headwaters Ten Mile Creek	TEN-B	3/15/2021	58.3	2419.6	<0.50	<0.020	<0.50	243	0.84
		7/22/2021	150	>2419.6	<0.50	<0.020	<0.50	179	1.48
	TEN-D	3/22/2021	272.3	>2419.6	<0.50	<0.020	<0.50	274	1.8
		7/22/2021	161	>2419.6	<0.50	<0.020	<0.50	168	0.9
Headwaters Turtle Creek	DAEB-1	4/8/2021	85.7	>2419.6	<0.50	0.027	<0.50	306	0.1
		4/8/2021	113.7	>2419.6	<0.50	0.026	<0.50	308	
		7/28/2021	53.8	>2419.6	<0.50	<0.020	0.519	224	Unwadable
	DAEB-2	4/5/2021	488.4	>2419.6	<0.50	<0.020	0.98	391	1.28
		7/28/2021	1550	>2419.6	<0.50	<0.020	1.17	303	0.18
	CBD-2	4/7/2021	>2419.6	>2419.6	<0.50	<0.020	<0.50	297	0.2
		7/28/2021	1410	>2419.6	<0.50	<0.020	<0.50	290	Unwadable

	CEB-B	3/16/2021	579.4	>2419.6	<0.50	<0.020	<0.50	362	No Flow
		7/15/2021	866	>2419.6	<0.50	<0.020	<0.50	307	0.86
	KNI-A	3/16/2021	40.8	>2419.6	<0.50	<0.020	<0.50	329	No Flow
		7/15/2021	162	>2419.6	<0.50	<0.020	<0.50	288	0.16
	TRO-A	3/30/2021	82	>2419.6	<0.50	<0.020	0.57	239	0.4
		7/14/2021	378	>2419.6	<0.50	<0.020	0.523	180	0.4
	TRO-C	4/8/2021	517.2	>2419.6	<0.50	<0.020	0.71	341	No Flow
		7/26/2021	9.8	1120	<0.50	<0.020	<0.50	223	0.04
	TUR-A	3/30/2021	1299.7	>2419.6	<0.50	<0.020	<0.50	337	0.44
		3/30/2021	980.4	>2419.6	<0.50	<0.020	<0.50	314	
		7/14/2021	1120	>2419.6	<0.50	<0.020	<0.50	290	No Flow
	TUR-C	4/8/2021	1553.1	>2419.6	<0.50	<0.020	<0.50	293	Unwadable
		7/27/2021	112	>2419.6	<0.50	<0.020	<0.50	208	Unwadable
Headwaters White Rock Creek	UWRC-1	4/5/2021	290.9	1732.9	<0.50	<0.020	<0.50	286	Unwadable
		7/27/2021	60.2	>2419.6	<0.50	<0.020	<0.50	166	Unwadable
Hickory Creek - Parsons Slough	HIC-D	4/7/2021	579.4	>2419.6	<0.50	<0.020	<0.50	340	0.92
		4/7/2021	488.4	>2419.6	<0.50	<0.020	<0.50	331	
		7/28/2021	387	>2419.6	<0.50	<0.020	<0.50	377	0.594
	ATEN-1	4/7/2021	365.4	>2419.6	<0.50	<0.020	2.9	190	Not Enough Water
		7/28/2021	488	>2419.6	<0.50	<0.020	0.691	142	1.54
		7/28/2021	365	>2419.6	<0.50	0.0227	0.543	147	

Table E-6b (continued) Water Quality Data 2

HUC Watershed	Sample ID	Collection Date	E. coli (MPN / 100ml)	Total Coliform (MPN / 100ml)	Surfactants (mg/L)	Copper (mg/L)	Iron (mg/L)	Hardness (mg/L)	Flow (cu ft / sec)
Indian Creek - Elm Fork Trinity River	FUR-A	4/5/2021	13.2	1553.1	<0.50	<0.020	<0.50	252	0.86
		4/5/2021	11	1119.9	<0.50	<0.020	<0.50	258	
		7/26/2021	67	>2419.6	<0.50	<0.020	<0.50	172	0.64
Pitman Creek - Spring Creek	SPC-A	4/6/2021	143.9	>2419.6	<0.50	<0.020	<0.50	286	Unwadable
		7/27/2021	73.8	>2419.6	<0.50	<0.020	<0.50	193	Unwadable
		7/27/2021	78.4	>2419.6	<0.50	<0.020	<0.50	197	
Prairie Creek – Trinity River	PRA-A	3/15/2021	172.3	>2419.6	<0.50	<0.020	<0.50	234	0.8
		7/22/2021	260	>2419.6	<0.50	<0.020	<0.50	232	Unsafe
	PRAI-2	4/8/2021	648.8	>2419.6	<0.50	<0.020	<0.50	203	Unwadable
		7/27/2021	126	>2419.6	<0.50	<0.020	<0.50	146	Unwadable
		7/27/2021	93.3	>2419.6	<0.50	<0.020	<0.50	150	
South Mesquite Creek	SMC-A	3/16/2021	64.4	>2419.6	<0.50	<0.020	<0.50	244	0.36
		7/15/2021	52	>2419.6	<0.50	<0.020	<0.50	107	1.18
	SMC-B	3/30/2021	488.4	>2419.6	<0.50	<0.020	<0.50	218	0.434
		7/14/2021	95.9	>2419.6	<0.50	<0.020	<0.50	111	No Flow
	SMC-C	3/30/2021	>2419.6	>2419.6	<0.50	<0.020	<0.50	162	2.2
		7/14/2021	199	>2419.6	<0.50	<0.020	<0.50	105	0.04
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	248.1	>2419.6	<0.50	<0.020	<0.50	317	0.5
		7/15/2021	411	>2419.6	<0.50	<0.020	<0.50	195	0.4
		7/15/2021	816	>2419.6	<0.50	<0.020	<0.50	206	
	JAC-A	4/6/2021	1119.9	>2419.6	<0.50	<0.020	<0.50	298	Unwadable

		7/27/2021	579	>2419.6	<0.50	<0.020	<0.50	260	Unwadable
	MCC-A	4/6/2021	2419.6	>2419.6	<0.50	<0.020	<0.50	251	Unwadable
		7/27/2021	48.7	>2419.6	<0.50	<0.020	<0.50	166	Unwadable
	WIL-A	4/6/2021	1986.3	>2419.6	<0.50	<0.020	<0.50	358	Unwadable
		7/27/2021	65.7	>2419.6	<0.50	<0.020	<0.50	143	Unwadable
	WHC-C	4/6/2021	275.5	>2419.6	<0.50	<0.020	<0.50	269	1.36
		7/27/2021	167	>2419.6	<0.50	<0.020	<0.50	200	No Flow

Table E-6b (continued) Water Quality Data 2

HUC Watershed	Sample ID	Collection Date	E. coli (MPN / 100ml)	Total Coliform (MPN / 100ml)	Surfactants (mg/L)	Copper (mg/L)	Iron (mg/L)	Hardness (mg/L)	Flow (cu ft / sec)
Turtle Creek-Trinity River	CEC-B	4/7/2021	410.6	>2419.6	<0.50	<0.020	<0.50	286	Wild Dogs Present
		7/28/2021	>2419.6	>2419.6	<0.50	<0.020	<0.50	227	3.567
	CEDR-1	3/29/2021	191.8	>2419.6	<0.50	<0.020	<0.50	308	1.56
		7/19/2021	488	>2419.6	<0.50	<0.020	<0.50	233	0.4
	COO-A	3/30/2021	184.2	>2419.6	<0.50	<0.020	<0.50	319	1.32
		7/14/2021	411	>2419.6	<0.50	<0.020	<0.50	188	1
	DAWB-3	4/5/2021	60.2	>2419.6	<0.50	<0.020	<0.50	340	0.1
		7/28/2021	214	>2419.6	<0.50	<0.020	<0.50	350	0.48
	FIL-A	4/8/2021	10.7	>2419.6	<0.50	<0.020	<0.50	282	0.24
		7/26/2021	18.5	>2419.6	<0.50	<0.020	<0.50	278	No Flow
	LAC-A	4/8/2021	16.9	>2419.6	<0.50	<0.020	0.68	142	Unwadable
		7/28/2021	17.3	>2419.6	<0.50	<0.020	<0.50	108	Unwadable
	LAC-B	4/8/2021	686.7	>2419.6	<0.50	<0.020	<0.50	320	Unwadable
		7/28/2021	13.5	>2419.6	<0.50	<0.020	<0.50	131	Unwadable
	WDAL-1	4/8/2021	298.7	>2419.6	<0.50	<0.020	<0.50	365	0.62
		7/26/2021	53.8	>2419.6	<0.50	<0.020	0.699	191	Unwadable
	WDAL-2	4/8/2021	206.4	>2419.6	<0.50	<0.020	<0.50	463	Not Enough Water
		7/26/2021	1990	>2419.6	<0.50	<0.020	<0.50	495	No Flow

Table E-6c Water Quality Data (Pesticides 1)

HUC Watershed	Sample ID	Collection Date	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Alpha BHC (µg/L)	Atrazine (µg/L)	Beta BHC (µg/L)
Bachman Branch - Elm Fork Trinity River	JOES-1	3/29/2021	<0.094	<0.094	<0.019	<0.0094	<0.047	0.4	<0.047
		7/19/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	BAB-B	3/16/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	0.5	<0.049
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	NWDA-1	3/29/2021	<0.094	<0.094	<0.019	<0.0094	<0.047	2.0	<0.047
		7/19/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	RIB-A	3/30/2021	<0.096	<0.096	<0.019	<0.0096	<0.048	0.6	<0.048
		7/1/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
Delaware Creek - West Fork Trinity River	MOC-A	3/15/2021	<0.099	<0.099	<0.020	<0.0099	<0.050	0.2	<0.050
		7/22/202	<0.100	<0.100	<0.020	<0.0100	<0.050	0.4	<0.050
Farmer's Branch - Elm Fork Trinity River	FARM-1	3/30/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	0.9	<0.048
		7/19/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
		7/19/202	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
Five Mile Creek – Trinity River	FIV-A	3/16/2021	DRY						
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	FIV-B	3/16/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	<0.1	<0.048
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	NEW-A	3/15/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	0.2	<0.048
		7/22/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
		7/22/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	SEDA-1	3/29/2021	<0.096	<0.096	<0.019	<0.0096	<0.048	0.3	<0.048
		7/19/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
Floyd Branch - White Rock Creek	FLO-A	3/22/2021	<0.096	<0.096	<0.019	<0.0096	<0.048	0.2	<0.048
		7/22/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	MCK-C	3/16/2021	<0.099	<0.099	<0.020	<0.0099	<0.050	0.7	<0.050
		3/16/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	0.7	<0.049
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
Headwaters Five Mile Creek	FIV-D	3/22/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	<0.1	<0.049
		3/22/2021	<0.097	<0.097	<0.019	<0.0097	<0.049	<0.1	<0.049
		7/22/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050

Table E-6c (continued) Water Quality Data (Pesticides 1)

HUC Watershed	Sample ID	Collection Date	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Alpha BHC (µg/L)	Atrazine (µg/L)	Beta BHC (µg/L)
Headwaters Ten Mile Creek	TEN-B	3/15/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	0.2	<0.049
		7/22/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	TEN-D	3/22/2021	<0.10	<0.10	<0.020	<0.010	<0.051	0.3	<0.051
		7/22/2021	<0.100	<0.100	<0.020	<0.010	<0.050	<0.1	<0.050
Headwaters Turtle Creek	CEB-B	3/16/2021	<0.097	<0.097	<0.019	<0.0097	<0.049	0.5	<0.049
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	KNI-A	3/16/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	0.7	<0.049
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	TRO-A	3/30/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	0.2	<0.049
		7/14/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	TUR-A	3/30/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	0.2	<0.048
		3/30/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	0.2	<0.048
		7/14/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	0.1	<0.050
Prairie Creek - Trinity River	PRA-A	3/15/2021	<0.097	<0.097	<0.019	<0.0097	<0.049	0.3	<0.049
		7/22/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
South Mesquite Creek	SMC-A	3/16/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	0.3	<0.048
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	SMC-B	3/30/2021	<0.098	<0.098	<0.020	<0.0098	<0.049	3.7	<0.049
		7/14/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	< 0.1	<0.050
	SMC-C	3/30/2021	<0.099	<0.099	<0.020	<0.0099	<0.050	3.4	<0.050
		7/14/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
Turtle Creek - Trinity River	CEDR-1	3/29/2021	<0.096	<0.096	<0.019	<0.0096	<0.048	0.1	<0.048
		7/19/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
	COO-A	3/30/2021	<0.095	<0.095	<0.019	<0.0095	<0.048	0.2	<0.048
		7/14/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	0.1	<0.050
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	<0.099	<0.099	<0.020	<0.0099	<0.050	0.5	<0.050
		7/15/2021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050
		7/15/20021	<0.100	<0.100	<0.020	<0.0100	<0.050	<0.1	<0.050

Table E-6d Water Quality Data (Pesticides 2)

HUC Watershed	Sample ID	Collection Date	Chlordane (µg/L)	Delta BHC (µg/L)	Dieldrin (µg/L)	Endosulfan I (µg/L)	Endosulfan II (µg/L)	Endosulfan sulfate (µg/L)	Endrin (µg/L)
Bachman Branch - Elm Fork Trinity River	JOES-1	3/29/2021	<0.19	<0.047	<0.019	<0.0094	<0.019	<0.094	<0.019
		7/19/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	BAB-B	3/16/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	NWDA-1	3/29/2021	<0.19	<0.047	<0.019	<0.0094	<0.019	<0.094	<0.019
		7/19/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	RIB-A	3/30/2021	<0.19	<0.048	<0.019	<0.0096	<0.019	<0.096	<0.019
		7/14/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Delaware Creek - West Fork Trinity River	MOC-A	3/15/2021	<0.20	<0.050	<0.020	<0.0099	<0.020	<0.099	<0.020
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Farmer's Branch - Elm Fork Trinity River	FARM-1	3/30/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		7/19/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
		7/19/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Five Mile Creek – Trinity River	FIV-A	3/16/2021	DRY						
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	FIV-B	3/16/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	NEW-A	3/15/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	SEDA-1	3/29/2021	<0.19	<0.048	<0.019	<0.0096	<0.019	<0.096	<0.019
		7/19/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Floyd Branch - White Rock Creek	FLO-A	3/22/2021	<0.19	<0.048	<0.019	<0.0096	<0.019	<0.096	<0.019
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	MCK-C	3/16/2021	<0.20	<0.050	<0.020	<0.0099	<0.020	<0.099	<0.020
		3/16/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Headwaters Five Mile Creek	FIV-D	3/22/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		3/22/2021	<0.19	<0.049	<0.019	<0.0097	<0.019	<0.097	<0.019
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020

Table E-6d (continued) Water Quality Data (Pesticides 2)

Permit-Listed Watershed	Sample ID	Collection Date	Chlordane (µg/L)	Delta BHC (µg/L)	Dieldrin (µg/L)	Endosulfan I (µg/L)	Endosulfan II (µg/L)	Endosulfan sulfate (µg/L)	Endrin (µg/L)
Headwaters Ten Mile Creek	TEN-B	3/15/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	TEN-D	3/22/2021	<0.20	<0.051	<0.020	<0.010	<0.020	<0.10	<0.020
		7/22/2021	<0.20	<0.050	<0.020	<0.010	<0.020	<0.10	<0.020
Headwaters Turtle Creek	CEB-B	3/16/2021	<0.19	<0.049	<0.019	<0.0097	<0.019	<0.097	<0.019
		7/15/2021	<0.20	<0.050	0.058	<0.0100	<0.020	<0.100	<0.020
	KNI-A	3/16/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	TRO-A	3/30/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		7/14/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	TUR-A	3/30/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		3/30/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		7/14/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Prairie Creek - Trinity river	PRA-A	3/15/2021	<0.19	<0.049	<0.019	<0.0097	<0.019	<0.097	<0.019
		7/22/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
South Mesquite Creek	SMC-A	3/16/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	SMC-B	3/30/2021	<0.20	<0.049	<0.020	<0.0098	<0.020	<0.098	<0.020
		7/14/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	SMC-C	3/30/2021	<0.20	<0.050	<0.020	<0.0099	<0.020	<0.099	<0.020
		7/14/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
Turtle Creek - Trinity River	CEDR-1	3/29/2021	<0.19	<0.048	<0.019	<0.0096	<0.019	<0.096	<0.019
		7/19/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
	COO-A	3/30/2021	<0.19	<0.048	<0.019	<0.0095	<0.019	<0.095	<0.019
		7/14/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	<0.20	<0.050	<0.020	<0.0099	<0.020	<0.099	<0.020
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020
		7/15/2021	<0.20	<0.050	<0.020	<0.0100	<0.020	<0.100	<0.020

Table E-6e Water Quality Data (Pesticides 3)

HUC Watershed	Sample ID	Collection Date	Endrin aldehyde (µg/L)	G-BHC (Lindane) (µg/L)	Heptachlor (µg/L)	Heptachlor epoxide (µg/L)	Simazine (µg/L)	Methoxychlore (µg/L)	Toxaphene (µg/L)
Bachman Branch - Elm Fork Trinity River	JOES-1	3/29/2021	<0.094	<0.047	<0.0094	<0.0094	0.08	<1.9	<0.28
		7/19/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	BAB-B	3/16/2021	<0.098	<0.049	<0.0098	<0.0098	0.11	<2.0	<0.29
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	NWDA-1	3/29/2021	<0.094	<0.047	<0.0094	<0.0094	0.39	<1.9	<0.28
		7/19/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	RIB-A	3/30/2021	<0.096	<0.048	<0.0096	<0.0096	<0.07	<1.9	<0.29
		7/14/2021	<0.100	<0.050	<0.010	<0.0100	<0.07	<2.0	<0.30
Delaware Creek - West Fork Trinity	MOC-A	3/15/2021	<0.099	<0.050	<0.0099	<0.0099	0.23	<2.0	<0.30
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	0.08	<2.0	<0.30
Farmer's Branch - Elm Fork Trinity River	FARM-1	3/30/2021	<0.095	<0.048	<0.0095	<0.0095	2.1	<1.9	<0.29
		7/19/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
		7/19/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
Five Mile Creek – Trinity River	FIV-A	3/16/2021	DRY						
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	FIV-B	3/16/2021	<0.095	<0.048	<0.0095	<0.0095	<0.07	<1.9	<0.29
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	NEW-A	3/15/2021	<0.095	<0.048	<0.0095	<0.0095	<0.07	<1.9	<0.29
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	SEDA-1	3/29/2021	<0.096	<0.048	<0.0096	<0.0096	<0.07	<1.9	<0.29
		7/19/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
Floyd Branch - White Rock Creek	FLO-A	3/22/2021	<0.096	<0.048	<0.0096	<0.0096	<0.07	<1.9	<0.29
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	MCK-C	3/16/2021	<0.099	<0.050	<0.0099	<0.0099	2.5	<2.0	<0.30
		3/16/2021	<0.098	<0.049	<0.0098	<0.0098	2.5	<2.0	<0.29
		7/15/2021	**<0.100**	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
Headwaters Five Mile Creek	FIV-D	3/22/2021	**<0.098**	<0.049	<0.0098	<0.0098	<0.07	<2.0	<0.29
		3/22/2021	<0.097	<0.049	<0.0097	<0.0097	<0.07	<1.9	<0.29
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30

Table E-6e		**Water Quality Data (Pesticides 3)**							
HUC Watershed	Sample ID	Collection Date	Endrin aldehyde (µg/L)	G-BHC (Lindane) (µg/L)	Heptachlor (µg/L)	Heptachlor epoxide (µg/L)	Simazine (µg/L)	Methoxychlore (µg/L)	Toxaphene (µg/L)
Headwaters Ten Mile Creek	TEN-B	3/15/2021	<0.098	<0.049	<0.0098	<0.0098	<0.07	<2.0	<0.29
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	TEN-D	3/22/2021	<0.10	<0.051	<0.010	<0.010	0.10	<2.0	<0.30
		7/22/2021	<0.10	<0.050	<0.010	<0.010	<0.07	<2.0	<0.30
Headwaters Turtle Creek	CEB-B	3/16/2021	<0.097	<0.049	<0.0097	<0.0097	0.08	<1.9	<0.29
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	KNI-A	3/16/2021	<0.098	<0.049	<0.0098	<0.0098	0.23	<2.0	<0.29
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	TRO-A	3/30/2021	<0.098	<0.049	<0.0098	<0.0098	0.19	<2.0	<0.29
		7/14/2021	<0.100	<0.050	<0.0100	<0.0100	0.14	<2.0	<0.30
	TUR-A	3/30/2021	<0.095	<0.048	<0.0095	<0.0095	0.11	<1.9	<0.29
		3/30/2021	<0.095	<0.048	<0.0095	<0.0095	0.11	<1.9	<0.29
		7/14/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
Prairie Creek - Trinity River	PRA-A	3/15/2021	<0.097	<0.049	<0.0097	<0.0097	<0.07	<1.9	<0.29
		7/22/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
South Mesquite Creek	SMC-A	3/16/2021	<0.095	<0.048	<0.0095	<0.0095	0.19	<1.9	<0.29
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	SMC-B	3/30/2021	<0.098	<0.049	<0.0098	<0.0098	0.14	<2.0	<0.29
		7/14/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	SMC-C	3/30/2021	<0.099	<0.050	<0.0099	<0.0099	0.15	<2.0	<0.30
		7/1/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
Turtle Creek - Trinity River	CEDR-1	3/29/2021	<0.096	<0.048	<0.0096	<0.0096	<0.07	<1.9	<0.29
		7/19/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
	COO-A	3/30/2021	<0.095	<0.048	<0.0095	<0.0095	0.08	<1.9	<0.29
		7/14/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
White Rock Creek - White Rock Lake	DIX-A	3/16/2021	<0.099	<0.050	<0.0099	<0.0099	0.21	<2.0	<0.30
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30
		7/15/2021	<0.100	<0.050	<0.0100	<0.0100	<0.07	<2.0	<0.30

Note:

Table E-7	Bacteria Trends – from Rapid Bioassessment Data						
Watershed (Sample Location	Geomean	Percent Improvement	# Samples	Maximum	Minimum	# of Exceedances	Period of Record
Elm Fork Trinity River (Texas Segment 0822)							
Elm Fork Trinity River (ELMT-1)	491	-65%	29	34480	10	22	2009-2021
Furneaux Creek (FUR-A)	84	-56%	33	2247	1	15	2007-2021
Hutton Branch (HUTT-1)	62	-51%	29	816	6	5	2007-2021
Elm Fork @ Cooks Branch (EFCB-1)	11	-64%	28	490	1	1	2009-2021
Farmer's Branch (FARM-1)	53	-74%	34	1900	1	9	2007-2021
Joe's Creek (JOES-1)	757	2%	28	32550	108	26	2009-2021
West Joe's Creek (NWDA-1)	128	212%	27	43520	9	12	2007-2021
Upper Bachman Creek (BAB-C)	218	-25%	31	921	39	24	2009-2021
Bachman Creek U/S Bachman Lake (BAB-B)	134	-46%	29	500	10	19	2007-2021
Bachman Creek (LBAC-1)	91	-72%	26	563	10	8	2009-2021
California Crossing (CAC-A)	44	110%	26	760	1	9	2007-2021
Daniel's Creek (DAN-A)	172	301%	33	2420	1	15	2007-2021
Richard's Branch (RIB-A)	199	7%	32	2900	1	20	2007-2021
Elm Fork Trinity River (NWD-5)	668	-83%	17	5170	2	15	2009-2021
Lower West Fork Trinity River (Texas Stream Segment 0841)							
Fish Creek – Mountain Creek Lake							
Mountain Creek U/S (MOC-B)	17	242%	36	231	1	2	2007-2021
Artesian Creek (ART-A)	25	-63%	31	591	1	4	2007-2021
Delaware Creek (DELA-1)	220	0%	20	241960	1	14	2009-2021
Mountain Creek D/S (MOC-A)	20	559%	33	1600	1	3	2007-2021
Lower Mountain Creek (LMOC-1)	132	339%	28	11199	1	13	2009-2021
West Fork Trinity River (WDAL-2)	325	150%	24	2420	20	20	2009-2021
Old Trinity River (Nobles Branch) (WDAL1)	186	-66%	23	9590	10	13	2009-2021

Table E-7	Bacteria Trends – from Rapid Bioassessment Data (Continued)						
Watershed (Sample Location	Geomean	Percent Improvement	# Samples	Maximum	Minimum	# of Exceedances	Period of Record
Main Stem Trinity River (Texas Stream Segment 0805-04) [Segment from West Fork/Elm Fork confluence to Cedar Creek]							
Headwaters Turtle Creek							
Dallas East Bank Sump (Delta) (U/S) (DAEB-2)	290	21%	28	487856	1	22	2009-2021
Dallas East Bank Sump (D/S) (DAEB-1)	200	-9%	28	3076	10	17	2009-2021
Knights Branch (KNI-A)	317	59%	33	11199	7	27	2007-2021
Old Trinity River – U/S (TRO-C)	101	146%	27	1203	10	12	2009-2021
Old Trinity River – D/S (TRO-A)	131	41%	31	2603	1	15	2008-2021
Cedar Branch (CEB-B)	970	-31%	26	2420	243	26	2009-2021
Turtle Creek - U/S (TUR-C)	286	-65%	26	1553	34	23	2009-2021
Turtle Creek - D/S (TUR-A)	539	-103%	30	11199	69	28	2007-2021
CBD – 2	1246	40%	25	24196	184	25	2009-2021
Main Stem Trinity River (Texas Stream Segment 0805-04) [Segment from West Fork/Elm Fork confluence to Cedar Creek]							
Turtle Creek – Trinity River (West Bank)							
Fish Trap Lake (FIL-A)	98	226%	29	1467	1	15	2007-2021
Coombs Creek (COO-A)	347	-42%	33	22470	10	28	2007-2021
Dallas West Bank Sump System (DAWB-3)	197	-64%	22	4611	1	13	2009-2021
Lake Cliff (LAC-B)	212	-97%	30	24000	10	21	2009-2021
Lake Cliff (LAC-A)	41	418%	29	16000	1	7	2007-2021
Cedar Creek – U/S (CEC-B)	882	-37%	26	15531	63	25	2009-2021
Cedar Creek – D/S (CEDR-1)	357	-79%	34	1700	70	30	2009-2021
Main Stem Trinity River (Texas Stream Segment 0805-03) [Segment from Cedar Creek to Five Mile Creek]							
Five Mile Creek – Trinity River							
West Sump System (SDAL-1)	399	90%	29	2420	98	28	2009-2021
Honey Springs Branch (SEDA-1)	95	-21%	29	487	6	14	2009-2021
Elam Creek – U/S @175 (ELA-B)	322	939%	21	1414	31	17	2011-2021
Elam Creek – D/S (ELA-A)	443	-7%	29	24196	75	25	2007-2021

Table E-7	Bacteria Trends – from Rapid Bioassessment Data (Continued)						
Watershed (Sample Location	Geomean	Percent Improvement	# Samples	Maximum	Minimum	# of Exceedances	Period of Record
Five Mile Creek System							
Headwaters Five Mile Creek							
Five Mile Creek – U/S @ Loop 12 (FIV-E)	175	-13%	28	1440	20	21	2007-2021
Five Mile Creek -U/S @ Loop 12 (FIV-D)	154	-23%	30	2520	41	16	2007-2021
Crow Creek (CRO-A)	460	-16%	28	3654	10	25	2007-2021
Woody Branch (WOO-A)	316	65%	33	9678	64	28	2007-2021
Rickett's Branch (RIC-B)	202	73%	31	1529	10	23	2007-2021
Five Mile Creek –M/S @ (FIV-C)	150	1	31	3448	10	18	2007-2021
Five Mile Creek – Trinity River							
Five Mile Creek – M/S @ (FIV-B)	114	-29%	34	2420	10	12	2007-2021
Five Mile Creek – D/S @ SH310 (FIV-A)	88	160%	34	2420	3	10	2007-2021
Newton Creek (NEW-A)	109	-22%	37	816	1	21	2007-2021
Main Stem Trinity River (Texas Stream Segment 0805-02) [Segment from Five Mile Creek to Ten Mile Creek]							
East Bank – Trinity River							
Upper Prairie Creek – Trinity River							
Prairie Creek - U/S (PRAI 2)	129	-99%	24	20000	10	11	2009-2021
Prairie Creek – D/S (PRA-A)	143	1328%	25	771	10	14	2009-2021
Hickory Creek - Parson's Slough							
Hickory Creek (HIC-D)	236	-85%	24	1600	6	17	2009-2021
Main Stem Above Ten Mile Creek (ATEN-1)	122	12067%	9	1300	1	5	2009-2021
Headwaters Ten Mile Creek							
Ten Mile Creek – U/S (Ten-D)	111	-31%	31	12997	10	12	2007-2021
Ten Mile Creek - D/S (Ten-B)	99	-36%	37	2282	1	19	2007-2021

Table E-7	Bacteria Trends – from Rapid Bioassessment Data (Continued)						
Watershed (Sample Location	Geomean	Percent Improvement	# Samples	Maximum	Minimum	# of Exceedances	Period of Record
White Rock Creek System (Texas Stream Segment 0827) [discharges into trinity River Stream Segment 0805-03]							
Headwater White Rock Creek							
White Rock creek Above Lake (UWRC-1)	83	-25%	29	4000	3	10	2009-2021
Floyd Branch – White Rock creek							
McKamy Branch (MCK-C)	292	-23%	28	1017	63	25	2009-2021
Cottonwood Creek (COT-C)	649	56%	30	21200	150	30	2007-2021
Floyd Branch (FLO-A)	465	12%	33	19863	160	33	2007-2021
White Rock Creek – U/S (WHC-C)	175	-20%	34	2420	1	23	2007-2021
White Rock creek – White Rock Lake							
Jackson ranch (JAC-A)	419	40%	35	2420	52	32	2007-2021
Dixon Branch (DIX-A)	369	51%	31	4400	122	30	2007-2021
Williamson Branch (WIL-A)	255	-44%	24	2863	1	18	2007-2021
McCommas Creek (MCC-A)	127	-39%	36	2420	1	20	2007-2021
City of Dallas – White Rock Creek							
Ash Creek (ASH-A)	122	-42%	31	3255	4	18	2007-2021
White Rock Creek below Lake (WHC-A)	110	130%	28	2420	20	11	2007-2021
Lake Ray Hubbard (Texas Stream Segment 0820)							
Pitman Creek – Spring Creek							
Spring Creek (SPC-A)	140	-33%	31	1274	10	16	2009-2021
Duck Creek							
Long Branch Creek (LON-B)	413	-43%	26	2420	26	23	2009-2021

Appendix I:

Fort Worth Bioassessment Report

Rapid Bioassessment Characterizations of Six Monitored Watersheds within the City of Fort Worth, Spring and Fall 2021.

Introduction

The City of Fort Worth's TPDES stormwater permit contains a monitoring component. To satisfy part of the monitoring requirements, Fort Worth participates in the Regional Wet Weather Characterization Program through the North Central Texas Council of Government (NCTCOG). Fort Worth's monitoring program includes performing rapid bioassessments on representative creeks within six watersheds twice per year, at a minimum of two sites per creek. The watersheds selected for monitoring include Mary's Creek, White's Branch-Big Fossil Creek, Headwaters Sycamore Creek, Marine Creek-West Fork Trinity River, Lake Como-Clear Fork Trinity River, and Sycamore Creek-West Fork Trinity River. On each monitored creek within the watershed, three sites were selected for sampling: an upper reach site (1), a mid-reach site (2), and a lower reach site (3) (Table 1).

Additional sites not included in the NCTCOG Regional Wet Weather Characterization Program were sampled during 2021. These sites provide information about other watersheds partially within the City of Fort Worth. Most of these sites are located at the furthest accessible downstream area of the main stream within the watershed and within the City, which incorporates the effects of stormwater runoff from areas in the City. One site further upstream on Mary's Creek (MRY0), is outside the City of Fort Worth's city limits and doesn't receive discharge from the city's MS4 system. This site was sampled during spring 2021; however, during fall 2021 the stream was dry with very shallow puddles and was not sampled. One site within the Farmer's Branch watershed (FAR3), one within Henrietta Creek watershed (HEN3) and one site within Headwaters Elizabeth Creek watershed (ELI3) was sampled during spring and fall 2021 (Table 1). Further sites within additional watersheds may be sampled in future years as resources allow.

Table 1: Bioassessment Sampling Site Names and Locations within nine Fort Worth Watersheds.

SITE NAME	LOCATION DESCRIPTION	STREAM NAME	HUC12 WATERSHED
MRY1	3900 block of Longvue crossing, FM 2871	Mary's Creek	Mary's Creek
MRY2	Loop IH-820 SW crossing, north of Team Ranch Rd	Mary's Creek	Mary's Creek
MRY3	At Winscott Road (Vickery Blvd.) crossing	Mary's Creek	Mary's Creek
BFC1	West of and parallel to Pepperidge Lane	Big Fossil Creek	White's Branch-Big Fossil Creek
BFC2	IH-35Wcrossing, north of Western Center Blvd	Big Fossil Creek	White's Branch-Big Fossil Creek
BFC3	Beach St. N crossing, north of Paula Ridge	Big Fossil Creek	White's Branch-Big Fossil Creek
SYC1	Intersection of IH-20 and IH-35W	Sycamore Creek	Headwaters Sycamore Creek
SYC2	Cobb Park West south of US-287 at low water crossing	Sycamore Creek	Headwaters Sycamore Creek
SYC3	End of Scott Avenue west of Beach Street	Sycamore Creek	Headwaters Sycamore Creek
MAR1	West of Angle Avenue in Buck Sansom Park	Marine Creek	Marine Creek-West Fork Trinity River
MAR2	Lincoln Park, north of 28th Street crossing	Marine Creek	Marine Creek-West Fork Trinity River
MAR3	Saunders Park north of NE 23rd, along Mule Alley	Marine Creek	Marine Creek-West Fork Trinity River
OVR1	NW of Granbury Rd and Trail Lake Dr intersection in Foster Park	Unnamed Tributary in Overton Park	Lake Como-Clear Fork Trinity River
OVR2	East of 3808 Overton Park West, near Tanbark Trail intersection	Unnamed Tributary in Overton Park	Lake Como-Clear Fork Trinity River
OVR3	Overton Park West south of intersection with Bellaire Dr. S	Unnamed Tributary in Overton Park	Lake Como-Clear Fork Trinity River
LFC1	2200 block Cantrell Sansom	Little Fossil Creek	Sycamore Creek-West Fork Trinity River
LFC2	upstream of IH35W crossing, south of Getsemani Baptist Church	Little Fossil Creek	Sycamore Creek-West Fork Trinity River
LFC3	West and southwest of Beach St. N and Long Ave. intersection	Little Fossil Creek	Sycamore Creek-West Fork Trinity River
MRY0+	FM3325 crossing	Mary's Creek	Mary's Creek
FAR3^	South of 9716-9748 Francesca Dr, along the creek	Farmer's Branch	Farmer's Branch
HEN3^	South of the Litsey Road crossing, east of the roundabout with Cleveland Gibbs Rd	Henrietta Creek	Henrietta Creek
ELI3^	East of the Cleveland Gibbs Rd crossing	Elizabeth Creek	Headwaters Elizabeth Creek

+Potential new reference site, non-regulatory site
^ Non-regulatory site

Methods

Rapid bioassessment elements include evaluation of chemical and physical water quality parameters, habitat assessment, and sample collection and analysis of benthic aquatic macroinvertebrate communities. Sampling was conducted during spring (May) and fall (October) 2021.

Habitat Assessments and Physico-chemical Sampling

Habitat assessments were performed at each site following guidelines for high gradient streams in Chapter 5 of USEPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers, Second Edition*[1]. This assessment includes scoring 10 different habitat factors with available scores ranging from 0 to 20, with 0 representing poor conditions and 20 representing optimal habitat. Parameters evaluated in habitat assessments include bottom substrate and available cover suitability for colonization, embeddedness, flow regimes present, bottom scouring and sediment deposition, channel alteration, channel flow status, frequency of riffles or bends, stream bank stability, vegetative protection, and riparian vegetative zone width. Individual scores for these 10 factors are totaled for the overall habitat score.

Physical and chemical parameters collected and analyzed with portable meters include pH, dissolved oxygen (D.O.), turbidity, specific conductance, and water and air temperature. Colorimetric test kits were used to analyze nutrient concentrations of ammonia-nitrogen, phosphate, and nitrate-nitrogen. *Escherichia coli* (*E. coli*) bacteria analysis was included at all monitored sites during both spring and fall 2021 sampling events. *E. coli* samples were processed in-house by experienced storm water quality monitoring staff using approved Colilert® procedures and in accordance with City of Fort Worth Standard Operating Procedures (SOP). Physical characterization includes an estimated flow calculation. This calculation is made using the averages of five depth and velocity profiles across one measured stream width as well as a correction constant based on a rough or smooth stream bottom. The estimated flow calculation smooth/rough correction factor is based on the guidance for flow estimates found in TCEQ's Surface Water Quality Monitoring, Volume 1[2].

Biological Sample Collection

Aquatic benthic macroinvertebrates were collected at twenty two (22) stream sites during spring (May) 2021 and at 21 sites during fall (October) 2021. Macroinvertebrates were collected using a D-frame kick net with a 550 µm mesh from riffle areas. If there was no riffle area, samples were taken within run/glide areas or pools. Bottom substrate in front of the net opening was disturbed to dislodge organisms, which were collected in the net along with bottom material. Intermittent stream sites with pools were collected sampling available habitat by gathering rock substrate and washing them into the D-frame net or into a sieve bucket, and

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[1] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

[2] TCEQ, revised August 2012. Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods. TCEQ RG-415. August 2012.

sweeping root banks. Collected samples were transferred from the D-frame net or sieve bucket to sample containers and preserved in the field with 100% isopropyl alcohol. Following transport to the in-house laboratory, macroinvertebrates in the samples were separated from the debris and identified. Samples which appeared to have more than 175 (+ or -20%) were subsampled according to SOPs, and similar to those found in TCEQ's Surface Water Quality Monitoring, Volume 2[3]. Most organisms were identified to family level with a few noted exceptions. In accordance with the current City of Fort Worth SOP, Chironomidae was identified to sub-family, Turbellaria and Hirudinea were identified to class, and Nematoda was identified to phylum.

Aquatic Macroinvertebrate Data Analysis

The TCEQ macroinvertebrate Statewide Texas Index of Biotic Integrity (TX-IBI) for kick net samples was used to analyze the data. The Statewide TX-IBI methodology is found in the TCEQ's *Surface Water Quality Monitoring Procedures, Volume 2*[4] and applies 12 macroinvertebrate community structural and functional metrics for the assessment of biotic integrity. This TX-IBI method used is designed for macroinvertebrate samples collected with a D-frame kick net sampler. Biological metrics are calculated with the resulting macroinvertebrate identification data, an interim score is assigned to each individual metric, and the individual metric scores are summed to produce an overall score for each individual site. Scores generated at each site are compared to values in TCEQ guidelines to determine an aquatic life use rating. The values for the aquatic life use ratings found in the TCEQ guidelines were developed based on data collected from reference sites. This method gives an individual value for each site without a direct comparison to a specific reference site, but to values from TCEQ reference sites. Individual sites may also be compared to themselves year to year on a seasonal basis (spring to spring and fall to fall) to demonstrate biological community changes within each reach.

Results and Discussion

Sampling conditions prior to and during spring sampling were considered to be typical with regular weather patterns. Prior to fall sampling, the area experienced little to no rainfall during September which led to moderate to severe drought conditions. By October, many streams had lower flows than normal, some were intermittent with pools, and one site was not sampled as it was dry with very shallow puddles.

Habitat Assessments and Physico-chemical Sampling

Habitat assessment scores for spring and fall 2021 are shown in Table 2. Habitat assessment scores for MRY0 and BFC1 was ranked in the optimal category during spring sampling event. During fall sampling MRY0 was not sampled as it was dry with very shallow puddles only, and BFC1 was rated with having sub-optimal habitat. The remaining sites were ranked as either sub-optimal or marginal categories during both sampling events, with more indicating sub-optimal ratings in the spring than in the fall.

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[3] TCEQ, revised May 2014. Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data. TCEQ RG-416. May 2014.
[4] ibid

Spring and fall 2021 chemical water quality parameter ranges across all sampled sites are listed in Table 3. Physico-chemical data measurements taken during spring and fall 2021 sampling events are presented in Tables 4 through 7.

Any site which indicates probable sewage infiltration by visual and olfactory observation, elevated *E. coli* test results (>10,000 MPN/100mL) along with elevated ammonia-nitrogen (>1.0 mg/L) results are referred to the Fort Worth Water Department for investigation. There were no sites sampled during either sampling event indicated the presence of sewage infiltration. If any sample results were >2420 MPN/100 mL, the sites were retested with sample dilutions added to determine a more accurate number.

Table 2. Habitat Scores Collected for Mary's Creek, Big Fossil Creek, Sycamore Creek, Marine Creek, Overton Park, Little Fossil Creek, and Farmer's Branch in Spring and Fall 2021.

Site	Spring 2021	Fall 2021	Habitat Rating	Score
MRY0+	164	NS	Optimal	160-200
MRY1	145	114	Sub-optimal	110-159
MRY2	139	98	Marginal	60-109
MRY3	153	112	Poor	<60
FAR3^	130	130		
BFC1	172	154		
BFC2	148	117		
BFC3	147	133		
SYC1	110	97		
SYC2	135	143		
SYC3	122	122		
MAR1	141	116		
MAR2	134	103		
MAR3	152	139		
OVR1	118	93		
OVR2	128	128		
OVR3	124	110		
LFC1	152	130		
LFC2	157	151		
LFC3	128	85		
HEN3^	101	126		
ELI3^	115	130		

NS= not sampled
+=Potential new reference site, non-regulatory site
^= Non-regulatory site

Table 3. Minimum and Maximum Values of Water Quality Parameters Spring and Fall 2021 Bioassessment Sampling.

Parameter	Spring 2021		Fall 2021	
	Minimum	Maximum	Minimum	Maximum
Water temperature, °C	16.6	30.4	16.7	25.7
pH, s.u.	7.66	8.60	7.3	8.45
Conductivity (µS)	450	730	350	770
DO (mg/L)	5.94	9.43	2.53	8.7
Turbidity (NTUs)	0.71	5.40	0	21.30
NO3-N (mg/L)	0.01	1.70	0.00	1.15
NH3-N (mg/L)	0.00	3.65	0	0.68
PO4 (mg/L)	0.00	0.83	0.00	0.09
E. coli (MPN/100mL)	32	2420	9	2420

Table 4. Physico-chemical Results for Samples Collected during Bioassessments from Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Spring 2021.

	STATION										
PARAMETER	**MRY0+**	**MRY1**	**MRY2**	**MRY3**	**FAR3^**	**BFC1**	**BFC2**	**BFC3**	**SYC1**	**SYC2**	**SYC3**
Width (ft)	11	39.0	35.0	66.0	9.0	16.0	82.0	64.0	31.0	57.0	26.0
Avg. depth (ft)	0.18	0.58	0.52	0.12	0.28	0.32	0.16	0.16	0.28	0.56	0.38
Avg. Velocity (ft/s)	0.210	0.316	0.520	0.460	0.088	0.534	0.132	0.358	0.534	0.078	0.378
Estimated flow (cfs)	0.374	6.433	8.520	3.280	0.204	2.187	0.385	2.933	3.708	1.992	2.99
Water Temperature (ºC)	29.1	21.5	20.6	19.7	25.9	23.0	23.2	25.3	18.7	19.2	18.2
pH (s.u.)	7.84	8.05	8.05	8.03	7.87	8.04	8.60	8.04	8.15	8.07	8.00
Conductivity (µS)	660	510	520	550	730	550	560	550	530	550	610
DO (mg/L)	6.25	8.36	7.96	6.92	6.76	8.51	8.37	8.75	7.13	6.28	7.12
Turbidity (NTUs)	1.36	2.44	2.00	2.54	0.71	5.16	1.88	4.4	0.75	1.90	1.99
NO_3-N (mg/L)	0.09	0.03	0.01	0.07	1.70	0.31	0.18	0.18	0.04	0.06	0.10
NH_3-N (mg/L)	1.97	0.06	0.02	0.1	0.11	0.07	0.09	0.84	0.19	0.40	0.54
PO_4 (mg/L)	0.08	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.04	0.03	0.00
E. coli (MPN/100mL)	32	34	43	126	770	74	88	93	111	146	326

+=Potential new reference site, non-regulatory site
^= Non-regulatory site

Table 5. Physico-chemical Results for Samples Collected during Bioassessments from Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Spring 2021.

	STATION										
PARAMETER	**MAR1**	**MAR2**	**MAR3**	**OVR1**	**OVR2**	**OVR3**	**LFC1**	**LFC2**	**LFC3**	**HEN3^**	**ELI3^**
Width (ft)	14.0	28.0	14.0	10.0	18.0	22.0	9.0	22.0	15.0	24	22
Avg. depth (ft)	0.66	0.30	0.86	0.16	0.16	1.14	0.26	0.48	0.66	0.36	0.58
Avg. Velocity (ft/s)	0.520	0.530	0.498	0.046	0.134	0.044	0.342	0.092	0.104	0.450	0.474
Estimated flow (cfs)	3.843	3.561	4.797	0.059	0.309	0.883	0.720	0.777	0.824	3.110	4.797
Water Temperature (ºC)	16.6	18.8	20.1	22.5	22.3	21.3	19.2	19.1	17.8	30.4	29.0
pH (s.u.)	8.35	8.18	8.16	7.97	7.87	7.66	7.83	7.95	7.81	7.85	7.91
Conductivity (µS)	450	520	530	700	670	660	650	590	640	670	580
DO (mg/L)	8.49	7.48	6.92	8.72	9.43	7.26	7.46	7.06	7.90	5.94	7.73
Turbidity (NTUs)	3.19	1.80	2.68	1.58	0.8	1.24	2.33	2.4	1.73	5.40	2.20
NO_3-N (mg/L)	0.08	0.07	0.26	1.42	0.56	0.51	0.32	0.18	0.42	1.11	0.01
NH_3-N (mg/L)	0.94	1.56	0.12	0.42	0.47	1.14	0.10	0.17*	0.15	3.65	0.00
PO_4 (mg/L)	0.00	0.00	0.00	0.10	0.07	0.01	0.06	0.12	0.06	0.83	0.00
E. coli (MPN/100mL)	126	435	411	2420	158	189	135	161	93	582	38

^= Non-regulatory site

***= LCF2 ammonia was over range during initial sampling on May 6; resampling indicated results of 0.17 mg/l; most likely operator error during field analysis on May 6.**

Table 6. Physico-chemical Results for Samples Collected during Bioassessments from Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Fall 2021.

	STATION										
PARAMETER	**MRY0+**	**MRY1**	**MRY2**	**MRY3**	**FAR3^**	**BFC1**	**BFC2**	**BFC3**	**SYC1**	**SYC2**	**SYC3**
Width (ft)	NS	40.0	23.0	68.0	--	12.0	50.0	60.0	26.0	50.0	22.0
Avg. depth (ft)	NS	0.28	0.34	0.10	--	0.56	0.26	0.34	0.42	1.12	0.2
Avg. Velocity (ft/s)	NS	0.022	0.032	0.052	--	0.006	0.022	0.030	0.072	0.202	0.200
Estimated flow (cfs)	NS	0.222	0.225	0.318	--	0.032	0.229	0.551	0.629	9.050	0.871
Water Temperature (ºC)	NS	19.4	18.3	18.2	16.7	22.8	23.6	22.7	24.2	23.8	25.7
pH (s.u.)	NS	8.45	8.30	8.27	8.14	7.64	7.92	7.78	7.69	7.49	7.53
Conductivity (µS)	NS	350	360	510	670	680	610	570	490	440	420
DO (mg/L)	NS	8.36	7.35	5.42	6.87	6.36	8.04	6.45	7.55	4.96	6.89
Turbidity (NTUs)	NS	0.97	0.91	0.54	0.00	1.61	0.24	2.71	0.00	0.76	0.29
NO_3-N (mg/L)	NS	0.00	0.00	0.09	0.76	0.02	0.16	0.11	0.05	0.09	0.00
NH_3-N (mg/L)	NS	0.00	0.00	0.00	0.00	0.18	0.68	0.37	0.00	0.00	0.00
PO_4 (mg/L)	NS	0.00	0.02	0.01	0.00	0.03	0.02	0.00	0.00	0.00	0.00
E. coli (MPN/100mL)	NS	9	117	15	124	12	687	>2420*	31	70	291

FAR3 was intermittent with pools only during fall sampling. Pools varied from 6" to >2.5'.
***BFC3-original test was Oct 6; rained on Oct 10, retested Oct 21 with a result of 2420.**
+=Potential new reference site, non-regulatory site
^= Non-regulatory site
NS=not sampled, site was dry with shallow puddles

Table 7. Physico-chemical Results for Samples Collected during Bioassessments from Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Fall 2021.

	STATION										
PARAMETER	**MAR1**	**MAR2**	**MAR3**	**OVR1**	**OVR2**	**OVR3**	**LFC1**	**LFC2**	**LFC3**	**HEN3^**	**ELI3^**
Width (ft)	10.0	15.0	14.0	13.0	18.0	16.0	7.0	22.0	22.5	21	24
Avg. depth (ft)	0.2	0.12	0.38	0.52	0.20	0.20	0.48	0.42	0.08	0.34	0.76
Avg. Velocity (ft/s)	0.000	0.016	0.068	0.024	0.022	0.028	0.010	0.006	0.002	0.172	0.070
Estimated flow (cfs)	0.000	0.023	0.310	0.146	0.063	0.072	0.030	0.050	0.003	1.105	1.149
Water Temperature (ºC)	20.4	20.7	20.7	22.4	21.8	21.7	21.0	19.0	18.8	18.3	20.1
pH (s.u.)	7.37	7.72	8.03	7.30	7.57	7.92	7.30	7.94	8.01	8.14	7.57
Conductivity (µS)	640	600	770	500	430	450	630	500	410	450	630
DO (mg/L)	3.47	3.43	6.04	4.69	7.55	7.00	2.53	5.05	5.24	8.52	8.7
Turbidity (NTUs)	0.00	0.00	0.96	1.91	12.10	8.89	3.43	1.02	1.01	21.3~	1.06
NO_3-N (mg/L)	0.14	0.38	1.15	0.18	0.02	0.00	0.01	0.05	0.04	0.00	0.17
NH_3-N (mg/L)	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.18	0.07	0.00	0.00
PO_4 (mg/L)	0.06	0.07	0.07	0.03	0.00	0.00	0.00	0.09	0.02	0.00	0.00
E. coli (MPN/100mL)	133	308	122	1553	687	76	13	96	34	187	184

^= Non-regulatory site
NS=not sampled
~HEN3 had an ongoing discharge from an adjacent construction site, which was being addressed at the time of sampling

Biological Data Analysis

Spring 2021 TX-IBI metric calculations (Table 8 and Figure 1) returned a score of “high” aquatic life use for two sites (MRY0 and BFC1). Twelve sites (MRY1, MRY2, MRY3, FAR3, BFC3, SYC1, SYC3, MAR2, OVR2, OVR3, LFC1, HEN3) indicated scores with “intermediate” life use and the remaining eight sites (BFC2, SYC2, MAR1, MAR3, OVR1, LFC2, LFC3, and ELI3) showed “limited” aquatic life use. TX-IBI macroinvertebrate metric calculations for spring samples are displayed in Tables 9-12.   Spring macroinvertebrate abundance data are shown in Tables 17-18.

TX-IBI analysis for the fall 2021 macroinvertebrate data (Table 8 and Figure 2) indicated five sites (MRY1, BFC2, SYC1, SYC2, and MAR1) were rated with “high” aquatic life use and fourteen sites (MRY2, MRY3, FAR3, BFC1,BFC3, SYC3, MAR2, MAR3, OVR2, OVR3, LFC2, LFC3, HEN3 and ELI3) were rated with “intermediate” aquatic life use. The remaining two sites (OVR1 and LFC1) indicated a “limited” aquatic life use. Results for the individual metric calculations are included in Tables 13-16. Macroinvertebrate abundance data for fall are presented in Tables 19-20.

Comparison of each site’s scores will be made on a seasonal basis at the end of monitoring or permit term.

Table 8. Texas Macroinvertebrate Index of Biotic Integrity Scores (TX-IBI) for Mary's Creek, Farmer's Branch, Big Fossil Creek, Sycamore Creek, Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Spring and Fall 2021.

Site	Spring 2021	Fall 2021	Aquatic Life Use	Score
MRY0+	32	NS	Exceptional	>36
MRY1	26	31	High	29-36
MRY2	24	27	Intermediate	22-28
MRY3	26	28	Limited	<22
FAR3^	24	25		
BFC1	33	28		
BFC2	21	31		
BFC3	24	25		
SYC1	25	36		
SYC2	21	30		
SYC3	23	28		
MAR1	21	30		
MAR2	26	26		
MAR3	21	23		
OVR1	16	21		
OVR2	22	26		
OVR3	23	23		
LFC1	26	21		
LFC2	16	25		
LFC3	20	28		
HEN3^	23	26		
ELI3^	19	24		

+=Potential new reference site, non-regulatory site
^ =Non-regulatory site

Conclusion

Rapid bioassessments were performed on stream sites within nine watersheds in Fort Worth during spring and fall 2021. Four new sites were sampled, increasing the coverage of the city's watersheds from the required six to nine watersheds. Spring habitat assessment scores for most sampled sites were classified in the sub-optimal category, except for one site (HEN3) rated with marginal habitat, and two sites (MRY0 and BFC1) rated as having optimal habitat. Five sites (MRY2, SYC1, MAR2, OVR1, and LFC3) were rated as having marginal habitat during fall sampling, with the remaining sites rated with sub-optimal habitat. Physico-chemical test results were within normal range for all sampled sites during both sampling events, except for the turbidity was elevated at HEN3 during fall sampling, which was attributable to an adjacent construction site. Corrective action for the turbid runoff was taken with the construction contractor at the time of sampling.

Texas IBI calculations for the spring 2021 macroinvertebrate data indicated two sites (MRY0 and BFC1) rated with high aquatic life use, twelve sites rated with intermediate aquatic life use, and eight sites rated with limited aquatic life use. Fall 2021 data analysis indicated more sites rated with high aquatic life use (five), more sites rated with intermediate aquatic life use (fourteen) and fewer sites rated with limited aquatic life use (two).

Table 9. TX-IBI Metric Calculations for Macroinvertebrate Community Samples Collected from Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Spring 2021.

TX-IBI Metrics	MRY0+	MRY1	MRY2	MRY3	FAR3^	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3
Taxa Richness	16	17	14	14	14	22	14	18	18	14	15
EPT taxa richness	6	6	4	4	4	8	6	6	4	3	5
HBI biotic index	3.96	4.60	4.78	4.88	4.33	4.51	4.90	4.39	5.30	4.99	5.66
% Chironomidae	13.12	40.00	47.97	43.22	16.09	27.44	20.47	23.89	47.80	32.91	50.00
% dominant taxon	39.63	36.19	44.31	40.70	35.36	24.19	49.12	27.07	39.56	31.01	33.91
% dominant FFG	49.87	58.57	66.26	82.41	50.92	49.82	83.63	46.82	59.34	70.25	74.71
% Predators	5.25	8.10	4.88	7.54	2.11	11.91	2.92	3.82	8.24	4.43	9.77
Ratio of intolerant:tolerant taxa	5.25	1.28	1.05	1.19	4.57	2.11	1.71	2.49	0.72	1.08	0.51
% of total Trichoptera as Hydropsychidae	60.47	57.14	45.45	25.00	45.58	73.49	15.00	87.32	97.67	100.00	33.33
# of non-insect taxa	4.0	5.0	3.0	4.0	3.0	7.0	4.0	8.0	9.0	6.0	5.0
% collectors-gatherers	42.52	58.57	66.26	82.41	50.92	49.82	83.63	45.22	59.34	70.25	74.71
% of total number as Elmidae	1.05	1.90	3.66	1.51	0.26	4.69	0.00	0.00	1.65	15.19	0.00

+=Potential new reference site, non-regulatory site

^ =Non-regulatory site

Table 10. TX-IBI Scores for Macroinvertebrate Community Samples Collected from Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Spring 2021.

TX-IBI Scores	MRY0 +	MRY1	MRY2	MRY3	FAR3^	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3
Taxa Richness	3	3	2	2	2	4	2	3	3	2	3
EPT taxa richness	2	2	2	2	2	3	2	2	2	1	2
HBI biotic index	3	2	2	2	3	3	2	3	1	2	1
% Chironomidae	2	1	1	1	2	1	1	1	1	1	1
% dominant taxon	2	2	1	1	2	3	1	3	2	3	2
% dominant FFG	2	1	1	1	2	2	1	2	1	1	1
% Predators	4	4	4	4	1	4	1	1	4	1	4
Ratio of intolerant:tolerant taxa	4	1	1	1	3	2	2	2	1	1	1
% of total Trichoptera as Hydropsychidae	2	2	3	4	3	2	4	1	1	1	3
# of non-insect taxa	3	3	2	3	2	4	3	4	4	4	3
% collectors-gatherers	1	1	1	1	1	1	1	1	1	1	1
% of total number as Elmidae	4	4	4	4	1	4	1	1	4	3	1
Total Score	32	26	24	26	24	33	21	24	25	21	23
Aquatic Life Use Rating	High	Intermediate	Intermediate	Intermediate	Intermediate	High	Limited	Intermediate	Intermediate	Limited	Intermediate

+=Potential new reference site, non-regulatory site

^ =Non-regulatory site

Table 11. TX-IBI Metric Calculations for Macroinvertebrate Community Samples Collected from Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Spring 2021.

TX-IBI Metrics	**MAR1**	**MAR2**	**MAR3**	**OVR1**	**OVR2**	**OVR3**	**LFC1**	**LFC2**	**LFC3**	**HEN3^**	**ELI3^**
Taxa Richness	10	16	12	14	19	18	19	9	15	13	11
EPT taxa richness	3	5	5	1	4	5	6	2	4	4	6
HBI biotic index	4.23	4.92	5.35	7.65	5.97	5.59	5.01	5.80	4.89	4.88	4.37
% Chironomidae	18.33	36.13	43.56	44.98	62.92	53.27	35.88	87.10	46.19	39.29	29.53
% dominant taxon	54.44	29.68	27.61	33.62	35.15	30.65	31.33	73.39	40.95	31.12	38.86
% dominant FFG	86.11	63.23	82.21	92.14	71.88	64.82	73.41	93.95	67.14	69.39	56.48
% Predators	4.44	1.94	0.00	4.37	11.25	13.57	20.04	4.03	4.29	10.71	3.11
Ratio of intolerant:tolerant taxa	3.86	1.01	0.68	0.02	0.25	0.44	1.25	0.13	1.10	1.39	2.39
% of total Trichoptera as Hydropsychidae	75.00	42.86	66.67	No Trich	96.00	55.56	69.23	No Trich	83.33	91.18	93.75
# of non-insect taxa	2.0	6.0	3.0	5.0	10.0	4.0	8.0	1.0	3.0	2.0	1.0
% collectors-gatherers	86.11	63.23	82.21	92.14	71.88	64.82	73.41	93.95	67.14	69.39	37.82
% of total number as Elmidae	16.11	6.45	6.13	0.00	0.00	0.50	4.01	1.21	0.95	2.04	0.00

^ =Non-regulatory site

Table 12. TX-IBI Scores for Macroinvertebrate Community Samples Collected from Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Spring 2021.

TX-IBI Scores	**MAR 1**	**MAR2**	**MAR3**	**OVR1**	**OVR2**	**OVR3**	**LFC1**	**LFC2**	**LFC3**	**HEN3^**	**ELI3^**
Taxa Richness	2	3	2	2	3	3	3	2	3	2	2
EPT taxa richness	1	2	2	1	2	2	2	1	2	2	2
HBI biotic index	3	2	1	1	1	1	2	1	2	2	3
% Chironomidae	1	1	1	1	1	1	1	1	1	1	1
% dominant taxon	1	3	3	2	2	3	2	1	1	2	2
% dominant FFG	1	1	1	1	1	1	1	1	1	1	1
% Predators	1	1	1	1	4	4	3	1	1	4	1
Ratio of intolerant:tolerant taxa	3	1	1	1	1	1	1	1	1	1	2
% of total Trichoptera as Hydropsychidae	2	3	2	1	1	2	2	1	1	1	1
# of non-insect taxa	2	4	2	3	4	3	4	1	2	2	1
% collectors-gatherers	1	1	1	1	1	1	1	1	1	1	2
% of total number as Elmidae	3	4	4	1	1	1	4	4	4	4	1
Total Score	21	26	21	16	22	23	26	16	20	23	19
Aquatic Life Use Rating	Limited	Intermediate	Limited	Limited	Intermediate	Intermediate	Intermediate	Limited	Limited	Intermediate	Limited

^ =Non-regulatory site

Table 13. TX-IBI Metric Calculations for Macroinvertebrate Community Samples Collected from Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Fall 2021.

TX-IBI Metrics	**MRY0+**	**MRY1**	**MRY2**	**MRY3**	**FAR3^**	**BFC1**	**BFC2**	**BFC3**	**SYC1**	**SYC2**	**SYC3**
Taxa Richness	NS	21	18	24	10	21	17	20	22	16	17
EPT taxa richness	NS	7	7	7	1	9	7	6	7	7	7
HBI biotic index	NS	5.57	5.27	5.57	8.02	5.23	4.49	5.94	4.88	4.56	4.86
% Chironomidae	NS	18.88	59.47	40.22	14.29	43.11	13.99	43.48	29.28	38.94	38.91
% dominant taxon	NS	16.78	57.27	31.84	61.90	20.00	21.76	24.84	27.25	38.44	30.55
% dominant FFG	NS	42.66	63.88	69.27	71.43	47.11	41.97	53.42	34.78	46.23	56.27
% Predators	NS	22.38	9.25	23.46	9.52	24.00	17.62	26.09	12.17	6.28	13.18
Ratio of intolerant:tolerant taxa	NS	0.74	0.52	0.77	0.15	0.80	2.51	0.44	1.10	1.30	1.25
% of total Trichoptera as Hydropsychidae	NS	0.00	22.41	16.67	No Trich	48.21	4.00	0.00	24.20	15.05	31.40
# of non-insect taxa	NS	5.0	2.0	4.0	4.0	7.0	3.0	7.0	9.0	4.0	2.0
% collectors-gatherers	NS	42.66	63.88	69.27	17.46	47.11	41.97	53.42	34.78	45.48	56.27
% of total number as Elmidae	NS	7.69	1.76	5.59	1.59	0.00	0.52	0.00	1.16	1.26	0.96

+=Potential new reference site, non-regulatory site

^ =Non-regulatory site

Table 14. TX-IBI Scores for Macroinvertebrate Community Samples Collected from Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Fall 2021.

TX-IBI Scores	**MRY0+**	**MRY1**	**MRY2**	**MRY3**	**FAR3^**	**BFC1**	**BFC2**	**BFC3**	**SYC1**	**SYC2**	**SYC3**
Taxa Richness	NS	3	3	4	2	3	3	3	4	3	3
EPT taxa richness	NS	3	3	3	1	3	3	2	3	3	3
HBI biotic index	NS	1	2	1	1	2	3	1	2	2	2
% Chironomidae	NS	1	1	1	2	1	2	1	1	1	1
% dominant taxon	NS	4	1	2	1	4	4	3	3	2	3
% dominant FFG	NS	3	1	1	1	2	3	2	4	2	1
% Predators	NS	3	4	3	4	3	3	2	4	4	4
Ratio of intolerant:tolerant taxa	NS	1	1	1	1	1	2	1	1	1	1
% of total Trichoptera as Hydropsychidae	NS	4	4	4	1	3	4	4	4	4	3
# of non-insect taxa	NS	3	2	3	3	4	2	4	4	3	2
% collectors-gatherers	NS	1	1	1	4	1	1	1	2	1	1
% of total number as Elmidae	NS	4	4	4	4	1	1	1	4	4	4
Total Score	NS	31	27	28	25	28	31	25	36	30	28
Aquatic Life Use Rating	NS	High	Intermediate	Intermediate	Intermediate	Intermediate	High	Intermediate	High	High	Intermediate

+=Potential new reference site, non-regulatory site
^ =Non-regulatory site

Table 15. TX-IBI Metric Calculations for Macroinvertebrate Community Samples Collected from Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Fall 2021.

TX-IBI Metrics	MAR1	MAR2	MAR3	OVR1	OVR2	OVR3	LFC1	LFC2	LFC3	HEN3^	ELI3^
Taxa Richness	19	16	16	20	16	18	19	18	15	18	21
EPT taxa richness	7	5	5	3	5	6	2	6	4	4	7
HBI biotic index	5.52	5.05	4.90	6.81	4.84	5.10	7.74	5.78	7.34	5.16	5.63
% Chironomidae	11.25	42.18	42.63	61.03	31.33	36.44	12.41	46.01	16.85	13.25	58.06
% dominant taxon	35.63	40.82	42.31	56.81	27.90	33.90	60.15	41.31	26.40	22.52	54.84
% dominant FFG	56.88	57.82	66.35	77.93	57.94	66.67	70.30	62.91	39.33	60.26	67.34
% Predators	13.75	11.56	4.49	7.51	13.30	13.28	13.91	21.13	20.22	13.25	11.69
Ratio of intolerant:tolerant taxa	0.80	0.86	1.09	0.04	1.51	1.19	0.03	0.50	0.09	1.48	0.39
% of total Trichoptera as Hydropsychidae	0.00	34.15	46.43	66.67	49.21	30.00	100.00	43.33	0.00	86.96	28.57
# of non-insect taxa	6.0	5.0	4.0	7.0	6.0	3.0	10.0	6.0	6.0	8.0	6.0
% collectors-gatherers	56.88	57.82	66.35	77.93	57.94	66.67	70.30	62.91	39.33	60.26	67.34
% of total number as Elmidae	1.88	2.04	3.21	0.00	0.00	0.85	0.38	3.29	0.00	22.52	0.00

^ =Non-regulatory site

Table 16. TX-IBI Scores for Macroinvertebrate Community Samples Collected from Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Fall 2021.

TX-IBI Scores	MAR1	MAR2	MAR3	OVR1	OVR2	OVR3	LFC1	LFC2	LFC3	HEN3^	ELI3^
Taxa Richness	3	3	3	3	3	3	3	3	3	3	3
EPT taxa richness	3	2	2	1	2	2	1	2	2	2	3
HBI biotic index	1	2	2	1	2	2	1	1	1	2	1
% Chironomidae	2	1	1	1	1	1	2	1	1	2	1
% dominant taxon	2	1	1	1	3	2	1	1	3	3	1
% dominant FFG	1	1	1	1	1	1	1	1	3	1	1
% Predators	4	4	1	4	4	4	4	3	3	4	4
Ratio of intolerant:tolerant taxa	1	1	1	1	1	1	1	1	1	1	1
% of total Trichoptera as Hydropsychidae	4	3	3	2	3	3	1	3	4	1	3
# of non-insect taxa	4	3	3	4	4	2	4	4	4	4	4
% collectors-gatherers	1	1	1	1	1	1	1	1	2	1	1
% of total number as Elmidae	4	4	4	1	1	1	1	4	1	2	1
Total Score	30	26	23	21	26	23	21	25	28	26	24
Aquatic Life Use Rating	High	Intermediate	Intermediate	Limited	Intermediate	Intermediate	Limited	Intermediate	Intermediate	Intermediate	Intermediate

^ =Non-regulatory site

Table 17. Macroinvertebrate abundances collected at each sample site along Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Spring 2021.

Common Name	Order	Family	MRY0+	MRY1	MRY2	MRY3	FAR3^	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3
Flatworms	Turbellaria		3	14	4	2	0	24	0	5	2	2	0
Nematodes	Nematoda		0	0	0	0	0	0	0	0	0	0	0
Worms	Oligochaeta	Lumbriculidae	0	0	0	0	0	0	0	1	0	0	0
		Tubificidae	0	0	1	0	1	0	1	1	2	3	6
		Naididae	1	0	0	0	0	0	4	0	2	12	15
Leeches	Hirudinea		0	0	0	0	0	3	0	1	5	3	4
Snails	Gastropoda	Physidae	2	0	0	0	3	0	0	4	1	0	2
		Planorbidae	0	1	0	0	0	0	0	1	3	0	1
		Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0
		Hydrobiidae	0	0	0	0	0	1	0	0	0	0	0
		Ancylidae	0	0	0	0	0	3	0	1	0	0	0
Clams	Bivalvia	Corbiculidae	0	3	1	1	0	1	0	0	2	1	0
		Sphaeridae	2	0	0	0	0	2	1	0	3	5	0
Crawfish	Decapoda	Cambaridae	0	1	0	1	1	0	0	0	0	0	0
Scuds	Amphipoda	Hyallelidae	0	4	0	4	0	2	22	6	1	0	0
Mayflies	Ephemeroptera	Baetidae	115	30	39	81	134	46	84	58	16	20	31
		Caenidae	1	1	0	0	0	1	1	5	5	2	3
		Heptageniidae	1	0	0	1	0	0	0	0	0	0	0
		Leptophyphidae	0	1	0	0	0	2	1	0	0	0	0
Caddisflies	Trichoptera	Brachycentridae	0	0	0	0	2	6	0	0	0	0	2
		Helicopsychidae	0	0	0	0	0	3	14	5	1	0	4
		Hydropsychidae	26	4	25	3	67	61	3	62	42	7	3
		Hydroptilidae	6	1	0	0	78	7	0	2	0	0	0
		Leptoceridae	0	0	1	0	0	0	0	2	0	0	0
		Philopotamidae	11	0	29	9	0	6	3	0	0	0	0
		Odontoceridae	0	2	0	0	0	0	0	0	0	0	0

+=Potential new reference site, non-regulatory site
^ =Non-regulatory site

Table 17. Macroinvertebrate abundances collected at each sample site along Mary's Creek, Farmer's Branch, Big Fossil Creek, and Sycamore Creek in Spring 2021, continued.

Common Name	Order	Family	MRY0⁺	MRY1	MRY2	MRY3	FAR3^	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3
Damselflies	Zygoptera	Coenagrionidae	6	0	0	0	2	2	0	0	0	0	0
True Water Bugs	Hemiptera	Corixidae	0	0	0	0	0	0	0	0	0	0	0
		Saldidae	0	0	0	0	0	0	0	0	0	0	0
		Veliidae	0	0	1	0	0	0	0	0	0	0	0
Beetles	Coleoptera	Carabidae	0	0	0	0	0	0	0	0	0	0	0
		Elmidae	4	4	9	3	1	13	0	0	3	24	0
		Hydrophilidae	2	0	0	0	0	0	0	0	0	0	0
		Staphylinidae	0	0	0	0	0	0	0	0	0	0	0
Dobsonflies	Megaloptera	Corydalidae	0	0	0	2	0	0	0	0	0	0	1
Butterflies and Moths	Lepidoptera	Crambidae	0	0	0	0	0	0	0	0	0	0	0
Midges and flies	Diptera	Ceratopogonidae	0	1	2	0	0	2	0	0	0	0	0
		Empididae	0	0	0	0	0	0	0	0	0	0	0
		Psychodidae	0	0	0	0	1	0	0	0	0	0	0
		Simuliidae	151	59	16	6	28	16	2	85	7	27	15
		Stratiomyidae	0	0	0	0	0	0	0	0	0	0	0
		Tipulidae	0	0	0	0	0	0	0	0	0	0	0
		Chironominae	41	76	109	69	53	67	14	67	72	49	59
		Tanypodinae	9	2	5	11	6	2	5	6	8	2	12
		Orthocladiinae	0	6	4	6	2	7	16	2	7	1	16
	Number of Individuals		381	210	246	199	379	277	171	314	182	158	174

+=Potential new reference site, non-regulatory site

^ =Non-regulatory site

Table 18. Macroinvertebrate abundances collected at each sample site along Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Spring 2021.

Common Name	Order	Family	MAR1	MAR2	MAR3	OVR1	OVR2	OVR3	LFC1	LFC2	LFC3	HEN3^	ELI3^
Flatworms	Turbellaria		0	0	0	1	8	9	102	0	5	4	4
Nematodes	Nematoda		0	0	0	0	0	0	1	0	0	0	0
Worms	Oligochaeta	Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0
		Tubificidae	0	6	0	30	16	0	3	0	0	0	0
		Naididae	0	1	0	77	30	19	12	0	1	0	0
Leeches	Hirudinea		3	1	0	3	40	8	0	0	0	0	0
Snails	Gastropoda	Physidae	1	0	1	7	3	0	1	0	0	0	0
		Planorbidae	0	0	0	0	0	0	0	0	0	0	0
		Lymnaeidae	0	0	0	0	1	0	0	0	0	0	0
		Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0
		Ancylidae	0	0	0	0	1	0	0	0	0	0	0
Clams	Bivalvia	Corbiculidae	0	4	0	0	1	0	0	4	1	1	0
		Sphaeridae	0	0	0	0	2	0	3	0	0	0	0
Crawfish	Decapoda	Cambaridae	0	2	5	0	0	0	1	0	0	0	0
Scuds	Amphipoda	Hyallelidae	0	9	25	0	1	1	28	0	0	0	0
Mayflies	Ephemeroptera	Baetidae	98	14	21	0	14	6	145	13	43	61	17
		Caenidae	0	2	2	2	2	2	2	7	0	0	0
		Heptageniidae	0	0	0	0	0	0	0	0	0	0	1
		Leptophyphidae	0	0	0	0	0	0	0	0	0	0	1
Caddisflies	Trichoptera	Brachycentridae	0	3	0	0	2	3	3	0	0	0	0
		Helicopsychidae	0	0	1	0	0	0	4	0	2	1	4
		Hydropsychidae	3	3	4	0	48	5	18	0	45	31	75
		Hydroptilidae	0	0	1	0	0	1	1	0	0	2	0
		Leptoceridae	0	0	0	0	0	0	0	0	0	0	0
		Philopotamidae	1	1	0	0	0	0	0	0	7	0	1
		Odontoceridae	0	0	0	0	0	0	0	0	0	0	0

^ =Non-regulatory site

Table 18. Macroinvertebrate abundances collected at each sample site along Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek in Spring 2021, continued.

Common Name	Order	Family	MAR1	MAR2	MAR3	OVR1	OVR2	OVR3	LFC1	LFC2	LFC3	HEN3^	ELI3^
Damselflies	Zygoptera	Coenagrionidae	0	0	0	0	0	2	0	0	0	4	0
True Water Bugs	Hemiptera	Corixidae	0	0	0	1	0	0	0	0	0	0	0
		Saldidae	0	0	0	1	0	0	0	0	0	0	0
		Veliidae	0	0	0	0	0	0	0	0	0	0	0
Beetles	Coleoptera	Carabidae	0	0	0	1	0	0	0	0	0	0	0
		Elmidae	29	10	10	0	0	1	22	3	2	4	0
		Hydrophilidae	0	0	0	0	0	0	0	0	0	0	0
		Staphylinidae	0	0	0	0	0	0	0	0	0	7	0
Dobsonflies	Megaloptera	Corydalidae	0	0	0	0	0	0	0	0	0	0	0
Butterflies and Moths	Lepidoptera	Crambidae	0	0	0	0	0	0	0	0	1	0	0
Midges and flies	Diptera	Ceratopogonidae	0	0	0	0	0	0	0	4	1	0	0
		Empididae	0	0	0	0	0	1	0	0	1	0	0
		Psychodidae	0	0	0	0	0	0	0	0	0	0	0
		Simuliidae	12	43	22	1	38	33	6	1	4	4	33
		Stratiomyidae	0	0	0	2	4	1	0	0	0	0	0
		Tipulidae	0	0	0	0	0	1	0	0	0	0	0
		Chironominae	22	46	45	29	200	61	172	182	86	60	54
		Tanypodinae	5	2	0	3	16	7	7	6	2	6	2
		Orthocladiinae	6	8	26	71	142	38	18	28	9	11	1
	Number of Individuals		180	155	163	229	569	199	549	248	210	196	193

^ =Non-regulatory site

Table 19. Macroinvertebrate abundances collected at each sample site along Mary's Creek, Farmer's Branch, Big Fossil Creek and Sycamore Creek during Fall 2021.

Common Name	Order	Family	MRY1	MRY2	MRY3	FAR3^	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3
Flatworms	Turbellaria		0	1	3	0	1	2	2	3	0	0
Worms	Oligochaeta	Lumbriculidae	0	0	0	0	0	0	0	0	0	0
		Tubificidae	0	0	0	3	0	0	0	2	0	0
		Naididae	2	0	0	0	0	0	0	1	0	0
Leeches	Hirudinea		0	0	0	0	0	0	1	1	9	7
Snails	Gastropoda	Physidae	8	0	3	39	4	0	12	4	0	2
		Planorbidae	1	0	1	0	2	3	4	6	1	0
		Lymnaeidae	0	0	0	0	0	0	0	0	0	0
		Hydrobiidae	0	0	0	6	0	0	7	0	0	0
		Ancylidae	0	0	0	0	5	0	0	9	1	0
Clams	Bivalvia	Corbiculidae	24	2	0	0	1	0	2	5	1	0
Scuds		Sphaeridae	2	0	0	0	3	0	0	2	0	0
	Amphipoda	Hyallelidae	0	0	3	2	4	6	17	0	0	0
Mayflies	Ephemeroptera	Baetidae	15	6	35	0	13	15	9	15	29	70
		Caenidae	1	1	6	1	1	0	5	0	2	0
		Heptageniidae	7	0	3	0	0	0	0	0	3	6
		Leptophyphidae	9	1	5	0	27	42	7	1	0	3
Caddisflies	Trichoptera	Brachycentridae	0	1	0	0	2	0	0	5	2	0
		Helicopsychidae	0	1	1	0	8	38	6	50	0	6
		Hydropsychidae	0	13	1	0	27	3	0	38	28	27
		Hydroptilidae	2	0	0	0	10	21	2	17	3	10
		Leptoceridae	0	0	0	0	6	1	7	0	0	0
		Philopotamidae	1	43	4	0	3	12	0	47	153	43
		Odontoceridae	3	0	0	0	0	0	0	0	0	0
Dragonflies	Anisoptera	Gomphidae	3	0	0	0	0	0	0	0	0	0
		Libellulidae	0	0	0	0	0	0	0	0	0	0

MRY0 was not sampled

Table 19. Macroinvertebrate abundances collected at each sample site along Mary's Creek, Farmer's Branch, Big Fossil Creek and Sycamore Creek during Fall 2021, continued.

Common Name	Order	Family	MRY1	MRY2	MRY3	FAR3^	BFC1	BFC2	BFC3	SYC1	SYC2	SYC3
Damselflies	Zygoptera	Coenagrionidae	18	12	19	0	9	19	5	33	6	8
		Calopterygidae	0	0	0	0	2	0	0	0	0	0
True water bugs	Hemiptera	Belostomatidae	0	0	1	0	0	0	0	0	0	0
		Hebridae	0	0	1	0	0	0	0	0	0	0
		Mesoveliidae	0	0	1	0	0	0	2	0	0	0
		Naucoridae	0	0	1	0	0	0	0	0	0	0
		Veliidae	0	0	1	0	0	2	0	0	0	0
Beetles	Coleoptera	Elmidae	11	4	10	1	0	1	0	4	5	3
		Hydrophilidae	4	1	3	0	0	0	0	0	0	3
Dobsonflies	Megaloptera	Corydalidae	1	3	0	0	0	0	1	0	0	1
Butterflies and moths	Lepidoptera	Crambidae	0	0	0	0	0	1	0	0	0	1
Midges and flies	Diptera	Ceratopogonidae	2	2	3	0	0	0	1	1	0	0
		Culicidae	0	0	0	1	0	0	0	0	0	0
		Empididae	0	0	0	0	0	0	0	0	0	0
		Ephydridae	0	0	0	1	0	0	0	0	0	0
		Psychodidae	0	0	0	0	0	0	0	0	0	0
		Simuliidae	0	1	0	0	0	0	0	0	0	0
		Stratiomyidae	0	0	2	0	0	0	1	0	0	0
		Tipulidae	2	0	0	0	0	0	0	0	0	0
		Chironominae	23	130	57	4	45	15	40	94	137	95
		Tanypodinae	4	2	9	5	42	11	30	4	10	22
		Orthocladiinae	0	3	6	0	10	1	0	3	8	4
	Number of Individuals		143	227	179	63	225	193	161	345	398	311

MRY0 was not sampled

Table 20. Macroinvertebrate abundances collected at each sample site along Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek during Fall 2021.

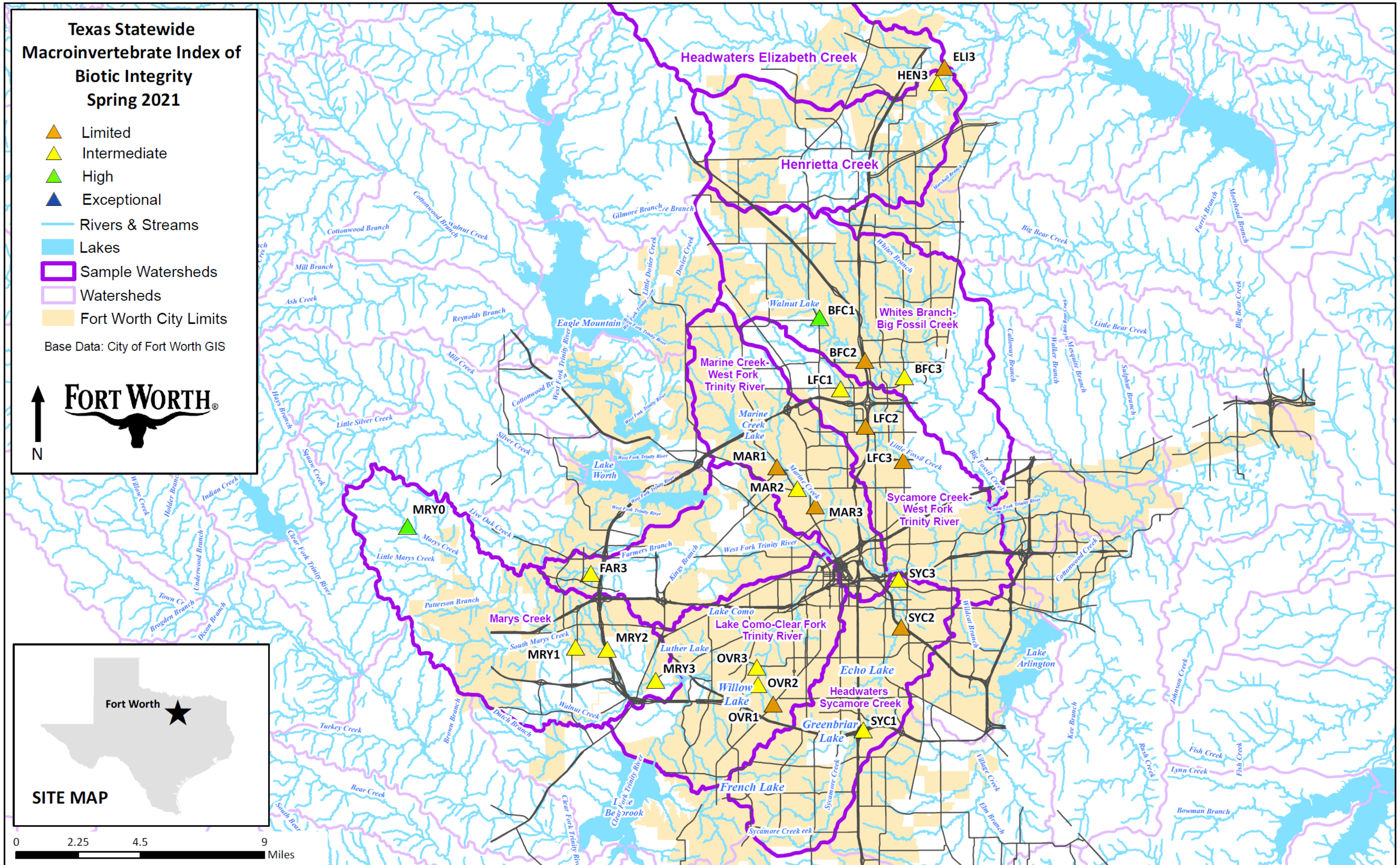
Common Name	Order	Family	MAR1	MAR2	MAR3	OVR1	OVR2	OVR3	LFC1	LFC2	LFC3	HEN3^	ELI3^
Flatworms	Turbellaria		0	1	0	0	12	14	2	5	0	9	7
Worms	Oligochaeta	Lumbriculidae	0	0	0	0	0	0	0	1	0	3	0
		Tubificidae	0	0	0	0	0	0	2	0	0	11	0
		Naididae	0	2	0	18	1	6	5	1	0	0	5
Leeches	Hirudinea		2	1	0	1	8	0	12	0	8	0	0
Snails	Gastropoda	Physidae	2	0	3	19	0	0	25	1	40	1	2
		Planorbidae	1	1	1	1	0	0	11	0	13	0	13
		Lymnaeidae	0	0	0	0	0	0	2	0	0	0	2
		Hydrobiidae	0	0	0	2	0	0	0	0	0	0	0
		Ancylidae	1	1	0	2	1	0	1	2	2	1	0
Clams	Bivalvia	Corbiculidae	1	0	2	0	0	0	2	0	16	8	0
Scuds		Sphaeridae	0	0	1	0	1	0	0	0	0	4	0
	Amphipoda	Hyallelidae	57	0	0	15	7	9	160	3	47	4	1
Mayflies	Ephemeroptera	Baetidae	4	20	64	3	60	72	0	25	8	20	19
		Caenidae	6	0	0	0	2	26	2	2	1	0	0
		Heptageniidae	1	0	0	0	0	0	0	0	0	3	0
		Leptophyphidae	6	0	0	0	0	0	0	1	2	0	2
Caddisflies	Trichoptera	Brachycentridae	0	0	1	0	1	0	0	0	0	0	0
		Helicopsychidae	38	22	0	0	0	7	0	6	1	0	1
		Hydropsychidae	0	14	39	2	31	21	1	13	0	20	10
		Hydroptilidae	0	1	0	0	0	3	0	0	0	0	2
		Leptoceridae	8	0	1	0	0	0	0	0	0	0	1
		Philopotamidae	3	4	43	1	31	39	0	11	0	3	21
		Odontoceridae	0	0	0	0	0	0	0	0	0	0	0
Dragonflies	Anisoptera	Gomphidae	0	0	0	0	0	0	0	0	0	0	1
		Libellulidae	1	0	0	3	0	2	2	0	0	0	0

^ =Non-regulatory site

Table 20. Macroinvertebrate abundances collected at each sample site along Marine Creek, Overton Park Creek, Little Fossil Creek, Henrietta Creek, and Elizabeth Creek during Fall 2021, continued.

Common Name	Order	Family	MAR1	MAR2	MAR3	OVR1	OVR2	OVR3	LFC1	LFC2	LFC3	HEN3^	ELI3^
Damselflies	Zygoptera	Coenagrionidae	6	12	9	7	2	16	4	36	7	9	11
		Calopterygidae	0	0	1	0	0	1	0	0	0	0	0
True water bugs	Hemiptera	Belostomatidae	0	0	0	0	0	0	0	0	0	0	0
		Hebridae	0	1	0	1	0	0	0	0	0	1	0
		Mesoveliidae	0	0	0	0	0	0	0	0	0	0	0
		Naucoridae	0	0	0	0	0	0	0	0	0	0	0
		Veliidae	0	0	3	0	1	3	1	0	0	0	2
Beetles	Coleoptera	Elmidae	3	3	10	0	0	3	1	7	0	34	0
		Hydrophilidae	2	0	0	0	0	0	0	0	3	0	0
Dobsonflies	Megaloptera	Corydalidae	0	0	0	0	0	0	0	0	0	0	0
Butterflies and moths	Lepidoptera	Crambidae	0	2	1	0	2	0	0	1	0	0	0
Midges and flies	Diptera	Ceratopogonidae	0	0	0	0	0	2	0	0	0	0	3
		Culicidae	0	0	0	4	0	0	0	0	0	0	0
		Empididae	0	0	0	2	0	0	0	0	0	0	0
		Ephydridae	0	0	0	0	0	0	0	0	0	0	0
		Psychodidae	0	0	0	1	0	0	0	0	0	0	0
		Simuliidae	0	0	0	0	0	1	0	0	0	0	1
		Stratiomyidae	0	0	0	1	0	0	0	0	0	0	0
		Tipulidae	0	0	0	0	0	0	0	0	0	0	0
		Chironominae	7	60	132	121	65	120	16	88	9	17	136
		Tanypodinae	11	2	1	2	8	9	16	4	18	1	5
		Orthocladiinae	0	0	0	7	0	0	1	6	3	2	3
	Number of Individuals		160	147	312	213	233	354	266	213	178	151	248

^ =Non-regulatory site



Amy LaMar | December 2021 | Map Source: X:\07_ENVIRONMENTAL\GIS\WaterQuality\AnnualReport\IBI_RBA Monitoring\2022

Figure 1. TX Statewide Macroinvertebrate IBI Aquatic Life Use Ratings, Spring 2021.

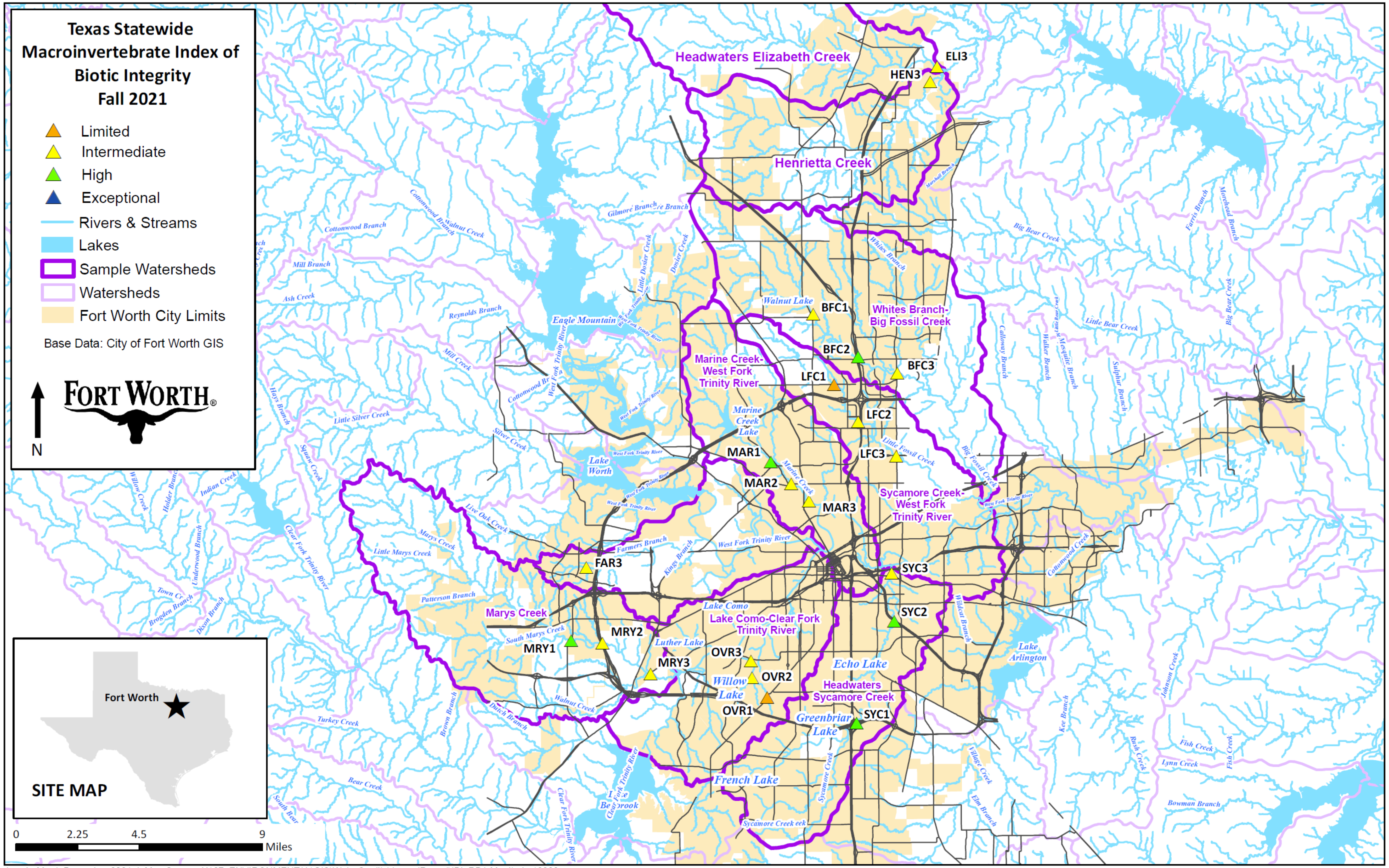


Figure 2. TX Statewide Macroinvertebrate IBI Aquatic Life Use Ratings, Fall 2021.