Upper Tule Creek West Improvement and Habitat Enhancement Phase II

Final Report 2011 & 2012

Nonpoint Source Water Quality Management
Planning Implementation Grant
Agreement Numbers 582-12-10077, 582-13-30050
Grantee: Aransas County

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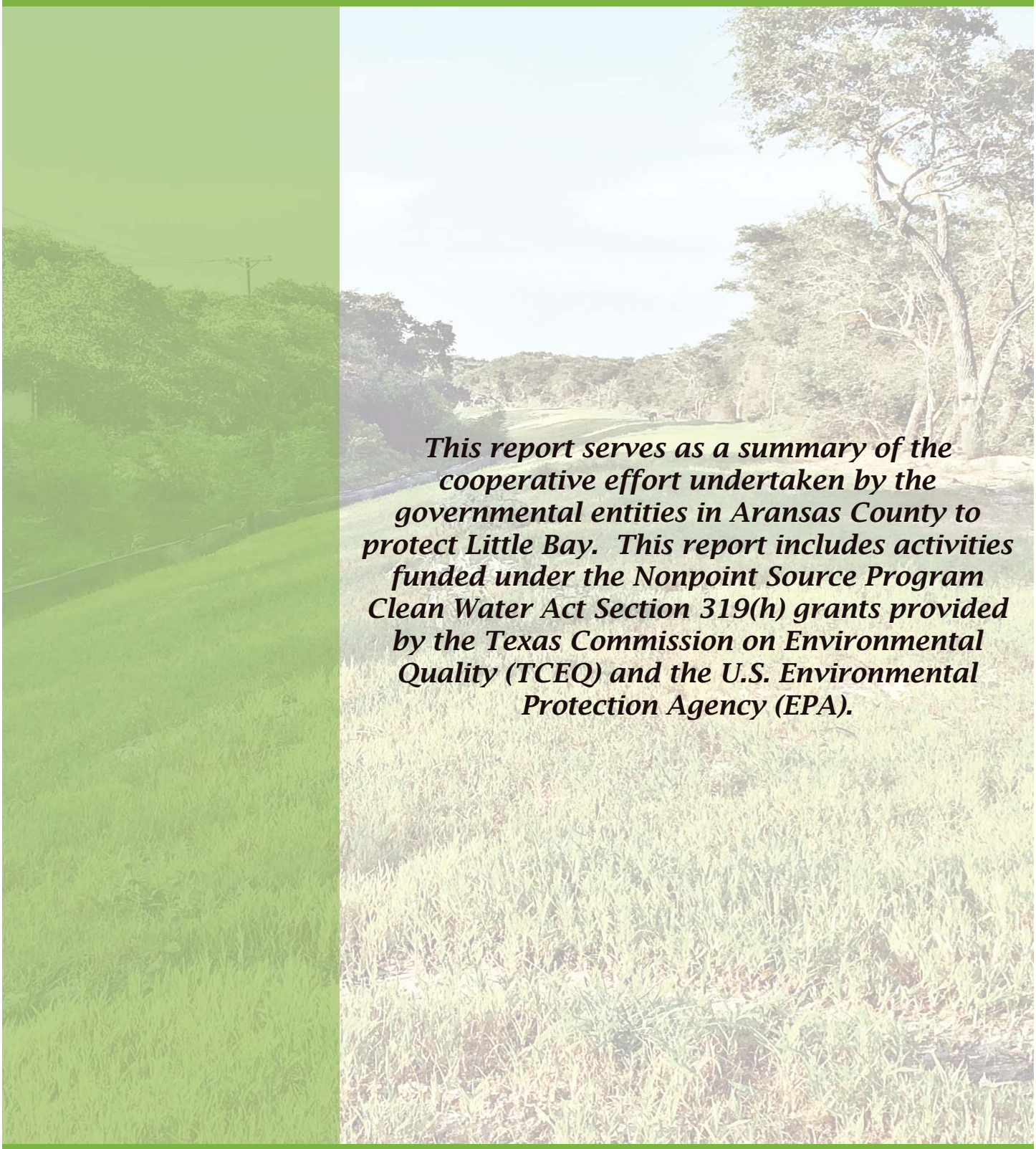
Executive Summary



This report serves as a summary of the cooperative effort undertaken by the governmental entities in Aransas County to protect Little Bay. This report includes activities funded under the Nonpoint Source Program Clean Water Act Section 319(h) grants provided by the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (EPA).

This report summarizes the project activities and findings including development of a Monitoring Quality Assurance Project Plan (QAPP) and a Modeling QAPP, stream water quality and streamflow monitoring, groundwater and rainfall monitoring, modeling and BMP assessment of both this project (Upper Tule Creek West Widening) and the Tule Creek West Sediment Trap Pond, engineering review of bank stabilization and slope protection strategies and permitting, design plans and specifications, the construction bid process, and construction. The grant-funded stormwater best management practices (BMPs) were implemented on Tule Creek, a priority watershed in Aransas County. The first phase involved the construction of a sediment trap pond and associated habitat enhancement efforts; the second phase involved the widening, bank stabilization, vegetated slope protection, and realignment of the creek, and associated habitat enhancement efforts. Throughout both phases, water quality monitoring and modeling was conducted to evaluate the behavior of stormwater BMP quality controls. The first phase was funded under contract number 582-10-90462 and the second phase was funded under contract numbers 582-12-10077 and 582-13-30050 which all are a part of the Nonpoint Source 319(h) grant program.

Pictured above is the area where the first phase of the Tule Creek Water Quality Enhancement Project took place. This phase involved the construction of a sediment trap pond and the restoration/protection of wetlands and habitat.

The Tule Creek watershed is a 2,340-acre watershed that discharges stormwater runoff from the City of Rockport, the Town of Fulton, unincorporated areas of Aransas County, and effluent from the City of Rockport's Wastewater Treatment Plant (WWTP) into Little Bay. The Tule Creek watershed is urbanizing with a population expected to increase significantly within the next two decades. Prior to the grant-funded improvements, Tule Creek experienced severe erosion, high rates of sediment transport, and periods of stagnation. Sediments and non-point source pollutants associated with fine sediment are a primary pollutant of concern found in Tule Creek and discharged to Little Bay.

The sediment carried by runoff will be reduced through implementation of stormwater BMPs. A delta has formed in Little Bay at the Tule Creek outfall, and historical water quality studies show a decline in water quality in Little Bay.

A renewed emphasis on habiat preservation and bank stabilization along Tule Creek, in conjunction with a planned approach for proper management of new stormwater infrastructure, was the foundation for the recently completed regional stormwater management plan. Aransas County, along with the City of Rockport, the Aransas County Navigation District (ACND), and the Town of Fulton have cooperatively developed the Aransas County Regional Stormwater Management Plan (ACSMP) (Aransas County, 2011). The ACSMP included a recommendation for implementing stormwater controls within the priority watersheds specifically Tule Creek. One of the Capital Improvement Plan (CIP) BMP projects identified was the West Tule Creek Sediment Trap Pond and Habitat Enhancement Project (West Tule Sediment Trap), and the Upper Tule Creek West Project. The first phase of these grant-funded projects, the West Tule Sediment Trap, involved the construction of an approximately 1-acre sediment trap located where SH 35 Business crosses Tule Creek just north of Wal-Mart and across the highway from the Wetlands Demonstration Pond. The sediment trap is an in-line treatment device intended to reduce the sediment that is discharged into Little Bay. In addition, other project elements involved riparian/bottomland habitat enhancements, removal of invasive vegetation (Chinese tallow and Brazilian pepper), and restoration (replanting) of this area. Modeling and Monitoring QAPPs were developed and implemented as part of this project. The goal of the modeling and monitoring components of this project is to better characterize solids present in Tule Creek's runoff.

Pictured above is the open water habitat area and sediment trap that was created as part of the phase one of the Tule Creek Water Quality Enhancement Project.

Introduction

Aransas County is experiencing growth in population which is, in turn, increasing the residential and commercial development of the area. The growth in population and development are both factors that contribute to the increasing pressure on wetlands, wildlife habitats, and water resources in the area. As more and more land is converted for human use, the potential for water quality degradation is significantly increased and this poses a serious threat to the health of the ecosystem. Pollutants that threaten the health of the county's six bays are nutrients and sediments from human activities such as shoreline development and stormwater runoff.

This threat is most obvious in Little Bay, a shallow bay within the corporate boundaries of the City of Rockport that historically has supported fishing activities, large populations of wintering waterfowl, as well as large populations of nesting birds. Little Bay is bounded on the south and southeast by public lands (Rockport Beach Park, Festival Grounds) and on the west by a street with multiple public access areas. Little Bay's public access also includes a boat ramp in the beach park, and usage levels are high, especially on weekends and holidays. The bay is utilized year-round for a variety of water-based recreation, including kayaking, boating, fishing, swimming, windsurfing, skiing, and birding. Universities and public schools from throughout South Texas use Little Bay as a research and teaching resource. It is common to see groups of students on Little Bay or along its shore, taking part in environmental studies and field trips.

Scientists have identified contaminated stormwater runoff as a principal cause of declining water quality and loss of wildlife habitat within Little Bay (Dunton and Wilson, 2010). Studies documented high levels of nitrogen loading from land-based activities, reduced salinity due to stormwater outflows (exacerbated by poor water exchange with Aransas Bay), persistent eutrophication problems, and algal blooms during the summer months (Naismith, 2009). Little Bay has experienced a decline in the once extensive beds of submerged seagrasses. Fisheries are less productive, and winter flocks of waterfowl have declined in numbers and diversity in recent years.

The Tule Creek Watershed includes both the Tule Creek West and Tule Creek North tributaries (Appendix A). The creek drains areas of the City of Rockport, the Town of Fulton, and areas of Aransas County outside the jurisdiction of both municipalities. The ACND

owns Little Bay by virtue of a land patent from the Texas Legislature and cooperates with the City of Rockport in managing the bay. Thus, all governmental entities in Aransas County are in involved in a cooperative effort to protect Little Bay, and there is consensus among these entities that the Tule Creek runoff and associated adverse impacts to Little Bay are top-priority concerns within the framework of the regional program to protect water resources and improve wildlife habitat.

The Tule Creek Watershed has been enhanced through ongoing and forthcoming water quality and stormwater improvements using TCEQ grants, Texas General Land Office (TXGLO) Coastal Management Plan (CMP) grants, Coastal Bend Bays and Estuaries Program (CBBEP) grants, and also funds from the Aransas County Stormwater Program. These grants have funded construction of various improvements to satisfy the policies, goals, and objectives of the stormwater program and partnerships.

In particular, the 2009 TCEQ Nonpoint Source 319(h) grant was used to construct water quality and habitat related controls. These controls included a sediment trap pond to act as an in-line treatment device intended to reduce some of the transported sediment and solids from reaching Little Bay, and habitat enhancement areas that included riparian and bottomland habitat enhancements, removal of invasive vegetation (Chinese tallow and Brazilian pepper), and restoration (replanting) areas. Both the sediment trap pond and habitat enhancement areas cover approximately 1.6 acres and are located just upstream (west) of the State Highway 35 Business crossing at Tule Creek. Construction of the sediment trap was completed in July 2012.

Two additional 319(h) grants (2011 and 2012) were acquired to carry out the continued focus on implementation of water quality controls located within the Tule Creek watershed; this work is referred to as Tule Creek Phase II. The focus of this report is on these two grants which involved the widening and stabilizing of the creek banks upstream from the sediment trap pond, vegetated slope protection, and realignment with the goal of reducing bank erosion and decreasing sediment transport to Little Bay.

A Watershed Treatment System, Habitat, and Invasive Plant Management Program has been recommended to ensure that benefits of these stormwater BMPs and habitat improvements are continued and improved upon. With the exception of routine removal of sediment from the sediment trap pond when needed, current funding does not provide for long-term continued management although there are grant funds potentially available which could be pursued.

Project Significance and Background

The United States Geological Survey (USGS) has identified sediment as one of the most prevalent urban runoff pollutants in its National Water Quality Assessment Program (USGS, 1991-2001). Sediment and pollutants associated with stormwater runoff are primary pollutants of concern in Tule Creek and its receiving waterway, Little Bay (LDP, Consultants, Inc., 2012). The goal of the 319(h) grant projects (2009, 2011, and 2012) is to further characterize solids in runoff and implement and evaluate water quality controls.

The purpose of these projects is to help improve water quality in Little Bay by reducing the transport and deposition of sediment and solids in Tule Creek and consequently its receiving waterbody, Little Bay. Excess sediment and pollutant-clad solids can choke seagrass and marsh vegetation by decreasing the dissolved oxygen and can introduce bacterial and nutrient pollutants.

The improvements funded by the 319(h) 2011 and 2012 grants are located upstream of the sediment trap pond. The Upper Tule West channel was an improved earthen drainage channel with steep and barren slopes on primarily one side of the channel that have been modified over the years, including excavation of various areas and installation of cross pipe culverts. The channel has historically experienced significant erosion during rainfall events carrying sediment downstream where it is ultimately deposited into Little Bay, smothering seagrasses and emergent marsh vegetation. In order to reduce erosion and improve water and habitat quality, the channel banks were stabilized by re-shaping the eroding bank and incorporating slope protection features. Engineers and scientists with Naismith Engineering, Inc. (NEI) and LDP Consultants designed the bank BMPs. A study of alternative stormwater management approaches to widening, re-sloping, re-aligning, and then planting of vegetation along the banks has been completed. The project is located mostly on City of Rockport property, within drainage easements. The design of the bank BMP will improve habitat quality along the creek as well, including the removal of highly invasive Brazilian pepper trees, which is a high priority.

Habitat monitoring as well as stormwater monitoring and modeling was performed to aid in assessing performance of the improvements. Quantitative data has been collected and submitted to TCEQ's Surface Water Quality Monitoring Information System (SWQMIS) and has also been provided to assist the modeling efforts. Results of monitoring and modeling will provide insights to solids characterization and water quality challenges of Tule Creek.

Such insights may determine appropriate improvements such as increasing the size of the sediment trap or incorporating added control structures that affect how the sediment trap system can be operated for greatest efficacy.

Methods

Construction and Habitat Enhancement

In September 2012 a workshop was held with the results presented to the Aransas County Stormwater Advisory Committee, and subsequently to the City of Rockport, outlining the Design Process including identification of guiding principles, specific outcomes desired, design consideration objectives of the project, engineering and environmental analysis approaches, optimal solutions, identification of constraints and opportunities for the BMP and bank stabilization, determination of "hard edged" design constraints, and select alternative design features/components.

The identification of the Guiding Principles utilized to aid in the design of the BMP to enhance water quality solutions included:

- minimizing maintenance costs;
- controlling capital costs;
- respecting regulations;
- adaptive management; and
- minimizing habitat impacts.

Specific Outcomes expected out of the project included:

- safety considerations;
- maintenance of water balance;
- preservation and protection of habitat; and
- preservation and protection of water quality.

The Design Considerations for this project included:

- groundwater recharge;
- maintain or improve water quality integrity;
- preserve the hydrologic/hydraulic capacity;
- avoid stagnation;
- avoid erosive conditions; and
- preserve habitat corridors yet still provide BMPs (where necessary).

The steps that were taken for the Engineering and Environmental Analysis Approaches were as follows:

Step 1: Review of Optimum Solutions and Initial Plans for Providing Stormwater BMPs and Bank Stabilization;

Step 2: Identification of Constraints and Opportunities Influencing Stormwater BMPs and Bank Stabilization Alternatives;

Step 3: Determination of "Hard Edged" Design Constraints;

Step 4: Selection of Alternative Design Features and Components; and
Step 5: Development of a Preferred and Recommended Plan.

To determine an optimal solution in-line with the guiding principles for the BMP design, a number of applicable BMPs and approaches were considered:

- concrete lined channel;
- widening and lessening side slopes of the existing channel;
- softening structural solutions to stabilize slopes such as concrete mats;
- articulated block, vegetated gabions, rock or rubble rip-rap;
- utilizing aggressive vegetated stabilization efforts;
- seeding; or
- no action.

The Optimal Solutions, absent any constraints, include:

- wider corridors;
- flatter side slopes (vegetated stabilization);
- allow for low flows to develop natural sinuosity;
- alignment consistent with natural runoff principles;
- remove of the erosive "bend";
- creation of a "blue corridor".

Identification of constraints and opportunities for the BMP and bank stabilization and determination of "hard edged" design constraints were considered early on in the design process. Constraints included ("hard edged" denoted in italics):

- *Property Ownership*
- Habitat Impacts
- Alignment is parallel with contours
- *Preserving Conveyance Capacity*
- Permitting
- Costs
- *Hike/Bike Trail Alignment*
- Maintenance / Access
- *Topography / Available Grade*
- Cohesion-less Soil
- *Hydrologic Patterns*
- Property Value Impacts
- Limited Quality/Quantity Data

Targeted / Localized Problems:

- Outfalls are creating erosive conditions
- Grading of Maintenance Trail
- Sheet flow runoff over banks' edge creating rills
- Extreme angle at the Bend

Alternative design features looked at various locations along Tule Creek for BMP placement including the confluence of Tule Creek North and Tule Creek West to the bend, the erosive bend itself along Tule Creek West upstream of the confluence, the

bend to the Hike/Bike Trail Interaction, the Hike/Bike Trail to the Frost Property, the Frost Property and channel frontage, the Hike/Bike Trail Culvert Crossing, and the Wal-Mart detention ponds. The confluence to the bend might elicit a possible response to the existing outfall from Henderson Street and could divert flow to wetlands upstream from confluence. The bend would allow the opportunity to straighten the alignment and soften the bend, widen and reshape the channel, provide energy dissipation, provide erosion control and hardened edges, and provide an opportunity for aggressive vegetative stabilization techniques. The bend to the Hike/Bike Trail Interaction could elicit a response to the Patton Street outfall, any widening or reshaping could avoid substantial live oaks, and aid in the stability of maintenance road by re-grading towards the woodlands to control bank erosion/rills, and could add amenities near Hike/Bike Trail connectivity. The preferred alternative, realignment and widening in order to soften the form of the channel, was chosen based on the fact that the channel was unstable.

On Monday, September 9, 2013 the Aransas County Stormwater Advisory Committee made a recommendation to the Commissioners' Court to approve the low bid and award the contract to J.J. Fox Construction for $389,700. Subsequently, on Monday September 23rd, the Commissioners' Court did unanimously approve the bid accordingly. The contract was awarded on November 20, 2013, and construction began shortly after the bid was awarded. A jurisdictional request was submitted to the United States Army Corps of Engineers for the project area, upstream of the confluence with the pond, and it was found to be non-jurisdictional therefore no USACE permit was required (Appendix H).

In order to allow access for equipment, a construction entrance was created by widening a maintenance pathway at the end of North Patton Street. The project site was cleared of understory vegetation and selected trees were removed in the area immediately adjacent to the channel to allow for truck and equipment access as well as to allow the east creek bank to be laid back. Before construction began, silt fences were installed at the toe of the bank in the areas being improved and along with a downstream, rock-filter dam, helped to control erosion and sediment transport during construction. The southern (straight) and northern (bend) sections of the project were then excavated and graded to reduce the bank slopes. On the straight section of the creek, upstream of the bend, the construction only took place on the east side bank. Both the east and west sides of the bank on the bend were excavated and graded. Sprinkler heads were then installed in order to water the seeds and hydromulch that was placed for long term surface stabilization.

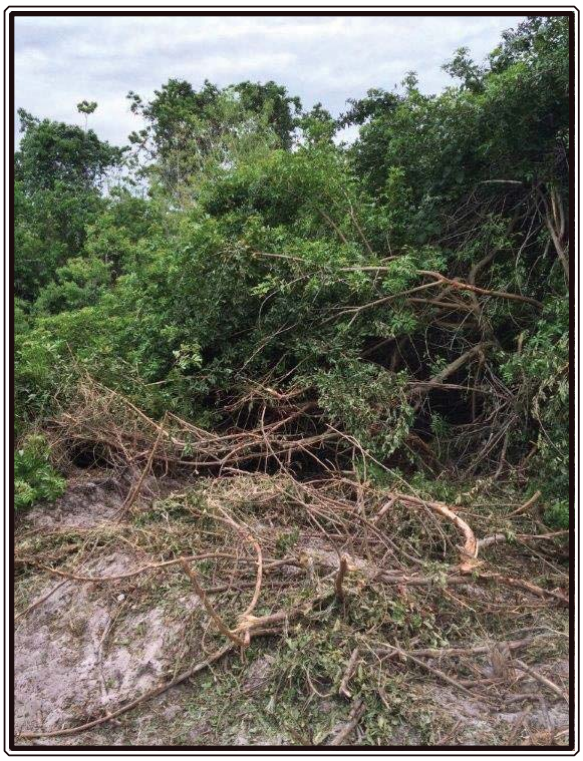
The area of the creek downstream of the bend was heavily infested with the invasive species Brazilian pepper (*Schinus terebinthifolius*). As part of the habitat enhancement goals of the project, the Brazilian pepper was mechanically removed.

The section of the creek where the erosive bend occurs is the area that was highly reinforced with both soft and hard armor protection. During high flow events, the creek was rapidly eroding the land that is within private landowners' backyards. On the western and northern banks of the bend, an approximately 6-foot wide layer of rock was placed to help stabilize the area of highest impact. Above the layer of rock,

sod was placed on the remainder of the slope to ensure all of the bare ground was covered, protected, and stabilized. Lastly, the entire east bank of the straight section downstream of the bend and the south bank of the section downstream from the bend were both seeded with a native grasses and hydromulch.

During construction, it was decided that a change order was required in order to successfully modify the bend in the creek. The change order called for an increase in the amount of silt fencing, an increase in the area being cleared and stripped, an increase in the amount of excavation, and an increase in the amount of hydromulch. To compensate for the added charges, the change order also required the exclusion of the soft armor erosion control geotech mat as well as the anchor reinforced vegetation system replaced by the aforementioned stabilization techniques.

Prior to construction, trees that were not to be cleared were marked with tape. This helped to distinguish between the natives and invasives, as well as to identify trees of significant value.



The Brazilian pepper trees within the immediate project area were mechanically cleared and removed from the site.

An irrigation system was installed on the project site. The system will be used until the seeding and hydromulch vegetation is fully established.

This is the area of the creek called the "bend" which was severely eroding. Rip-rap (left side) was placed to help stabilize the bank. Erosion-control silt fencing (right) was erected prior to construction activities.

Monitoring

The goals of the water quality monitoring efforts were to integrate the monitoring data for the 2009, 2011 , and 2012 TCEQ 319(h) grant projects, assess the performance of the sediment trap and the proposed Tule Creek Stormwater BMP Projects, and to determine the need and basis for improvements to the BMPs. Data were provided to the Water Quality Modeling team for inclusion into the Quality Hydrologic Model (QUALHYMO). The monitoring will aid in identification of potential nonpoint source contributions and address concerns regarding the water quality conditions. Monitoring associated with the 2009 grant addressed the Sediment trap post-construction conditions, and the 2011, 2012 grants addressed conditions before and after Tule Creek West bank stabilization phase II work. Three sampling events occurred under the 2009 grant; two wet events and one dry event, 9/14/2012, 4/8/2013, and 5/15/2013 respectively. The other five sampling events were carried out under the 2011 and 2012 grants.

The monitoring QAPP was designed to integrate monitoring efforts for the County's 2009, 2011, and 2012 TCEQ Nonpoint Source Grant BMP stormwater projects for the Tule Creek Watershed and was approved August 10, 2012. Additionally, it provided data to be utilized in the modeling effort described in a separate Modeling QAPP titled "West Tule Creek Sediment Trap Pond and Habitat Enhancement Quality Assurance Project Plan for Modeling." Several analyses were conducted to evaluate various aspects of the sediment trap behavior. The main requirement was to assess sediment buildup and control in the sediment trap using the QUALHYMO model. Key data needed for the QUALYMO Model include rainfall, estimated flow data at each water quality sampling station, TSS, soil infiltration rate, evaporation data, groundwater elevation at each piezometer location and evapo-transpiration data. Additionally, a general qualitative review of stream and habitat quality indicators and physical observations along the creek was performed. Procedures to obtain supporting data for both the QUALHYMO parameters and the Qualitative Review of the Stream and Habitat were included in the Monitoring QAPP. It is noted that the data acquired under this QAPP was not collected on behalf of a regulatory required program such as the Total Maximum Daily Load (TMDL) Program, Stormwater Permit Program, Clean Rivers Program, or for WWTP permit requirements.

The stream and habitat quality indicators collected in the program outlined in this QAPP do not provide definitive baseline or planning data, but are intended to provide insight responding to questions identified during local community coordination (i.e. Rockport Water Quality Committee) involving potential non-point source contributions to Tule Creek and the issue involving poor water quality conditions. The stream and habitat quality indicators help identify gross non-point source contributions that could potentially influence downstream conditions, and provide general habitat characterization information during and after construction to help identify habitat enhancements from invasive plant removal and implementation of the BMP improvements. The local community also had questions involving the need to avoid undesirable water quality conditions as a result of implementing the proposed stormwater BMP improvements. In particular, the question involved the construction of the proposed in-line sediment trap and the avoidance of stagnant water conditions in the sediment trap that could get washed downstream to Little Bay during a flood or

high water stage event in Tule Creek. However, it should be noted that Tule Creek is already experiencing periods of stagnation and low flow, low velocity conditions during extreme dry weather. The City of Rockport WWTP discharges to Tule Creek upstream of the proposed in-line sediment trap facility. During extreme dry weather conditions as experienced in 2011, a significant portion of the treatment plant's effluent was diverted to the Rockport golf course for irrigation purposes. Given these conditions, Tule Creek was an extreme low flow effluent dominated stream. This extreme low flow condition was typified by very slow velocities, stagnant pools located immediately adjacent to major outfalls, and the appearance of fine sediment deposits within the creek bed.

As a precaution, given these lingering local concerns and the existence of evidence that Tule Creek can demonstrate water quality degradation, the following stream water and habitat quality indicators were incorporated into the stormwater monitoring program at a screening level:

- total suspended solids (TSS) and turbidity
- pH, temperature, conductivity
- dissolved oxygen (DO)
- oil and grease
- physical characteristics of Tule Creek and BMP Improvement Area
- habitat characteristics of Tule Creek and BMP Improvement Area

The TCEQ Surface Water Quality Monitoring Procedure, Volume 1 and Volume 2 (2012 and 2014) were also generally reviewed as a guideline for addressing these other stream

A variety of duck species and ibis are usually seen at confluence where the creek flows into the sediment trap (upper left) as well as all along the upper portions of the creek (upper right). The newly constructed creek bank is already exhibiting healthy signs of vegetative growth (lower right) and many deer have been sighted grazing in the area.

water and habitat quality indicators in the Monitoring QAPP. The Texas Surface Water Quality Standards (Appendix A) and the 2010 Guidance for Assessing and Reporting Surface Water Quality in Texas (August 25, 2010) were also generally used as a guideline for identifying a set of parameters to address the stagnation or eutrophication in the sediment trap. Tule Creek and Little Bay are unclassified, and aquatic life uses are not being assessed as part of this project.

The overall monitoring plan outline is as follows:

1. Monitoring initiated with the 2009 grant will address the West Tule Creek Project post-construction conditions and the 2011/2012 grants will address conditions before and after construction of the Upper Tule Creek West Project.

2. Monitoring was performed at six (6) locations to evaluate sediment loading. This assessment was conducted prior to and after the construction of the Upper Tule Creek West BMPs.

3. Eight (8) total representative sampling events were conducted representing four (4) baseline dry and four (4) wet weather stormwater conditions.

4. Discrete grab samples were collected and analyzed for TSS, turbidity, and oil and grease. A multi-parameter probe was used to collect data for pH, specific conductivity, DO, and temperature.

5. To estimate stream flow, a pygmy flow meter was used to capture velocity at the sampling sites along with water depths to then estimate flow at each sampling station.

6. An infiltrometer was used at locations representative of differing soil conditions in the watershed to estimate the soil infiltration rate.

7. Six piezometers were constructed along Tule Creek: three piezometers on the west side and three piezometers on the east side. Water levels at the wells were measured and used in the QUALHYYMO model (covered under separate modeling QAPP).

8. TSS, infiltration rate, and piezometer data was included in the QUALHYMO model (covered by separate modeling QAPP).

Key data collected and entered in the QUALHYMO included rainfall, estimated flow data at each water quality sampling station, concentration of total suspended solids (TSS) samples collected at six monitoring sites, soil infiltration rate, evaporation data, groundwater elevation at each piezometer location, and evapo-transpiration data from the Texas Water Development Board (TWDB). In addition, a general qualitative review of stream and habitat quality indicators and physical observations along the creek was performed at the time of water sampling. Procedures to obtain supporting data for both the QUALHYMO parameters and the Qualitative Review of the Stream and Habitat are included in the Monitoring QAPP (Naismith, 2012).

The comparison of pre-construction conditions with post-construction conditions can

be used as a screening tool for identifying the potential for undesirable conditions in the proposed sediment trap pond. The habitat observations generally identified species composition and percent cover within the stream reach where stream stormwater BMPs are implemented. The habitat quality inspection involved the collection of data using the Habitat Quality Index Worksheets at each sample location. In addition, on the sample collection day, there was a general drive-by and walk-about along the entire creek to identify any other factors that could also contribute or influence the stream conditions as well as the performance of the BMPs. Although the scope of the monitoring program was limited with regards to the assessment of additional stormwater runoff contributions and controls throughout the drainage basin outfalling into Tule Creek, the habitat quality and physical characteristics survey can help identify and explain issues that relate to the performance and modeling of the BMPs, as well as help address the community's concerns and questions. The Habitat Quality Index Worksheets (Appendix D) were used to log the in-stream, bottom, riparian cover, and other physical stream features at each sample location.

Modeling

Sediments and pollutants associated with sediment are the primary pollutants of concern in the Tule Creek watershed and its receiving waterbody, Little Bay. The modeling described in this section was conducted in the context of a wider effort launched to provide a better characterization of solids present in Tule Creek's runoff. As such, this modeling is not related to a wider modeling effort (e.g. TMDL or WPP) but was developed at a very small scale and limited scope, in order to gain a better understanding of the BMP facility performance. However, detailed local water quality information for Tule Creek is very limited. Data from other parts of the country must be used to broadly assess water quality constituents, pollutant removal rates and long-term performance of stormwater quality control facilities. Aransas County is unique when compared to the rest of the country, and using data derived from other areas of the country does not adequately assess local characteristics. Since it is the long term behavior of sediments that is of primary interest, a continuous simulation model was identified as a requirement to enable estimation of the system response continuously over time. It was noted that the model would need to have the ability to represent the contributing watershed, the BMP, and potentially the channel linking the two. It must also be able to represent flow and sediments carried by that flow, on a continuous basis. Finally, it must be a model that can be deployed and applied in the context of this project, namely a rapid and low level of effort, and one with only basic information on runoff relationships and on sediment generation. A model which is suitable for this condition is QUALHYMO. To do this, a simplified continuous simulation model was constructed, based on available local data, and applied as described below (full report in Appendix G).

The technical approach for this project was specified in the QAPP (LDP Consultants, Inc., 2012), and the project was conducted accordingly. The major steps were:

1. Confirm approach: Develop and obtain approval for the modeling QAPP prior to undertaking model development or application tasks.

2. Obtain precipitation data: obtain local rainfall data and/or design precipitation series and prepare them for input into the model.

3.Obtain monitoring data: this was required as a part of the data input into the QUALHYMO model. As noted, details of monitoring are contained in a separate monitoring QAPP. However, the following basic information is provided for convenient reference in relation to the modeling effort.

a. Six storm water monitoring locations were defined in the monitoring QAPP. For modeling purposes, data from these locations were evaluated, and the parameter monitored was total suspended solids (TSS).

b. Flow data were obtained from available physical measurements and mathematical estimates also identified in the monitoring QAPP. For modeling purposes, infiltration and runoff estimates were based on soil type and curve numbers available from prior modeling specified in the modeling QAPP.

c. Hydraulic information was obtained from the Interconnected Channel and Pond Routing Model (ICPR) modeling of the Tule Creek watershed undertaken as a part of the prior Aransas County Stormwater Management Plan, supplemented if necessary for present purposes by outflow structure conveyance calculations.

4. Develop model input data set: the available data were put into a form suitable for modeling. This included:

a. definition of contributing areas, and definition of land use types, based on available data from the earlier ICPR modeling of the Tule Creek watershed,

b. definition of the volume/depth and area/depth characteristics of the sediment trap, based on available design information (GIS data were not needed as the design information adequately characterized the pond),

c. definition of initial estimates of hydrologic parameters, sediment characteristics (production rating curve based on observations from the monitoring program, and settling velocities based on information from the monitoring program), and

d. definition of connectivity between the contributing areas, sediment trap and channel between these features based on geophysical information contained in available GIS data sets as represented in the ICPR modeling report.

All model features were oriented towards surface flow capture and management. The model was then adjusted to represent the available observations, with values adjusted based on monitoring results as well as typical hydrologic and hydraulic behavior since monitoring data were insufficient for a formal calibration. The monitored flow values were the principal data used in the adjustment process for dry weather, and the predicted runoff values were the principal data used in the development of wet weather flows.

The sequence of adjustment was to 1) develop representative and reasonable estimates of rainfall/runoff relationships, 2) develop hydraulically reasonable estimates of volumetric estimates of the routing (and bypass) of flows around the BMP, and 3) develop physically reasonable estimates of sediment removal based on fall velocities consistent with observed sediment characteristics.

5. Assess BMP performance: BMP behavior was estimated based on volumetric routing through the sediment trap itself, as determined by QUALHYMO modeling. Model outputs include:

a. estimated flow mass balance accounting (inflow, outflow, bypass and evaporation),

b. estimated sediment load and removal, and

c. estimated volumetric detention time in the BMP.

6. Conduct internal QC: the modeling data results were reviewed and checked. Details verified included 1) data sources, 2) data reduction, 3) data storage, 4) model structure, 5) model parameter adjustment, and 6) predicted model results.

7. Complete reporting and submission: documentation of the above development and activities, analysis and review processes was completed.

Results and Observations

As of June 2014, the creek banks along the Upper Tule West project area were successfully re-sloped, widened, and realigned, including correcting the sharp turn in the creek which was experiencing severe erosion. The Brazilian pepper trees in the project area had also been successfully removed during the construction process. And lastly, the creek banks were sprayed with seed and hydromulch to provide stabilization, help reduce erosion and sedimentation, and to filter and uptake pollutants. At present, the banks are more stable than they were prior to construction due to the decreased slopes and bank stabilizing techniques which include seeding the area with native grasses and reinforcing the bend with rock rip-rap.

As of June 19, 2014, all eight of the monitoring sampling events had been conducted. In order to determine whether the BMP installment is successful at decreasing the erosion of fine sand sedimentation to Little Bay, additional sampling and monitoring will be necessary.

The modeling was finished in August 2014 and it showed that the sediment trap pond is performing as predicted and will continue to do so with the routine maintenance that was proposed.

Construction and Habitat Enhancement

Construction was completed in late June 2014 and the site, as of August 2014, has had successful vegetative growth from the seeding and hydromulch, as well as natural vegetation regrowth. An abundance of wildlife has been observed in the area, grazing on the new growth and drinking from the creek. The site will continue to be irrigated at least until August 2015, giving the hydromulch growth time to fully mature and stablize. The silt fencing will also remain in place until revegetation is established and in conformance to the Stormwater Pollution Protection Plan (SWPPP).

During and after construction an abundance of white-tailed deer were seen on and around the project site, drinking from the creek and grazing on new vegetative growth. In the foreground is the silt fencing that was erected for erosion control.

Pre-Construction Photo 1: Facing downstream, Tule Creek on the left, pre-construction. The eroding banks were steep and sparsely vegetated.

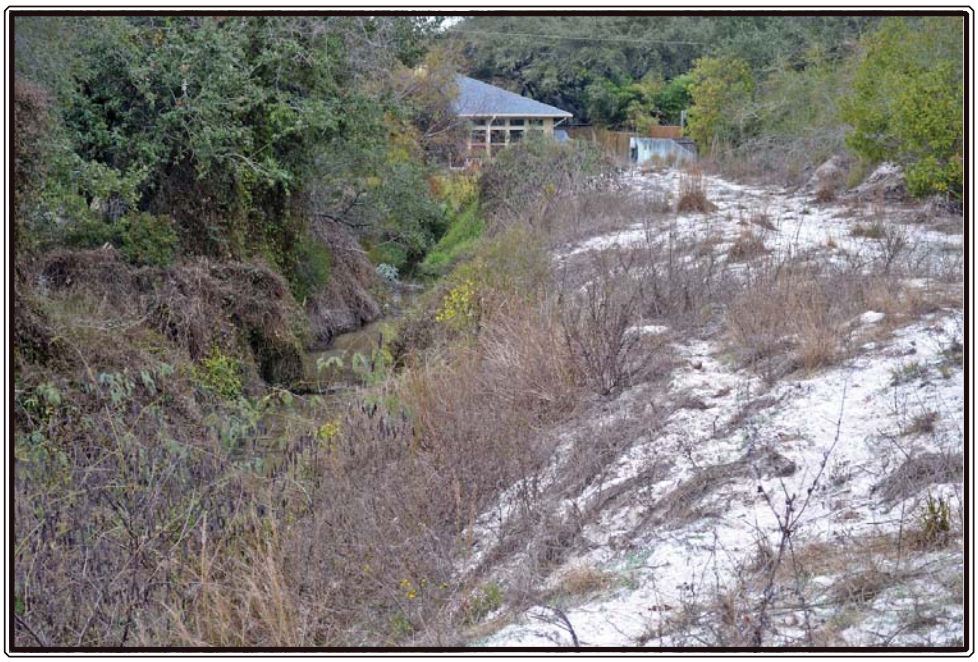
Post-Construction Photo 1: With the intention of stabilizing the banks, in order to reduce sedimentation the bank slope was layed back to decrease the slope and seeded with hydromulch to provide vegetative slope stabilization.

Pre-Construction Photo 2: Looking upstream, Tule Creek is on the right.

Post-Construction Photo 2: Looking upstream at the widened and vegetated slope, Tule Creek is on the right.

Pre-Construction Photo 3: Looking downstream, Tule Creek is on the left and Water Quality Sampling Site #4 is marked with the post.

Post-Construction Photo 3: Looking downstream at the widened and vegetated slope, Tule Creek is on the left.

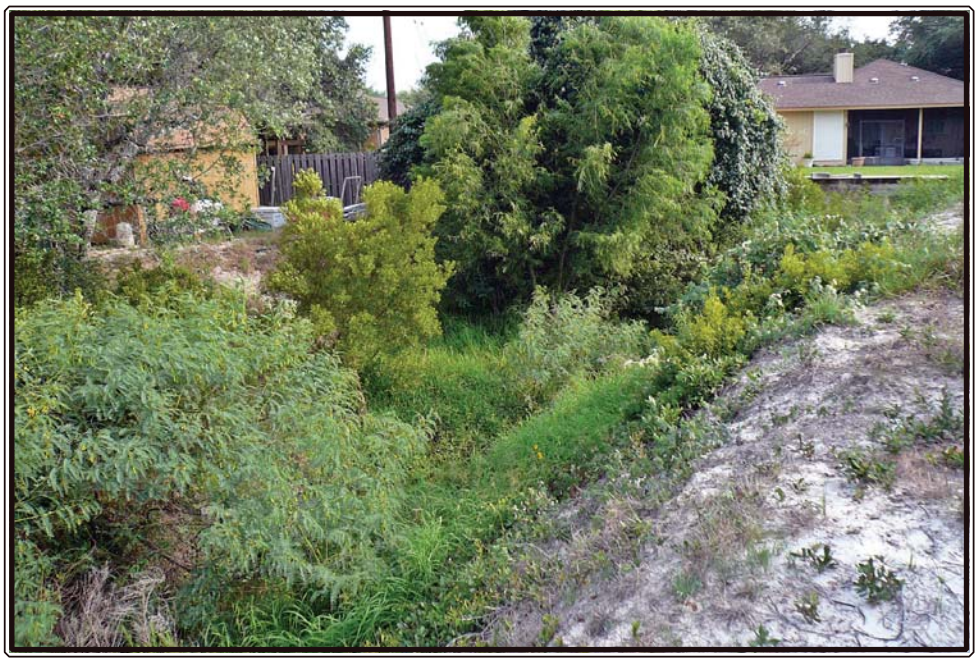


Pre-Construction Photo 4: Looking downstream, Tule Creek is on the left, this photo is taken directly upstream from where the bend starts; the bend takes a ninety-degree angle turn to the right in this photo.

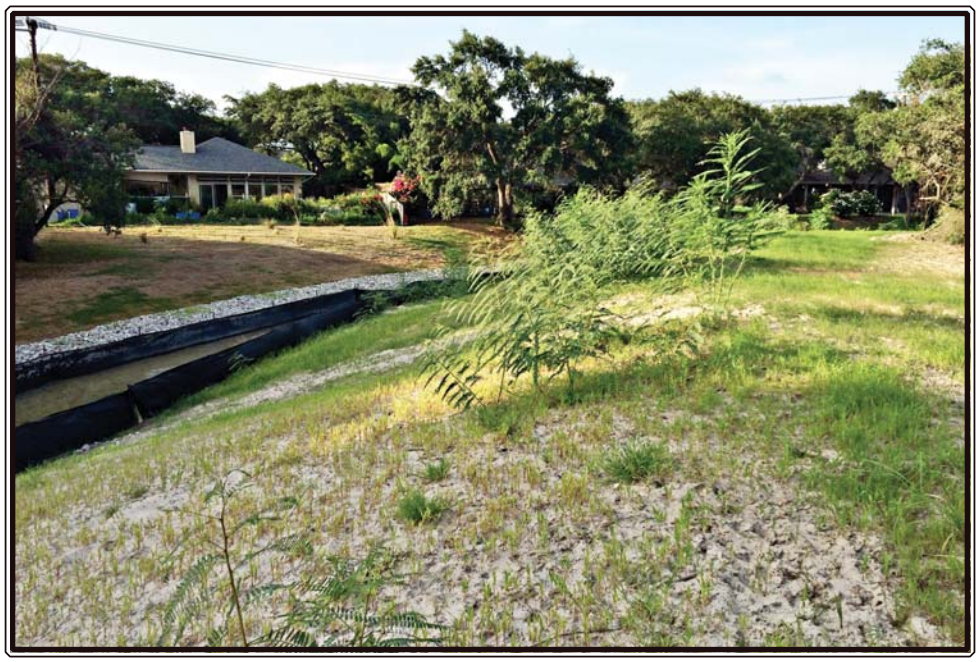
Post-Construction Photo 4: Looking downstream, Tule Creek is on the left.

Pre-Construction Photo 5: Looking upstream, Tule Creek is on the right.

Post-Construction Photo 5: Looking upstream, Tule Creek is on the right.

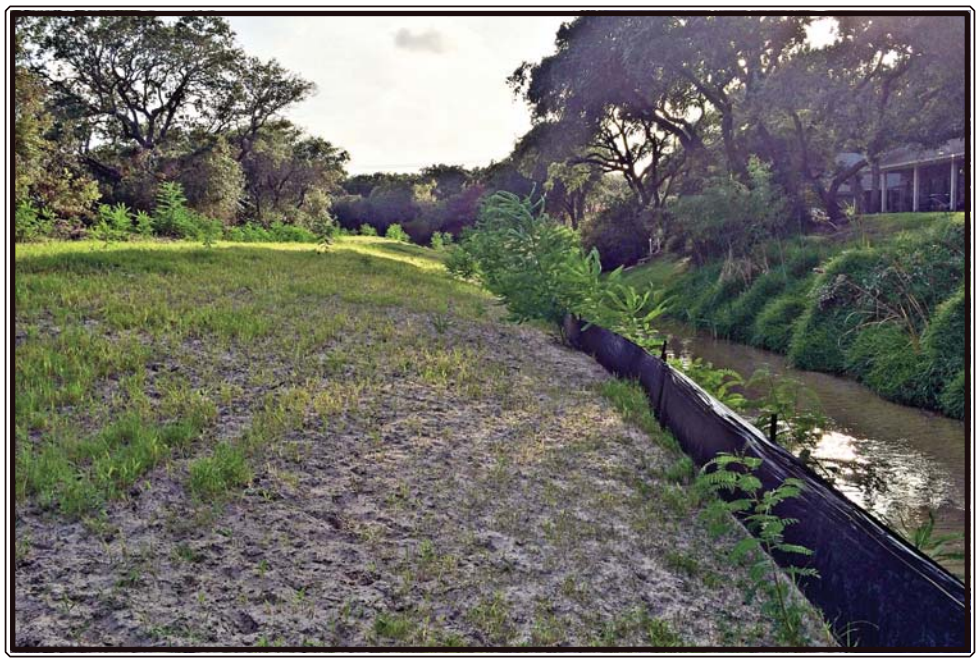


Pre-Construction Photo 6: This photo was taken on the bend, looking downstream, Tule Creek is on the left and makes a ninety-degree angle turn to the right, in front of the houses.



Post-Construction Photo 6: Another issue that this BMP addressed was to help reduce the erosion of personal property that abuts the creek. With the widening of the creek and placement of rock along the toe of the reshaped bank, the bank stabilization will help reduce erosion at this key bend in the creek.

Pre-Construction Photo 7: Looking upstream towards the bend.



Post-Construction Photo 7: Looking upstream towards the bend.

Monitoring

All eight of the sampling events have been conducted; four wet events and four dry events:

· The first sampling event took place on September 14, 2012 (under 2009 grant) and it was classified as a wet event with over two inches of rain falling that day. General weather conditions were noted as overcast with temperatures in the low 80s and a slight breeze.

· The second sampling event took place on March 6, 2013 (under 2009 grant) and was classified as a dry event since no rain had fallen within the last 72 hours. The general weather conditions noted that day were sunny, temperatures in the 60s, and very windy/gusty.

· The third sampling event took place on May 15, 2013 (under 2009 grant) and was the second wet event to be documented. Weather on May 15, 2013 was noted to be partly cloudy with a total of 0.24 inches of rain, temperatures in the upper 70s and breezy.

· On July 17, 2013 (under 2011 grant) the fourth sampling event was conducted and was a wet event. Weather conditions that day were temperatures in the low 80s, 0.42 inches of rain, overcast, and little wind.

· The final wet-weather sampling event was conducted on August 26, 2013 (under 2011 grant) when 2.80 inches of rain fell on the watershed. It was noted that weather conditions that day were temperatures in the low 80s, overcast with the occasional sprinkle, and breezy.

· The last sampling to be conducted before the Phase II construction started took place on November 6, 2013 (under 2011 grant) and was a dry sampling event. The weather conditions that day were temperatures in the 80s, sunny, partly cloudy, and little to no breeze.

·April 8, 2014 (under 2012 grant) was also a dry event. Weather conditions that day were sunny, partly cloudy, temperatures in the low 80s, with little wind.

· The eighth and final sampling event took place on June 19, 2014 (under 2012 grant) and was a dry event. Weather conditions that day were temperatures in the upper 80s, sunny, and breezy.

All data sheets, Stream Physical Characteristics Worksheets, and Habitat Quality Index Worksheets can be found in Appendix D. The Habitat Quality Index scoring is summarized in Table 3.

The data in Table 1 was obtained using a YSI 556 Multiprobe System and a pygmy flow meter. The following groundwater elevation data (Table 2) was obtained using a Solinst Water Level Meter. Table 3 presents the data from the water samples analyzed and tested by the Test America lab and the lab's data sheets can be found in Appendix E.

As shown, the data do not display any useful correlation against flow. The correlation coefficients at the inlet and outlet of the trap are 0.365 and 0.179 respectively. This does not suggest that the data can be used to develop convincing representations of TSS conentration based on flow. Even partitioning the data according to wet and dry conditions provides little useful insights; at the inlet to the trap, the average TSS concentration during wet conditions was reported as 24.08 mg/L, and the average during dry conditions was 66.25 mg/L, a counter-experimental result. It was decided to use the bulk average at the inlet as the representative concentration, along with the standard deviation as an indicator of variability. The results of this are that the mean TSS concentration was taken as 45.16 mg/L, and the standard deviation as 44.76 mg/L. Figure 5, below, from the Modeling Report (Appendix G) illustrates the findings.

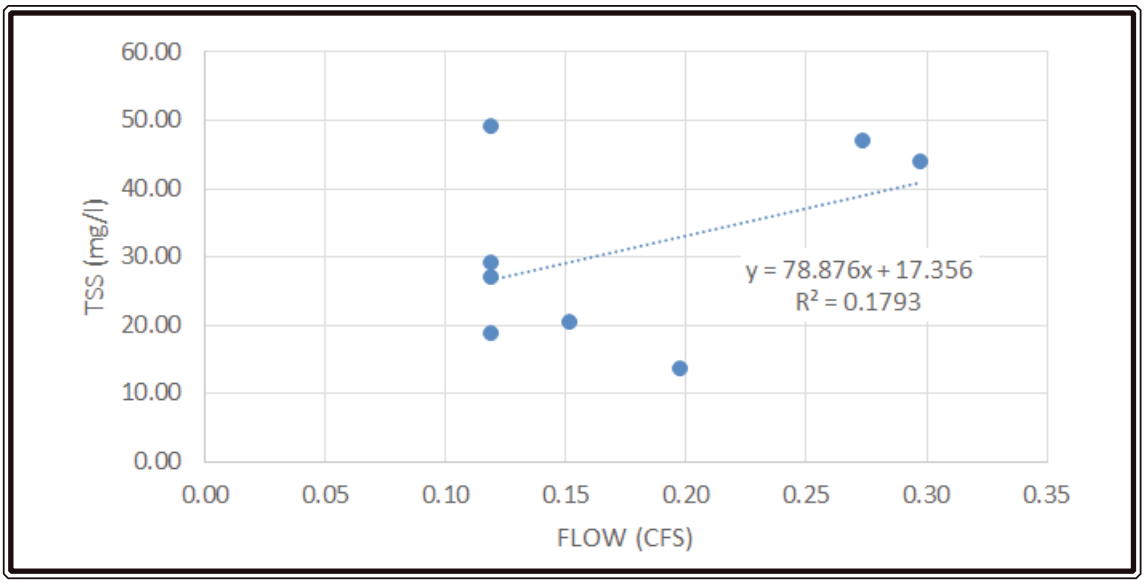


Table 1. Water quality sampling data obtained from Tule Creek using the YSI Multiprobe System and a pygmy flow meter.

	Date	Station	Time Sample Was Taken	Temperature (°C)	Conductivity (mS)	Dissolved Oxygen (%)	pH (SU)	Water Depth (ft)	Flow (cfs)
Wet Sampling Event	9/14/2012	WQS 1	10:20 AM	24.40	1.180	73.0	7.64	1.45	0.27
	9/14/2012	WQS 2	10:50 AM	23.53	0.478	70.1	7.82	2.17	0.15
	9/14/2012	WQS 3	9:50 AM	23.06	0.300	67.5	7.86	1.58	0.25
	9/14/2012	WQS 4	11:45 AM	26.52	1.503	59.3	7.15	1.50	0.64
	9/14/2012	WQS 5	1:55 PM	30.81	2.583	52.0	7.08	0.79	0.44
	9/14/2012	WQS 6	9:30 AM	24.38	1.980	78.9	7.81	2.00	0.37
Dry Sampling Event	3/6/2013	WQS 1	1:10 PM	18.19	2.620	97.3	7.85	1.22	0.20
	3/6/2013	WQS 2	12:55 PM	18.26	2.638	106.4	7.71	0.75	0.41
	3/6/2013	WQS 3	11:20 AM	14.18	2.145	93.3	7.43	0.90	0.21
	3/6/2013	WQS 4	9:45 AM	14.09	2.599	85.7	7.83	0.65	0.66
	3/6/2013	WQS 5	9:13 AM	14.94	2.633	60.0	7.33	0.40	1.32
	3/6/2013	WQS 6	11:04 AM	15.75	2.632	89.0	7.93	1.10	0.18
Wet Sampling Event	5/15/2013	WQS 1	11:37 AM	25.48	2.482	86.3	8.02	1.20	0.30
	5/15/2013	WQS 2	11:20 AM	25.30	1.928	88.7	7.97	1.15	0.14
	5/15/2013	WQS 3	10:50 AM	25.20	2.292	56.9	7.55	0.50	0.59
	5/15/2013	WQS 4	2:30 PM	25.50	2.323	101.3	7.99	0.70	0.44
	5/15/2013	WQS 5	9:55 AM	24.67	1.038	58.8	7.64	0.75	0.44
	5/15/2013	WQS 6	1:56 PM	26.13	2.550	88.1	8.03	2.50	0.12
Wet Sampling Event	7/17/2013	WQS 1	12:57 PM	27.82	2.473	69.5	7.84	1.20	0.12
	7/17/2013	WQS 2	12:35 PM	26.93	1.900	54.1	7.67	1.10	0.21
	7/17/2013	WQS 3	12:20 PM	26.48	2.080	20.9	7.35	0.50	0.14
	7/17/2013	WQS 4	10:05 AM	27.26	2.303	69.6	7.87	3.50	0.71
	7/17/2013	WQS 5	8:42 AM	27.12	1.483	31.5	7.35	0.50	0.21
	7/17/2013	WQS 6	11:09 AM	28.96	37.600	24.9	7.99	2.50	0.14
Wet Sampling Event	8/26/2013	WQS 1	1:35 PM	28.16	1.292	84.7	8.31	2.50	0.12
	8/26/2013	WQS 2	1:19 PM	28.56	1.655	87.8	8.42	3.10	0.44
	8/26/2013	WQS 3	1:06 PM	28.19	1.183	65.1	8.09	1.60	0.18
	8/26/2013	WQS 4	11:03 AM	27.94	1.500	69.0	8.27	1.40	1.37
	8/26/2013	WQS 5	10:23 AM	28.34	1.617	35.6	7.36	1.20	0.87
	8/26/2013	WQS 6	12:30 PM	27.94	1.218	77.7	8.14	2.55	0.40
Dry Sampling Event	11/6/2013	WQS 1	2:20 PM	26.55	3.026	91.1	7.92	1.80	0.12
	11/6/2013	WQS 2	2:00 PM	27.65	2.753	78.6	7.76	1.70	0.25
	11/6/2013	WQS 3	1:30 PM	27.17	2.430	67.8	7.39	0.70	0.12
	11/6/2013	WQS 4	12:30 PM	27.83	2.992	91.0	8.09	0.70	0.35
	11/6/2013	WQS 5	2:45 PM	29.41	3.167	47.3	7.41	0.70	0.48
	11/6/2013	WQS 6	2:55 PM	26.44	13.670	84.5	7.88	2.70	0.12
Dry Sampling Event	4/8/2014	WQS 1	12:00 PM	20.35	2.793	64.9	7.23	1.83	0.15
	4/8/2014	WQS 2	11:35 AM	23.79	2.816	73.4	7.38	0.42	0.66
	4/8/2014	WQS 3	10:00 AM	17.24	2.560	41.8	6.89	0.83	0.12
	4/8/2014	WQS 4	8:30 AM	14.42	2.775	93.2	7.34	0.75	0.65
	4/8/2014	WQS 5	10:50 AM	24.02	2.801	78.9	7.20	0.17	0.69
	4/8/2014	WQS 6	9:20 AM	21.65	29.050	36.1	7.45	1.67	0.15
Dry Sampling Event	6/19/2014	WQS 1	1:30:00 PM	29.66	2.490	91.1	7.83	2.00	0.12
	6/19/2014	WQS 2	1:00:00 AM	33.12	2.562	93.1	7.74	1.00	0.36
	6/19/2014	WQS 3	12:40:00 PM	26.77	3.049	29.3	7.49	0.67	0.12
	6/19/2014	WQS 4	10:00:00 AM	29.29	2.495	91.0	7.83	0.63	0.18
	6/19/2014	WQS 5	8:54:00 AM	27.25	2.460	92.0	7.55	0.56	0.34
	6/19/2014	WQS 6	11:00:00 AM	29.44	50.120	9.8	7.73	2.25	0.12

Table 2. Piezometer readings (groundwater elevation) taken in the Tule Creek watershed using a **Solinst Water Level Meter.**

	Date	Station	Time Sample Was Taken	Depth (ft)
Wet Sampling Event	9/14/2012	1A	1:46 PM	9.44
	9/14/2012	1B	1:52 PM	8.18
	9/14/2012	1C	1:59 PM	9.82
	9/14/2012	2A	1:15 PM	11.75
	9/14/2012	2B	1:22 PM	9.55
	9/14/2012	2C	1:05 PM	8.95
Dry Sampling Event	3/6/2013	1A	10:45 AM	8.10
	3/6/2013	1B	10:50 AM	6.90
	3/6/2013	1C	10:55 AM	8.45
	3/6/2013	2A	9:37 AM	11.00
	3/6/2013	2B	9:35 AM	8.30
	3/6/2013	2C	9:40 AM	7.70
Wet Sampling Event	5/15/2013	1A	3:30 PM	8.30
	5/15/2013	1B	3:35 PM	7.10
	5/15/2013	1C	3:40 PM	8.60
	5/15/2013	2A	9:38 AM	10.95
	5/15/2013	2B	9:45 AM	8.55
	5/15/2013	2C	10:30 AM	8.00
Wet Sampling Event	7/17/2013	1A	8:20 AM	9.20
	7/17/2013	1B	8:22 AM	8.00
	7/17/2013	1C	8:25 AM	9.55
	7/17/2013	2A	1:00 PM	11.68
	7/17/2013	2B	1:05 PM	9.35
	7/17/2013	2C	1:10 PM	8.75
Wet Sampling Event	8/26/2013	1A	9:40 AM	9.10
	8/26/2013	1B	9:47 AM	8.00
	8/26/2013	1C	9:53 AM	9.70
	8/26/2013	2A	10:40 AM	11.60
	8/26/2013	2B	10:13 AM	9.40
	8/26/2013	2C	10:00 AM	8.90
Dry Sampling Event	11/6/2013	1A	3:10 PM	9.00
	11/6/2013	1B	3:17 PM	7.70
	11/6/2013	1C	3:25 PM	9.50
	11/6/2013	2A	3:50 PM	11.10
	11/6/2013	2B	3:45 PM	8.30
	11/6/2013	2C	3:48 PM	8.70
Dry Sampling Event	4/8/2014	1A	12:39 PM	8.30
	4/8/2014	1B	12:51 PM	6.90
	4/8/2014	1C	12:47 PM	8.50
	4/8/2014	2A	1:11 PM	11.10
	4/8/2014	2B	11:15 AM	8.30
	4/8/2014	2C	1:05 PM	7.90
Dry Sampling Event	6/19/2014	1A	11:25 AM	8.60
	6/19/2014	1B	11:23 AM	7.50
	6/19/2014	1C	11:20 AM	9.10
	6/19/2014	2A	9:35 AM	11.50
	6/19/2014	2B	9:30 AM	9.10
	6/19/2014	2C	9:40 AM	8.40

Table 3. Water quality sampling data obtained from Tule Creek and analyzed by Test America Laboratory.

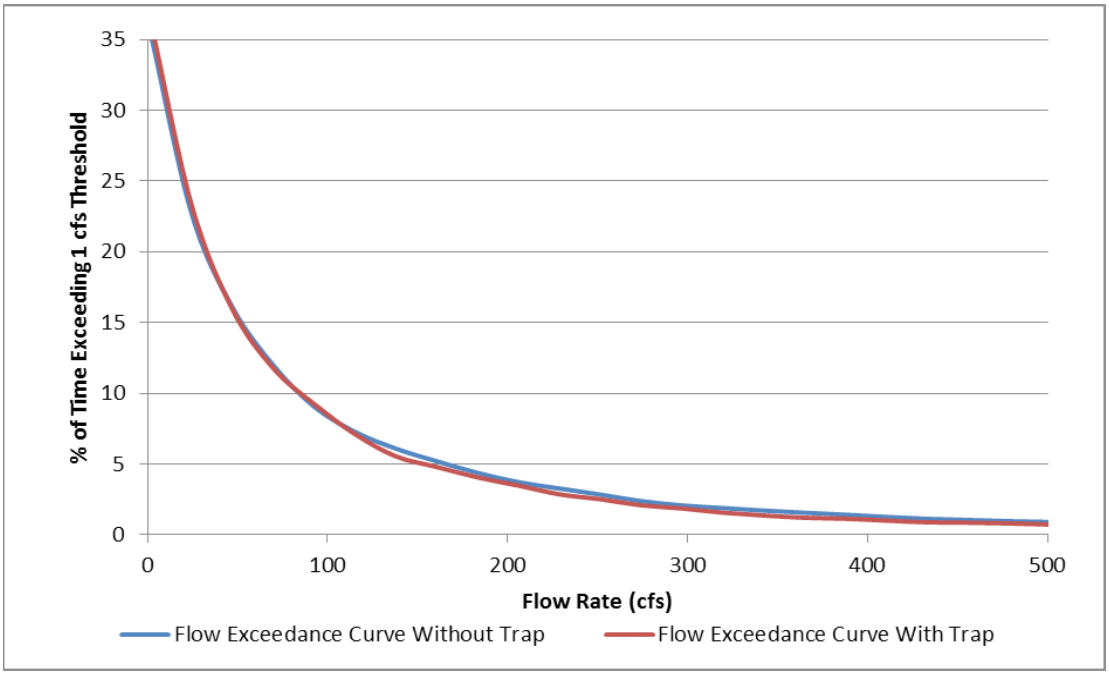
	Date	Station	Time Sample Was Taken	HEM (Oil and Grease) (mg/L)	Turbidity (NTU)	Total Suspended Solids (mg/L)
Wet Sampling Event	9/14/2012	WQS 1	10:20 AM	3.33	44.20	47.00
	9/14/2012	WQS 2	10:50 AM	3.84	27.70	20.50
	9/14/2012	WQS 3	9:50 AM	3.15	30.40	20.00
	9/14/2012	WQS 4	11:45 AM	3.03	15.10	30.00
	9/14/2012	WQS 5	1:55 PM	1.75	6.05	10.40
	9/14/2012	WQS 6	9:30 AM	2.58	11.30	40.80
Dry Sampling Event	3/6/2013	WQS 1	1:10 PM	3.37	10.10	13.60
	3/6/2013	WQS 2	12:55 PM	3.17	4.76	12.40
	3/6/2013	WQS 3	11:20 AM	1.39	14.60	24.00
	3/6/2013	WQS 4	9:45 AM	3.48	5.40	8.80
	3/6/2013	WQS 5	9:13 AM	3.93	10.80	22.00
	3/6/2013	WQS 6	11:04 AM	3.62	1.92	3.00
Wet Sampling Event	5/15/2013	WQS 1	11:37 AM	2.00	24.70	44.00
	5/15/2013	WQS 2	11:20 AM	3.61	28.80	25.00
	5/15/2013	WQS 3	10:50 AM	1.53	41.10	40.00
	5/15/2013	WQS 4	2:30 PM	3.05	10.40	4.50
	5/15/2013	WQS 5	9:55 AM	3.43	8.24	3.00
	5/15/2013	WQS 6	1:56 PM	1.70	19.60	32.50
Wet Sampling Event	7/17/2013	WQS 1	12:57 PM	3.37	20.60	27.00
	7/17/2013	WQS 2	12:35 PM	3.16	17.10	16.00
	7/17/2013	WQS 3	12:20 PM	2.42	25.60	8.00
	7/17/2013	WQS 4	10:05 AM	3.26	16.10	18.00
	7/17/2013	WQS 5	8:42 AM	3.82	13.30	8.50
	7/17/2013	WQS 6	11:09 AM	2.95	32.20	97.50
Wet Sampling Event	8/26/2013	WQS 1	1:35 PM	1.77	21.50	18.80
	8/26/2013	WQS 2	1:19 PM	2.20	34.40	34.80
	8/26/2013	WQS 3	1:06 PM	2.71	77.50	70.40
	8/26/2013	WQS 4	11:03 AM	2.19	13.00	49.60
	8/26/2013	WQS 5	10:23 AM	1.57	12.30	8.50
	8/26/2013	WQS 6	12:30 PM	3.25	17.40	25.60
Wet Sampling Event	11/6/2013	WQS 1	2:20 PM	2.11	18.30	29.20
	11/6/2013	WQS 2	2:00 PM	2.06	18.00	19.60
	11/6/2013	WQS 3	1:30 PM	3.58	17.40	10.40
	11/6/2013	WQS 4	12:30 PM	2.08	14.60	17.20
	11/6/2013	WQS 5	12:45 PM	2.22	5.40	8.40
	11/6/2013	WQS 6	2:55 PM	2.16	19.30	44.00
Dry Sampling Event	4/8/2014	WQS 1	12:00 PM	1.58	16.40	20.40
	4/8/2014	WQS 2	11:35 AM	1.94	27.50	108.00
	4/8/2014	WQS 3	10:00 AM	> 1.46	16.10	10.40
	4/8/2014	WQS 4	8:30 AM	2.35	15.50	58.00
	4/8/2014	WQS 5	10:50 AM	> 1.46	14.60	37.60
	4/8/2014	WQS 6	9:20 AM	> 1.46	43.30	94.00
Wet Sampling Event	6/19/2014	WQS 1	1:30:00 PM	2.28	31.2	49.00
	6/19/2014	WQS 2	1:00:00 AM	<1.46	51.9	125.00
	6/19/2014	WQS 3	12:40:00 PM	<1.49	36.5	28.00
	6/19/2014	WQS 4	10:00:00 AM	<1.48	11.5	17.00
	6/19/2014	WQS 5	8:54:00 AM	2.04	11.2	28.50
	6/19/2014	WQS 6	11:00:00 AM	<1.51	51.9	37.00

Table 4. Habitat Quality Index scoring criteria for the Water Quality Sampling stations during each sampling event.

	Date	Station	Time Sample Was Taken	Available Instream Cover	Bottom Substrate Stability	Number of Riffles	Dimensions of Largest Pool	Channel Flow Status	Bank Stability	Channel Sinuosity	Riparian Buffer Vegetation	Aesthetics of Reach	Total Score	Habitat Quality Index
Wet Sampling Event	9/14/2012	WQS 1	10:20 AM	3	3	1	1	1	2	1	3	2	17	Intermediate
	9/14/2012	WQS 2	10:50 AM											
	9/14/2012	WQS 3	9:50 AM	4	3	1	1	1	2	0	0	1	13	Limited
	9/14/2012	WQS 4	11:45 AM	3	4	1	1	2	2	2	1	2	18	Intermediate
	9/14/2012	WQS 5	1:55 PM											
	9/14/2012	WQS 6	9:30 AM											
Dry Sampling Event	3/6/2013	WQS 1	1:10 PM	3	1	1	1	3	2	1	3	1	16	Intermediate
	3/6/2013	WQS 2	12:55 PM	3	1	1	1	2	2	1	3	2	16	Intermediate
	3/6/2013	WQS 3	11:20 AM	2	1	1	1	2	1	0	0	1	9	Limited
	3/6/2013	WQS 4	9:45 AM	3	1	1	1	1	1	2	1	2	13	Limited
	3/6/2013	WQS 5	9:15 AM	3	2	3	3	1	3	1	0	1	17	Intermediate
	3/6/2013	WQS 6	11:04 AM	2	2	1	1	2	3	0	2	1	14	Intermediate
Wet Sampling Event	5/15/2013	WQS 1	11:37 AM	3	1	1	1	3	2	1	3	1	16	Intermediate
	5/15/2013	WQS 2	11:20 AM	3	1	1	1	3	2	1	3	2	17	Intermediate
	5/15/2013	WQS 3	10:50 AM	2	1	1	1	2	1	0	0	1	9	Limited
	5/15/2013	WQS 4	2:30 PM	4	1	1	1	1	1	2	1	2	14	Intermediate
	5/15/2013	WQS 5	9:55 AM	3	2	3	3	1	3	1	0	1	17	Intermediate
	5/15/2013	WQS 6	1:56 PM	2	2	1	1	2	3	0	2	1	14	Intermediate
Wet Sampling Event	7/17/2013	WQS 1	12:57 PM	3	1	1	1	3	2	1	3	1	16	Intermediate
	7/17/2013	WQS 2	12:35 PM	3	1	1	1	3	2	1	3	2	17	Intermediate
	7/17/2013	WQS 3	12:20 PM	2	1	1	1	2	1	0	0	1	9	Limited
	7/17/2013	WQS 4	10:05 AM	4	1	1	1	1	1	2	1	2	14	Intermediate
	7/17/2013	WQS 5	8:42 AM	3	2	3	3	1	3	1	0	1	17	Intermediate
	7/17/2013	WQS 6	11:09 AM	2	2	1	1	2	3	0	2	1	14	Intermediate
Wet Sampling Event	8/26/2013	WQS 1	1:35 PM	3	1	1	1	3	2	1	3	1	16	Intermediate
	8/26/2013	WQS 2	1:19 PM	3	1	1	1	3	2	1	3	2	17	Intermediate
	8/26/2013	WQS 3	1:06 PM	2	1	1	1	2	1	0	0	1	9	Limited
	8/26/2013	WQS 4	11:03 AM	4	1	1	1	1	1	2	1	2	14	Intermediate
	8/26/2013	WQS 5	10:23 AM	3	2	3	3	1	3	1	0	1	17	Intermediate
	8/26/2013	WQS 6	12:30 PM	2	2	1	1	2	3	0	2	1	14	Intermediate
Dry Sampling Event	11/6/2013	WQS 1	2:20 PM	3	1	1	1	3	3	1	3	1	17	Intermediate
	11/6/2013	WQS 2	2:00 PM	3	1	1	3	3	2	1	3	2	19	Intermediate
	11/6/2013	WQS 3	1:30 PM	2	1	1	1	2	1	0	0	1	9	Limited
	11/6/2013	WQS 4	12:30 PM	4	1	1	1	1	1	2	1	2	14	Intermediate
	11/6/2013	WQS 5	2:45 PM	3	2	3	3	1	3	0	0	1	16	Intermediate
	11/6/2013	WQS 6	2:55 PM	2	2	1	1	2	3	0	2	1	14	Intermediate
Dry Sampling Event	4/8/2014	WQS 1	12:00 PM	3	1	1	1	3	3	1	3	1	17	Intermediate
	4/8/2014	WQS 2	11:35 AM	3	1	1	3	3	2	1	3	2	19	Intermediate
	4/8/2014	WQS 3	10:00 AM	2	1	1	1	2	2	0	0	1	10	Limited
	4/8/2014	WQS 4	8:30 AM	4	1	1	1	1	2	2	1	2	15	Intermediate
	4/8/2014	WQS 5	10:50 AM	1	4	2	1	1	3	0	0	1	13	Limited
	4/8/2014	WQS 6	9:20 AM	2	2	1	1	2	3	0	2	1	14	Intermediate
Dry Sampling Event	6/19/2014	WQS 1	1:30:00 PM	2	1	1	1	1	2	0	2	2	12	Limited
	6/19/2014	WQS 2	1:00:00 AM	4	1	1	1	2	2	0	2	2	15	Intermediate
	6/19/2014	WQS 3	12:40:00 PM	4	1	1	1	0	0	0	1	2	10	Limited
	6/19/2014	WQS 4	10:00:00 AM	3	1	1	1	1	1	0	1	2	11	Limited
	6/19/2014	WQS 5	8:54:00 AM	1	3	2	1	2	3	2	1	2	17	Intermediate
	6/19/2014	WQS 6	11:00:00 AM	1	1	1	1	1	1	0	1	1	8	Limited

Modeling

Figure 6 (below) from the Modeling Report in Appendix G shows the estimated flow/ frequency relationship at the outlet point of the sediment trap with and without the BMPs in place, for flows greater than 0.5 cfs. As noted, the sediment trap has only a modest effect on flow behavior. This is because the volume is small relative to the volume of runoff, and the outlet is not highly restricted. As a result, during storm events it tends to be overwhelmed by the incoming volume, and has little impact on flow routing. This is less true for small events that are less taxing on the available volume, but is still generally the case. This is because the second factor is the nature of the outlet. The trap is bounded on the downstream side by a relatively unrestricted outlet, taking the form of a broad crested weir that is an appreciable fraction of the channel width. This is an appropriate design given the nature of that outlet, which must convey storm flows under State Highway 35 Business without causing undue flooding. With little restriction in place, little backup occurs and little hydraulic flow routing results. Given that the intended function of this device was not flood control, this is an appropriate result.



Discussion

Construction and Habitat Enhancement

The area of Upper Tule Creek West was a principal source of erosion and sediment discharge to Little Bay. In conjunction with the sediment trap pond, the laying back of the banks, widening and realignment of the channel, and slope protection are expected to be successful in reducing the amount of sediment that is transported to Little Bay. The habitat enhancement portion of the project is already evident, as the creek banks are aesthetically pleasing and the wildlife has been abundant in the area. Another important habitat enhancement feature included widening the bottom of the channel which created pool and riffle areas thus creating greater habitat diversity. The habitat quality was also improved by removing Brazilian pepper trees in the creek area. The TCEQ 2011 grant included $8,000 for invasive removal. Brazilian pepper trees are known for being highly invasive and can quickly choke out desireable, native vegetation. After the construction and removal of the invasives was completed, the entire project area was spray with seeded hydromulch. The hydromulch contained a variety of grass species such as green sprangletop, sideoats gama, buffalograss, and others. This mixture will provide a sound root system for erosion control once it is fully established. It will also allow for the natural re-vegetation of native species which will enhance the health of the ecosystem.

During construction, it was decided that a change order was requried in order to successfully modify the bend in the creek. The change order called for an increase in the amount of silt fencing, an increase in the area being cleared and stripped, an increase in the amount of excavation, and an increase in the amount of seeded hydromulch needed. To compensate for the added charges, the change order also required the exclusion of the soft armor erosion control geotech mat as well as the anchor reinforced vegetation system.

Monitoring

The monitoring data did not show any discernable patterns since only eight events were collected over a period of approximately 32 months but important observations regarding habitat and physical stream characteristics were made during this time.

An annual occurrence is the heavy growth of water lettuce which covers large areas of the sediment trap pond. It was noted in 2014

that the lettuce had advaced downstream, all the way to Water Quality Station 6 near Little Bay. Because the water lettuce dies off every year naturally, it may not be a concern but if it keeps spreading, removal and continued control on an annual basis may be requried. The aquatic vegetation herbicide (Eraser) used on the tallows can also be used along with mechanical removal for the water lettuce. The sediment trap is primarily a water treatment device and to operate effectively for sediment removal, it should not be covered with water lettuce. Following this grant period, the County will need to continue ongoing invasive removal and pond maintenance to ensure the continued success of the project.

It was also noted that along a few areas of Tule Creek, there were other, non-related construction projects occurring. Between Water Quality Sampling Stations 4 and 5, the Frost property along the creek bank was recently excavated in early summer 2014 to create two pool-type habitat areas. This almost certainly increased the amount of suspended solids in the water and it is possible that these pools affect the stream flow as well. Other construction projects taking place along the sediment trap pond include the building of a bridge and a conjoining kiosk. It was noted that a consolidated delta fan of sediment from the construction site had formed just downstream of Water Quality Sampling Station 1. It was noted that the construction sediment curtain may have failed. There was also substantial invasive vegetation removal which took place at the pond as well as further downstream across State Highway 35 Business. It is believed that these construction and clearing events are at least partially responsible for the increased amount of suspended solids as reflected in the TSS data at Water Quality Sampling Station 2, which is located in the sediment trap pond near the confluence (data in Table 3).

At Water Quality Sampling Station 6, there were three events in which the conductivity seemed unusually high but it was explained by the high tides during that time, as Little Bay is less than 600 yards downstream.

Modeling

Nevertheless, the sediment trap does provide an effective removal of sediments, particularly where size ranges in the sand category or larger are considered. This is because the widening and deepening of the channel constituted by the trap causes a drop in velocity and a reduction in turbulence which allows sediments to fall out of solution. The model predicts build-up of sediments in the pond. As shown in the modeling results provided in Appendix G, the rate of build-up of sediments is significant.

The total fraction of sediments removed is expected to be about 71.1% , representing almost complete removal of larger fractions (sands), partial removal of mid range particles (silts), and limited removal of fine particles (clays). This amounts to 2.31 x 10^12 milligrams over the simulation period (31 years), which implies a buildup volume of about 45 in situ cubic yards per year. As discussed below, this rate implies a need to remove sediments from time to time so that the volume of the trap is not compromised in the long term. The removal of sediments in the coarser range was intentionally conservative since actual fall velocities and distributions are not known, but even so the amounts encountered in reality could be considerably larger. As

noted in the discussion of measured TSS results above, the standard deviation of the estimated sediment fraction is nearly the same magnitude as the average. A rate of sediment arrival equal to the mean plus one standard deviation equates to a buildup of about 90 cubic yards per year.

Care must be taken in considering these results, since there can be physical activities within the watershed that can materially affect sediment supply but that are not represented by the modeling designed for this project. For example, in this case it was observed that construction above the sediment trap may have at times added an unknown but significant load to the creek, different in cause and nature than the sediments represented in the model.

Another factor to consider is that the pond volume is not infinite, and as sediments accumulate, trap efficiency will decrease. As a result, over the long term, if the pond is not maintained, it will eventually fill in and approximate the natural conditions that would prevail were the channel left intact and the sediment trap not placed. For the purposes of this project it is assumed that sediment trap maintenance is sufficient to keep it operating at close to design efficiency. Design of a maintenance schedule is beyond the scope of the present effort, and would require a better empirical basis for model calibration, but it is noted that a removal program can be designed in more than one way. For example, it could be designed to frequently remove small amounts of sediment, or to periodically (less often) remove larger amounts. Or, it could be designed to remove sediments not at some predetermined frequency but whenever a target accumulation amount has been reached. The tradeoff between operating costs and long term performance would need to be considered in developing a preferred approach to an operating maintenance schedule. In the absence of such an assessment, it is suggested that, given the available information, an appropriate approach to this problem would be to monitor actual sediment build-up, remove sediment when the facility is overly full of sediment, and based on experience over time, develop standard procedures that will keep the facility functioning reasonably well. As a starting point for consideration, it is suggested that keeping the accumulated sediment to less than a third of the available permanent pool facility volume be considered as a target.

Over all, the results of this assessment provide the information that was sought for with this project. The hydraulic routing effects are minimal, but sediment removal (provided the sediment trap is maintained) is significant.

Summary

This Tule Creek Watershed Project Report is a priority component of the ACSWMP which was started in early 2009. The County deemed the Tule Creek Watershed, a large and extensive drainage basin in the heart of Rockport and Fulton, a priority for several reasons. These reasons include the flooding of residences during storm events, the fact that it is the primary outfall to Little Bay which is a priority ecological and community resource, and the expected development pressures which place an even higher importance on stormwater management. The purpose of the ACSWMP and this report is to use an integrated approach to help protect and enhance public and private properties from poor drainage and flooding, and to protect and enhance wetlands, estuaries, bays, and other ecological resources through water quality and ecological improvements. These goals are to be accomplished through the development of BMPs for construction and development and through the design and implementation of stormwater projects such as those in this report. This report presents the hydrologic, hydraulic, water quality and ecological and habitat analysis that was performed for the Tule Creek Watershed along with recommended improvements. The stormwater planning process and recommendations involving the Tule Creek Watershed have been developed based on comments from the Stormwater Management Advisory Committee, Technical Committee, Water and Ecological Resources Advisory Group, stakeholders, Aransas County staff, the public, and agencies.

A detailed hydrologic and hydraulic model was created to closely simulate existing conditions and determine existing peak flows and water levels for three design storms, 5-yr, 25-yr, and the 100-year 24-hour storms. Historical flood level information was used to calibrate the model and a map was produced showing areas inundated for each of the storms. Stormwater quality professionals utilized the hydrologic and hydraulic information along with site visits to analyze the watershed for alternative sites suited for BMPs. Also, a habitat survey and ecological assessment was conducted at each of the BMP sites, resulting in the three pronged approach to stormwater management: (1) an evaluation of alternatives to mitigate flood conditions; (2) assessing areas for incorporating possible stormwater quality devices; and (3) identifying opportunities for ecological/habitat protection and enhancement.

After assessing many alternatives throughout the watershed, the project team narrowed its focus to several priority sites. These recommended stormwater projects largely involve property owned

by Aransas County, the City of Rockport, and the Town of Fulton and were arrived at based on the optimum combined benefit for flood mitigation, water quality and ecological/habitat to the overall watershed. There will be U.S. Army Corps of Engineers (USACE) permits and agency coordination involved to varying degrees with the different projects, and different grants to Aransas County are helping project funding.

The aforementioned recommended alternatives to address drainage, stormwater quality, and ecology were studied and the five areas recommended, are described below:

1. Mesquite By-Pass – This project includes the placement of approximately 3,200 LF of 5' x 5' box culvert, including sediment traps, diverting drainage to Aransas Bay along a route in Mesquite Street from the Railroad ROW Channel to an ultimate outfall just north of Paws and Taws. While the project is primarily for purposes of lowering the water surface level during flood events by diverting almost 25% of the watershed area, it is believed that a reduction in freshwater inflows to Little Bay is a water quality and ecological benefit. The estimated project cost is $1,600,000.

2. Tule Creek West Marsh Sediment Pond and Habitat Enhancement – This project is located just upstream of SH 35 essentially between the old and the new Wal-Mart sites. The recommended improvements included excavating several acres of pond/ old lake restoration providing sediment reduction, a steep vegetated slope protection, and invasive removal within a forested wetland area. While this project has primarily stormwater quality and ecological benefits, a relatively small amount of additional volume is gained for flood mitigation. While the overall estimated cost of this project is $300,000, an existing TCEQ FY 2009 Grant (with the appropriate County match) is expected to cover approximately $238,000.

3. Upper Tule Creek West – This project includes the widening of approximately 1,000 LF of existing earthen channel from the Tule Creek West Marsh, removing an erosive bend in the channel, and reducing the angle and stabilizing the disturbed side slopes. The estimated project cost is $650,000.

4. Tule Creek North – This project is located on a tract of land, approved for purchase with a CMP Grant, adjacent to the Rockport Country Club golf course between Henderson Street and Palmetto Street and adjacent the existing Tule Creek North Channel. The proposed improvements include excavation of a several acre wetland area/pond for habitat enhancement, sediment reduction and drainage control, the placement of 300 LF of 42" RCP (to mirror the existing outfall from the golf course), and a connection with a restricted channel along Palmetto Street. The estimated project cost is $1,325,000.

5. Tule Creek East Marsh – This project is located just downstream of the SH 35 crossing and includes the placement of a weir within a widened portion of the existing channel along Encina Street to raise the water surface and allow runoff to infiltrate the existing ponds and wetland areas which will be further excavated and benched. Also recommended is the removal of a large area of invasive plants in a low-lying area north of the Tule Park. The estimated project cost is $650,000.

Tule Park Road / Picton Drive /Sorenson Drive – This project is between the Tule Creek

East Marsh and the Little Bay outfall and includes the lowering of the profile of the three roads (with no culvert adjustment) to significantly improve drainage and reducing the flooding potential in Little Bay Shore. The estimated project cost is $100,000.

As the 2011 and 2012 grants draw to a close, Aransas County will install signage to acknowledge the source of the grant funding for the project and expand the public's appreciation and sense of responsibility for stewardship and proactive protection of the aquatic resources. Three (3) full color high-pressure laminate panels, 36"w x 24"h, are currently being designed. They will be mounted in low profile, traditional in-ground mount aluminum exhibit display structures. They will be installed in along the improved section of the Tule Creek, in high-volume pedestrian traffic areas.
Topics include:

Sign One
About the Project:
- Background and description of the Aransas County Stormwater Plan and how the three local government entities worked across jurisdictional lines to develop an integrated plan to preserve and protect the county's unique aquatic ecosystem.
- The purpose, objectives, tasks, and outcomes of the Tule Creek Project.
- Before and after-pictures illustrating the dramatic improvements along the creek.

Sign Two
Illustrated descriptions of the habitats that can be found on Live Oak peninsula:
- Live Oak Woodlands
- Estuarine Wetlands
- Riparian wetlands
- Bays

Sign Three
Photos and descriptions of Tule Creek Natives
- Trees, plants, bushes
- Various animals, e.g., birds, reptiles, fish, and amphibians

Literature Review/References

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Appendices

Appendix A
Tule Creek Watershed Map

Appendix B
Construction Drawings

Appendix C
Water Quality and Groundwater Piezometer Sample Locations

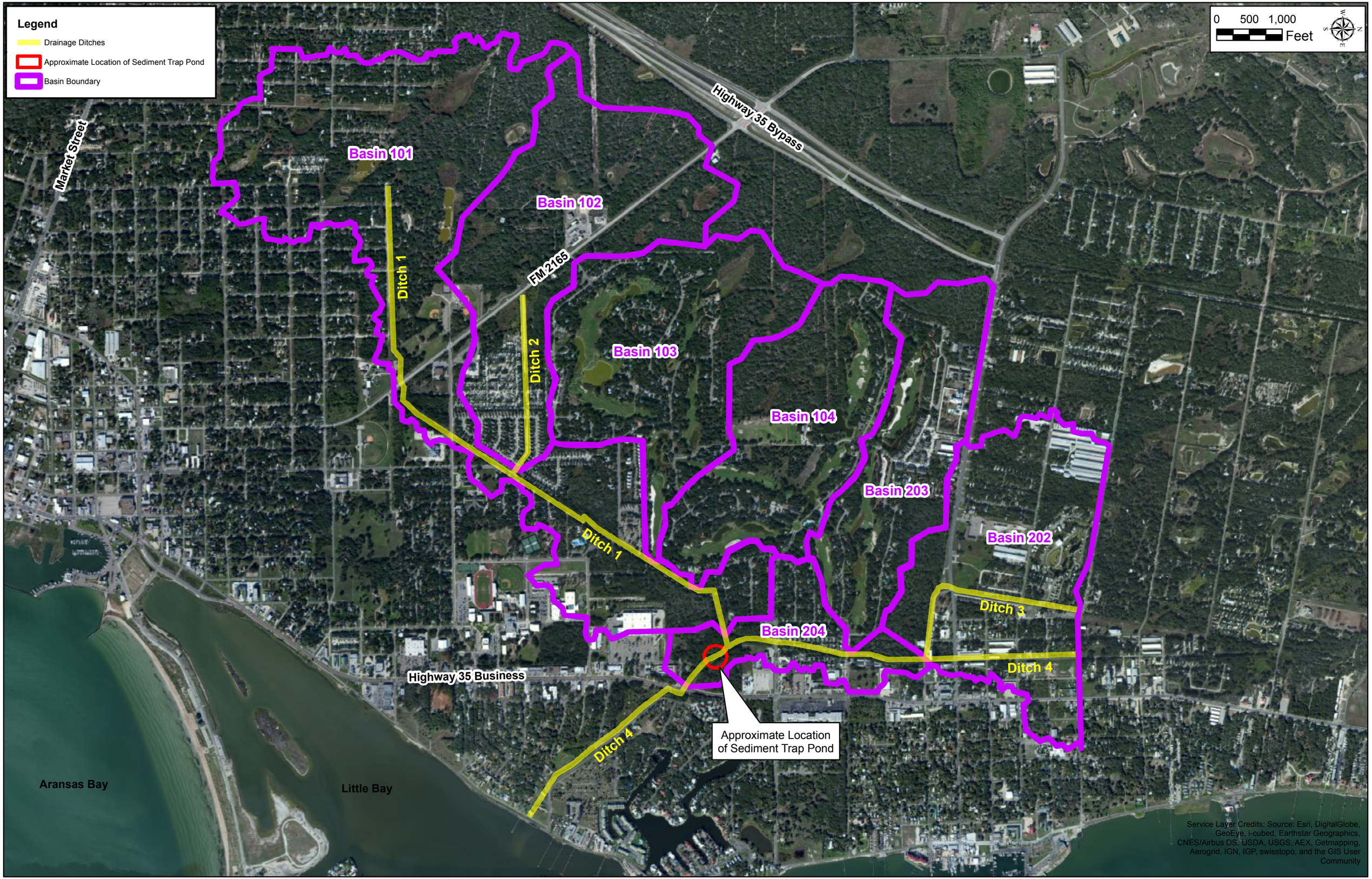
Appendix D
Field Data Sheets, Stream Physical Characterisitc Sheets, Habitat Quality Index Sheets

Appendix E
Test America Data Sheets

Appendix F
SWQMIS Electronic Data Files, Final Data Review Checklists, Validator Reports

Appendix G
Modeling Report

Appendix A
Tule Creek Watershed Map


Legend
Drainage Ditches
Approximate Location of Sediment Trap Pond
Basin Boundary
0 500 1,000
Feet
Market Street
Highway 35 Bypass
Basin 101
Basin 102
Basin 103
Basin 104
Basin 202
Basin 203
Basin 204
FM 2165
Ditch 1
Ditch 2
Ditch 3
Ditch 4
Highway 35 Business
Approximate Location of Sediment Trap Pond
Aransas Bay
Little Bay
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Appendix B
Construction Drawings

CONSTRUCTION PLANS
FOR THE
UPPER TULE CREEK STORMWATER IMPROVEMENTS
ARANSAS COUNTY, TEXAS

AUGUST 2013

BOARD MEMBERS

C.H. "BURT" MILLS, JR.....COUNTY JUDGE

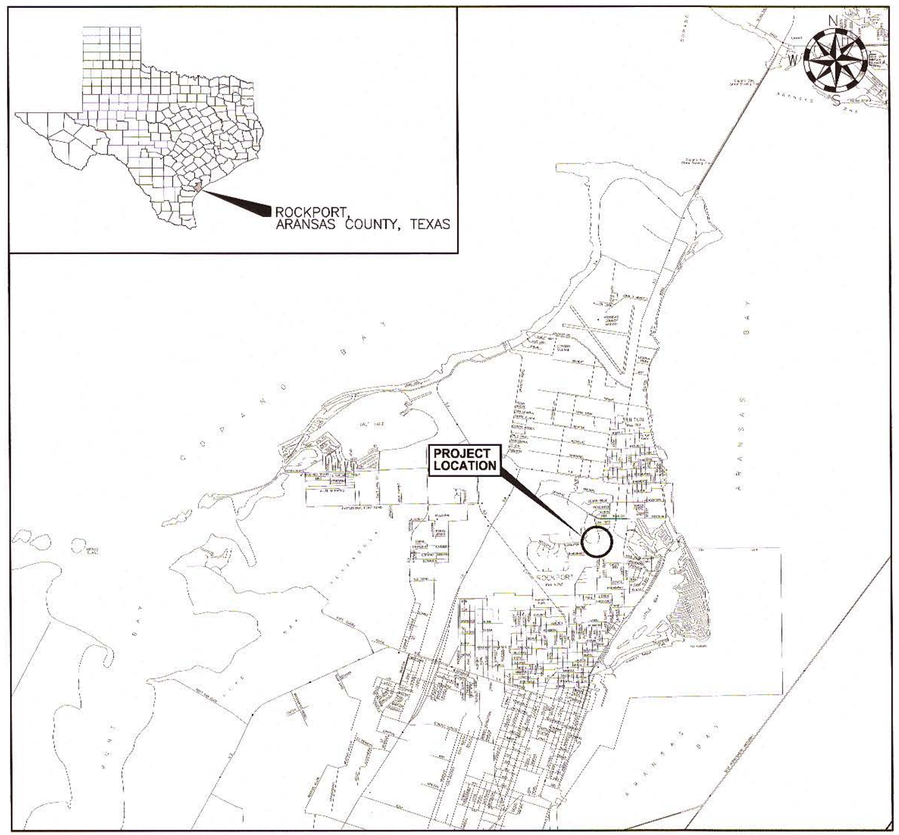
JACK CHANEY.....COMMISSIONER, PRECINCT 1

LESLIE "BUBBA" CASTERLINE.....COMISSIONER, PRECINCT 2

CHARLES SMITH.....COMMISSIONER, PRECINCT 3

BETTY STILES.....COMMISSIONER, PRECINCT 4

PEGGY L. FRIEBELE.....COUNTY CLERK



VICINITY MAP

SCALE: 1"=5,000'

SHEET INDEX

1. TITLE SHEET
2. GENERAL NOTES / SHEET INDEX
3. LAYOUT WITH SW3P
4. PLAN AND SECTIONS
5. PLAN AND SECTIONS
6. PLAN AND SECTIONS
7. MISCELLANEOUS DETAILS
8. MISCELLANEOUS DETAILS

NaismithEngineering,Inc
ENGINEERING ■ ENVIRONMENTAL ■ SURVEYING
F-355

REV.	DESCRIPTION	APPR.	DATE

Drawn By : AB
Checked By : CBT
Approved By : CBT
Project No. : 8722
Scale : AS SHOWN
Date : 07/2013
Revision No. : 0

STATE OF TEXAS
CRAIG B. THOMPSON
89496
LICENSED
PROFESSIONAL ENGINEER
8/6/13

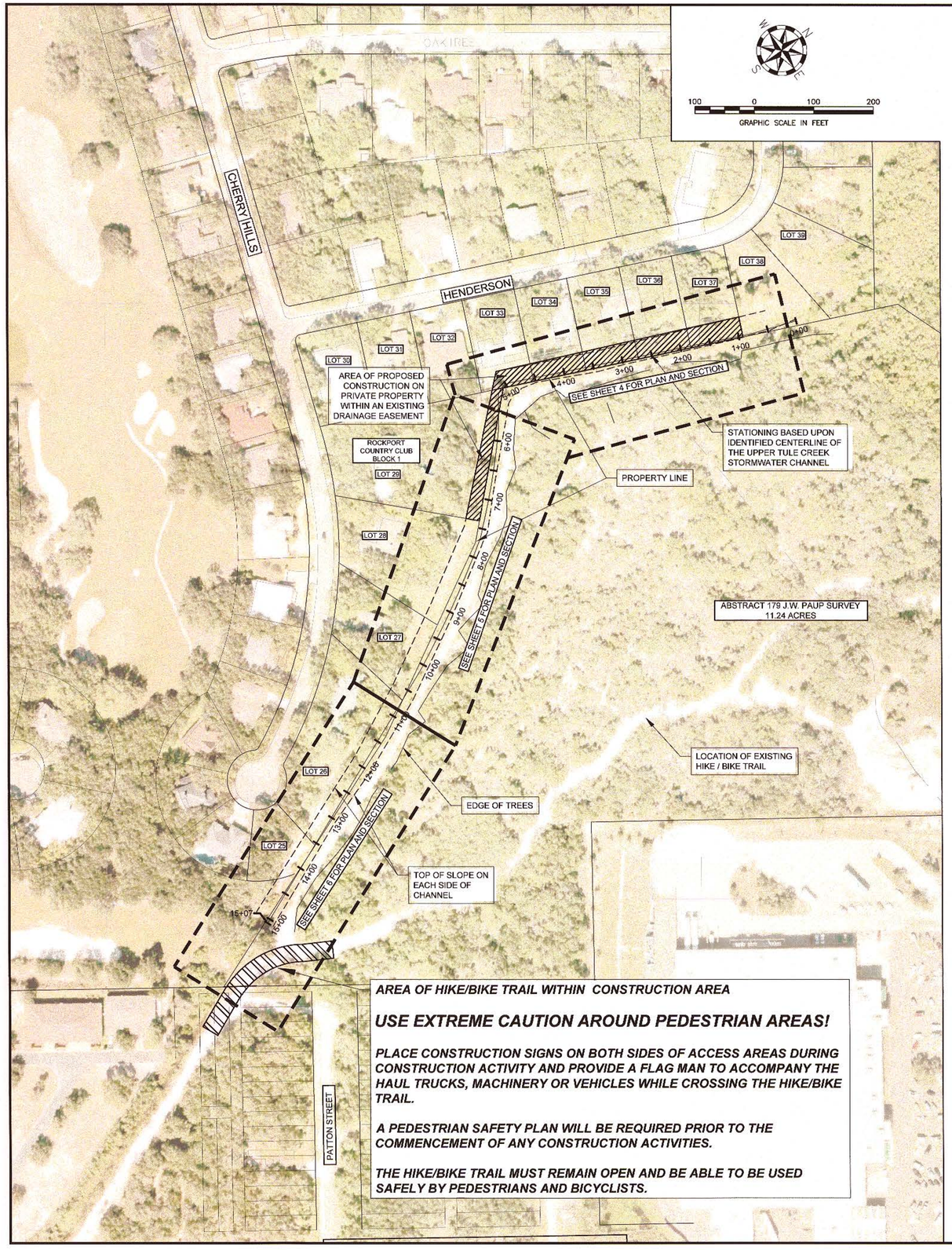
OFFICE LOCATION :
4501 Gollihar Rd.
Corpus Christi, Texas 78411
P.O. Box 3099
Corpus Christi, Texas 78463
(361)-814-9900

Naismith Engineering,Inc
TBPE No. F-355

COVER SHEET
UPPER TULE CREEK
STORMWATER IMPROVEMENTS
ROCKPORT, ARANSAS COUNTY, TEXAS

Dwg. File: 8722-SHT-01

1



GENERAL NOTES

GENERAL REQUIREMENTS:

1. CONSTRUCTION ACTIVITIES, OTHER THAN REQUIRED FOR MOBILIZATION, SHALL NOT COMMENCE PRIOR TO THE INSTALLATION OF REQUIRED STORM WATER POLLUTION PREVENTION (SWPP) DEVICES.
2. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN ALL STORM WATER POLLUTION PREVENTION (SWPP) DEVICES AS SHOWN ON THE STORM WATER POLLUTION PREVENTION (SWPP) PLAN WITHIN THIS PLAN SET DURING THE CONSTRUCTION ACTIVITIES.
3. ANY AREAS SHOWN AS AREAS TO PROTECT FROM DISTURBANCE SHALL BE UNDISTURBED AND REMAIN IN THEIR CURRENT CONDITION AND ANY DAMAGE TO SUCH AREA WILL BE REPAIRED TO THE CURRENT CONDITION AT THE CONTRACTORS EXPENSE.
4. DURING GRADING AND CONSTRUCTION THE CONTRACTOR IS REQUIRED TO CONTROL BLOWING DUST, SAND, AND OTHER MATERIALS BY THE USE OF WATER, HAY MULCH, HYDROMULCH, AND OTHER AS LONG AS THE ENGINEER APPROVES THE METHOD(S) AND SHOULD BE INCLUDED WITHIN THE GRADING RELATED BID ITEMS.
5. ONCE GRADING IS COMPLETE, ALL DISTURBED AREAS SHALL BE STABILIZED WITH APPROVED METHOD BY THE ENGINEER AND SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
   5.1. NOTE: DEPENDING ON WEATHER AND RAINFALL THE WATERING OF THE SEED WILL BE NEEDED TO INSURE GROWTH AND STABILIZATION.
6. SHOULD SETTLEMENT OR EROSION OCCUR, OR VEGETATION FAILS TO GROW WITHIN SIX (6) MONTHS AFTER COMPLETION, THE CONTRACTOR SHALL RESHAPE AND RESEED ANY AREA DEEMED NECESSARY BY ENGINEER OR COUNTY.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRAINING ALL EMPLOYEES AND SUBCONTRACTORS IN THE RECOGNITION AND AVOIDANCE OF UNSAFE CONDITIONS, AND IN THE REGULATIONS AND HAZARDS WHICH APPLY TO THE AREA IN WHICH THE WORK WILL TAKE PLACE.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROTECTION OF PERSONS AND PROPERTY, AND FOR PROVIDING SAFE WORKING CONDITIONS THROUGHOUT THE WORK PROGRESS. ALL SAFETY EXPOSURES OR VIOLATIONS SHALL BE RECTIFIED IMMEDIATELY BY THE CONTRACTOR.
9. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF EXISTING CONDITIONS AND PROPOSED CONDITIONS, AND SHALL PERFORM FIELD MEASUREMENTS PRIOR TO CONSTRUCTION, FABRICATION, AND/OR PURCHASE OF ANY MATERIAL, AND SHALL CONTACT THE ENGINEER SHOULD CONDITIONS BE DIFFERENT FROM THE DESIGN DRAWINGS FOR THIS PROJECT. CONFLICTS ARISING DUE TO LACK OF COORDINATION SHALL BE THE RESPONSIBILITY AND AT THE SOLE EXPENSE OF THE CONTRACTOR.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF EXISTING UPSTREAM OR DOWNSTREAM DITCHES, UTILITIES, MAINTENANCE ROADS, ETC. AND ANY DAMAGE TO THESE FACILITIES DURING CONSTRUCTION SHALL BE PROMPTLY REPAIRED OR REPLACED EQUAL TO OR BETTER THAN THEIR ORIGINAL CONDITION BY THE CONTRACTOR AT HIS SOLE EXPENSE.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSTRUCTION PERMITS AND CLEARANCES PRIOR TO COMMENCEMENT OF CONSTRUCTION.
12. THE WORK AREA SHALL, AT ALL TIMES, BE KEPT FREE OF DEBRIS AND NON-HAZARDOUS MATERIAL TO THE SATISFACTION OF THE COUNTY, CITY AND ENGINEER.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING AND CONTROLLING THE WORK SITE TO PREVENT ACCIDENTS AND VANDALISM, AND SHALL BE RESPONSIBLE FOR ANY ADDITIONAL EXPENSES. ACCIDENTS AND VANDALISM AS A RESULT OF FAILURE TO SECURE AND CONTROL THE WORK SITE SHALL BE REMEDIED BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER.
14. THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION ACTIVITY TO WITHIN THE CONSTRUCTION LIMITS; INCLUDING, BUT NOT LIMITED TO, JOB SITE FACILITIES, STAGING AREAS, STOCKPILES, EQUIPMENT, ETC., UNLESS PRIOR APPROVAL FROM THE OWNER'S REPRESENTATIVE IS GIVEN.
15. EQUIPMENT AND MATERIALS THAT ARE TO BE STORED ON SITE SHALL BE LOCATED IN AN AREA THAT IS PROTECTED TO PREVENT ACCIDENTS, DAMAGE TO MATERIALS AND ANY ADVERSE ENVIRONMENTAL EFFECTS. ANY EQUIPMENT THAT IS LEAKING FLUIDS SHALL BE FIXED PROMPTLY AND ANY FLUID CONTAMINATED SOIL, SHALL BE REMOVED PROMPTLY IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
16. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE AND IMPLEMENT A TRAFFIC CONTROL PLAN MEETING THE REQUIREMENTS OF THE CITY, TxDOT, THE ENGINEER, AND THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR ANY WORK ALONG THE ROAD AND ALL ADJACENT ROADS. THIS PLAN IS TO BE SUBMITTED TO AND APPROVED OF BY THE APPROPRIATE AGENCIES AND TO THE ENGINEER BEFORE CONSTRUCTION ALONG THE ROAD IS TO COMMENCE. IF A PLAN IS INCLUDED WITHIN THIS PLAN SET IT SHOULD BE USED AS A GENERAL GUIDELINE.
17. A SEQUENCE OF CONSTRUCTION SHALL BE SCHEDULED AND COORDINATED WITH THE ENGINEER PRIOR TO COMMENCEMENT OF CONSTRUCTION AND ANY CHANGES TO THE SEQUENCE SHALL BE COORDINATED WITH THE ENGINEER.
18. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF A SAFETY PROGRAM. THE CONTRACTOR SHALL APPOINT A SAFETY FOREMAN WHO WILL BE ON SITE AT ALL TIMES. ALL CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH THE LATEST OSHA EXCAVATION SAFETY STANDARDS, STATE REGULATIONS, AND LOCAL REGULATIONS.
19. DISPOSAL OF ALL MATERIALS REMOVED WHICH ARE NOT TO BE REINSTALLED OR SALVAGED ON THE PROJECT, AND DISPOSAL OF ALL EXCESS MATERIALS NOT USED ON THE PROJECT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
20. ANY CHANGES TO THE PLANS RESULTING FROM ACCEPTANCE OF ALTERNATIVES AND/OR SUBSTITUTIONS IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBMITTED TO THE OWNER AND THE ENGINEER FOR APPROVAL.
21. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE SUBMISSION OF AN *"AS-BUILT"* PLAN SET AT COMPLETION OF THE PROJECT. THIS *"AS-BUILT"* PLAN SET SHALL SHOW ALL DEVIATIONS TO THE PLANS MADE BY THE CONTRACTOR AND NOTE REASON FOR THE DEVIATION.

PROJECT NOTES:

1. DURING STORM EVENTS WORK SHALL CEASE AND THE CONTRACTOR SHALL MAINTAIN THE SWPP DEVICES TO ENSURE THAT SEDIMENT AND DEBRIS FROM THE SITE WILL NOT CAUSE HARM TO OR DAMAGE AREAS DOWNSTREAM OF THE PROJECT SITE.
2. THE USE OF BYPASS PUMPS TO ASSIST IN CONTROLLING THE WATER LEVEL WITHIN THE PROJECT SITE AS LONG AS APPROVAL BY THE ENGINEER IS OBTAINED.
3. GRADING ACTIVITIES SHALL BE PERFORMED IN A MANNER TO MINIMIZE DISTURBANCE TO THE WOODLANDS ALONG THE SOUTHERN EDGE OF THE PROJECT.
4. CONSTRUCTION ACTIVITIES WITHIN LOTS 33, 34 AND 35, BLOCK 1 OF THE ROCKPORT COUNTRY CLUB WILL REQUIRE ADDITIONAL COORDINATION WITH PROPERTY OWNERS. ACCESS FROM HENDERSON ST. OR CHERRY HILLS WILL NOT BE ALLOWED.
5. FOR SAFERTY PURPOSES, THE HAULING OF EXCAVATED MATERIAL SHALL NOT OCCUR DURING ROCKPORT-FULTON HIGH SCHOOL PICK-UP AND DROP-OFF HOURS AND SHALL ONLY OCCUR DURING DAYLIGHT HOURS.
6. A FLAG MAN MUST ACCOMPANY THE HAUL TRUCKS, EQUIPMENT, AND ALL OTHER VEHICLES WHEN THEY CROSS THE HIKE/BIKE TRAIL.
7. THE HIKE/BIKE TRAIL MUST REMAIN OPEN AT ALL TIMES TO PEDESTRIANS AND BICYCLISTS. REPAIRS AND PATCHES MAY BE NEEDED DURING CONSTRUCTION TO ALLOW SAFE PASSING.

REV.	DESCRIPTION	APPR.	DATE

Drawn By : AB
Checked By : CBT
Approved By : CBT
Project No. : 8722
Scale : AS SHOWN
Date : 07/2013
Revision No. : 0

STATE OF TEXAS
CRAIG B. THOMPSON
89496
LICENSED PROFESSIONAL ENGINEER
7/16/13

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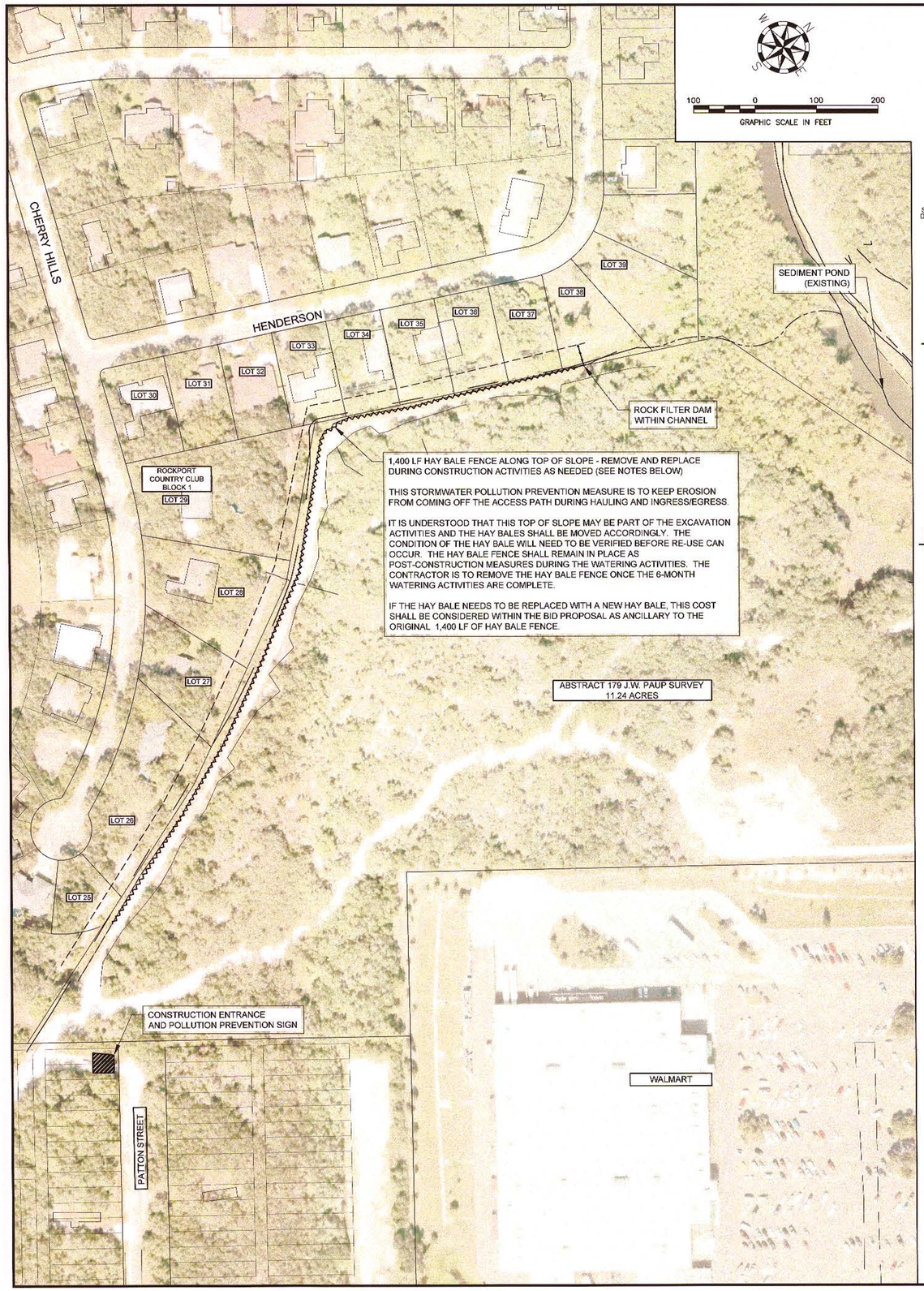
Naismith Engineering,Inc
TBPE No. F-355

LAYOUT SHEET / NOTES
UPPER TULE CREEK
STORMWATER IMPROVEMENTS
ROCKPORT, ARANSAS COUNTY, TEXAS

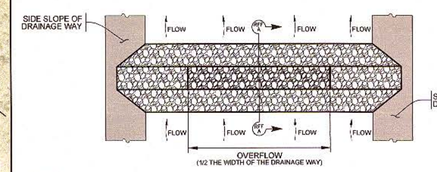
Dwg. File: 8722-SHT-02

2

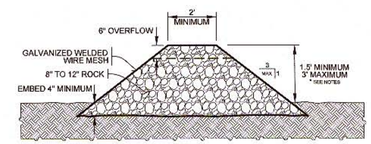


LEGEND

- HAY-BALE FENCE
- ROCK FILTER DAM
- CONSTRUCTION ENTRACE



PLAN
NOT TO SCALE



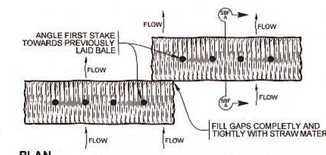
RFF A **SECTION**
NOT TO SCALE

ROCK FILTER DAM (RFD) NOTES:
1. SHALL BE INSTALLED AS SOON AS PRACTICABLE
2. SHALL REMAIN IN PLACE AND MAINTAINED UNTIL DISTURBED AREA IS STABILIZED BY PERMANENT MEASURES AND ENGINEER APPROVES REMOVAL.
3. DAILY INSPECTION IS TO BE MADE BY THE CONTRACTOR.
4. SILT ACCUMULATION OF 1/3 THE HEIGHT OF THE ROCK FILTER FENCE SHALL BE REMOVED PRIOR TO A STORM EVENT AND IMMEDIATELY AFTERWARDS.

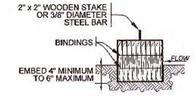
ROCK FILTER DAM REQUIREMENTS:
1. ROCK MATERIAL: SHALL BE 8 INCH TO 12 INCH DIAMETER ROCK
2. SIZE: SHALL BE A MINIMUM HEIGHT OF 18 INCHES. A MAXIMUM HEIGHT OF 36" OR 6" BELOW TOP OF THE DRAINAGE WAY WHICHEVER IS LESS. A MINIMUM WIDTH OF 24 INCHES AT THE TOP. A OVERFLOW AREA SHALL BE CENTERED IN THE DRAINAGE WAY WITH DEPTH OF 6" AND A MINIMUM WIDTH OF 1/2 THE DRAINAGE WAY WIDTH.
3. WIRE MATERIAL: SHALL BE GALVANIZED WELDED WIRE MESH (12.5 GAUGE MINIMUM) WITH A MAXIMUM OPENING SIZE OF 3" x 4"
4. PLACEMENT: THE ROCK MATERIAL SHALL BE HAND OR MECHANICALLY PLACED WITHIN THE WIRE MATERIAL CAGE.
5. IMMEDIATELY REPLACE OR REPAIR WIRE MATERIAL THAT IS DAMAGED OR DETERIORATING.

ROCK FILTER DAM (RFD)
NOT TO SCALE

HAY BALE FENCE (HBF) NOTES:
1. SHALL BE INSTALLED AS SOON AS PRACTICABLE.
2. SHALL REMAIN IN PLACE AND MAINTAINED UNTIL DISTURBED AREA IS STABILIZED BY PERMANENT MEASURES OR ENGINEER OR OWNER APPROVES REMOVAL.
3. DAILY INSPECTION IS TO BE MADE BY THE CONTRACTOR.
4. SILT ACCUMULATION OF 1/3 THE HEIGHT OF THE STRAW BALE FENCE SHALL BE REMOVED PRIOR TO A STORM EVENT AND IMMEDIATELY AFTERWARDS.



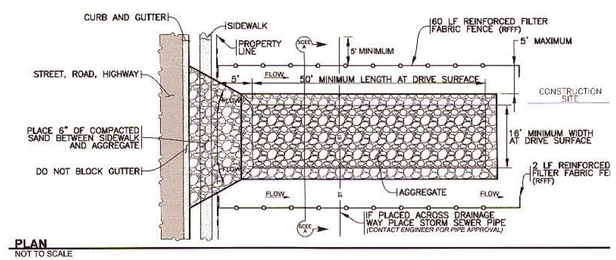
PLAN
NOT TO SCALE



SBF A **SECTION**
NOT TO SCALE

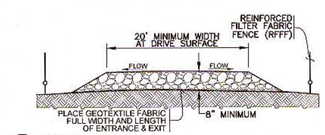
HAY BALE REQUIREMENTS:
1. STRAW BALE MATERIAL: SHALL BE COMPOSED OF VEGETATIVE MATERIAL APPROVED BY ENGINEER
2. STRAW BALE SIZE: SHALL BE A MINIMUM LENGTH OF 30 INCHES, A WIDTH OF 14 INCHES, A HEIGHT OF 18 INCHES AND WEIGH A MINIMUM OF 50 LBS.
3. BINDINGS: SHALL BE OF WIRE (14 GAUGE MIN.), NYLON OR POLYPROPYLENE ROPE (12 GAUGE MIN.). JUTE AND COTTON BINDING IS NOT ALLOWED.
4. STRAW BALE PLACEMENT: OVERLAP THE SIDES OF THE STRAW BALES A MINIMUM OF 8 INCHES AND SHALL BE TIGHT AGAINST EACH OTHER. ANY GAPS SHALL BE FILLED COMPLETLY WITH STRAW MATERIAL. EMBED INTO THE SOIL A MINIMUM OF 4 INCHES AND A MAXIMUM OF 1/2 OF BALE HEIGHT
5. STAKE MATERIAL:
   WOOD STAKE - MADE FROM NON-TREATED LUMBER OF SHAPE AND SIZE STATED WHICH IS FREE OF ANY DEFECTS.
   STEEL BAR REINFORCEMENT - SHALL BE A MINIMUM 3/8 INCH IN DIAMETER.
6. IMMEDIATELY REPLACE STRAW BALES THAT ARE DAMAGED OR DETERIORATING.

HAY BALE FENCE (HBF)
NOT TO SCALE



PLAN
NOT TO SCALE

NOTICE: TO BE USED BY *ALL* VEHICLES ENTERING AND EXITING CONSTRUCTION SITE

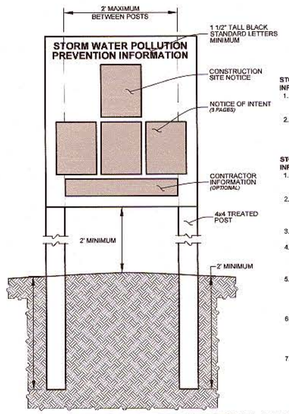


SCEE A **SECTION**
NOT TO SCALE

STABILIZED CONSTRUCTION ENTRANCE & EXIT (SCEE) NOTES:
1. SHALL BE INSTALLED AS SOON AS PRACTICABLE BEFORE CONSTRUCTION ACTIVITIES COMMENCE.
2. SHALL REMAIN IN PLACE AND MAINTAINED UNTIL DISTURBED AREA IS STABILIZED BY PERMANENT MEASURES AND THE ENGINEER OR OWNER APPROVES REMOVAL.
3. DAILY INSPECTION IS TO BE MADE BY THE CONTRACTOR.
4. REMOVE ACCUMULATED SEDIMENT AND DEBRIS ONCE AGGREGATE IS 50% COVERED OR AS DIRECTED BY ENGINEER OR OWNERS REPRESENTATIVE.

STABILIZED CONSTRUCTION ENTRANCE & EXIT (SCEE) REQUIREMENTS:
1. GEOTEXTILE FABRIC MATERIAL: WOVEN OR NONWOVEN FABRIC WHICH IS PERMEABLE MADE WITH POLYPROPYLENE OR POLYETHYLENE FABRIC WITH A MINIMUM GRAB STRENGTH OF 270 PSI (ASTM D-4632). TO BE PLACED BETWEEN NATURAL GROUND AND AGGREGATE.
2. AGGREGATE: SHALL CONSIST OF 3 TO 6 INCH DIAMETER MATERIAL AND BE NON-DELETERIOUS MATERIAL.
3. SIZE: SHALL BE A MINIMUM LENGTH OF 50 FEET, A WIDTH OF 20 FEET, AND THICKNESS OF 8 INCHES AT DRIVE SURFACE.
4. REINFORCED FILTER FABRIC FENCE (RFFF): SEE DETAIL *"REINFORCED FILTER FABRIC FENCE (RFFF)"*.
5. PLACEMENT: PLACE GEOTEXTILE FABRIC BELOW AGGREGATE AND THE SLOPE SHALL PROMOTE DRAINAGE TO SIDES AND TOWARDS THE CONSTRUCTION SITE. FILTER FABRIC FENCE AND ORANGE SAFETY FENCE SHALL BE PLACED AS SHOWN.

STABILIZED CONSTRUCTION ENTRANCE & EXIT (CEE)
NOT TO SCALE



STORM WATER POLLUTION PREVENTION INFORMATION SIGN (SWPPIS) NOTES:
1. SHALL BE INSTALLED PRIOR TO BEGINNING CONSTRUCTION AT EACH ENTRANCE AND EXIT.
2. SHALL REMAIN IN PLACE AND MAINTAINED UNTIL CONSTRUCTION HAS BEEN COMPLETED AND THE ENGINEER APPROVES REMOVAL.

STORM WATER POLLUTION PREVENTION INFORMATION SIGN (SWPPIS) REQUIREMENTS:
1. WOOD MATERIAL - SHALL BE ALL TREATED LUMBER AND PLYWOOD WHICH IS PAINTED WHITE.
2. SIZE - SHALL BE A MAXIMUM HEIGHT OF 6 FEET ABOVE GRADE AND A WIDTH THAT ALLOWS THE REQUIRED INFORMATION SHOWN TO BE PLACED ON THE SIGN.
3. LETTER SIZE - LETTERS SHALL BE 1 1/2" IN HEIGHT MINIMUM AND BE BLACK.
4. PAPER - SHALL BE STANDARD 8 1/2" x 11" OR ENGINEER APPROVED OTHER, WHICH IS LAMINATED TO RESIST WEATHER CONDITIONS.
5. CONTRACTOR INFORMATION (OPTIONAL) - MAY INCLUDE CONTRACTOR NAME, CONTACT INFORMATION, AND OTHER GENERAL INFORMATION. TEXT SIZE OF 1" MAXIMUM.
6. PLACEMENT - SHALL BE AT EACH ENTRANCE AND EXIT. THE COPIES OF THE DOCUMENTS SHALL BE ADHERED TO THE BOARD BY MEANS THAT RESIST THE EFFECTS OF WIND AND PRECIPITATION.
7. IMMEDIATELY REPLACE MATERIALS AND DOCUMENTS ONCE DAMAGED OR DETERIORATING.

POLLUTION PREVENTION INFORMATION SIGN
NOT TO SCALE

GENERAL SWPPP NOTES:

WHEN TOPSOILING, THE CONTRACTOR SHALL MAINTAIN EROSION AND SEDIMENTATION CONTROL SYSTEMS, SUCH AS DIKES, SWALES, GRADE STABILIZATION STRUCTURES, WATERWAYS, AND SEDIMENT BASINS

THE CONTRACTOR SHALL PROTECT TREES OUSIDE CONSTRUCTION LIMITS. HEAVY EQUIPMENT, VEHICULAR TRAFFIC, AND STOCKPILES OF CONSTRUCTION MATERIALS, INCLUDING TOPSOIL, ARE NOT PERMITTED WITHIN THE DRIPLINE OF ANY TREE TO BE RETAINED. TREE TRUNKS, EXPOSED ROOTS, AND LIMBS OF TREES DESIGNATED TO BE RETAINED WHICH ARE DAMAGED DURING CONSTRUCTION OPERATIONS SHALL BE CARED FOR BY A LICENSED TREE EXPERT. SPECIMEN TREES

THE CONTRACTOR SHALL CONTROL DUST BLOWING AND MOVEMENT ON CONSTRUCTION SITES AND ROADS TO PREVENT LOSS OF SOIL SURFACE, TO REDUCE ONSITE AND OFFSITE DAMAGE, TO PREVENT HEALTH HAZARDS, AND TO IMPROVE TRAFFIC SAFETY.

THE CONTRACTOR SHALL CONTROL DUST BLOWING BY UTILIZING ONE OR MORE OF THE FOLLOWING METHODS. DUST CONTROL METHODS SHALL BE IMPLEMENTED IMMEDIATELY WHENEVER DUST CAN BE OBSERVED BLOWING

A. IRRIGATION BY WATER SPRINKLING.
E. BARRIERS USING SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY, OR SIMILAR MATERIALS.

VEHICLES SUCH AS DUMP TRUCKS AND OTHER CONSTRUCTION EQUIPMENT SHALL NOT BE WASHED AT LOCATIONS WHERE THE RUNOFF WILL FLOW DIRECTLY INTO A WATERCOURSE OR STORM WATER CONVEYANCE SYSTEM. SPECIAL AREAS SHALL BE DESIGNATED FOR WASHING VEHICLES. THESE AREAS SHALL BE LOCATED WHERE THE WASH WATER WILL SPREAD OUT AND EVAPORATE OR INFILTRATE DIRECTLY INTO THE GROUND, OR WHERE THE RUNOFF CAN BE COLLECTED IN A TEMPORARY HOLDING OR SEEPAGE BASIN. WASH AREAS SHALL HAVE GRAVEL OR CRUSHED STONE BASES.

EQUIPMENT MAINTENANCE AND REPAIR:

THE CONTRACTOR'S MAINTENANCE AND REPAIR OF CONSTRUCTION MACHINERY AND EQUIPMENT SHOULD BY CONFINED TO AREAS SPECIFICALLY DESIGNATED FOR THAT PURPOSE. SUCH DESIGNATED AREAS SHOULD BY LOCATED AND DESIGNED SO THAT OILS, GASOLINE, GREASE, SOLVENTS, AND OTHER POTENTIAL POLLUTANTS CANNOT BE WASHED DIRECTLY INTO RECEIVING STREAMS OR STORM WATER CONVEYANCE SYSTEMS. THE CONTRACTOR SHALL PROVIDE THESE AREAS WITH ADEQUATE WASTE DISPOSAL RECEPTACLES FOR LIQUID AS WELL AS SOLID WASTE. MAINTENANCE AREAS SHOULD BE INSPECTED AND CLEANED DAILY.

ON A CONSTRUCTION SITE WHERE DESIGNATED EQUIPMENT MAINTENANCE AREAS ARE NOT FEASIBLE, THE CONTRACTOR SHALL TAKE CARE DURING EACH INDIVIDUAL REPAIR OR MAINTENANCE OPERATION TO PREVENT POTENTIAL POLLUTANTS FROM BECOMING AVAILABLE TO BE WASHED INTO STREAMS OR STROM SEWER CONVEYANCE SYSTEMS. TEMPORARY WASTE DISPOSAL RECEPTACLES SHALL BE PROVIDED BY THE CONTRACTOR AS NECESSARY.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING ALL ONSITE VEHICLES AND EQUIPMENT FOR LEAKS AND PERFORM REGULAR PREVENTATIVE MAINTENACE TO REDUCE THE CHANCE OF LEAKAGE. PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED.

WASTE COLLECTION AND DISPOSAL:

THE CONTRACTOR SHALL FORMULATE A PLAN FOR THE COLLECTION AND DISPOSAL OF WASTE MATERIALS ON THE CONSTRUCTION SITE. THIS PLAN SHALL DESIGNATE LOCATIONS FOR TRASH AND WASTE RECEPTACLES AND ESTABLISH A SPECIAL COLLECTION SCHEDULE. METHODS FOR ULTIMATE DISPOSAL OF WASTE SHALL BE SPECIFIED AND CARRIED OUT IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL HEALTH AND SAFETY REGULATIONS. SPECIAL PROVISIONS SHALL BE MADE FOR THE COLLECTION DISPOSAL OF LIQUID WASTES AND TOXIC OR HAZARDOUS MATERIALS.

THE CONTRACTOR SHALL KEEP RECEPTACLES AND OTHER WASTE COLLECTION AREAS NEAT AND ORDERLY TO THE EXTENT POSSIBLE. WASTE SHALL NOT BE ALLOWED TO OVERFLOW ITS CONTAINER OR ACCUMULATE FOR EXCESSIVELY LONG PERIODS OF TIME. TRASH COLLECTION POINTS SHALL BE LOCATED WHERE THEY WILL LEAST LIKELY BE AFFECTED BY CONCENTRATED STORM WATER RUNOFF.

SANITARY FACILITIES:

THE CONTRACTOR SHALL PROVIDE THE CONSTRUCTION SITE WITH ADEQUATE SANITARY FACILITIES FOR WORKERS IN ACCORDANCE WITH APPLICABLE HEALTH REGULATIONS.

REV.	DESCRIPTION	APPR.	DATE

Drawn By	TS
Checked By	CH
Approved By	DES
Project No.	8722
Scale	AS SHOWN
Date	03/12/2013
Revision No.	0

STATE OF TEXAS
CRAIG B. THOMPSON
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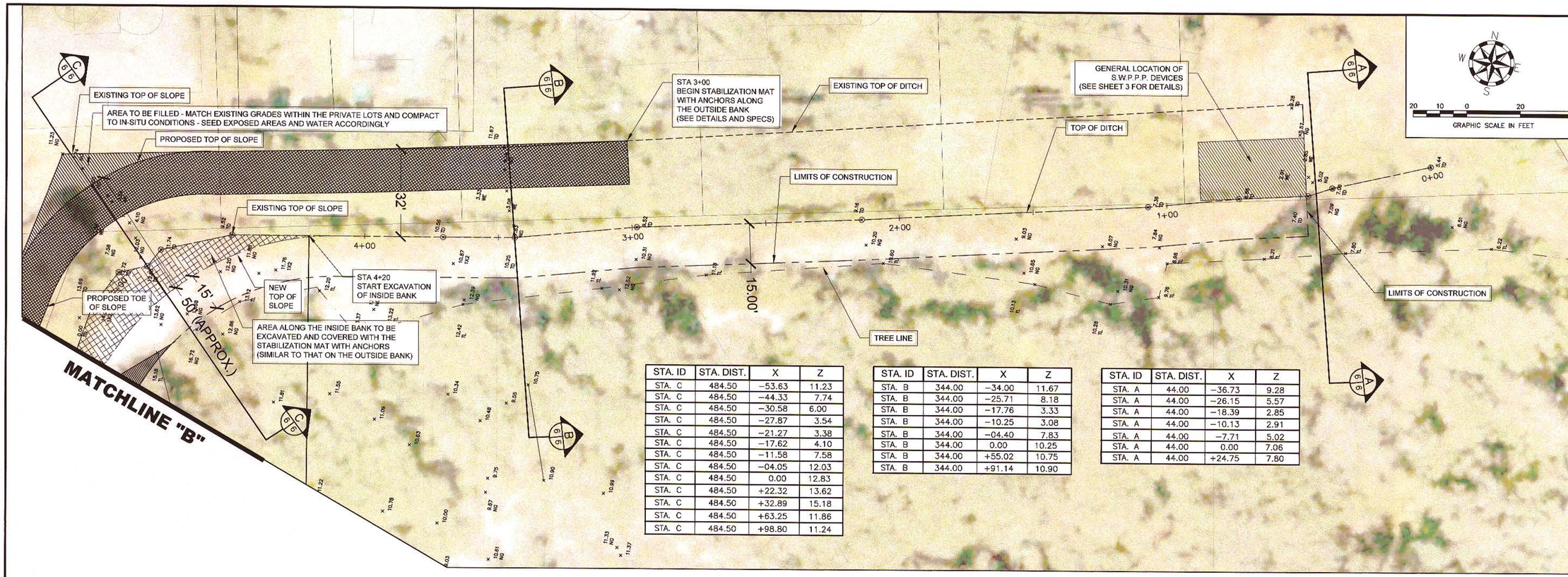
Naismith Engineering,Inc
TBPE No. F-355

OVERALL LAYOUT WITH SWPPP
UPPER TULE CREEK STORMWATER IMPROVEMENTS
ROCKPORT, ARANSAS COUNTY, TEXAS

Dwg. File: 8722-SHT-03

Sheet 3 Of 8



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STA. C	484.50	−17.62	4.10
STA. C	484.50	−11.58	7.58
STA. C	484.50	−04.05	12.03
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STA. C	484.50	+63.25	11.86
STA. C	484.50	+98.80	11.24

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STA. B	344.00	−10.25	3.08
STA. B	344.00	−04.40	7.83
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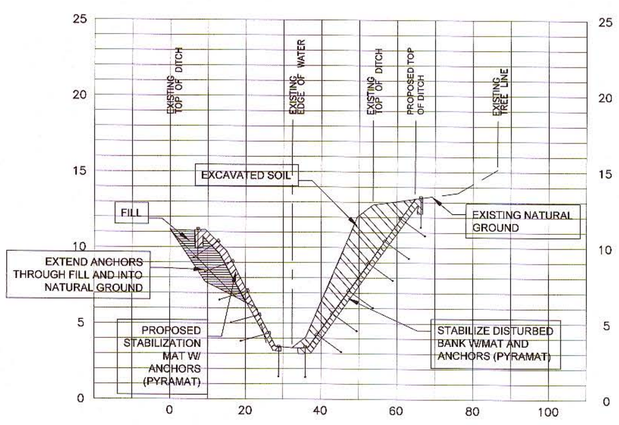

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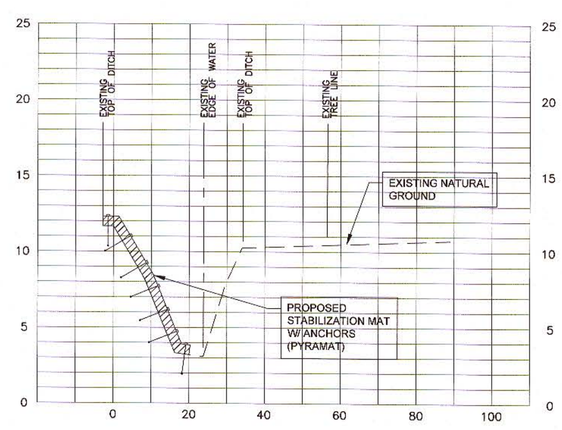

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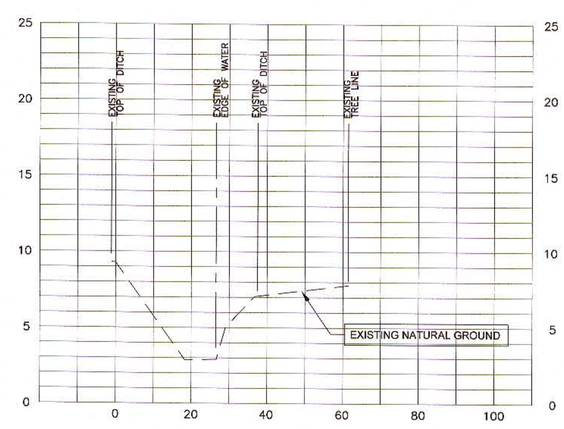

SECTION A-A

LEGEND

X	=	Ground Elevation
TD	=	Top of Ditch
TL	=	Tree Line
CL HB	=	Centerline Hike/Bike Trail
WE	=	Water's Edge

NAD 83, Texas State Plane South Central
Elevations - NAVD 88

GRAPHIC SCALE IN FEET

REV.	DESCRIPTION	APPR.	DATE

Drawn By : AB
Checked By : CBT
Approved By : CBT
Project No. : 8722
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Date : 03/12/2013
Revision No. : 7/2013

STATE OF TEXAS
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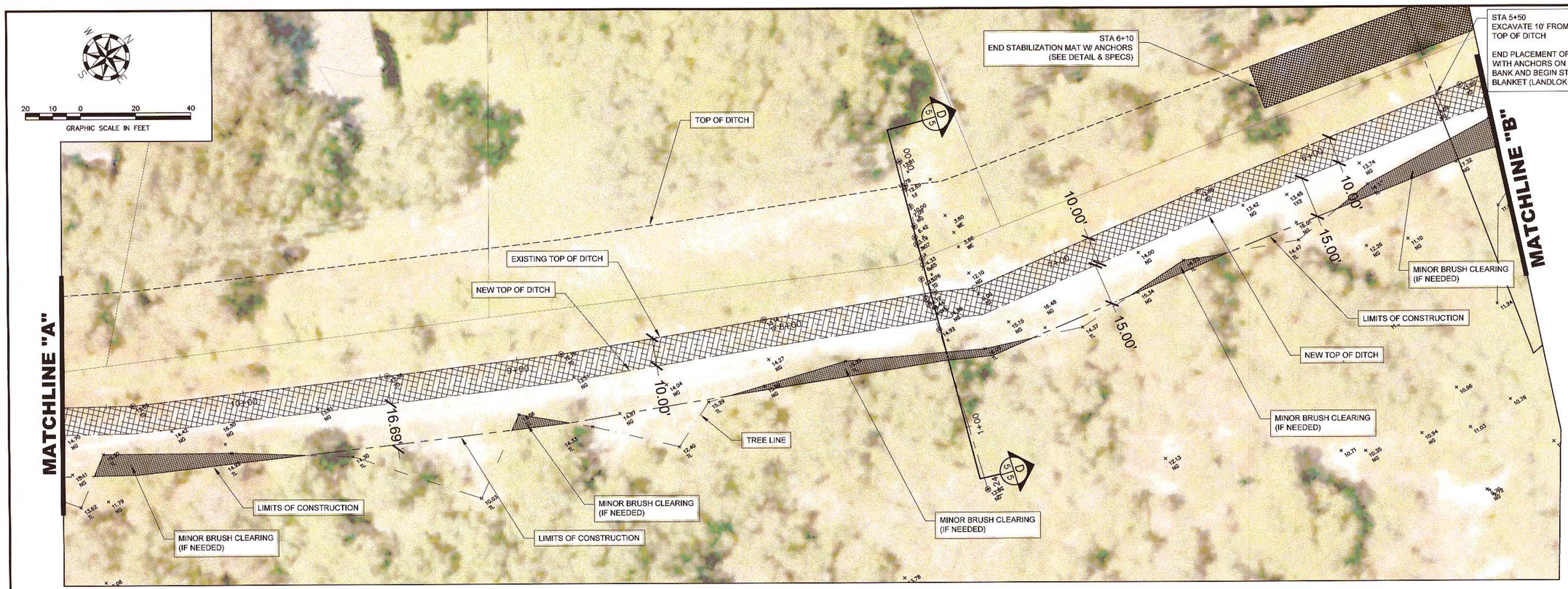
OVERALL LAYOUT WITH SWPPP
UPPER TULE CREEK STORMWATER IMPROVEMENTS
ROCKPORT, ARANSAS COUNTY, TEXAS

Dwg. File: 8722-SHT-04



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NAD 83, Texas State Plane South Central
Elevations - NAVD 88

STA. ID	STA. DIST.	X	Z
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STA. C	750.00	−40.08	12.69
STA. C	750.00	−32.38	10.00
STA. C	750.00	−25.05	6.42
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STA. C	750.00	−18.52	3.07
STA. C	750.00	−12.99	4.33
STA. C	750.00	−10.80	6.85
STA. C	750.00	−5.38	10.51
STA. C	750.00	+0.00	14.32
STA. C	750.00	+2.06	14.17
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STA. C	750.00	+14.17	14.92
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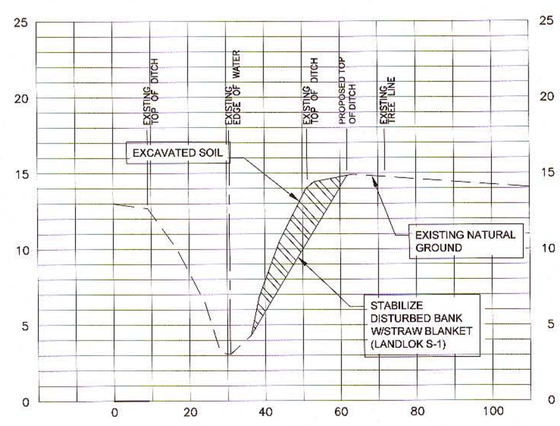
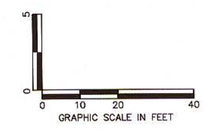


SECTION D-D



REV.	DESCRIPTION	APPR.	DATE

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Revision No. :	0

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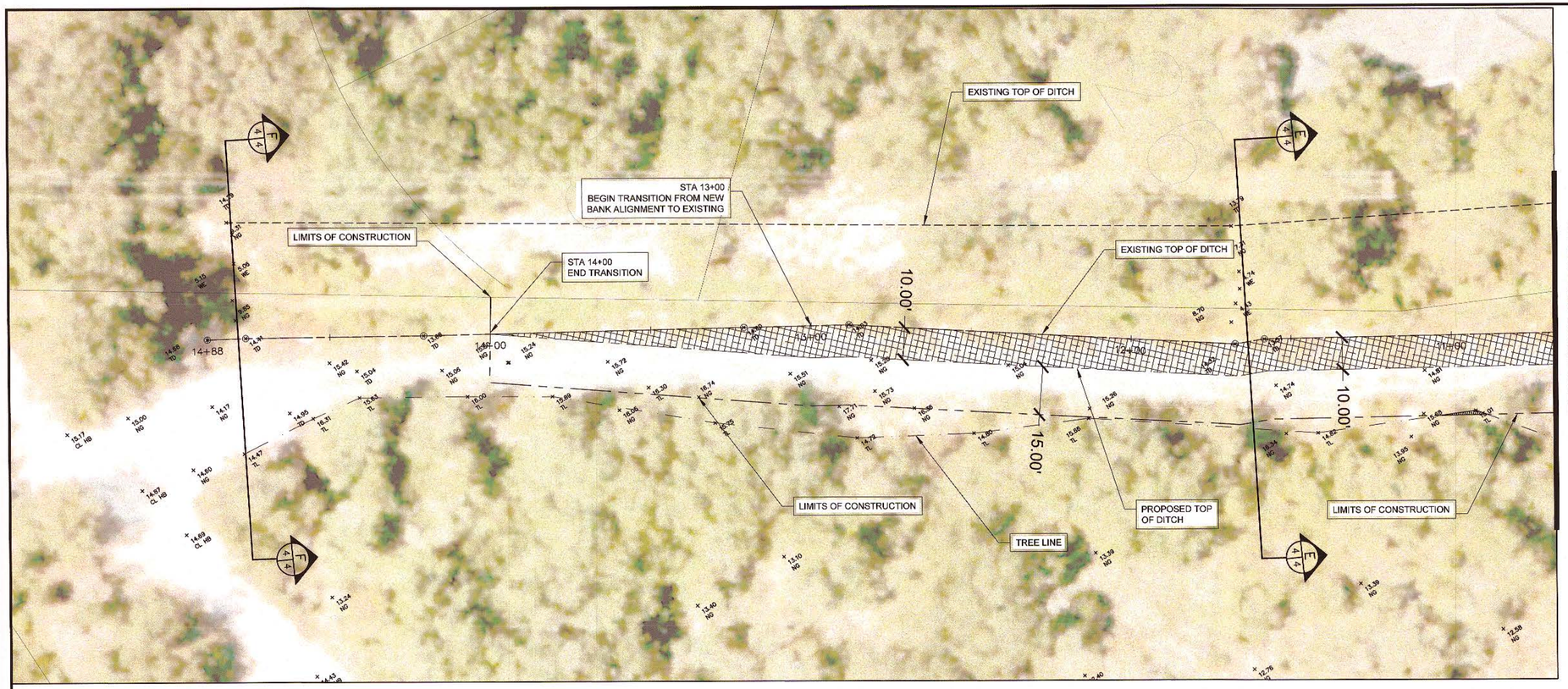
OVERALL LAYOUT WITH SWPPP
UPPER TULE CREEK STORMWATER IMPROVEMENTS

ROCKPORT, ARANSAS COUNTY, TEXAS

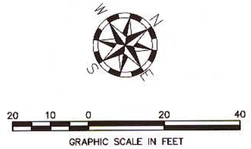
Dwg. File: 8722-SHT-05

5

Sheet 5 Of 8



MATCHLINE "A"



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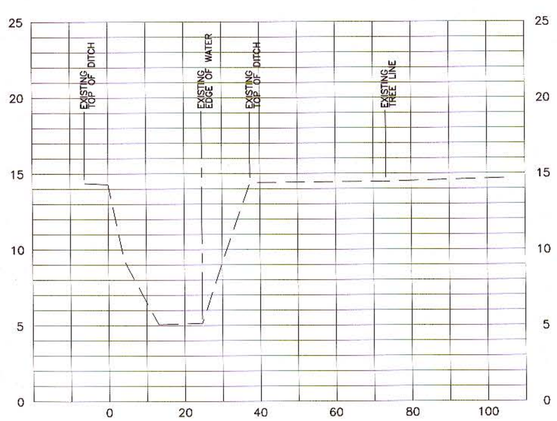
NAD 83, Texas State Plane South Central
Elevations - NAVD 88



SECTION F-F

STA. ID	STA. DIST.	X	Z
STA. E	1163.50	−37.41	13.79
STA. E	1163.50	−23.00	7.31
STA. E	1163.50	−17.65	4.74
STA. E	1163.50	−12.86	4.43
STA. E	1163.50	−6.89	8.70
STA. E	1163.50	0.00	14.32
STA. E	1163.50	+32.04	16.34

STA. ID	STA. DIST.	X	Z
STA. F	1478.30	−37.43	14.29
STA. F	1478.30	−33.29	9.31
STA. F	1478.30	−24.23	5.06
STA. F	1478.30	−12.74	5.15
STA. F	1478.30	−06.46	9.85
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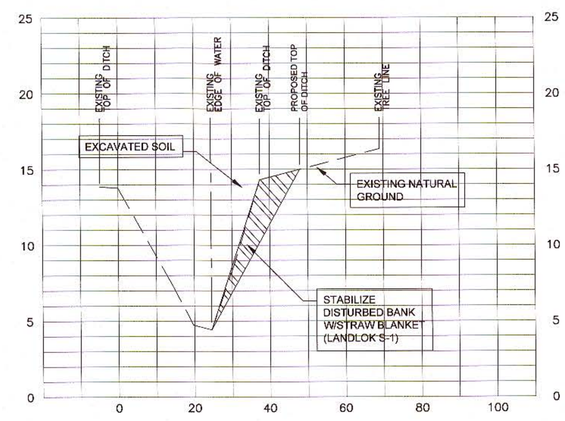
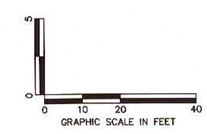
STA. F	1478.30	+67.06	14.69



SECTION E-E



OVERALL LAYOUT WITH SWPPP
UPPER TULE CREEK STORMWATER IMPROVEMENTS
ROCKPORT, ARANSAS COUNTY, TEXAS

Dwg. File: 8722-SHT-06

6

Sheet 6 Of 8

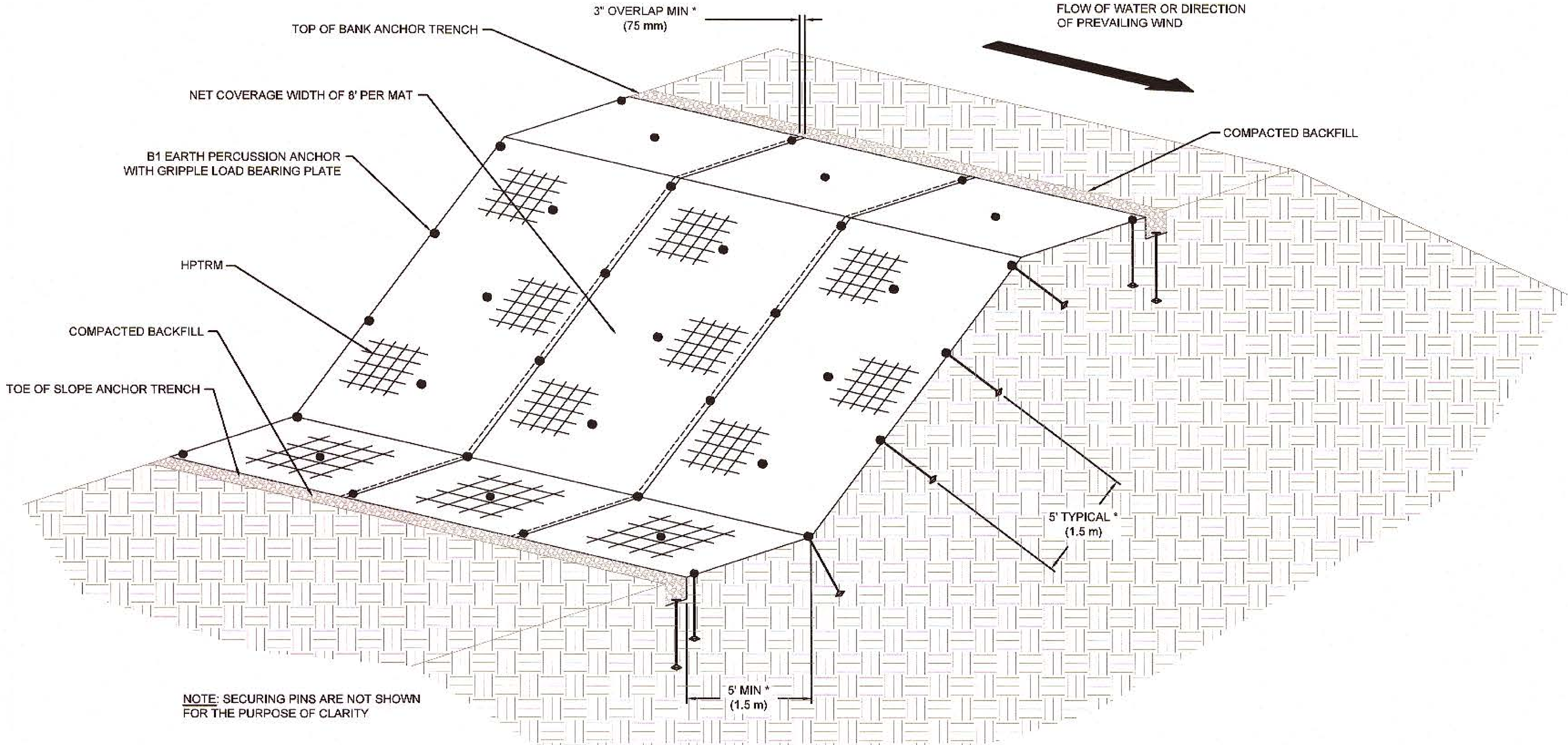
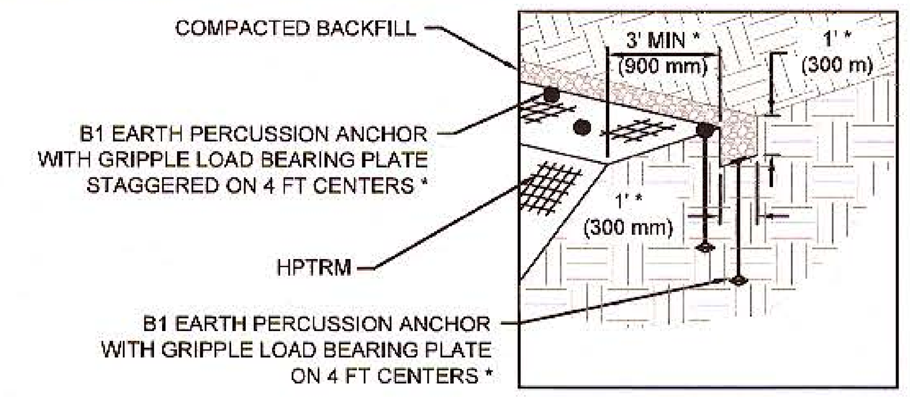


FIGURE 1: INSTALLATION OF ARMORMAX SYSTEM ON A SLOPE OR LEVEE



NOTE: SEED OR SOD ALL DISTURBED AREAS

FIGURE 2:TOP OF BANK (TOB) ANCHOR TRENCH

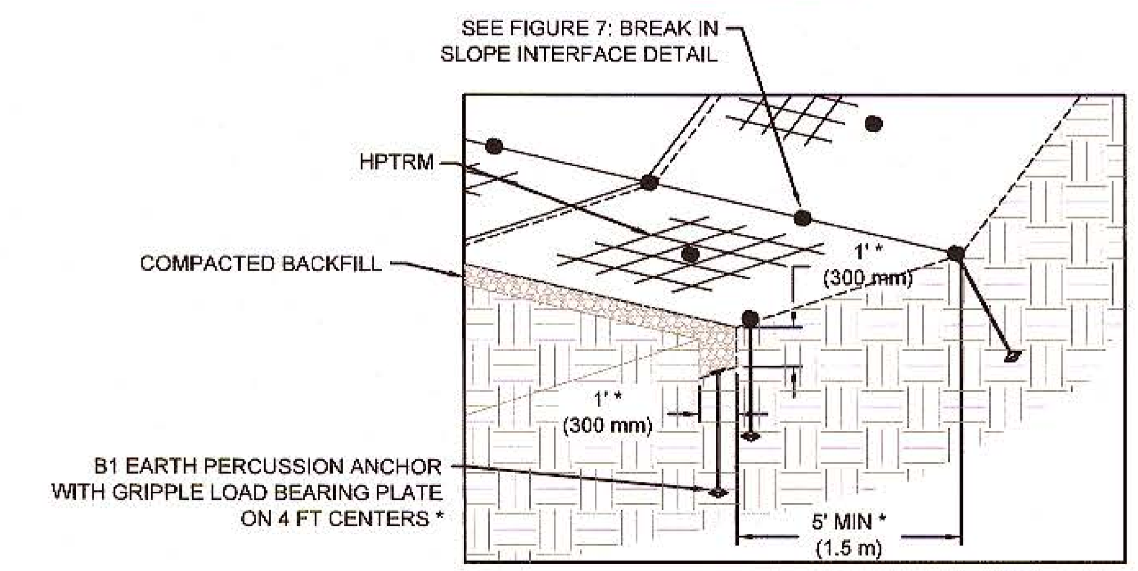


FIGURE 3: TOE OF SLOPE ANCHOR TRENCH

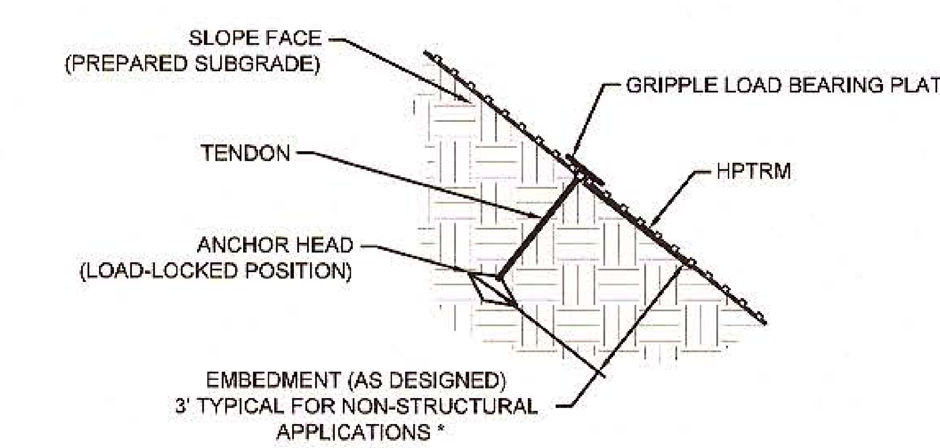


FIGURE 8: EARTH PERCUSSION ANCHOR DETAIL

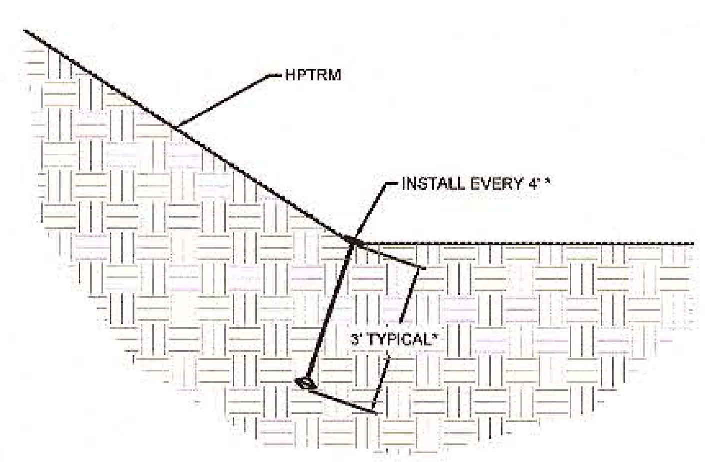


FIGURE 6: BREAK IN SLOPE INTERFACE DETAIL FOR CHANNELS

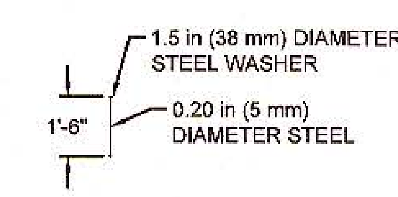


FIGURE 7: SECURING PIN DETAIL

............SYSTEM ON A LEVEE OR SLOPE (NON-STRUCTURAL APPLICATION) GENERAL INSTALLATION GUIDELINES

PRE-CONSTRUCTION

A pre-construction meeting shall be held with the construction team and a representative from Propex ®. This meeting shall be scheduled by the contractor with at least two weeks notice. Also, Propex suggests that installation monitoring of the ArmorMax System be performed by a qualified independent third party.

SITE PREPARATION

- Grade and compact area of ArmorMax System installation as directed and approved by Engineer. Subgrade shall be uniform and smooth. Remove all rocks, clods, vegetation or other objects so the installed mat will have direct contact with soil surface.
- Prepare seedbed by loosening the top 2-3 in (50-75 mm) minimum of soil. This may be accomplished with a rotary tiller on slopes 3:1 or flatter.
- Perform a site specific soil test to determine what amendments such as lime and fertilizer to incorporate.
- Do not mulch areas where mat is to be placed.

SEEDING

- Keep seeded areas moist as necessary to establish vegetation. When watering seeded areas, use fine spray to prevent erosion of seeds or soil. If as a result of a rain, prepared seedbed becomes crusted or eroded, or if eroded places, ruts or depressions exist for any reason, rework soil until smooth and reseed such areas.
- Apply an amount equivalent to 50% of the total seed mixture required to be installed on the soil surface before installing the High Performance Turf Reinforcement Mat (HPTRM).
- Disturbed areas shall be reseeded.
- Consult project plans and/or specifications for seed types and application rates.

GENERAL INSTALLATION GUIDELINES FOR A LEVEE OR SLOPE

- Figure 1 shows general installation layout and details for ArmorMax System on a slope. (The details on this page are for 8.5 ft wide HPTRM roll widths, for 13.5 ft wide applications see Drawing #S100A)
- Excavate an Top of Bank (TOB) Anchor Trench 12 in wide x 12 in deep (300 mm x 300 mm) minimum of 3 ft (900 mm) over the crest of the slope (see Figure 2). For a levee, the TOB Anchor Trench may start 3 ft (900 mm) from the crest of the slope on the "wet" side. (see Figure 2). Deeper TOB Anchor Trench and/or hard armoring may be required for slopes or levees that have the potential for scour.
- Beginning at the downstream end of the levee or the downwind end of the prevailing winds on a slope, place HPTRM roll end into the TOB Anchor Trench and secure with Gripple Earth Percussion Anchors on 4 ft (1.2 m) centers (see Figure 2). Position adjacent HPTRM rolls and secure in trench in same manner. Backfill and compact soil into trench as directed and approved by Engineer.
- Unroll HPTRM down the slope.
- Secure HPTRM longitudinal edge with Securing Pins on 12 in (300 mm) centers and with Gripple Earth Percussion Anchors on 5 ft (1.5 m) centers (see Figure 4). When required, the Engineer is to create project details for transition to structures along the longitudinal edge or to address water flowing perpendicular to the seams.
- Continue installation as described above, overlapping adjacent rolls as follows:
  - A. HPTRM roll edge overlap: 3 in (75 mm) minimum overlap with upslope HPTRM on top. Secure with one row of Securing Pins on 12 in (300 mm) centers and with one row of Gripple Earth Percussion Anchors on the designed anchor pin pattern detail in Figure 4. A typical spacing on the overlapping seams for the Gripple Earth Percussion Anchors is 5 ft (1.5 m).
  - B. HPTRM roll end overlap for slopes: 6 in (150 mm) minimum overlap with upslope HPTRM on top. Secure with two rows of Securing Pins staggered 6 in (150 mm) apart on 12 in (300 mm) centers and with one row of Gripple Earth Percussion Anchors on 4 ft (1.2 m) centers (see Figure 9). No HPTRM roll end overlaps or seams parallel to the centerline will be allowed on levees.
- Secure HPTRM using Securing Pins and Gripple Earth Percussion Anchors. For appropriate frequency and pattern, see the typical Anchor/Pin Pattern Detail (see Figure 4) and the Pin Pattern Detail (see Figure 5).
- For slope heights or levee slope lengths greater than 45 ft (13.7 m), install simulated check slots per Figure 10. This method includes placing two rows of Securing Pins staggered 6 in (150 mm) apart on 12 in (300 mm) centers and one row of Gripple Earth Percussion Anchors between the rows of pins on 4 ft (1.2 m) centers at 45 ft (13.7 m) maximum intervals (see Figure 10) or across the midpoint of the slope for slope lengths less than 60 ft (18.2 m).
- Excavate Toe of Slope (TOS) Anchor Trench 12 in wide x 12 in deep (300 x 300 mm) minimum at least 5 ft (1.5 m) from the toe of the slope or levee. (see Figure 3). Deeper TOS Anchor Trench and/or hard armoring may be required when slopes or levees have scour potential at their toes. See Toe Interface Detail (Figure 7) for special anchoring patterns for breaks in slope.
- Anchor, backfill and compact end of HPTRM in terminal trench (see Figure 3). Terminal Gripple Earth Percussion Anchors should be spaced on 4 ft (1.2 m) centers (see Figure 3).

GROUND PINNING AND ANCHORING DEVICES

- Metal Securing Pins should be at least 0.20 in (5 mm) diameter steel with a 1 1/2 in (38 mm) steel washer at the head of the pin (see Figure 8). Metal pins should be driven flush to the soil surface. Securing Pins should be between 12-24 in (300-600 mm) long and have sufficient ground penetration to resist pullout. Longer pins may be required for looser soils. Heavier metal stakes may be required in rocky soils. Depending on soil pH and design life of the pin, galvanized or stainless steel pins may be required. Consult project plans and/or specifications for tie down device details.
- Gripple Earth Percussion Anchor assembly consists of an anchor head, stranded cable, gripping device and two crimping ferrules. Materials of each component have been selected to achieve an expected life of more than 50 years. The anchor head is made from die cast aluminum and is bullet nosed in shape to penetrate a turf mat without breaking strands of the mat. The cable is zinc-aluminum coated carbon steel and is of 1 x19 construction. The ferrules are made from aluminum. The grip is die cast from zinc and uses a ceramic roller to clamp the cable in place. The one piece zinc top plate will have openings on the top to facilitate vegetative growth, and the grip plate is approximately 0.2 inches thick and so will only protrude above the surface of the mat that far after installation. The grip is designed such that the top of the cable can be cut below the top surface of the grip in a recessed cavity. See Figure 10.

SPECIAL TRANSITIONS

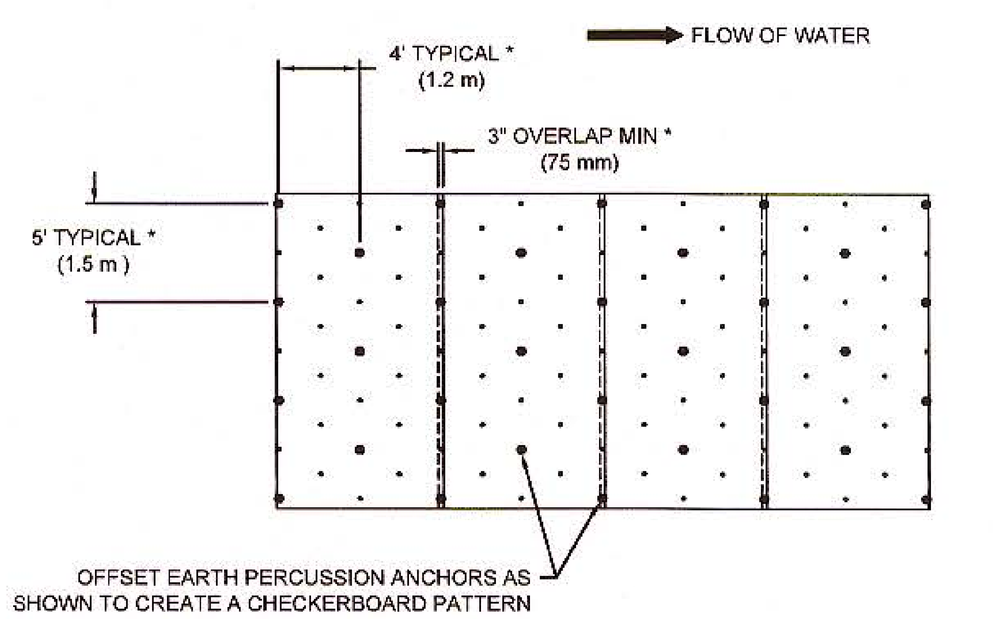
- For applications that require special transitions (i.e. connections to riprap, concrete, T-Walls, etc.), refer to the project specific drawings or consult with Propex Engineering Service at 423-553-2450.

VEGETATION ESTABLISHMENT

- Installed ArmorMax System shall be re-seeded and soil-filled or sodded as is required by the project documents.
- After seeding, spread and lightly rake 1/2 - 3/4 in (12-19 mm) of fine site soil or topsoil into the mat and completely fill the voids using backside of rake or other flat tool. For slopes 3:1 or flatter, roll the entire ArmorMax installation with a drum roller to compact seed and soil tightly into the matrix.
- Smooth soil-fill in order to just expose the top of the HPTRM. Do not place excessive soil above the mat.
- If equipment must operate on the mat, make sure it is of the rubber-tired type. No tracked equipment or sharp turns are allowed on the mat.
- Avoid any traffic over the mat if loose or wet soil conditions exist.
- Broadcast additional seed and install a Landlok® Erosion Control Blanket (ECB) above the soil-filled mat as required by the Engineer. For levees or slopes steeper than 3:1, the addition of the ECB may be required or alternate methods of retaining the soil fill may be considered. Please contact the project engineer or Propex Engineering Services at (423) 553-2450.
- Irrigate as necessary to establish and maintain vegetation. Frequent, light irrigation will need to be applied to seeded areas if no natural rain events have occurred within two weeks of seeding and shall continue until 75% of vegetation has established and has reached a height of 2 inches. Do not over irrigate.

CONTRACTORS MAINTENANCE AND GUARANTEE PERIOD

It shall be the responsibility of the Owner to maintain all seed and ArmorMax areas after Engineer's acceptance. Maintenance shall consist of watering and weeding, repair of all erosion and any re-seeding as necessary to establish a uniform stand of the specified grasses. A minimum of 70% of the area seed shall be covered with no bare or dead spots greater than 10 ft² (1 m²). Seeded areas shall not be mowed prior to establishment of 70% vegetative density and a minimum grass growth of 4 inches (100 mm). Mower height shall not be set lower than 4 inches (100 mm). Throughout the duration of the project, the contractor shall be responsible for mowing to facilitate growth and shall not let the vegetation in the seeded areas exceed 18 inches (450 mm). In addition, the Contractor shall water all grassed areas as often as necessary to establish satisfactory growth and to maintain its growth throughout the duration of the project.
Replanting is to be performed within 14 calendar days of notification by the Engineer.



NOTE: NO END OF ROLL OVERLAP ALLOWED ON FACE OF A LEVEE

- ● B1 EARTH PERCUSSION ANCHOR WITH GRIPPLE LOAD BEARING PLATE
- • SECURING PIN

FIGURE 4: ANCHOR / PIN PATTERN AND LONGITUDINAL EDGE DETAIL

NOTE: FOR EARTH PERCUSSION ANCHOR RATIOS OTHER THAN THE ABOVE, PLEASE CONSULT WITH PROPEX ENGINEERING SERVICES AT 423-553-2450)

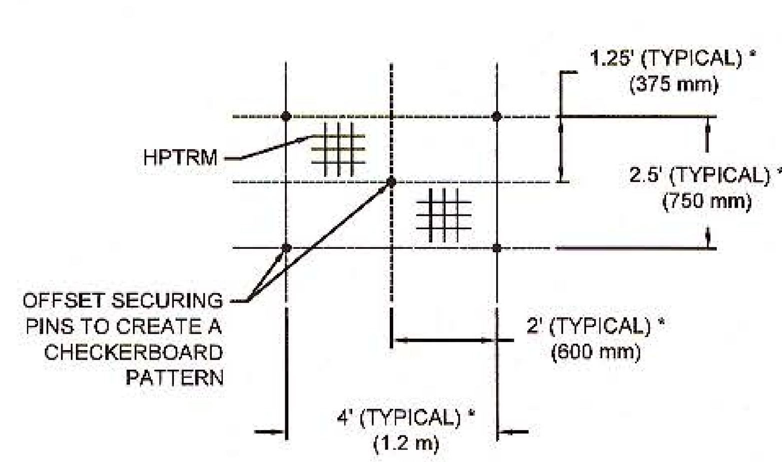
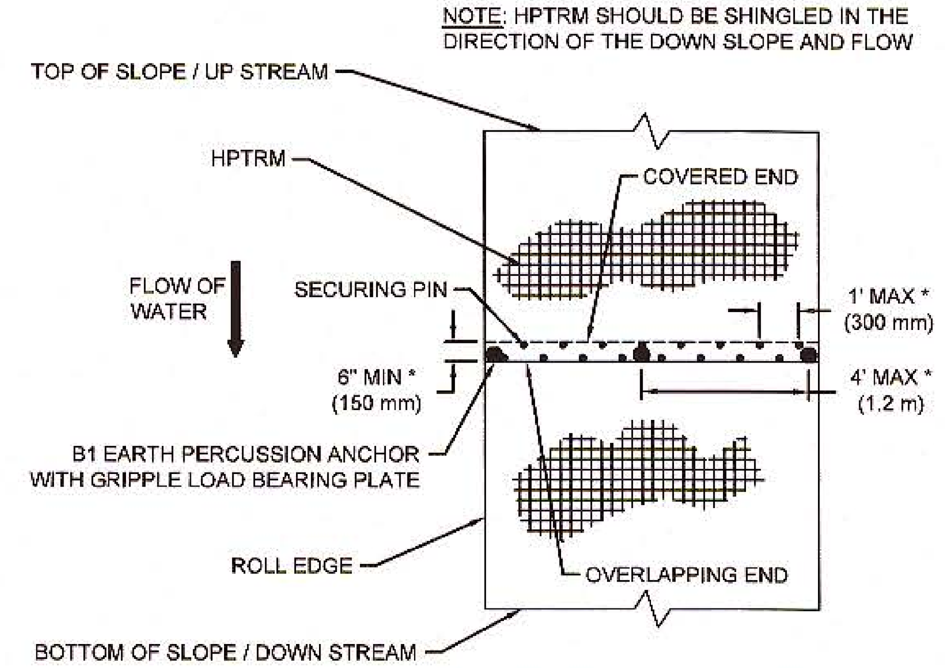


FIGURE 5: PIN PATTERN DETAIL SPECIFIC TO B1 ANCHOR RATIO OF 0.5 ANCHORS/YD²

NOTE: HPTRM SHOULD BE SHINGLED IN THE DIRECTION OF THE DOWN SLOPE AND FLOW



- ● B1 EARTH PERCUSSION ANCHOR WITH GRIPPLE LOAD BEARING PLATE
- • SECURING PIN

FIGURE 9: OVERLAP AT ROLL END DETAIL

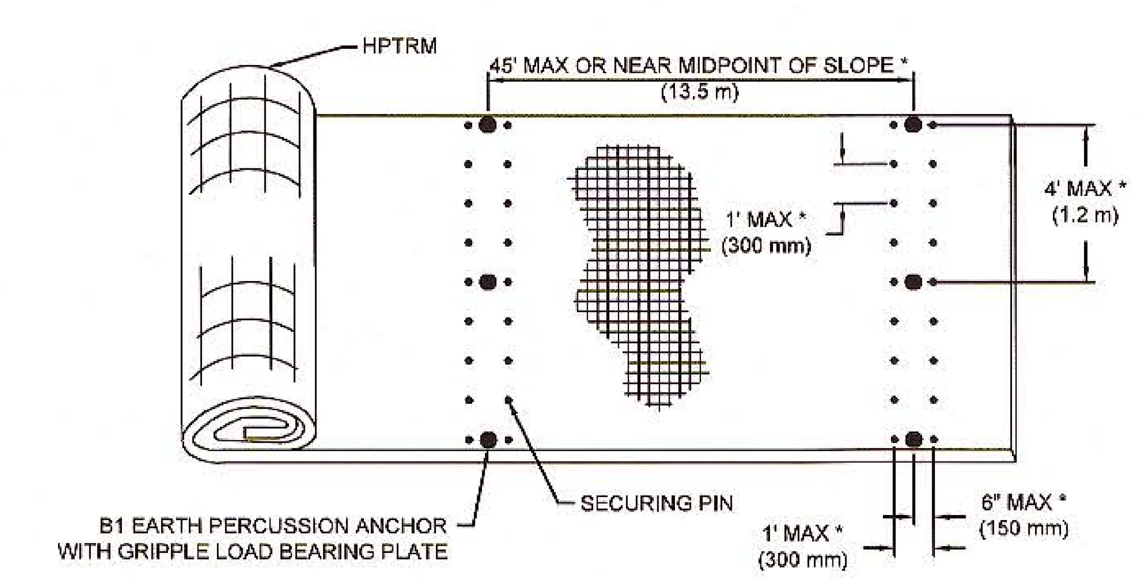


FIGURE 10: SIMULATED CHECK SLOT DETAIL

NOTES:
1) These installation details are for slope and levee applications and are not to scale. For channels, please consult the Propex Website for the Channel Drawing C100.
2) Please consult the Propex Website for the most up to date details.

Propex™ Geotextile Systems

Please note that the information presented herein is general information only. It is for conceptual use only and not intended to be used for construction. While every effort has been made to ensure its accuracy, this information should not be used for a specific application without independent professional examination and verification of its suitability, applicability, and accuracy.

ARMORMAX® BY PROPEX — ANCHOR REINFORCED VEGETATED SYSTEM (ARVS) — CONCEPTUAL ARMORMAX INSTALLATION DETAILS FOR SLOPES AND LEVEES

S100	Date: 02/13/2012	Drawn By: D.LOIZEAUX	Scale: NTS	ALL DIMENSIONS ARE TO BE VERIFIED BY THE ENGINEER

REV.	DESCRIPTION	APPR.	DATE

Drawn By	:	AB
Checked By	:	CBT
Approved By	:	CBT
Project No.	:	8722
Scale	:	AS SHOWN
Date	:	07/2013
Revision No.	:	0

STATE OF TEXAS — CRAIG B. THOMPSON — 89496 — LICENSED PROFESSIONAL ENGINEER — 8/16/13

OFFICE LOCATION :
4501 Gollihar Rd.
Corpus Christi, Texas 78411
P.O. Box 3099
Corpus Christi, Texas 78463
(361)-814-9900

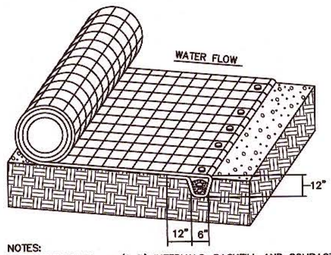
Naismith Engineering, Inc
TBPE No. F-355

MISCELLANEOUS DETAILS

UPPER TULE CREEK STORMWATER IMPROVEMENTS

ROCKPORT, ARANSAS COUNTY, TEXAS

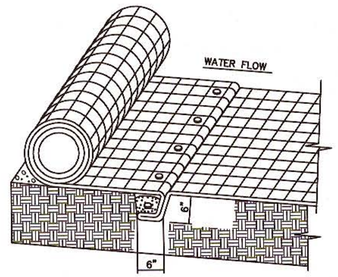
Dwg. File: 8722-SHT-02



NOTES:
1. SECURE AT 30 cm (1 ft) INTERVALS, BACKFILL AND COMPACT SOIL.

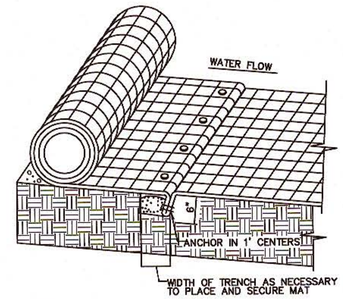
INITIAL ANCHOR TRENCH DETAIL

NOT TO SCALE



INTERMITTENT CHECK SLOT DETAIL

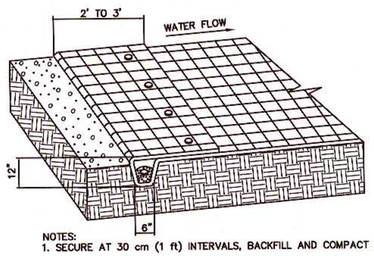
NOT TO SCALE



NOTES:
1. SECURE AT 30 cm (1 ft) INTERVALS, BACKFILL AND COMPACT SOIL
2. SLOT @ EVERY 30 FEET

ALTERNATE INTERMITTENT CHECK SLOT DETAIL

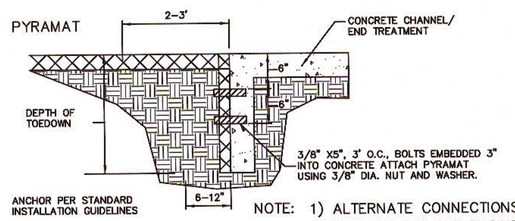
NOT TO SCALE



NOTES:
1. SECURE AT 30 cm (1 ft) INTERVALS, BACKFILL AND COMPACT SOIL.

TERMINAL CHANNEL ANCHOR TRENCH DETAIL

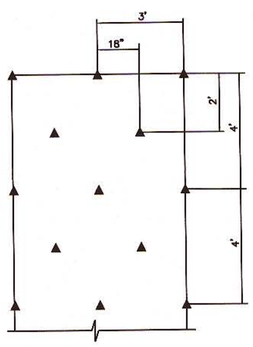
NOT TO SCALE



NOTE: 1) ALTERNATE CONNECTIONS MAY BE CONSIDERED BY THE ENGINEER

CONCRETE/PYRAMAT CONNECTION DETAIL

NOT TO SCALE



NOTES:
1. ANCHOR PATTERN 2.5 ANCHORS / m^2 (2 ANCHORS / Yd^2)
2. U – SHAPED WIRE STAPLES, METAL GEOTEXTILE PINS, TRIANGULAR WOODEN OR PLASTIC STAKES CAN BE USED TO ANCHOR TRMs TO THE GROUND SURFACE

ANCHOR PATTERN DETAIL

NOT TO SCALE

NOTE: 1) AREA UNDER MAT TO BE FREE OF ROCKS AND OTHER DEBRIS. MAT MUST MAINTAIN INTIMATE CONTACT WITH SOIL.
2) TURF REINFORCEMENT MAT TO BE ROLLED PARALLEL TO CHANNEL
3) MATERIAL PROVIDED BY GEO–SOLUTIONS, 210–710–6398

Part 4 – Execution

4.1 SITE PREPARATION – High Performance Turf Reinforcement Mat (HPTRM)

A. Grade and compact areas to be treated with HPTRM and compact. The top 8" of subgrade must be free of rock, debris and consist of a cohesive live soil. If the existing subgrade does not meet these standards the contractor is responsible for the import of acceptable material.
B. Remove large rocks, soil clods, vegetation, and other sharp objects (larger than 2" in diameter) that could keep the HPTRM from intimate contact with subgrade.
C. Prepare the 8" compacted seedbed by loosening the top ½" of soil above final subgrade.
D. Construct, as a minimum, 24 in x 12 in anchor trenches at upstream and downstream ends of the installation to inhibit undermining from stray surface water. (Anchor ed trenches should be excavated to a depth that matches design scour depth.) Excavate 6 in x 6 in check slots at 25 to 30 feet intervals along length of channel. Cut longitudinal anchor slots 6 in x 6 in at top of each side slope. The aforementioned dimensions are minimums and the dimensions detailed on the drawings will control.

4.2 INSTALLATION – HPTRM

A mandatory pre-construction conference with an Engineer representing the HPTRM manufacturer, contractor, and inspector must be completed. The conference is to be scheduled by the contractor with at least one week's notice to all parties involved. Representatives may be required to be on site for installation assistance.

The Contractor is to schedule the Engineer representing the HPTRM to inspect the site preparation prior to installation and the completed installation and provide a certified letter stating the site meets the manufacture's recommendations.

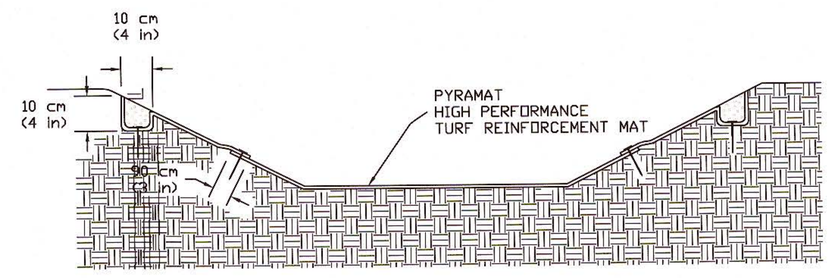
A. Install the HPTRM at elevation and alignment indicated.
B. The HPTRM, is to be soiled filled with ½" of top soil, and vegetated by applying the right mixture of seed and soil amendments with Flexterra, a Flexible Growth Medium, protected by a light weight erosion control blanket, or by applying the right mixture of seed and soil amendments with a wood fiber mulch, protected by a light weight erosion control blanket, or by placing sod directly on top and secure sod with 8" staples.
C. Beginning at downstream end in center of channel, place initial end of first roll of HPTRM in anchor trench and secure with ground anchor devices at 12 in intervals.
D. Position adjacent rolls in anchor trench in same manner, overlapping proceeding roll minimum 3 in.
E. Secure the HPTRM at 12 in intervals along the trench, backfill and compact with specified soil or as directed by the Engineer.
F. Unroll center strip of HPTRM upstream over compacted trench. Stop at next check slot or terminal anchor trench. Unroll adjacent rolls of HPTRM upstream in similar fashion, maintaining 3 in overlap.
G. Fold and secure the HPTRM snugly into transverse check slots. Lay material in bottom of slot, and then fold it back against itself as indicated. Anchor through both layers of HPTRM at 12 in intervals. Backfill with soil and compact. Continue unrolling the HPTRM widths upstream over compacted slot to next check slot or terminal anchor trench.
H. Secure HPTRM to channel bottom with ground anchoring devices at a frequency of 2 ½ anchors per square yard. Anchors should be a minimum of 8 gauge and 8" in length or so that they have sufficient ground penetration to resist pullout in a saturated condition. Increased anchoring frequency may be required if site conditions are such that the Engineer determines it necessary.
I. At the Engineers discretion a manufacturer's designated representative shall be on site for installation assistance.
J. Any installation of angular placement, overlapping around curves, or modified placement methods must be detailed on the construction drawings.
K. The Engineer must approve alternate installation methods prior to execution.

4.3 Irrigation, Mowing and Project Acceptance

A. Prior to project acceptance by the owner, it shall be the responsibility of the contractor to establish a minimum of 70% of the area seeded shall be covered with the specified vegetation with no bare or dead spots greater than 10 square feet. The contractor shall be responsible to set up and maintain temporary irrigation, as required, to assist in establishment of vegetation.

All areas that erode prior to project acceptance shall be repaired at the expense of the contractor including necessary reseeding , watering, and repair of the HPTRM.

Vegetated areas shall not be mowed prior to establishment of 70% vegetative density and a minimum grass growth of 3 inches. Mower height shall not be set lower than 3 inches. Throughout the duration of the project, the contractor shall be responsible for mowing to facilitate growth and shall not let the vegetation in the seeded areas exceed 18". In addition, the Contractor shall water all grassed areas as often as necessary to establish satisfactory growth and to maintain its growth throughout the duration of the project.



NOTES:
1. PLACE 3 ANCHOR / m? (2 ½ ANCHORS / Yd?) FOR CHANNELS
2. EXTEND LANDLOK? or PYRAMAT? TURF REINFORCEMENT MAT (OR EQUAL) TO ACCOMODATE MAXIMUM DESIGNED FLOW DEPTH

REV.	DESCRIPTION	APPR.	DATE

Drawn By :	AB
Checked By :	CBT
Approved By :	CBT
Project No. :	8722
Scale :	AS SHOWN
Date :	07/2013
Revision No. :	0

STATE OF TEXAS
CRAIG B. THOMPSON
LICENSED
PROFESSIONAL ENGINEER
89496
9/10/13

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(361)-814-9900

Naismith Engineering,Inc
TBPE No. F-355

MISCELLANEOUS DETAILS
UPPER TULE CREEK STORMWATER IMPROVEMENTS
ROCKPORT, ARANSAS COUNTY, TEXAS

Dwg. File: 8722-SHT-02

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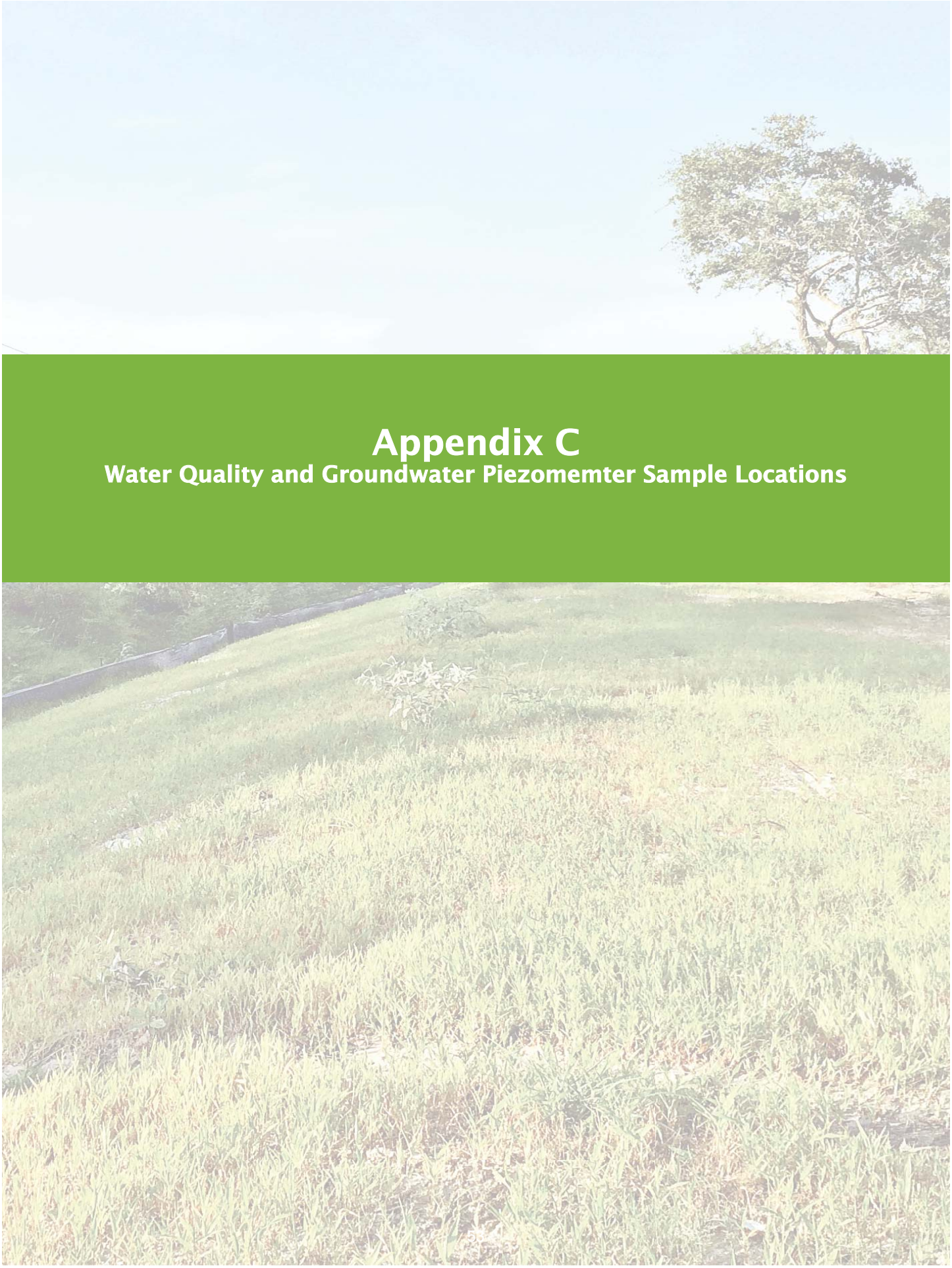
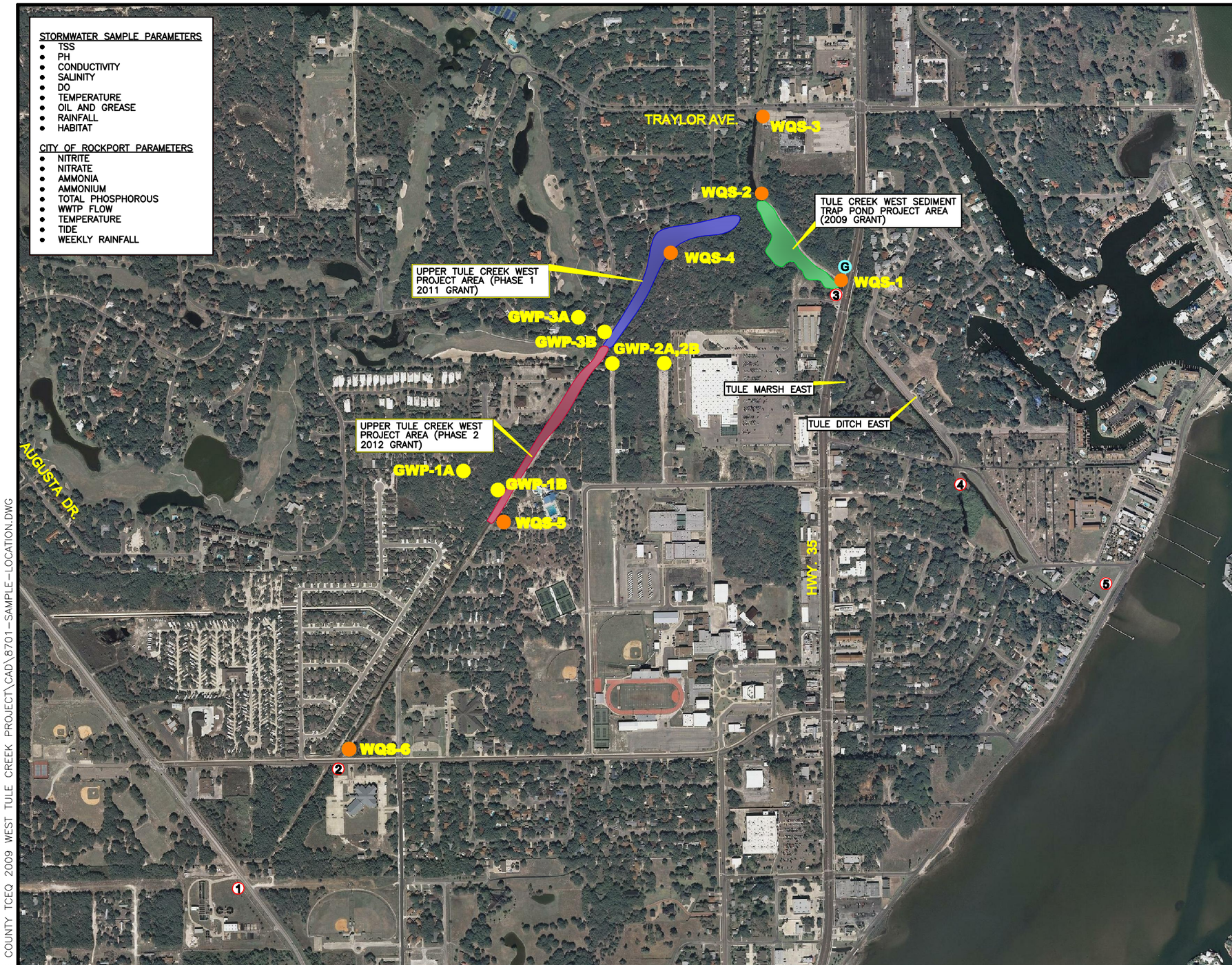


Appendix C

Water Quality and Groundwater Piezomemter Sample Locations



STORMWATER SAMPLE PARAMETERS
- TSS
- PH
- CONDUCTIVITY
- SALINITY
- DO
- TEMPERATURE
- OIL AND GREASE
- RAINFALL
- HABITAT

CITY OF ROCKPORT PARAMETERS
- NITRITE
- NITRATE
- AMMONIA
- AMMONIUM
- TOTAL PHOSPHOROUS
- WWTP FLOW
- TEMPERATURE
- TIDE
- WEEKLY RAINFALL

N W E S

LEGEND

- WATER QUALITY SAMPLE LOCATION (WQS)
- GROUNDWATER PIEZOMETER LOCATION (GWP)
- G STREAM FLOW GAUGE STATION
- 1 CITY SAMPLE LOCATIONS

LOCATION DESCIPTIONS

WQS–1 – BELOW PROPOSED POND ABOVE TX BUSINESS 35.
WQS–2 – ABOVE PROPOSED POND AT CONFLUENCE.
WQS–3 – AT TRAYLOR AVE. ABOVE BRIDGE.
WQS–4 – BELOW THE UPPER TULE CREEK WEST PHASE 1.
WQS–5 – ABOVE THE UPPER TULE CREEK WEST PHASE 2.
WQS–6 – UPPER TULE CREEK AT ENTERPRISE BLVD.

GWP–1A,1B
GWP–2A,2B
GWP–3A,3B

NOTES:

1. ALL SAMPLES SPECIFIC LOCATIONS AND ALIGNMENT TO BE DETERMINED IN THE FIELD.
2. GROUNDWATER PIEZOMETER LOCATIONS WILL HAVE AN UP GRADIENT AND DOWN GRADIENT LOCATION.
3. INFILTROMETER TEST LOCATIONS ARE LOCATED AT THE PIEZOMETER LOCATIONS

1000 0 1000 2000
GRAPHIC SCALE IN FEET

REV.	DESCRIPTION	APPR.	DATE

NaismithEngineering,Inc
ENGINEERING ■ ENVIRONMENTAL ■ SURVEYING
TBPE No. F-355
4501 GOLLIHAR RD. CORPUS CHRISTI,TEXAS 78411 PH. NO. 361-814-9900

WATER QUALITY AND GROUNDWATER PIEZOMETER SAMPLE LOCATIONS

TULE WATERSHED

Drawn By: ECF	Appr. By: DES	Scale: AS SHOWN	Dwg. No.: 8701-SAMPLE-LOCATION	Sheet 1
Checked By: DES	Project No.: 8701	Date: 12/2011	Rev.: 0	of 1

X:\8701 ARANSAS COUNTY TCEQ 2009 WEST TULE CREEK PROJECT\CAD\8701-SAMPLE-LOCATION.DWG

Appendix D

Field Data Sheets, Stream Phsyical Characterisitc Sheets, Habitat Quality Index Sheets

Client: **Aransas County** *Sampling ID:*
Project Name: *Sampling Date:* 9.14.12
Location:
Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*
Depth to Water *Rain Gauge*
Sampling Device *Tubing Type*
Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**
Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**
Sampling Personnel

STATION	Time	Temp. (°C)	Cond. (mS)	DO (mg/L)	pH (SU)	Water Depth	Turbidity (FTU [1])	~~Flow~~ velocity (L/min)	Comments
WQS -1	10:20	24.4	1.18	73.0	7.64	17.5in		19/15sc	
WQS -2	10:50	23.53	.478	70.1	7.82	26in		4/15sc	
WQS -3	9:50	23.06	0.300	67.5	7.86	19in		16/15sc	
WQS -4	11:45	26.52	1.503	59.3	7.15	18in		64/15sc	
WQS -5	1:55	30.81	2.583	52.0	7.08	9.5in		40/15sc	
WQS -6	9:30	24.38	1.98	78.9	7.81	24in		31/15sc	
GWP-1A	1:46					9.44			
GWP-1B	1:52					8.18			
GWP-1C	1:59					9.82			
GWP-2A	1:15					11.75			
GWP-2B	1:22					9.55			
GWP-2C	1:05					8.95			

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Client: **Aransas County** *Sampling ID:*
Project Name: *Sampling Date:* 3/6/13
Location:
Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*
Depth to Water *Rain Gauge*
Sampling Device *Tubing Type*
Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**
Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**
Sampling Personnel

STATION	Time	Temp. (°C)	Cond. (mS)	DO (mg/L)	pH (SU)	Water Depth (Ft)	Turbidity (FTU [1])	Flow mph ~~(L/min)~~	Comments
WQS -1	1:10	18.19	2.620	97.3	7.85	1.22		3 /15 sec	
WQS -2	12:55	18.26	2.638	106.4	7.71	0.75		22 /15 sec	wind driving flow (37 /15 sec)
WQS -3	11:20	14.18	2.145	93.3	7.43	0.9/1.35		4 /15 sec	
WQS -4	9:45	14.09	2.599	85.7	7.83	0.65		44 /15 sec	
WQS -5	9:13a	14.94	2.633	60.0	7.33	0.4 5.6		103 /15 sec	
WQS -6	11:04	15.75	2.632	89.0	7.93	1.1 4.22		1 /15 sec	
2B	9:35					8'3"			
2A	9:37					11'0"			
2C	9:40					7'7"			
1A	10:45					8'1"			
1B	10:50					6'9"			
1C	10:55					8'4.5"			

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson		Date: 3/6/13	Time: 1:10 PM
Weather conditions: sunny, high mid-60s, very windy/gusty			
Stream:		Stream segment no.	
Location of site: WQS 1		Length of reach:	
Observed stream uses: Drainage			
Stream type (circle one): perennial	or	intermittent w/ perennial pools	
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications:			No. of riffles 0
Channel flow status (circle one):	high	moderate	low to no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	5%
Shrubs	0	0
Grasses or forbs	100%	75%
Cultivated fields	0	0
Other	0	20%

Maximum Pool Depth:

Maximum Pool Width:

Notes

20% exposed soil on right bank (when facing downstream)

Stream/aquatic vegetation:

Spikerush
Cattail
bermuda
eleochris
frog fruit
St. Augustine
Bacopa
fleabane

Site map: (attached)

Pictures (log):

Stream observations (other issues):

current driven by wind upstream - atledston top layer of water

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 16				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 3/6/13	Time: 12:55 PM
Weather conditions: sunny, high mid-60s, very windy/gusty		
Stream:	Stream segment no.	
Location of site: WQS 2	Length of reach:	
Observed stream uses: drainage		
Stream type (circle one): perennial or intermittent w/ perennial pools		
Stream bends: No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive		
Channel obstructions or modifications:	No. of riffles 0	
Channel flow status (circle one): high moderate low to no flow		

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	40%
Shrubs	0	20%
Grasses or forbs	100%	30%
Cultivated fields	0	0
Other	0	10%

Maximum Pool Depth:

Maximum Pool Width:

Notes

10% exposed soil on right bank (when facing downstream)

Stream/aquatic vegetation:

water lettuce
rattle bush
bermuda grass
Johnson grass
fleabane

Site map: (attached)

Pictures (log):

Stream observations (other issues):

current being driven by wind to an extent

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 16				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson		Date: 3/6/13	Time: 11:20 AM
Weather conditions: sunny, high mid-60s, very windy/gusty			
Stream:		Stream segment no.	
Location of site: WQS 3		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:		No. of riffles 0	
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	75
Shrubs	0	25
Grasses or forbs	25%	50
Cultivated fields	0	0
Other	75%	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

observations made facing downstream, left bank is 75% rock + straw erosion-mat.

Stream/aquatic vegetation:

frog fruit
johnson grass
sunflower
penny wort
vine-grape
Ludwigia (yellow)

Site map: (attached)

Pictures (log):

Stream observations (other issues):

On left bank, rocks + straw have been placed - probably to reduce erosion

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 9				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 3/6/13	Time: 9:45 AM
Weather conditions: sunny, high mid-60s, very windy/gusty		
Stream:	Stream segment no.	
Location of site: WQS4	Length of reach:	
Observed stream uses: drainage		
Stream type (circle one): perennial or intermittent w/ perennial pools		
Stream bends: No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive		
Channel obstructions or modifications:	No. of riffles	
Channel flow status (circle one): high moderate low no flow		

Riparian vegetation (%):	Left Bank	Right Bank
Trees	20	10
Shrubs	20	10
Grasses or forbs	60	30
Cultivated fields		
Other		50

Maximum Pool Depth:

Maximum Pool Width:

Notes

observations made facing downstream

Stream/aquatic vegetation:

Sesbania drummondii

red bay

St. Augustine

bluestem

grapevine

cattails

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 13				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 3/6/13	Time: 9:13 AM
Weather conditions: sunny, high mid-60s, very windy/gusty		
Stream:	Stream segment no.	
Location of site: WQ55	Length of reach:	
Observed stream uses: drainage		
Stream type (circle one): perennial or intermittent w/ perennial pools		
Stream bends: No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive		
Channel obstructions or modifications:	No. of riffles 0	
Channel flow status (circle one): high moderate to low no flow		

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs		
Cultivated fields		
Other	100	100

Maximum Pool Depth:

Maximum Pool Width:

Notes

observations made facing downstream, the banks at the sample site are concrete - part of the bridge structure

Stream/aquatic vegetation:

Water grass (Luziola fluitans)?
Sesbania drummondii
johnson grass
pennywort

Site map: (attached)

Pictures (log):

Stream observations (other issues):

abundant in-stream cover

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability concrete...	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson		Date: 3/6/13	Time: 11:04 AM
Weather conditions: sunny, high mid-60s, very windy/gusty			
Stream:		Stream segment no.	
Location of site: WQS 6		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:		No. of riffles 0	
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100	100
Cultivated fields		
Other		

Maximum Pool Depth:

Maximum Pool Width:

Notes

observations made facing downstream

Stream/aquatic vegetation:

pennywort
scirpus
wild flowers
bermuda
frog fruit
st Augustine

Site map: (attached)

Stream observations (other issues):

Pictures (log):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

WET EVENT

Client: **Aransas County** *Sampling ID:*

Project Name: Tule Creek *Sampling Date:* 5/15/13

Location:

Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*

Depth to Water *Rain Gauge*

Sampling Device *Tubing Type*

Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**

Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**

Sampling Personnel S. Hart; K. Thompson

STATION	Time	Temp. (°C)	Cond. (mS)	DO (mg/L)	pH (SU)	Water Depth	~~Turbidity~~ (~~FTU~~[1])	Flow (L/min)	Comments
WQS -1	11:37	25.48	2.482	86.3	8.02	1.2	No flow		
WQS -2	11:20	25.3	1.928	88.7	7.97	1.15	22/15 sec 22/15 sec		
WQS -3	10:50	25.2	2.292	56.9	7.55	0.5 0.4 top	3/15 sec 0/15 sec		Sheen
WQS -4	2:30	25.5	2.323	101.3	7.99	0.7	61/15 sec 55/15 sec		
WQS -5	9:55	24.67	1.038	58.8	7.64	0.75 5.25 top	36/15 sec 43/15 sec		
WQS -6	1:56	26.13	2.55	88.1	8.03	2.5 2.9 top	No flow		
		Depth							
2A	9:38	10.95'	10'11"						
2B	9:45	8.55'	8'7"						
2C	10:30	8.00'	8'						
1A	3:30	8.3'	8'4"						
1B	3:35	7.1'	7'1"						
1C	3:40	8.6'	8'6"						

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 5/15/13	Time: 11:37 AM
Weather conditions: Partly cloudy / overcast		
Stream:	Stream segment no.	
Location of site: WQS1	Length of reach:	
Observed stream uses: Drainage		
Stream type (circle one): (perennial) or intermittent w/ perennial pools		
Stream bends: No. well defined / (No. moderately defined) / No. poorly defined		
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive		
Channel obstructions or modifications:	No. of riffles	
Channel flow status (circle one): high moderate low (no flow)		

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	75%
Shrubs	0%	0%
Grasses or forbs	100%	75%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

observations taken facing downstream
current driven by wind (on top) upstream

Stream/aquatic vegetation:

bermuda
purple - fleabane
eleochris
frog fruit
St. Augustine
floating - light purple flower
↳ Bacopa

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 16				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson		Date: 5/15/13	Time:
Weather conditions: Partly cloudy/overcast			
Stream:		Stream segment no.	
Location of site: WQS2		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial	or	intermittent w/ perennial pools	
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications:			No. of riffles
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	40%
Shrubs	0%	30%
Grasses or forbs	100%	30%
Cultivated fields	0%	0%
Other	0	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

flow should be taken right @ confluence from creek - current being driven by wind

Stream/aquatic vegetation:

Water lettuce
rattlebush
bermuda
johnsongrass
purple flower

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 5/15/13	Time: 10:50 am	
Weather conditions: Partly cloudy / overcast			
Stream:	Stream segment no.		
Location of site: WQS3	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	25
Shrubs	0	25
Grasses or forbs	25%	50
Cultivated fields	0	0
Other	75%	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

leaf litter
little bit of trash
sheen

Stream/aquatic vegetation:

Water lettuce
frog fruit
johnson grass
sunflower
penny wort
vine - grape
Ludwigia (yellow)

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	(2)	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	(1)
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	(1)
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	(1)
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	(2)	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 9				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 5/15/13	Time: 2:30 PM
Weather conditions: Partly cloudy / overcast		
Stream:	Stream segment no.	
Location of site: WQ54	Length of reach:	
Observed stream uses: drainage		
Stream type (circle one): perennial or intermittent w/ perennial pools		
Stream bends: No. well defined / No. moderately defined / No. poorly defined		
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive		
Channel obstructions or modifications:	No. of riffles	
Channel flow status (circle one): high moderate low no flow		

Riparian vegetation (%):	Left Bank	Right Bank
Trees	20	10
Shrubs	20	10
Grasses or forbs	60	30
Cultivated fields		
Other		50

Maximum Pool Depth:

Maximum Pool Width:

Notes @ site
algae dam, lt algae all along the creek

Stream/aquatic vegetation:
rattlebush
red bay
st augustine
bluestem
Grapevine
cattails

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	(4)	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	(1)
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	(1)
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	(1)
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	(1)	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	(1)	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	(2)	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	(1)	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	(2)	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thompson	Date: 5/15/13	Time: 9:55 AM	
Weather conditions: Partly cloudy/overcast			
Stream:	Stream segment no.		
Location of site: WQ55	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends: No. well defined	No. moderately defined	No. poorly defined	
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs		
Cultivated fields		
Other	100	100

Maximum Pool Depth:

Maximum Pool Width:

Notes

lots of cement

Stream/aquatic vegetation:

torpedo grass
unknown emergent
unknown ~~green~~ algae
rattlebush
johnson grass
pennywort

Site map: (attached)

Pictures (log):

Stream observations (other issues):

New + abundant algae in stream

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 5/15/13	Time: 1:56 PM
Weather conditions: Partly cloudy / overcast		
Stream:	Stream segment no.	
Location of site: WQS 6	Length of reach:	
Observed stream uses: drainage		
Stream type (circle one): perennial or intermittent w/ perennial pools		
Stream bends: No. well defined / No. moderately defined / No. poorly defined		
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive		
Channel obstructions or modifications:	No. of riffles 0	
Channel flow status (circle one): high moderate low no flow		

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100	100
Cultivated fields		
Other		

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation: cement

pennywort
scirpus
wildflowers
bermuda
frogfruit
St. Augustine

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Wet Event

Client: **Aransas County** *Sampling ID:*

Project Name: Tule Creek Monitoring *Sampling Date:* 7/17/13

Location:

Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*

Depth to Water *Rain Gauge* 0.21 at airport @ 6:53am

Sampling Device *Tubing Type*

Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**

Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**

Sampling Personnel S. Hart, K. Thompson

STATION	Time	Temp. (°C)	Cond. (mS)	DO (mg/L)	pH (SU)	Water Depth	Turbidity (FTU [1])	Flow (L/min)	Comments
WQS -1	12:57	27.82	2.473	69.5	7.84	1.2 ft		0 no flow no movement	
WQS -2	12:35	26.93	1.90	54.1	7.67	1.1 ft		11/15 s	
WQS -3	12:20	26.48	2.08	20.9	7.35	0.5 ft		2/15 s	water lettuce hyacinths
WQS -4	10:05	27.26	2.303	69.6	7.87	3.5"		73/15 s	shallow
WQS -5	8:42	27.12	1.483	31.5	7.35	0.5 ft		11/15 s	grass
WQS -6	11:09	28.96	37.6	24.9	7.99	2.5 ft		2/15 s	tide up
1A						9.2'			
1B						8.0'			
1C						9.55'			
2A						11.68'			
2B						9.35'			
2C						8.75'			

no algae in creek

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Site 6 - conductivity very high, tide very high

Site 2 - saw an osprey @ the pond

Naismith Engineering, Inc.

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thompson	Date: 7/17/13	Time: 1:12:57 p	
Weather conditions: overcast, little wind, 80°F			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 1	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	25%
Shrubs	0%	0%
Grasses or forbs	100%	75%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

bermuda
purple fleabane
eleochris
frogfruit
st. augustine
bacopa
water lettuce
hyacinth

Site map: (attached)

Pictures (log):

Stream observations (other issues):

water lettuce
hyacinth

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	(2)	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	(1)	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	(3)	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	(1)	0
Total Score 16				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thomas	Date: 7/17/13	Time: 12:35 p	
Weather conditions: overcast, little wind, 80°F			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 2	Length of reach:		
Observed stream uses:			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	40%
Shrubs	0%	30%
Grasses or forbs	100%	30%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

osprey sighted @ pond

Stream/aquatic vegetation:

water lettuce
hyacinth
rattlebush
bermuda
johnson grass
bacopa
fleabane

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	(2)	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	(1)	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	(3)	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	(2)	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson		Date: 7/17/13	Time: 12:20 p
Weather conditions: overcast, little wind, 80°F			
Stream: Tule Creek		Stream segment no.	
Location of site: WQS 3		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:			No. of riffles
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	25%
Shrubs	0%	25%
Grasses or forbs	25%	50%
Cultivated fields	0%	0%
Other	75%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

water lettuce
frog fruit
Johnson grass
sunflowers
pennywort
grape vine
Ludwigia

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 9				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thompson	Date: 7/17/13	Time: 10:05 a	
Weather conditions: overcast, little wind, 80°F			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 4	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	20%	20%
Shrubs	20%	20%
Grasses or forbs	60%	40%
Cultivated fields		
Other		20%

Maximum Pool Depth:

Maximum Pool Width:

Notes

vegetation has grown significantly

Stream/aquatic vegetation:

rattle bush
red bay
cattails
st. augustine
bluestem
grape vine

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	(4)	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	(1)
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	(1)
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	(1)
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	(1)	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	(1)	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	(2)	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	(1)	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	(2)	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Stream Physical Characteristics Worksheet

Observers: S. Hart, K. Thompson	Date: 7/17/13	Time: 8:42a
Weather Conditions: overcast, little wind, 80°F		
Sample Station Location and Number: WQ55	Length of Reach: Water Color:	
Observed stream uses: drainage		
Stream Type (circle one): **perennial** or **intermittent w/perennial pools**		

Stream bends/ Stability	Well Defined	Moderately Defined	Poorly Defined

Aesthetics (circle one): **(1) wilderness** **(2) natural** **(3) common** **(4) offensive**

Channel Obstructions or modifications: | No. of riffles:

Flow Status (circle one): **High** **Moderate** **Low** **No Flow**

Riparian Vegetation (%)	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs		
Cultivated Fields		
Other	100%	100%

Maximum Pool Depth:
Maximum Pool Width:

Steam/Aquatic Vegetation:
torpedo grass
rattle bush
Johnson grass
pennywort

Site Map: (Attached)

Stream Observations (Other issues):
sesbania has grown a lot + spread

NOTES:
concrete banks
lots of grass in-stream, it was collected to ID + was ID'd as torpedo grass

PICTURES (LOG):

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach Right-of-way land use (near sample station)	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Stream Physical Characteristics Worksheet

Observers: S. Hart K. Thompson	Date: 7/17/13	Time: 11:099
Weather Conditions: overcast, little wind, 80°F		
Sample Station Location and Number: WQS 6	Length of Reach: Water Color:	
Observed stream uses: drainage		
Stream Type (circle one): **perennial** or **intermittent w/perennial pools**		

Stream bends/ Stability	Well Defined	Moderately Defined	Poorly Defined

Aesthetics (circle one): **(1) wilderness** **(2) natural** **(3) common** **(4) offensive**

Channel Obstructions or modifications: | No. of riffles:

Flow Status (circle one): **High** **Moderate** **Low** **No Flow**

Riparian Vegetation (%)	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100%	100%
Cultivated Fields		
Other		

Maximum Pool Depth:
Maximum Pool Width:

NOTES:

Steam/Aquatic Vegetation:
pennywort frogfruit
scirpus
wild flowers St. augustine
bermudia

Site Map: (Attached)

Stream Observations (Other issues):

PICTURES (LOG):

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach Right-of-way land use (near sample station)	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Wet Event

Client: **Aransas County** *Sampling ID:*

Project Name: Tule Creek Monitoring *Sampling Date:* 8/20/13

Location:

Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*

Depth to Water *Rain Gauge*

Sampling Device *Tubing Type*

Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**

Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**

Sampling Personnel S. Hart, K. Thompson

STATION	Time	Temp. (°C)	Cond. (mS)	DO (mg/L)	pH (SU)	Water Depth	Turbidity (FTU [1])	Flow per 15 secs (L/min)	Comments
WQS -1	1:35	28.16	1.292	84.7	8.31	2.5'		0	
WQS -2	1:19	28.56	1.655	87.8	8.42	3.1'		40	
WQS -3	1:06	28.19	1.183	65.1	8.09	1.6'		7	sediment plume
WQS -4	11:03	27.94	1.5	69	8.27	1.4'		154	water lettuce broken up
WQS -5	10:23	28.34	1.617	35.6	7.36	1.2'		92	
WQS -6	12:30	27.94	1.218	77.7	8.14	2.55'		34	
1A	9:40					9.1			
1B	9:47					8.0			
1C	9:53					9.7			
2A	10:40					11.6			
2B	10:13					9.4			
2C	10:00					8.9			

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson		Date: 8/26/13	Time: 1:35p
Weather conditions: 80s, overcast, sprinkle, breezy			
Stream: Tule Creek		Stream segment no.	
Location of site: WQS 1		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none		No. of riffles 0	
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	25
Shrubs	0	0
Grasses or forbs	100	75
Cultivated fields	0	0
Other	0	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

bermuda, purple fleabane, eleocharis, frog fruit, st. Augustine, bacopa, water lettuce, hyacinth

Site map: (attached)

Pictures (log):

Stream observations (other issues):

a lot less water lettuce & hyacinth

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 16				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thompson		Date: 8/26/13	Time: 1:19 p
Weather conditions: 80s, overcast, sprinkling			
Stream: Tule Creek		Stream segment no.	
Location of site: WQS 7		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial	or	intermittent w/ perennial pools	
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: none			No. of riffles 0
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	40
Shrubs	0	30
Grasses or forbs	100	30
Cultivated fields	0	0
Other	0	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

water lettuce
hyacinth
rattlebush
bermuda grass
johnsongrass
bacopa
fleabane

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 11				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thompson	Date: 4/26/13	Time: 1:06p	
Weather conditions: 80s, overcast, sprinkle, breezy			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 3	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	25
Shrubs	0	25
Grasses or forbs	75	~~75~~ 50
Cultivated fields	0	0
Other	75	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

water lettuce ludwigia
frog fruit
johnson grass
sunflower
pennywort
grape vine

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 9				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: S. Hart, K. Thompson		Date: 8/26/13	Time: 11:03 am
Weather conditions: 80s, overcast, sprinkle, breezy			
Stream: Tule Creek		Stream segment no.	
Location of site: WQS4		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or ~~intermittent w/ perennial pools~~			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	~~(3) common~~ (4) offensive
Channel obstructions or modifications: none			No. of riffles 0
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	20	10
Shrubs	20	10
Grasses or forbs	60	30
Cultivated fields	0	0
Other	0	50

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:
rattlebush
red bay
st. augustine
bluestem
grapevine
cattails

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: S. Hart, K. Thompson	Date: 4/26/13	Time: 10:23a	
Weather conditions: 80s, overcast, sprinkle, breezy			
Stream: Tule Creek	Stream segment no.		
Location of site: WQSS	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	0
Shrubs	0	0
Grasses or forbs	0	0
Cultivated fields	0	0
Other	100	100

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:
torpedo grass
rattlebush
johnsongrass
pennywort

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: K. Thompson, S. Hart	Date: 8/23/13	Time: 12:30p	
Weather conditions: 80's, overcast, sprinkle, breezy			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 6	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: None	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100	100
Cultivated fields		
Other		

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:
pennywort
scirpus
wildflowers
bermuda
frogfruit
st. augustine

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Client: **Aransas County**
Project Name:
Location:
Sampling ID:
Sampling Date: 11/6/13

Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*
Depth to Water *Rain Gauge*
Sampling Device *Tubing Type*
Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**
Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**
Sampling Personnel Kara Thompson

STATION	Time	Temp. (°C)	Cond. (mS)	DO (mg/L)	pH (SU)	Water Depth	Turbidity (FTU [1])	Flow (L/min)	Comments (salinity)
WQS -1	2:20	26.55	3.026	91.1	7.92	1.8ft		0	(4ppt)
WQS -2	2:00	27.65	2.752	78.6	7.76	1.7ft		16/15sec	(4ppt)
WQS -3	1:30	27.17	2.430	67.8	7.39	.7ft		0	(4ppt)
WQS -4	12:30	27.83	2.992	91.0	8.09	0.7ft		28/15sec	(4ppt)
WQS -5	2:45	29.41	3.167	47.3	7.41	0.7ft		44/15sec	(4ppt)
WQS -6	2:55	26.44	13.67	84.5	7.88	2.7ft		0	(10ppt)
1A	3:10					9.0			
1B	3:17					7.7			
1C	3:25					9.5			
2A	3:50					11.1ft			
2B	3:45					8.3ft			
2C	3:55					8.7			

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: Kara Thompson		Date: 11/6/13	Time: 2:20P
Weather conditions: 80s, sunny, partly cloudy, no wind			
Stream:		Stream segment no.	
Location of site: WQS1		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial	or	intermittent w/ perennial pools	
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: none		No. of riffles 0	
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	25%
Shrubs	0%	0%
Grasses or forbs	100%	75%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

bermuda
purple fleabane
eleochris
frog fruit
St. Augustine
bacopa
water lettuce
hyacinth

Site map: (attached)

Pictures (log):

Stream observations (other issues):

almost all water lettuce & hyacinth has died off

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score ~~2~~ 3	3	~~2~~	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 16				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: Kara Thompson	Date: 11/6/13	Time: 2:00P	
Weather conditions: 80s, sunny, partly cloudy, howind			
Stream:	Stream segment no.		
Location of site: WQS 2	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none	No. of riffles 0		
Channel flow status (circle one): high moderate to low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	40%
Shrubs	0%	30%
Grasses or forbs	100%	30%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

osprey at pond again

Stream/aquatic vegetation:

water lettuce
hyacinth
rattlebush
bermuda
johnson grass
bacopa
fleabane

Site map: (attached)

Stream observations (other issues):

Pictures (log):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 19				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

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Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: Kara Thompson	Date: 11/6/13	Time: 1:30p	
Weather conditions: 80s, sunny, partly cloudy, no wind			
Stream:	Stream segment no.		
Location of site: WGS 3	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	75%
Shrubs	0%	25%
Grasses or forbs	75%	50%
Cultivated fields	0%	0%
Other	75%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

water lettuce
frog fruit
Johnson grass
sunflowers
Penny wort
grape vine
Ludwigia

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 9				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

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Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: Kara Thompson	Date: 11/6/13	Time: 12:30P	
Weather conditions: 80s, sunny, partly cloudy, no wind			
Stream:	Stream segment no.		
Location of site: WQS4	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends: No. well defined / No. moderately defined / No. poorly defined			
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	20%	20%
Shrubs	20%	20%
Grasses or forbs	60%	40%
Cultivated fields	0%	0%
Other	0%	20%

Maximum Pool Depth:

Maximum Pool Width:

Stream/aquatic vegetation:
rattle bush
red bay
cattails
St. Augustine
bluestem
grapevine

Site map: (attached)

Stream observations (other issues):

Notes
Construction for widening bend will start after this sampling - the pathway for equipment/machinery has been bulldozed flat & silt fence is up

Pictures (log):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

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Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**

Observers: Kara Thompson		Date: 11/6/13	Time: 2:45 P
Weather conditions: 50s, sunny, partly cloudy, no wind			
Stream:		Stream segment no.	
Location of site: WQS 5		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial	or	intermittent w/ perennial pools	
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications:			No. of riffles
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs		
Cultivated fields		
Other	100%	100%

Maximum Pool Depth:

Maximum Pool Width:

Notes

concrete banks
lots of grass
in-stream - torpedo

Stream/aquatic vegetation:

torpedo grass
rattle bush
Johnson grass
pennywort

Site map: (attached)

Stream observations (other issues):

Pictures (log):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 3	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score X 0	3	2	X 1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: Kara Thompson	Date: 11/6/13	Time: 2:55P	
Weather conditions: 80s, sunny, partly cloudy, no wind			
Stream:	Stream segment no.		
Location of site: WQS 6	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100%	100%
Cultivated fields		
Other		

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

pennywort
scirpus
wildflowers
bermuda
frog fruit
St. Augustine

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Client: **Aransas County** *Sampling ID:*
Project Name: *Sampling Date:* 4/8/14
Location:
Screen Type **PVC** *Screen Length* *Well Diameter* **2"** *Total Depth*
Depth to Water *Rain Gauge*
Sampling Device *Tubing Type*
Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**
Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**
Sampling Personnel

STATION	Time	Temp. (°C)	Cond. (mS)	DO ~~% sat~~ (mg/L)	pH (SU)	Water Depth	Turbidity (FTU [1])	Flow (L/min)	Comments
WQS -1	12:00	20.35	2.793	64.9	7.23	22"		4/15 sec	flow wind driven
WQS -2	11:35	23.79	2.816	73.4	7.38	5"		67/15 sec	distinct plume
Flow = WQS -3	10:00	17.24	2.56	41.8	6.89	10"		~~67/15 sec~~	H2O lettuce
WQS -4	8:30	17.42	2.775	93.2	7.34	9"		65/15 sec	lots of organic matter
WQS -5	10:50	24.02	2.801	78.9	7.20	2"		70/15sec	No veg
WQS -6	9:20	21.65	29.05	36.1	7.45	20"		4/15sec	tide high
1A	12:39					8.3'			
1B	12:57					6.9'			
1C	12:47					8.5'			
~~1B~~ 2A	1:11					11.1'			
2B	11:15					8.3'			
2C	1:05					7.9'			
~~Salinity~~	ppt ~~PPM~~								
WQS1	5								
WQS2									
WQS3	4								
WQS4	4								
WQS5	4								
WQS6	18								

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

WQS 2 depth was 5"-14" downstream on plume

WQS6 - wind driven current on top
WQS3 - no flow - all H2O lettuce

Naismith Engineering, Inc.

Page 1 of ___	Part I - Stream Physical Characteristics Worksheet		
Observers: K Thompson	Date: 4/8/14	Time: 12:00 PM	
Weather conditions: Sunny, partly cloudy, winds NW 40mph, temps upper 70s			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS1	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends: No. well defined	No. moderately defined	No. poorly defined	
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: None	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	25%
Shrubs	0%	0%
Grasses or forbs	100%	75%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

~~water lettuce & hyacinth are abundant & clogging the stream again now that the temps have warmed up~~ WQS3

Stream/aquatic vegetation:

bermuda, purple fleabane, eleocharis, frogfruit, St. Augustine, bacopa, waterlettuce, hyacinth

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

The new Pathways bridge was constructed w/in the last couple of weeks, it's completed except for the access ramps on either side

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 17				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	Part I - Stream Physical Characteristics Worksheet		
Observers: K Thompson	Date: 4/8/14	Time: 11:35 am	
Weather conditions: sunny, partly cloudy, winds NW ~10 mph, temps upper 70s			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 2	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness	(2) natural	(3) common	(4) offensive
Channel obstructions or modifications: None	No. of riffles 0		
Channel flow status (circle one): high	moderate	low	no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	40%
Shrubs	0%	30%
Grasses or forbs	100%	30%
Cultivated fields	0%	0%
Other	0%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

water lettuce clogging flow upstream of outfall, between WQS 2 & 3; abundance of birds (ibis & ducks) @ outfall

Stream/aquatic vegetation:

water lettuce, bacopa, hyacinth, fleabane, rattlebush, bermuda, johnsongrass

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Very prominent sediment plume forming, flow from outfall is good

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 3	4	3	2	~~1~~
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 3	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 1	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 3	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 19				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	Part I - Stream Physical Characteristics Worksheet		
Observers: K Thompson	Date: 4/8/14	Time: 10:00am	
Weather conditions: sunny, partly cloudy, winds NW 10mph, temps upper 70s			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 3		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): ~~perennial~~ or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: None		No. of riffles None	
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0%	25%
Shrubs	0%	25%
Grasses or forbs	75%	50%
Cultivated fields	0%	0%
Other	25%	0%

Maximum Pool Depth:

Maximum Pool Width:

Notes

water lettuce & hyacinth are abundant & clogging the stream again now that the temps have warmed up

Stream/aquatic vegetation:

water lettuce, hyancith, frog fruit, grapevine, Johnson grass, Ludwigia, sunflowers, Penny wort

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Flow was completely stopped by water lettuce & hyacinth

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 10				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: K Thompson		Date: 4/8/14	Time: 8:30
Weather conditions: sunny, partly cloudy, winds NW ~10mph, temps upper 70s			
Stream: Tule Creek		Stream segment no.	
Location of site: WQS4		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial	or	intermittent w/ perennial pools	
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: None		No. of riffles None	
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	5	0
Shrubs		0
Grasses or forbs	~~95~~ 80	0
Cultivated fields	0	0
Other	15	100%

bare ground - live oaks

↳ sand 100%

Maximum Pool Depth:

Maximum Pool Width:

Stream/aquatic vegetation:
cattails
St. Augustine
dollar/penny wort
sesbania sprouts
(plant I id'd for dave)

Site map: (attached)

Stream observations (other issues):

Notes
site was just recently re-graded as part of the Phase II (?) grant, veg is trimmed back on left bank + right bank is all sand

(observations made facing down stream)

Pictures (log):

TCEQ 20156-A (Rev. 4-15-2004)

- humming birds, deer, ducks, ibis, + herons/egrets present
- pipe bisecting stream - sprinklers?

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score 15				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	Part I - Stream Physical Characteristics Worksheet		
Observers: K Thompson	Date: 4/8/14	Time: 10:50 am	
Weather conditions: sunny, partly cloudy, winds NW ~10mph, temps upper 70s			
Stream: Tule Creek	Stream segment no.		
Location of site: WQS 5	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:	No. of riffles		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs		
Cultivated fields		
Other	100%	100%

Maximum Pool Depth:

Maximum Pool Width:

Notes

all vegetation removed from both sides of stream as well as from in-stream, now there's no vegetation sans some algae

Stream/aquatic vegetation:

None

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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the bank ~100yd downstream is being laid back on the Frost Property side

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 1	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 4	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 2	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

all concrete now →

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 0	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 13				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	Part I - Stream Physical Characteristics Worksheet		
Observers: K Thompson		Date: 4/8/14	Time: 9:20 AM
Weather conditions: sunny, partly cloudy, winds NW ~10mph, temps upper 70s			
Stream: Tule Creek		Stream segment no.	
Location of site: WQS 6		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: None		No. of riffles None	
Channel flow status (circle one): high moderate low to no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100%	100%
Cultivated fields		
Other		

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

pennywort
scirpus
wildflowers
bermudagrass
frog fruit
St. Augustine

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 2	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score 14				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Client: **Aransas County** *Sampling ID:* WQS-
Project Name: Tule Creek *Sampling Date:* 6/19/14
Location:
Screen Type **PVC** *Screen Length* \ *Well Diameter* **2"** *Total Depth*
Depth to Water *Rain Gauge*
Sampling Device *Tubing Type* \
Instrument Information *Mfg.* *Model* *Parameters* **Temp, Cond., DO, pH, Sal**
Instrument Information *Mfg.* *Model* *Parameters* **Turbidity**, TSS
Sampling Personnel K Thompson, S Hart

STATION	Time	Temp. (°C)	Cond. (mS)	DO % ~~(mg/L)~~	pH (SU)	Water Depth	Turbidity (FTU [1])	Flow (L/min)	Comments (Salinity)
WQS -1	1:30	29.66	2.49	91.1%	7.83	24"		0/15 sec	1.27 Need units
WQS -2	1:00	33.12	2.562	93.1%	7.74	12"	30	/15 sec	1.3
WQS -3	12:40	26.77	3.049	29.3%	7.49	8"		0/15sec	1.58
WQS -4	10:00	29.29	2.495	91%	7.83	7.5"	\	8/15sec	1.87
WQS -5	8:54	27.25	2.46	92%	7.55	6.75"	\	27/15sec	1.26
WQS -6	11:00	29.44	50.12	9.8%	7.73	27"	\	0/15sec	32.7
	depth	time							
1A	8.6'	11:25							
1B	7.5'	11:23							
1C	9.1'	11:20							
2A	11.5'	9:35							
2B	9.1'	9:30							
2C	8.4'	9:40							

1 FTU (Formazine Turbidity Unit) = NTU (Nephelometric Turbidity Unit)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: SH, KT		Date: 6/19/14	Time: 1:30
Weather conditions: sunny, low 90s, breezy			
Stream:		Stream segment no.	
Location of site: WBS1		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one):	perennial	or	intermittent w/ perennial pools
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: none			No. of riffles
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	25
Shrubs	0	0
Grasses or forbs	100	75
Cultivated fields	0	0
Other	0	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

*No flow but top is wind driven

Stream/aquatic vegetation:

water lettuce at edge
arrow grass
frog fruit

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 2	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score_____				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: SH, KT		Date: 6/14/14	Time: 11:00
Weather conditions: sunny, low 90s, breezy			
Stream:		Stream segment no.	
Location of site: WQS 2		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications:		No. of riffles 0	
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	40
Shrubs	0	30
Grasses or forbs	100	30
Cultivated fields	0	0
Other	0	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

Elochoris
water lettuce

Stream/aquatic vegetation:

water lettuce back
water very muddy looking

Site map: (attached)

Pictures (log):

Stream observations (other issues):

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 2	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 2	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score_____				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: SH, KT		Date: 6/19/14	Time: 12:40
Weather conditions: sunny, low 90s, breezy			
Stream:		Stream segment no.	
Location of site: WQS 3		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: none		No. of riffles none	
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees	0	25
Shrubs	0	25
Grasses or forbs	75	50
Cultivated fields	0	0
Other	25	0

Maximum Pool Depth:

Maximum Pool Width:

Notes

Stream/aquatic vegetation:

waterhyacinth

snake

Site map: (attached)

Pictures (log):

Stream observations (other issues):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 4	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 0	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 0	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score_____				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: SH, KT		Date: 6/19/14	Time: 10:00
Weather conditions: sunny, low 90s, breezy			
Stream:		Stream segment no.	
Location of site: WQS 4		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none		No. of riffles none	
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees	5	
Shrubs		
Grasses or forbs	80	10
Cultivated fields	0	
Other	15	90

Maximum Pool Depth:

Maximum Pool Width:

Stream/aquatic vegetation:

hydromulch in place, small fish present

Site map: (attached)

Stream observations (other issues):

Notes

cattails
rattlebush
eleochris
pluchia (?)

Pictures (log):

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 3	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 1	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score_____				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: SHIRT		Date: 6/9/14	Time: 8:54
Weather conditions: sunny - low 90s, breezy			
Stream:		Stream segment no.	
Location of site: WQS 5		Length of reach:	
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends:	No. well defined	No. moderately defined	No. poorly defined
Aesthetics (circle one):	(1) wilderness	(2) natural	(3) common (4) offensive
Channel obstructions or modifications: none		No. of riffles 0	
Channel flow status (circle one):	high	moderate	low no flow

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs		
Cultivated fields		
Other	100	100

Maximum Pool Depth:

Maximum Pool Width:

Notes

frog fruit
arrow grass
rattle bush
Johnson grass
no instream cover

Stream/aquatic vegetation:

lots of small fish

Site map: (attached)

Pictures (log):

Stream observations (other issues):

Sample point has been cleaned out at culvert and flow is still good but depth is less so samples were taken at end of concrete water culvert where ~~[illegible]~~ was deeper

TCEQ 20156-A (Rev. 4-15-2004)

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 1	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 3	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 2	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score 2	3	2	1	0

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 3	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 2	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 2	3	2	1	0
Total Score_____				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Page 1 of ___	**Part I - Stream Physical Characteristics Worksheet**		
Observers: KT, SH	Date: 6/19/14	Time: 12:40	
Weather conditions: sunny, low 90s, breezy			
Stream:	Stream segment no:		
Location of site: WQS 6	Length of reach:		
Observed stream uses: drainage			
Stream type (circle one): perennial or intermittent w/ perennial pools			
Stream bends: No. well defined	No. moderately defined	No. poorly defined	
Aesthetics (circle one): (1) wilderness (2) natural (3) common (4) offensive			
Channel obstructions or modifications: none	No. of riffles 0		
Channel flow status (circle one): high moderate low no flow			

Riparian vegetation (%):	Left Bank	Right Bank
Trees		
Shrubs		
Grasses or forbs	100	100
Cultivated fields		
Other		

Maximum Pool Depth:

Maximum Pool Width:

Notes

flow is wind driven on top of water column

Stream/aquatic vegetation:

water off color (reddish) due to mulching upstream at Tule East Wetlands

fish present

Site map: (attached)

Pictures (log): water looks like is flowing upstream

Stream observations (other issues):

no silt fencing

pennywort, frogfruit scirpus wildflowers

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Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score 1	4	3	2	1
Bottom Substrate Stability	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score 1	4	3	2	1
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score 1	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
Score 1	4	3	2	1
Channel Flow Status ?	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
Score	3	2	1	0

No flow.
Wind driven

Part III - Habitat Quality Index (continued)

Habitat Parameter	Scoring Category			
Bank Stability	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
Score 1	3	2	1	0
Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
Score 0	3	2	1	0
Riparian Buffer Vegetation	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
Score 1	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
Score 1	3	2	1	0
Total Score_____				

HABITAT QUALITY INDEX

26 - 31	**Exceptional**
20 - 25	**High**
14 - 19	**Intermediate**
≤ 13	**Limited**

TCEQ 20156-C (Rev. 4-15-2004)

Appendix E
Test America Data Sheets

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-34826-1
TestAmerica Sample Delivery Group: September 14, 2012
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
9/28/2012 9:10:05 AM

Timothy Kellogg
Lab Director
tim.kellogg@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Job ID: 560-34826-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 9/14/2012 3:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 24.6º C and 24.7º C.

General Chemistry

Method(s) 1664A: It was noted that the matrix spike (MS) recovery for 560-34826-1 in batch #56078626 was outside of the control limits. Matrix interferences inherent to the sample are suspected to be the cause of the recoveries. The associated laboratory control sample (LCS) recovery met acceptance criteria. No other analytical or quality issues were noted.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Client Sample ID: WQS-1

Lab Sample ID: 560-34826-1
Date Collected: 09/14/12 10:20
Matrix: Water
Date Received: 09/14/12 15:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.33	J	5.05	0.788	mg/L			09/27/12 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	44.2		2.00	2.00	NTU			09/15/12 11:15	2
Total Suspended Solids	47.0		3.00	3.00	mg/L			09/17/12 16:30	1

Client Sample ID: WQS-2

Lab Sample ID: 560-34826-2
Date Collected: 09/14/12 10:55
Matrix: Water
Date Received: 09/14/12 15:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.84	J	5.05	0.788	mg/L			09/27/12 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	27.7		1.00	1.00	NTU			09/15/12 11:15	1
Total Suspended Solids	20.5		3.00	3.00	mg/L			09/17/12 16:30	1

Client Sample ID: WQS-3

Lab Sample ID: 560-34826-3
Date Collected: 09/14/12 09:57
Matrix: Water
Date Received: 09/14/12 15:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.15	J	5.08	0.792	mg/L			09/27/12 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	30.4		1.00	1.00	NTU			09/15/12 11:15	1
Total Suspended Solids	20.0		3.00	3.00	mg/L			09/17/12 16:30	1

Client Sample ID: WQS-4

Lab Sample ID: 560-34826-4
Date Collected: 09/14/12 11:55
Matrix: Water
Date Received: 09/14/12 15:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.03	J	5.05	0.788	mg/L			09/27/12 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	15.1		1.00	1.00	NTU			09/15/12 11:15	1
Total Suspended Solids	30.0		3.00	3.00	mg/L			09/17/12 16:30	1

Client Sample ID: WQS-5

Lab Sample ID: 560-34826-5
Date Collected: 09/14/12 13:45
Matrix: Water
Date Received: 09/14/12 15:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.75	J	4.85	0.757	mg/L			09/27/12 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	6.05		1.00	1.00	NTU			09/15/12 11:15	1
Total Suspended Solids	10.4		3.00	3.00	mg/L			09/17/12 16:30	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Client Sample ID: WQS-6

Date Collected: 09/14/12 09:28
Date Received: 09/14/12 15:15

Lab Sample ID: 560-34826-6

Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.58	J	5.62	0.876	mg/L			09/27/12 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	11.3		1.00	1.00	NTU			09/15/12 11:15	1
Total Suspended Solids	40.8		3.00	3.00	mg/L			09/17/12 16:30	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-78626/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78626

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<0.780		5.00	0.780	mg/L			09/27/12 09:00	1

Lab Sample ID: LCS 560-78626/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78626

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	40.0	37.40		mg/L		94	78 - 114

Lab Sample ID: 560-34826-1 MS — **Client Sample ID: WQS-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78626

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	3.33	J	40.4	26.06	F	mg/L		56	78 - 114

Method: SM 2130B - Turbidity

Lab Sample ID: MB 560-78144/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78144

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			09/15/12 11:15	1

Lab Sample ID: LCS 560-78144/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78144

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.58		NTU		106	90 - 110

Lab Sample ID: 560-34826-5 MS — **Client Sample ID: WQS-5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78144

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	6.05		10.0	15.81		NTU		98	75 - 125

Lab Sample ID: 560-34826-5 MSD — **Client Sample ID: WQS-5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78144

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	6.05		10.0	16.16		NTU		101	75 - 125	2	20

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-78158/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78158

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			09/17/12 16:30	1

Lab Sample ID: LCS 560-78158/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78158

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			200	197.0		mg/L		99	80 - 120		

Lab Sample ID: 560-34826-4 DU — **Client Sample ID: WQS-4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 78158

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	30.0			29.50		mg/L				2	20

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAC	7	E-10362	10-31-12
Oklahoma	State Program	6	9968	08-31-13
Texas	NELAC	6	T104704210-12-8	03-31-13
USDA	Federal		P330-11-00060	02-03-14

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
SM 2130B	Turbidity	SM	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-34826-1
SDG: September 14, 2012

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-34826-1	WQS-1	Water	09/14/12 10:20	09/14/12 15:15
560-34826-2	WQS-2	Water	09/14/12 10:55	09/14/12 15:15
560-34826-3	WQS-3	Water	09/14/12 09:57	09/14/12 15:15
560-34826-4	WQS-4	Water	09/14/12 11:55	09/14/12 15:15
560-34826-5	WQS-5	Water	09/14/12 13:45	09/14/12 15:15
560-34826-6	WQS-6	Water	09/14/12 09:28	09/14/12 15:15

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Obs 24.8c Corr 24.6c IR4
24.9c 24.7c NO ICE

No. 44857

CHAIN OF CUSTODY RECORD

Loc: 560
34826

CUSTOMER INFORMATION	PROJECT INFORMATION
COMPANY: Naismith Eng	PROJECT NAME/NUMBER: Tule Creek
SEND REPORT TO:	BILLING INFORMATION
ADDRESS: 4501 Gollihar Rd Corpus Christi 78411	BILL TO: same
	ADDRESS:
PHONE: 361-814-9900	PHONE:
FAX:	FAX: PO NO:

SEAL INTACT YES
TEMP C Just Sampled
CORR TEMP C
IR GUN ID
INITIAL/DATE CLA-9/14/12

SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	NUMBER OF CONTAINERS	TSS	Turbidity	Oil & Grease					REMARKS/PRECAUTIONS.
1	WQS-1	9.14.12	10:20	Water	Plastic/Amber	HCL	3	✓	✓	✓					
2	WQS-2	↓	10:55	↓	↓	↓	3	✓	✓	✓					
3	WQS-3	↓	9:57	↓	↓	↓	3	✓	✓	✓					
4	WQS-4	↓	11:55	↓	↓	↓	3	✓	✓	✓					
5	WQS-5	↓	1:45	↓	↓	↓	3	✓	✓	✓					
6	WQS-6	↓	9:28	↓	↓	↓	3	✓	✓	✓					

SAMPLER: Sandi Hart
SHIPMENT METHOD:
AIRBILL NO.:

REQUIRED TURNAROUND ☑ ROUTINE TAT (10 BUSINESS DAYS) ☐ RUSH TAT (MAY REQUIRE SURCHARGE)

1. RELINQUISHED BY:	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: Sandi Hart	9.14.12	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: NEI	TIME 15:15	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME
1. RECEIVED BY:	DATE	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: C Adams	9/14/12	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: TACC	TIME 15:15	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

TAL-8222-560 (0412)

TestAmerica
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone: 361.289.2673/Fax: 361.289.2471

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-34826-1
SDG Number: September 14, 2012

Login Number: 34826
List Number: 1
Creator: McDermott, Vivian

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-38489-1
TestAmerica Sample Delivery Group: March 2013
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
3/20/2013 5:16:48 PM

Timothy Kellogg
Lab Director
tim.kellogg@testamericainc.com

LINKS

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Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Job ID: 560-38489-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 3/6/2013 2:34 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 18.0º C and 19.8º C.

General Chemistry

Method(s) SM 2130B: It was noted that the matrix spike and matrix spike duplicate (MS/MSD) for 560-38489-1 were mistakenly spiked twice, therefore recoveries of spikes are ~200%. The associated laboratory control sample (LCS) recovery met acceptance criteria. the samples were not re-analyzed due to holding time expiration. No other analytical or quality issues were noted.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Client Sample ID: WQS1 — Lab Sample ID: 560-38489-1

Date Collected: 03/06/13 13:10 — **Matrix: Water**
Date Received: 03/06/13 14:34

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.37	J	5.62	0.876	mg/L			03/12/13 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	10.1		1.00	1.00	NTU			03/08/13 07:50	1
Total Suspended Solids	13.6		3.00	3.00	mg/L			03/11/13 16:25	1

Client Sample ID: WQS2 — Lab Sample ID: 560-38489-2

Date Collected: 03/06/13 12:55 — **Matrix: Water**
Date Received: 03/06/13 14:34

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.17	J	5.46	0.852	mg/L			03/12/13 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	4.76		1.00	1.00	NTU			03/08/13 07:50	1
Total Suspended Solids	12.4		3.00	3.00	mg/L			03/11/13 16:25	1

Client Sample ID: WQS3 — Lab Sample ID: 560-38489-3

Date Collected: 03/06/13 11:20 — **Matrix: Water**
Date Received: 03/06/13 14:34

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.39	J	5.35	0.834	mg/L			03/12/13 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	14.6		1.00	1.00	NTU			03/08/13 07:50	1
Total Suspended Solids	24.0		3.00	3.00	mg/L			03/11/13 16:25	1

Client Sample ID: WQS4 — Lab Sample ID: 560-38489-4

Date Collected: 03/06/13 09:45 — **Matrix: Water**
Date Received: 03/06/13 14:34

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.48	J	5.62	0.876	mg/L			03/12/13 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	5.40		1.00	1.00	NTU			03/08/13 07:50	1
Total Suspended Solids	8.80		3.00	3.00	mg/L			03/11/13 16:25	1

Client Sample ID: WQS5 — Lab Sample ID: 560-38489-5

Date Collected: 03/06/13 09:13 — **Matrix: Water**
Date Received: 03/06/13 14:34

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.93	J	5.62	0.876	mg/L			03/12/13 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	10.8		1.00	1.00	NTU			03/08/13 07:50	1
Total Suspended Solids	22.0		3.00	3.00	mg/L			03/11/13 16:25	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Client Sample ID: WQS6

Lab Sample ID: 560-38489-6

Date Collected: 03/06/13 11:04

Matrix: Water

Date Received: 03/06/13 14:34

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.62	J	5.32	0.830	mg/L			03/12/13 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	1.92		1.00	1.00	NTU			03/08/13 07:50	1
Total Suspended Solids	3.00		3.00	3.00	mg/L			03/11/13 16:25	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-85354/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85354

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<0.780		5.00	0.780	mg/L			03/12/13 10:00	1

Lab Sample ID: LCS 560-85354/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85354

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	39.2	36.60		mg/L		93	78 - 114

Method: SM 2130B - Turbidity

Lab Sample ID: MB 560-85390/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85390

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			03/08/13 07:50	1

Lab Sample ID: LCS 560-85390/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85390

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.13		NTU		101	90 - 110

Lab Sample ID: 560-38489-1 MS — **Client Sample ID: WQS1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85390

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.1		10.0	30.02	F	NTU		199	75 - 125

Lab Sample ID: 560-38489-1 MSD — **Client Sample ID: WQS1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85390

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	10.1		10.0	29.71	F	NTU		196	75 - 125	1	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-85323/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85323

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			03/11/13 16:25	1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: MB 560-85323/25 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85323

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			03/11/13 16:25	1

Lab Sample ID: LCS 560-85323/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85323

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			200	197.5		mg/L		99	80 - 120		

Lab Sample ID: LCS 560-85323/26 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85323

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			200	197.0		mg/L		99	80 - 120		

Lab Sample ID: 560-38489-6 DU — **Client Sample ID: WQS6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 85323

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	3.00			3.060		mg/L				2	20

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAP	7	E-10362	10-31-13
Oklahoma	State Program	6	9968	08-31-13
Texas	NELAP	6	T104704210-12-8	03-31-13
USDA	Federal		P330-11-00060	02-03-14

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
SM 2130B	Turbidity	SM	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-38489-1
SDG: March 2013

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-38489-1	WQS1	Water	03/06/13 13:10	03/06/13 14:34
560-38489-2	WQS2	Water	03/06/13 12:55	03/06/13 14:34
560-38489-3	WQS3	Water	03/06/13 11:20	03/06/13 14:34
560-38489-4	WQS4	Water	03/06/13 09:45	03/06/13 14:34
560-38489-5	WQS5	Water	03/06/13 09:13	03/06/13 14:34
560-38489-6	WQS6	Water	03/06/13 11:04	03/06/13 14:34

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

No. 46057

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION	PROJECT INFORMATION
COMPANY: NEI	PROJECT NAME/NUMBER: Tule Creek
SEND REPORT TO: Naismith Eng Inc	BILLING INFORMATION
ADDRESS: 4501 Gollihar Rd	BILL TO: Same
Corpus Christi, TX 78411	ADDRESS:
PHONE: 361-814-9900	PHONE:
FAX:	FAX: PO NO:

Loc: 560

38489

Just Sampl

SEAL INTACT

TEMP C 14.5/20.3 OBS

CORR TEMP C 18.0/19.8 corr

IR GUN ID JR4

INITIAL/DATE 3-6-13 RW

SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	NUMBER OF CONTAINERS	TSS	Turbidity	Oil + Grease						REMARKS/PRECAUTIONS.
1	WQS 1	3/6/13	1:10P	Water	Plastic/Amber	HCl	3	✓	✓	✓						
2	WQS 2	↓	12:55P	↓	↓	↓	3	✓	✓	✓						
3	WQS 3		11:20A				3	✓	✓	✓						
4	WQS 4		9:45A				3	✓	✓	✓						
5	WQS 5		9:13A				3	✓	✓	✓						
6	WQS 6		11:04A				3	✓	✓	✓						

SAMPLER: Sandi Hart & Kara Thompson

SHIPMENT METHOD:

AIRBILL NO.:

REQUIRED TURNAROUND ☒ ROUTINE TAT (10 BUSINESS DAYS) ☐ RUSH TAT (MAY REQUIRE SURCHARGE)

1. RELINQUISHED BY: Kara Thompson	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: Kara Thompson	3/6/13	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: NEI	TIME 2:34	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME
1. RECEIVED BY:	DATE	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: RWY	3-6-13	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: TACC	TIME 2:34	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

TAL-8222-560 (0412)

TestAmerica
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone: 361.289.2673/Fax: 361.289.2471

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-38489-1
SDG Number: March 2013

Login Number: 38489
List Number: 1
Creator: McDermott, Vivian

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	
Cooler Temperature is acceptable.	True	Just sampled
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-39959-1
TestAmerica Sample Delivery Group: May 16, 2013
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
5/29/2013 4:55:37 PM

Timothy Kellogg, Lab Director
tim.kellogg@testamericainc.com

LINKS

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Visit us at: www.testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Job ID: 560-39959-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 5/15/2013 3:50 PM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperatures of the 2 coolers at receipt time were 2.1º C and 2.2º C. No analytical or quality issues were noted.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Client Sample ID: WQS-1

Lab Sample ID: 560-39959-1
Matrix: Water

Date Collected: 05/15/13 11:37
Date Received: 05/15/13 15:50

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.00	J	5.00	1.40	mg/L			05/21/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	24.7		1.00	1.00	NTU			05/17/13 08:15	1
Total Suspended Solids	44.0		3.00	3.00	mg/L			05/17/13 11:05	1

Client Sample ID: WQS-2

Lab Sample ID: 560-39959-2
Matrix: Water

Date Collected: 05/15/13 11:20
Date Received: 05/15/13 15:50

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.61	J	5.15	1.44	mg/L			05/21/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	28.8		1.00	1.00	NTU			05/17/13 08:15	1
Total Suspended Solids	25.0		3.00	3.00	mg/L			05/17/13 11:05	1

Client Sample ID: WQS-3

Lab Sample ID: 560-39959-3
Matrix: Water

Date Collected: 05/15/13 10:50
Date Received: 05/15/13 15:50

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.53	J	5.10	1.43	mg/L			05/21/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	41.1		2.00	2.00	NTU			05/17/13 08:15	2
Total Suspended Solids	40.0		3.00	3.00	mg/L			05/17/13 11:05	1

Client Sample ID: WQS-4

Lab Sample ID: 560-39959-4
Matrix: Water

Date Collected: 05/15/13 14:30
Date Received: 05/15/13 15:50

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.05	J	5.08	1.42	mg/L			05/21/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	10.4		1.00	1.00	NTU			05/17/13 08:15	1
Total Suspended Solids	4.50		3.00	3.00	mg/L			05/17/13 11:05	1

Client Sample ID: WQS-5

Lab Sample ID: 560-39959-5
Matrix: Water

Date Collected: 05/15/13 09:55
Date Received: 05/15/13 15:50

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.43	J	5.05	1.41	mg/L			05/21/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	8.24		1.00	1.00	NTU			05/17/13 08:15	1
Total Suspended Solids	3.00		3.00	3.00	mg/L			05/17/13 11:05	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Client Sample ID: WQS-6

Date Collected: 05/15/13 13:56
Date Received: 05/15/13 15:50

Lab Sample ID: 560-39959-6

Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.70	J	5.00	1.40	mg/L			05/21/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	19.6		1.00	1.00	NTU			05/17/13 08:15	1
Total Suspended Solids	32.5		3.00	3.00	mg/L			05/17/13 11:05	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-88185/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88185

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			05/21/13 08:45	1

Lab Sample ID: LCS 560-88185/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88185

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	39.2	34.60		mg/L		88	78 - 114

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 560-88223/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88223

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			05/17/13 08:15	1

Lab Sample ID: LCS 560-88223/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88223

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.13		NTU		101	90 - 110

Lab Sample ID: 560-39959-1 MS — **Client Sample ID: WQS-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88223

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	24.7		10.0	35.08		NTU		104	75 - 125

Lab Sample ID: 560-39959-1 MSD — **Client Sample ID: WQS-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88223

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	24.7		10.0	34.76		NTU		101	75 - 125	1	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-88119/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 88119

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			05/17/13 11:05	1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: LCS 560-88119/2
Matrix: Water
Analysis Batch: 88119

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Suspended Solids	200	197.5		mg/L		99	80 - 120

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAP	7	E-10362	10-31-13
Oklahoma	State Program	6	9968	08-31-13
Texas	NELAP	6	T104704210-12-8	03-31-14
USDA	Federal		P330-11-00060	02-03-14

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
180.1	Turbidity, Nephelometric	MCAWW	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-39959-1
SDG: May 16, 2013

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-39959-1	WQS-1	Water	05/15/13 11:37	05/15/13 15:50
560-39959-2	WQS-2	Water	05/15/13 11:20	05/15/13 15:50
560-39959-3	WQS-3	Water	05/15/13 10:50	05/15/13 15:50
560-39959-4	WQS-4	Water	05/15/13 14:30	05/15/13 15:50
560-39959-5	WQS-5	Water	05/15/13 09:55	05/15/13 15:50
560-39959-6	WQS-6	Water	05/15/13 13:56	05/15/13 15:50

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

No. 46066

CHAIN OF CUSTODY RECORD

Loc: 560

39959

CUSTOMER INFORMATION	PROJECT INFORMATION
COMPANY: Naismith Eng	PROJECT NAME/NUMBER: Tule Creek
SEND REPORT TO: ↓	BILLING INFORMATION
ADDRESS: 4501 Gollihar Rd Corpus Christi, TX 78411	BILL TO: same
	ADDRESS:
PHONE: 361-814-9900	PHONE:
FAX:	FAX: PO NO:

LAB

SEAL INTACT: YES

TEMP C: 2.0°C, 1.9°C

CORR TEMP C: 2.2°C, 2.1°C

IR GUN ID: 0DST C0D2

INITIAL/DATE: IR-4 CLA-5/15/13

SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	NUMBER OF CONTAINERS	TSS	Turbidity	Oil & Grease						REMARKS/PRECAUTIONS.
1	WQS-1	5/15/13	11:37a	water	Plastic/Amber	HCl	3	✓	✓	✓						
2	WQS-2	↓	11:20a	↓		↓	3	✓	✓	✓						
3	WQS-3		10:50a				3	✓	✓	✓						
4	WQS-4		2:30p				3	✓	✓	✓						
5	WQS-5		9:55p				3	✓	✓	✓						
6	WQS-6		1:56p				3	✓	✓	✓						

SAMPLER: Sandi Hart / Kara Thompson

SHIPMENT METHOD:

AIRBILL NO.:

REQUIRED TURNAROUND ☒ ROUTINE TAT (10 BUSINESS DAYS) ☐ RUSH TAT (MAY REQUIRE SURCHARGE)

1. RELINQUISHED BY: Sandi Hart	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: Sandi Hart	5-15-13	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: NEI	TIME 15:15	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME
1. RECEIVED BY:	DATE	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: Christi Adams	5/15/13	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: TACC	TIME 10:50	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

TAL-8222-560 (0412)

TestAmerica
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone: 361.289.2673/Fax: 361.289.2471

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-39959-1
SDG Number: May 16, 2013

Login Number: 39959
List Number: 1
Creator: Adams, Christi L

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-41276-1
TestAmerica Sample Delivery Group: July 17, 2013
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
8/2/2013 7:56:30 AM

Timothy Kellogg, Lab Director
tim.kellogg@testamericainc.com

LINKS

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www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Job ID: 560-41276-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 7/18/2013 10:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.2º C.

General Chemistry

Method(s) 180.1: It was noted that the matrix spike and matrix spike duplicate (MS/MSD) recoveries for 560-41276-1 were outside of the control limits (it is suspected that the analyst used double the amount of spike). The associated laboratory control sample (LCS) recovery met acceptance criteria. No other analytical or quality issues were noted.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Client Sample ID: WQS1

Lab Sample ID: 560-41276-1
Date Collected: 07/17/13 12:57
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.37	J	5.26	1.47	mg/L			07/30/13 08:45	1
SGT-HEM	1.79	J	5.26	1.47	mg/L			07/30/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	20.6		1.00	1.00	NTU			07/19/13 07:35	1
Total Suspended Solids	27.0		3.00	3.00	mg/L			07/19/13 14:10	1

Client Sample ID: WQS2

Lab Sample ID: 560-41276-2
Date Collected: 07/17/13 12:35
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.16	J	5.26	1.47	mg/L			07/30/13 08:45	1
SGT-HEM	1.68	J	5.26	1.47	mg/L			07/30/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	17.1		1.00	1.00	NTU			07/19/13 07:35	1
Total Suspended Solids	16.0		3.00	3.00	mg/L			07/19/13 14:10	1

Client Sample ID: WQS3

Lab Sample ID: 560-41276-3
Date Collected: 07/17/13 12:20
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.42	J	5.26	1.47	mg/L			07/30/13 08:45	1
SGT-HEM	<1.47		5.26	1.47	mg/L			07/30/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	25.6		1.00	1.00	NTU			07/19/13 07:35	1
Total Suspended Solids	8.00		3.00	3.00	mg/L			07/19/13 14:10	1

Client Sample ID: WQS4

Lab Sample ID: 560-41276-4
Date Collected: 07/17/13 10:05
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.26	J	5.62	1.57	mg/L			07/30/13 08:45	1
SGT-HEM	<1.57		5.62	1.57	mg/L			07/30/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	16.1		1.00	1.00	NTU			07/19/13 07:35	1
Total Suspended Solids	18.0		3.00	3.00	mg/L			07/19/13 14:10	1

Client Sample ID: WQS5

Lab Sample ID: 560-41276-5
Date Collected: 07/17/13 08:42
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.82	J	5.62	1.57	mg/L			07/30/13 08:45	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Client Sample ID: WQS5

Lab Sample ID: 560-41276-5

Date Collected: 07/17/13 08:42
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
SGT-HEM	1.57	J	5.62	1.57	mg/L			07/30/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	13.3		1.00	1.00	NTU			07/19/13 07:35	1
Total Suspended Solids	8.50		3.00	3.00	mg/L			07/19/13 14:10	1

Client Sample ID: WQS6

Lab Sample ID: 560-41276-6

Date Collected: 07/17/13 11:09
Matrix: Water
Date Received: 07/18/13 10:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.95	J	5.26	1.47	mg/L			07/30/13 08:45	1
SGT-HEM	2.53	J	5.26	1.47	mg/L			07/30/13 08:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	32.2		1.00	1.00	NTU			07/19/13 07:35	1
Total Suspended Solids	97.5		3.00	3.00	mg/L			07/19/13 14:10	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-90856/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90856

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			07/30/13 08:45	1
SGT-HEM	<1.40		5.00	1.40	mg/L			07/30/13 08:45	1

Lab Sample ID: MB 560-90856/31 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90856

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			07/30/13 16:03	1

Lab Sample ID: LCS 560-90856/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90856

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	40.0	36.70		mg/L		92	78 - 114

Lab Sample ID: LCS 560-90856/32 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90856

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	40.0	37.70		mg/L		94	78 - 114

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 560-90476/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90476

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			07/19/13 07:35	1

Lab Sample ID: LCS 560-90476/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90476

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.13		NTU		101	90 - 110

Lab Sample ID: 560-41276-1 MS — **Client Sample ID: WQS1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90476

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	20.6		10.0	39.50	F	NTU		189	75 - 125

Method: 180.1 - Turbidity, Nephelometric (Continued)

Lab Sample ID: 560-41276-1 MSD — **Client Sample ID: WQS1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90476

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	20.6		10.0	38.87	F	NTU		183	75 - 125	2	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-90544/25 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90544

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			07/19/13 14:10	1

Lab Sample ID: MB 560-90544/49 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90544

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			07/19/13 14:10	1

Lab Sample ID: LCS 560-90544/26 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90544

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Suspended Solids	200	202.0		mg/L		101	80 - 120

Lab Sample ID: LCS 560-90544/50 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90544

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Suspended Solids	200	197.5		mg/L		99	80 - 120

Lab Sample ID: 560-41276-5 DU — **Client Sample ID: WQS5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 90544

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Suspended Solids	8.50		8.500		mg/L		0	20

Lab Chronicle

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Client Sample ID: WQS1 — Lab Sample ID: 560-41276-1

Date Collected: 07/17/13 12:57 — **Matrix: Water**
Date Received: 07/18/13 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	180.1		1	90476	07/19/13 07:35	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	90544	07/19/13 14:10	HMZ	TAL CC
Total/NA	Analysis	1664A		1	90856	07/30/13 08:45	LPO	TAL CC

Client Sample ID: WQS2 — Lab Sample ID: 560-41276-2

Date Collected: 07/17/13 12:35 — **Matrix: Water**
Date Received: 07/18/13 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	180.1		1	90476	07/19/13 07:35	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	90544	07/19/13 14:10	HMZ	TAL CC
Total/NA	Analysis	1664A		1	90856	07/30/13 08:45	LPO	TAL CC

Client Sample ID: WQS3 — Lab Sample ID: 560-41276-3

Date Collected: 07/17/13 12:20 — **Matrix: Water**
Date Received: 07/18/13 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	180.1		1	90476	07/19/13 07:35	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	90544	07/19/13 14:10	HMZ	TAL CC
Total/NA	Analysis	1664A		1	90856	07/30/13 08:45	LPO	TAL CC

Client Sample ID: WQS4 — Lab Sample ID: 560-41276-4

Date Collected: 07/17/13 10:05 — **Matrix: Water**
Date Received: 07/18/13 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	180.1		1	90476	07/19/13 07:35	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	90544	07/19/13 14:10	HMZ	TAL CC
Total/NA	Analysis	1664A		1	90856	07/30/13 08:45	LPO	TAL CC

Client Sample ID: WQS5 — Lab Sample ID: 560-41276-5

Date Collected: 07/17/13 08:42 — **Matrix: Water**
Date Received: 07/18/13 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	180.1		1	90476	07/19/13 07:35	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	90544	07/19/13 14:10	HMZ	TAL CC
Total/NA	Analysis	1664A		1	90856	07/30/13 08:45	LPO	TAL CC

Lab Chronicle

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Client Sample ID: WQS6

Lab Sample ID: 560-41276-6

Date Collected: 07/17/13 11:09
Matrix: Water
Date Received: 07/18/13 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	180.1		1	90476	07/19/13 07:35	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	90544	07/19/13 14:10	HMZ	TAL CC
Total/NA	Analysis	1664A		1	90856	07/30/13 08:45	LPO	TAL CC

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAP	7	E-10362	10-31-13
Oklahoma	State Program	6	9968	08-31-13
Texas	NELAP	6	T104704210-12-8	03-31-14
USDA	Federal		P330-11-00060	02-03-14

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
180.1	Turbidity, Nephelometric	MCAWW	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-41276-1
SDG: July 17, 2013

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-41276-1	WQS1	Water	07/17/13 12:57	07/18/13 10:20
560-41276-2	WQS2	Water	07/17/13 12:35	07/18/13 10:20
560-41276-3	WQS3	Water	07/17/13 12:20	07/18/13 10:20
560-41276-4	WQS4	Water	07/17/13 10:05	07/18/13 10:20
560-41276-5	WQS5	Water	07/17/13 08:42	07/18/13 10:20
560-41276-6	WQS6	Water	07/17/13 11:09	07/18/13 10:20

TestAmerica Corpus Christi
1733 N Padre Island Drive
Corpus Christi, TX 78408
Phone (361) 289-2673 Fax (361) 289-2471

Chain of Custo

560-41276 Chain of Custody

TestAmerica

Client Information	Sampler	Lab PM	COC No
	S. Hart, K. Thompson	Kellogg, Timothy L	560-9635-1094 1
Client Contact: Ms Sandy Hart	Phone: 361-814-9900	E-Mail: tim.kellogg@testamericainc.com	Page: Page 1 of 1
Company: Naismith Engineering			Job #:
Address: 4501 Gollihar	Due Date Requested:		Loc: 560 41276
City: Corpus Christi	TAT Requested (days):		
State, Zip: TX, 78411			
Phone: 361-814-9900	PO #: Purchase Order not required		
Email: chart@naismith-engineering.com	WO #		
Project Name: Tule Creek Water Analysis	Project #: 56003895		
Site	SSOW#		

Analysis Requested

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
P - Na2O4S
Q - Na2SO3
R - Na2S2SO3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - ph 4-5
Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	180.1 - Turbidity	2540D - Total Suspended Solids	1664A_NP - Oil & Grease	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	A		
WQS1	7/17/13	12:57a	G	Water	N		✓	✓	✓	3	
WQS2		12:35p	G	Water	N		✓	✓	✓	3	
WQS3		12:20p	G	Water	N		✓	✓	✓	3	
WQS4		10:05a	G	Water	N		✓	✓	✓	3	
WQS5		8:42a	G	Water	N		✓	✓	✓	3	
WQS6		11:09a	G	Water	N		✓	✓	✓	3	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements

Empty Kit Relinquished by: | Date | Time: | Method of Shipment

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Kara Thompson	7/18/13 10:20		[illegible]	7-18-13 10:20	TACC

Custody Seals Intact: Δ Yes Δ No (circled: No)
Custody Seal No.

Cooler Temperature(s) °C and Other Remarks: 4.1/4.2 IR / NA
2.3/2.4

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-41276-1
SDG Number: July 17, 2013

Login Number: 41276
List Number: 1
Creator: Adams, Christi L

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-42102-1
TestAmerica Sample Delivery Group: August 26, 2013
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
9/10/2013 9:04:21 PM

Timothy Kellogg, Lab Director
tim.kellogg@testamericainc.com

LINKS

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www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F	MS/MSD Recovery and/or RPD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Job ID: 560-42102-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 8/27/2013 8:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.0º C and 1.4º C.

General Chemistry

Method(s) 1664A: It was noted that the matrix spike (MS) recoveries for 560-42102-1 in batch #56092254 were outside of the control limits. Matrix interferences inherent to the sample are suspected to be the cause of the recoveries. The associated laboratory control sample (LCS) recovery met acceptance criteria. No other analytical or quality issues were noted.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Client Sample ID: WQS 1

Lab Sample ID: 560-42102-1
Matrix: Water

Date Collected: 08/26/13 13:35
Date Received: 08/27/13 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.77	J	5.21	1.46	mg/L			08/30/13 09:30	1
SGT-HEM	1.77	J	5.21	1.46	mg/L			08/30/13 09:30	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	21.5		1.00	1.00	NTU			08/28/13 08:50	1
Total Suspended Solids	18.8		3.00	3.00	mg/L			08/27/13 17:05	1

Client Sample ID: WQS 2

Lab Sample ID: 560-42102-2
Matrix: Water

Date Collected: 08/26/13 13:19
Date Received: 08/27/13 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.20	J	5.24	1.47	mg/L			08/30/13 09:30	1
SGT-HEM	<1.47		5.24	1.47	mg/L			08/30/13 09:30	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	34.4		1.00	1.00	NTU			08/28/13 08:50	1
Total Suspended Solids	34.8		3.00	3.00	mg/L			08/27/13 17:05	1

Client Sample ID: WQS 3

Lab Sample ID: 560-42102-3
Matrix: Water

Date Collected: 08/26/13 13:06
Date Received: 08/27/13 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.71	J	5.21	1.46	mg/L			08/30/13 09:30	1
SGT-HEM	1.56	J	5.21	1.46	mg/L			08/30/13 09:30	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	77.5		5.00	5.00	NTU			08/28/13 08:50	5
Total Suspended Solids	70.4		3.00	3.00	mg/L			08/27/13 17:05	1

Client Sample ID: WQS 4

Lab Sample ID: 560-42102-4
Matrix: Water

Date Collected: 08/26/13 11:03
Date Received: 08/27/13 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.19	J	5.21	1.46	mg/L			08/30/13 09:30	1
SGT-HEM	1.98	J	5.21	1.46	mg/L			08/30/13 09:30	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	13.0		1.00	1.00	NTU			08/28/13 08:50	1
Total Suspended Solids	49.6		3.00	3.00	mg/L			08/27/13 17:05	1

Client Sample ID: WQS 5

Lab Sample ID: 560-42102-5
Matrix: Water

Date Collected: 08/26/13 10:23
Date Received: 08/27/13 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.57	J	5.24	1.47	mg/L			08/30/13 09:30	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Client Sample ID: WQS 5

Lab Sample ID: 560-42102-5
Date Collected: 08/26/13 10:23
Matrix: Water
Date Received: 08/27/13 08:20

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
SGT-HEM	<1.47		5.24	1.47	mg/L			08/30/13 09:30	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**12.3**		1.00	1.00	NTU			08/28/13 08:50	1
Total Suspended Solids	**8.50**		3.00	3.00	mg/L			08/27/13 17:05	1

Client Sample ID: WQS 6

Lab Sample ID: 560-42102-6
Date Collected: 08/26/13 12:30
Matrix: Water
Date Received: 08/27/13 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	**3.25**	**J**	5.24	1.47	mg/L			08/30/13 09:30	1
SGT-HEM	<1.47		5.24	1.47	mg/L			08/30/13 09:30	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**17.4**		1.00	1.00	NTU			08/28/13 08:50	1
Total Suspended Solids	**25.6**		3.00	3.00	mg/L			08/27/13 17:05	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-92254/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92254

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			08/30/13 09:30	1
SGT-HEM	<1.40		5.00	1.40	mg/L			08/30/13 09:30	1

Lab Sample ID: LCS 560-92254/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92254

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	40.0	35.90		mg/L		90	78 - 114
SGT-HEM	20.0	15.90		mg/L		80	64 - 132

Lab Sample ID: 560-42102-1 MS — **Client Sample ID: WQS 1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92254

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	1.77	J	41.9	30.47	F	mg/L		69	78 - 114
SGT-HEM	1.77	J	20.9	14.55	F	mg/L		61	64 - 132

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 560-92126/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92126

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			08/28/13 08:50	1

Lab Sample ID: LCS 560-92126/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92126

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.13		NTU		101	90 - 110

Lab Sample ID: 560-42102-4 MS — **Client Sample ID: WQS 4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92126

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	13.0		10.0	21.18		NTU		82	75 - 125

Lab Sample ID: 560-42102-4 MSD — **Client Sample ID: WQS 4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 92126

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	13.0		10.0	20.87		NTU		79	75 - 125	2	20

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-92102/25
Matrix: Water
Analysis Batch: 92102

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			08/27/13 17:05	1

Lab Sample ID: LCS 560-92102/26
Matrix: Water
Analysis Batch: 92102

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			200	198.0		mg/L		99	80 - 120		

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAP	7	E-10362	10-31-13
Oklahoma	State Program	6	9968	08-31-14
Texas	NELAP	6	T104704210-12-8	03-31-14
USDA	Federal		P330-11-00060	02-03-14

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
180.1	Turbidity, Nephelometric	MCAWW	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-42102-1
SDG: August 26, 2013

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-42102-1	WQS 1	Water	08/26/13 13:35	08/27/13 08:20
560-42102-2	WQS 2	Water	08/26/13 13:19	08/27/13 08:20
560-42102-3	WQS 3	Water	08/26/13 13:06	08/27/13 08:20
560-42102-4	WQS 4	Water	08/26/13 11:03	08/27/13 08:20
560-42102-5	WQS 5	Water	08/26/13 10:23	08/27/13 08:20
560-42102-6	WQS 6	Water	08/26/13 12:30	08/27/13 08:20

TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone (361) 289-2673 Fax (361) 289-2471

Chain of Custod

560-42102 Chain of Custody

TestAmerica

Client Information	Sampler: SH, KT	Lab PM: Kellogg, Timothy L.	COC No: 560-10081-1094.1
Client Contact: Ms. Sandy Hart	Phone: 361-814-9900	E-Mail: tim.kellogg@testamericainc.com	Page: Page 1 of 1
Company: Naismith Engineering			Job #: Loc: 560 42102
Address: 4501 Gollihar	Due Date Requested:		
City: Corpus Christi	TAT Requested (days):		
State, Zip: TX, 78411			
Phone:	PO #: Purchase Order not required		
Email: chart@naismith-engineering.com	WO #:		
Project Name: Tule Creek Water Analysis	Project #: 56003895		
Site:	SSOW#:		

Analysis Requested

Preserv
A - HCL
B - NaOH
C - Zn Ac
D - Nitric
E - NaHS
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
R - Na2S2SO3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - ph 4-5
Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	180.1 - Turbidity	2540D - Total Suspended Solids	1664A_NP - Oil & Grease	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	A		
WQS 1	8/26/13	1:55p	G	Water			✓	✓	✓		
WQS 2		1:19p	G	Water			✓	✓	✓		
WQS 3		1:00p	G	Water			✓	✓	✓		
WQS 4		11:03a	G	Water			✓	✓	✓		
WQS 5		10:23a	G	Water			✓	✓	✓		
WQS 6	↓	12:30p	G	Water			✓	✓	✓		

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☒ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: Hoa Dominic	Date: 8/27/13	Time:		Method of Shipment:	
Relinquished by:	Date/Time:	Company	Received by: Cindy Adams	Date/Time: 8/27/13 @ 8:20	Company TAcc
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: OBS 0.9°C, 1.3°C / COOR 1.0°C, 1.4°C ID-4

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-42102-1
SDG Number: August 26, 2013

Login Number: 42102
List Number: 1
Creator: Adams, Christi L

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-43570-1
TestAmerica Sample Delivery Group: November 7, 2013
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
11/21/2013 4:22:39 PM

Timothy Kellogg, Lab Director
(361)289-2673
tim.kellogg@testamericainc.com

LINKS

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www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Job ID: 560-43570-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 11/7/2013 10:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 6.0º C and 6.1º C. No analytical or quality issues were noted.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Client Sample ID: WQS 1

Lab Sample ID: 560-43570-1
Matrix: Water

Date Collected: 11/06/13 14:20
Date Received: 11/07/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.11	J	5.26	1.47	mg/L			11/18/13 09:45	1
SGT-HEM	<1.47		5.26	1.47	mg/L			11/18/13 09:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	18.3		1.00	1.00	NTU			11/07/13 15:05	1
Total Suspended Solids	29.2		3.00	3.00	mg/L			11/08/13 14:45	1

Client Sample ID: WQS 2

Lab Sample ID: 560-43570-2
Matrix: Water

Date Collected: 11/06/13 14:00
Date Received: 11/07/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.06	J	5.15	1.44	mg/L			11/18/13 09:45	1
SGT-HEM	1.55	J	5.15	1.44	mg/L			11/18/13 09:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	18.0		1.00	1.00	NTU			11/07/13 15:05	1
Total Suspended Solids	19.6		3.00	3.00	mg/L			11/08/13 14:45	1

Client Sample ID: WQS 3

Lab Sample ID: 560-43570-3
Matrix: Water

Date Collected: 11/06/13 13:30
Date Received: 11/07/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	3.58	J	5.26	1.47	mg/L			11/18/13 09:45	1
SGT-HEM	<1.47		5.26	1.47	mg/L			11/18/13 09:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	17.4		1.00	1.00	NTU			11/07/13 15:05	1
Total Suspended Solids	10.4		3.00	3.00	mg/L			11/08/13 14:45	1

Client Sample ID: WQS 4

Lab Sample ID: 560-43570-4
Matrix: Water

Date Collected: 11/06/13 12:30
Date Received: 11/07/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.08	J	5.21	1.46	mg/L			11/18/13 09:45	1
SGT-HEM	<1.46		5.21	1.46	mg/L			11/18/13 09:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	14.6		1.00	1.00	NTU			11/07/13 15:05	1
Total Suspended Solids	17.2		3.00	3.00	mg/L			11/08/13 14:45	1

Client Sample ID: WQS 5

Lab Sample ID: 560-43570-5
Matrix: Water

Date Collected: 11/06/13 12:45
Date Received: 11/07/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.22	J	4.83	1.35	mg/L			11/18/13 09:45	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Client Sample ID: WQS 5

Lab Sample ID: 560-43570-5

Date Collected: 11/06/13 12:45
Matrix: Water
Date Received: 11/07/13 10:15

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
SGT-HEM	1.74	J	4.83	1.35	mg/L			11/18/13 09:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	5.40		1.00	1.00	NTU			11/07/13 15:05	1
Total Suspended Solids	8.40		3.00	3.00	mg/L			11/08/13 14:45	1

Client Sample ID: WQS 6

Lab Sample ID: 560-43570-6

Date Collected: 11/06/13 14:55
Matrix: Water
Date Received: 11/07/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.16	J	4.90	1.37	mg/L			11/18/13 09:45	1
SGT-HEM	<1.37		4.90	1.37	mg/L			11/18/13 09:45	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	19.3		1.00	1.00	NTU			11/07/13 15:05	1
Total Suspended Solids	44.0		3.00	3.00	mg/L			11/08/13 14:45	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-95206/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95206

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			11/18/13 09:45	1
SGT-HEM	<1.40		5.00	1.40	mg/L			11/18/13 09:45	1

Lab Sample ID: LCS 560-95206/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 95206

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	40.0	36.30		mg/L		91	78 - 114
SGT-HEM	20.0	17.10		mg/L		86	64 - 132

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 560-94803/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 94803

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			11/07/13 15:05	1

Lab Sample ID: LCS 560-94803/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 94803

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.13		NTU		101	90 - 110

Lab Sample ID: 560-43570-5 MS — **Client Sample ID: WQS 5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 94803

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	5.40		10.0	14.87		NTU		95	75 - 125

Lab Sample ID: 560-43570-5 MSD — **Client Sample ID: WQS 5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 94803

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	5.40		10.0	15.18		NTU		98	75 - 125	2	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-94910/25 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 94910

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			11/08/13 14:45	1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: LCS 560-94910/26
Matrix: Water
Analysis Batch: 94910

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			200	203.0		mg/L		102	80 - 120		

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAP	7	E-10362	10-31-14
Oklahoma	State Program	6	9968	08-31-14
Texas	NELAP	6	T104704210-12-8	03-31-14
USDA	Federal		P330-11-00060	02-03-14

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
180.1	Turbidity, Nephelometric	MCAWW	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-43570-1
SDG: November 7, 2013

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-43570-1	WQS 1	Water	11/06/13 14:20	11/07/13 10:15
560-43570-2	WQS 2	Water	11/06/13 14:00	11/07/13 10:15
560-43570-3	WQS 3	Water	11/06/13 13:30	11/07/13 10:15
560-43570-4	WQS 4	Water	11/06/13 12:30	11/07/13 10:15
560-43570-5	WQS 5	Water	11/06/13 12:45	11/07/13 10:15
560-43570-6	WQS 6	Water	11/06/13 14:55	11/07/13 10:15

TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone (361) 289-2673 Fax (361) 289-2471

Chain of Custo

560-43570 Chain of Custody

Loc: 560
43570

Client Information	Sampler: Kara Thompson	Lab PM: Kellogg, Timothy L.	COC No: 560-11451-1094.1
Client Contact: Ms. Sandy Hart	Phone: 361-814-9900	E-Mail: tim.kellogg@testame[illegible]	Page: Page 1 of 1
Company: Naismith Engineering			Job #:
Address: 4501 Gollihar	Due Date Requested:		
City: Corpus Christi	TAT Requested (days):		
State, Zip: TX, 78411			
Phone: 361-814-9900	PO #: Purchase Order not required		
Email: chart@naismith-engineering.com	WO #:		
Project Name: Tule Creek Water Analysis	Project #: 56003895		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	180.1 - Turbidity	2540D - Total Suspended Solids	1664A_NP - Oil & Grease	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	A		
WQS1	11/6/13	2:20p	G	Water	N		✓	✓	✓	3	
WQS2		2:00p	G	Water	N		✓	✓	✓	3	
WQS3		1:30p	G	Water	N		✓	✓	✓	3	
WQS4		12:30p	G	Water	N		✓	✓	✓	3	
WQS5		2:45p	G	Water	N		✓	✓	✓	3	
WQS6	↓	2:55p	G	Water	N		✓	✓	✓	3	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Kara Thompson	11/6/13 10:15		[illegible]	11-7-13 10:15	TACC

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 5.8/6.0 5.9/6.1 IRC

11/21/2013

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-43570-1
SDG Number: November 7, 2013

Login Number: 43570
List Number: 1
Creator: Wing, Randi

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-46597-1
TestAmerica Sample Delivery Group: April 08, 2014
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
4/17/2014 7:39:38 AM

Timothy Kellogg, Lab Director
(361)289-2673
tim.kellogg@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Job ID: 560-46597-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 4/8/2014 4:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperatures of the 2 coolers at receipt time were 3.8º C and 4.3º C. No other analytical or quality issues were noted.

Detection Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Client Sample ID: WQS 1 — Lab Sample ID: 560-46597-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
HEM (Oil & Grease)	1.58	J	5.26	1.47	mg/L	1		1664A	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	16.4		1.00	1.00	NTU	1		180.1	Total/NA
Total Suspended Solids	20.4		3.00	3.00	mg/L	1		SM 2540D	Total/NA

Client Sample ID: WQS 2 — Lab Sample ID: 560-46597-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
HEM (Oil & Grease)	1.94	J	5.10	1.43	mg/L	1		1664A	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	27.5		1.00	1.00	NTU	1		180.1	Total/NA
Total Suspended Solids	108		3.00	3.00	mg/L	1		SM 2540D	Total/NA

Client Sample ID: WQS 3 — Lab Sample ID: 560-46597-3

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	16.1		1.00	1.00	NTU	1		180.1	Total/NA
Total Suspended Solids	10.4		3.00	3.00	mg/L	1		SM 2540D	Total/NA

Client Sample ID: WQS 4 — Lab Sample ID: 560-46597-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
HEM (Oil & Grease)	2.35	J	5.35	1.50	mg/L	1		1664A	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	15.5		1.00	1.00	NTU	1		180.1	Total/NA
Total Suspended Solids	58.0		3.00	3.00	mg/L	1		SM 2540D	Total/NA

Client Sample ID: WQS 5 — Lab Sample ID: 560-46597-5

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	14.6		1.00	1.00	NTU	1		180.1	Total/NA
Total Suspended Solids	37.6		3.00	3.00	mg/L	1		SM 2540D	Total/NA

Client Sample ID: WQS 6 — Lab Sample ID: 560-46597-6

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	43.3		2.00	2.00	NTU	2		180.1	Total/NA
Total Suspended Solids	94.0		3.00	3.00	mg/L	1		SM 2540D	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Client Sample ID: WQS 1

Lab Sample ID: 560-46597-1
Matrix: Water

Date Collected: 04/08/14 12:00
Date Received: 04/08/14 16:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.58	J	5.26	1.47	mg/L			04/15/14 10:00	1
SGT-HEM	<1.47		5.26	1.47	mg/L			04/15/14 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	16.4		1.00	1.00	NTU			04/09/14 16:25	1
Total Suspended Solids	20.4		3.00	3.00	mg/L			04/11/14 16:40	1

Client Sample ID: WQS 2

Lab Sample ID: 560-46597-2
Matrix: Water

Date Collected: 04/08/14 11:35
Date Received: 04/08/14 16:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.94	J	5.10	1.43	mg/L			04/15/14 10:00	1
SGT-HEM	<1.43		5.10	1.43	mg/L			04/15/14 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	27.5		1.00	1.00	NTU			04/09/14 16:25	1
Total Suspended Solids	108		3.00	3.00	mg/L			04/11/14 16:40	1

Client Sample ID: WQS 3

Lab Sample ID: 560-46597-3
Matrix: Water

Date Collected: 04/08/14 10:00
Date Received: 04/08/14 16:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.46		5.21	1.46	mg/L			04/15/14 10:00	1
SGT-HEM	<1.46		5.21	1.46	mg/L			04/15/14 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	16.1		1.00	1.00	NTU			04/09/14 16:25	1
Total Suspended Solids	10.4		3.00	3.00	mg/L			04/11/14 16:40	1

Client Sample ID: WQS 4

Lab Sample ID: 560-46597-4
Matrix: Water

Date Collected: 04/08/14 08:30
Date Received: 04/08/14 16:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	2.35	J	5.35	1.50	mg/L			04/15/14 10:00	1
SGT-HEM	<1.50		5.35	1.50	mg/L			04/15/14 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	15.5		1.00	1.00	NTU			04/09/14 16:25	1
Total Suspended Solids	58.0		3.00	3.00	mg/L			04/11/14 16:40	1

Client Sample ID: WQS 5

Lab Sample ID: 560-46597-5
Matrix: Water

Date Collected: 04/08/14 10:50
Date Received: 04/08/14 16:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.49		5.32	1.49	mg/L			04/15/14 10:00	1

Client Sample ID: WQS 5

Lab Sample ID: 560-46597-5

Date Collected: 04/08/14 10:50

Matrix: Water

Date Received: 04/08/14 16:15

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
SGT-HEM	<1.49		5.32	1.49	mg/L			04/15/14 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**14.6**		1.00	1.00	NTU			04/09/14 16:25	1
Total Suspended Solids	**37.6**		3.00	3.00	mg/L			04/11/14 16:40	1

Client Sample ID: WQS 6

Lab Sample ID: 560-46597-6

Date Collected: 04/08/14 09:20

Matrix: Water

Date Received: 04/08/14 16:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.51		5.38	1.51	mg/L			04/15/14 10:00	1
SGT-HEM	<1.51		5.38	1.51	mg/L			04/15/14 10:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**43.3**		2.00	2.00	NTU			04/09/14 16:25	2
Total Suspended Solids	**94.0**		3.00	3.00	mg/L			04/11/14 16:40	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-100870/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100870

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			04/15/14 10:00	1
SGT-HEM	<1.40		5.00	1.40	mg/L			04/15/14 10:00	1

Lab Sample ID: LCS 560-100870/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100870

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	39.2	35.20		mg/L		90	78 - 114
SGT-HEM	19.4	17.90		mg/L		92	64 - 132

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 560-100885/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100885

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			04/09/14 16:25	1

Lab Sample ID: LCS 560-100885/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100885

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	10.55		NTU		105	90 - 110

Lab Sample ID: 560-46597-4 MS — **Client Sample ID: WQS 4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100885

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	15.5		10.0	25.96		NTU		105	75 - 125

Lab Sample ID: 560-46597-4 MSD — **Client Sample ID: WQS 4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100885

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	15.5		10.0	26.88		NTU		114	75 - 125	4	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-100782/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 100782

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			04/11/14 16:40	1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: LCS 560-100782/2
Matrix: Water
Analysis Batch: 100782

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Suspended Solids	200	198.0		mg/L		99	80 - 120

Lab Chronicle

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Client Sample ID: WQS 1

Lab Sample ID: 560-46597-1
Date Collected: 04/08/14 12:00
Matrix: Water
Date Received: 04/08/14 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	100870	04/15/14 10:00	LPO	TAL CC
Total/NA	Analysis	180.1		1	100885	04/09/14 16:25	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	100782	04/11/14 16:40	HMZ	TAL CC

Client Sample ID: WQS 2

Lab Sample ID: 560-46597-2
Date Collected: 04/08/14 11:35
Matrix: Water
Date Received: 04/08/14 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	100870	04/15/14 10:00	LPO	TAL CC
Total/NA	Analysis	180.1		1	100885	04/09/14 16:25	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	100782	04/11/14 16:40	HMZ	TAL CC

Client Sample ID: WQS 3

Lab Sample ID: 560-46597-3
Date Collected: 04/08/14 10:00
Matrix: Water
Date Received: 04/08/14 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	100870	04/15/14 10:00	LPO	TAL CC
Total/NA	Analysis	180.1		1	100885	04/09/14 16:25	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	100782	04/11/14 16:40	HMZ	TAL CC

Client Sample ID: WQS 4

Lab Sample ID: 560-46597-4
Date Collected: 04/08/14 08:30
Matrix: Water
Date Received: 04/08/14 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	100870	04/15/14 10:00	LPO	TAL CC
Total/NA	Analysis	180.1		1	100885	04/09/14 16:25	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	100782	04/11/14 16:40	HMZ	TAL CC

Client Sample ID: WQS 5

Lab Sample ID: 560-46597-5
Date Collected: 04/08/14 10:50
Matrix: Water
Date Received: 04/08/14 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	100870	04/15/14 10:00	LPO	TAL CC
Total/NA	Analysis	180.1		1	100885	04/09/14 16:25	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	100782	04/11/14 16:40	HMZ	TAL CC

Lab Chronicle

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Client Sample ID: WQS 6

Lab Sample ID: 560-46597-6

Date Collected: 04/08/14 09:20
Matrix: Water
Date Received: 04/08/14 16:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	100870	04/15/14 10:00	LPO	TAL CC
Total/NA	Analysis	180.1		2	100885	04/09/14 16:25	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	100782	04/11/14 16:40	HMZ	TAL CC

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Laboratory: TestAmerica Corpus Christi

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Kansas	NELAP	7	E-10362	10-31-14
Oklahoma	State Program	6	9968	08-31-14
Texas	NELAP	6	T104704210	03-31-15

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
180.1	Turbidity, Nephelometric	MCAWW	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-46597-1
SDG: April 08, 2014

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-46597-1	WQS 1	Water	04/08/14 12:00	04/08/14 16:15
560-46597-2	WQS 2	Water	04/08/14 11:35	04/08/14 16:15
560-46597-3	WQS 3	Water	04/08/14 10:00	04/08/14 16:15
560-46597-4	WQS 4	Water	04/08/14 08:30	04/08/14 16:15
560-46597-5	WQS 5	Water	04/08/14 10:50	04/08/14 16:15
560-46597-6	WQS 6	Water	04/08/14 09:20	04/08/14 16:15

TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone (361) 289-2673 Fax (361) 289-2471

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Kara Thompson	Lab PM: Kellogg, Timothy L.	Carrier Tracking No(s):	COC No: 560-13226-1094.1
Client Contact: Ms. Sandy Hart	Phone: 361-814-9900	E-Mail: tim.kellogg@testamericainc.com		Page: Page 1
Company: Naismith Engineering				Job #: Loc: 560 46597
Address: 4501 Gollihar	Due Date Requested:			
City: Corpus Christi	TAT Requested (days):			
State, Zip: TX, 78411				
Phone: 361-814-9900	PO #: Purchase Order not required			
Email: chart@naismith-engineering.com	WO #:			
Project Name: Tule Creek Water Analysis	Project #: 56003895			
Site:	SSOW#:			

Analysis Requested

Preservation Codes: A - HCl; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA; P - Na2O4S; Q - Na2SO3; R - Na2S2SO3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - ph 4-5; Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	180.1 Turbidity	2540D Total Suspended Solids	A1664A_NP Oil & Grease	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	A		
WQS-1	4/8/14	12:00	G	Water	N						
WQS-2	4/8/14	11:35	G	Water	N						
WQS-3	4/8/14	10:00	G	Water	N						
WQS-4	4/8/14	8:30	G	Water	N						
WQS-5	4/8/14	10:50	G	Water	N						
WQS-6	4/8/14	9:20	G	Water	N						
				Water							
				Water							
				Water							
				Water							
				Water							

560-46597 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Kara Thompson	4/8/14 4:15P	NEI	[illegible]	040814 @ 16:15	TACC
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 3.6 / 3.8°C / 4.1°C / 4.3°C IR4

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-46597-1
SDG Number: April 08, 2014

Login Number: 46597
List Number: 1
Creator: Rood, Vivian R

List Source: TestAmerica Corpus Christi

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Tel: (361)289-2673

TestAmerica Job ID: 560-48170-1
Client Project/Site: Tule Creek Water Analysis

For:
Naismith Engineering
4501 Gollihar
Corpus Christi, Texas 78411

Attn: Ms. Sandy Hart

Authorized for release by:
6/30/2014 2:55:25 PM

Timothy Kellogg, Lab Director
(361)289-2673
tim.kellogg@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at:
www.testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Definitions/Glossary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
H	Sample was prepped or analyzed beyond the specified holding time

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Job ID: 560-48170-1

Laboratory: TestAmerica Corpus Christi

Narrative

Receipt

The samples were received on 6/20/2014 10:35 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.4º C and 4.9º C.

General Chemistry

Method(s) 180.1: Please note that the samples in this delivery group were received for analysis with insufficient holding time to complete analysis before it expired (WQS1 (560-48170-1), WQS2 (560-48170-2), WQS3 (560-48170-3), WQS4 (560-48170-4), WQS5 (560-48170-5), WQS6 (560-48170-6)). Analysis was performed as soon as possible after sample receipt. The affect values are flagged in the final report. No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Client Sample ID: WQS1 — Lab Sample ID: 560-48170-1

Date Collected: 06/18/14 13:30 — **Matrix: Water**
Date Received: 06/20/14 10:35

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	**2.28**	**J**	5.43	1.52	mg/L			06/24/14 08:50	1
SGT-HEM	<1.52		5.43	1.52	mg/L			06/24/14 08:50	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**31.2**	**H**	1.00	1.00	NTU			06/20/14 14:45	1
Total Suspended Solids	**49.0**		3.00	3.00	mg/L			06/23/14 17:45	1

Client Sample ID: WQS2 — Lab Sample ID: 560-48170-2

Date Collected: 06/18/14 13:00 — **Matrix: Water**
Date Received: 06/20/14 10:35

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.46		5.21	1.46	mg/L			06/24/14 08:50	1
SGT-HEM	<1.46		5.21	1.46	mg/L			06/24/14 08:50	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**51.9**	**H**	2.00	2.00	NTU			06/20/14 14:45	2
Total Suspended Solids	**125**		3.00	3.00	mg/L			06/23/14 17:45	1

Client Sample ID: WQS3 — Lab Sample ID: 560-48170-3

Date Collected: 06/18/14 12:40 — **Matrix: Water**
Date Received: 06/20/14 10:35

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.49		5.32	1.49	mg/L			06/27/14 09:00	1
SGT-HEM	<1.49		5.32	1.49	mg/L			06/27/14 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**36.5**	**H**	2.00	2.00	NTU			06/20/14 14:45	2
Total Suspended Solids	**28.0**		3.00	3.00	mg/L			06/23/14 17:45	1

Client Sample ID: WQS4 — Lab Sample ID: 560-48170-4

Date Collected: 06/18/14 10:00 — **Matrix: Water**
Date Received: 06/20/14 10:35

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.48		5.29	1.48	mg/L			06/27/14 09:00	1
SGT-HEM	**1.80**	**J**	5.29	1.48	mg/L			06/27/14 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**11.5**	**H**	1.00	1.00	NTU			06/20/14 14:45	1
Total Suspended Solids	**17.0**		3.00	3.00	mg/L			06/23/14 17:45	1

Client Sample ID: WQS5 — Lab Sample ID: 560-48170-5

Date Collected: 06/18/14 08:54 — **Matrix: Water**
Date Received: 06/20/14 10:35

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	**1.83**	**J**	5.38	1.51	mg/L			06/27/14 09:00	1

Client Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Client Sample ID: WQS5

Lab Sample ID: 560-48170-5
Date Collected: 06/18/14 08:54
Matrix: Water
Date Received: 06/20/14 10:35

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
SGT-HEM	2.04	J	5.38	1.51	mg/L			06/27/14 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	11.2	H	1.00	1.00	NTU			06/20/14 14:45	1
Total Suspended Solids	28.5		3.00	3.00	mg/L			06/23/14 17:45	1

Client Sample ID: WQS6

Lab Sample ID: 560-48170-6
Date Collected: 06/18/14 11:00
Matrix: Water
Date Received: 06/20/14 10:35

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.51		5.38	1.51	mg/L			06/27/14 09:00	1
SGT-HEM	<1.51		5.38	1.51	mg/L			06/27/14 09:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	51.9	H	2.00	2.00	NTU			06/20/14 14:45	2
Total Suspended Solids	37.0		3.00	3.00	mg/L			06/23/14 17:45	1

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Method: 1664A - HEM and SGT-HEM

Lab Sample ID: MB 560-103702/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103702

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			06/24/14 08:50	1
SGT-HEM	<1.40		5.00	1.40	mg/L			06/24/14 08:50	1

Lab Sample ID: LCS 560-103702/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103702

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	39.2	42.00		mg/L		107	78 - 114
SGT-HEM	19.4	20.00		mg/L		103	64 - 132

Lab Sample ID: MB 560-103896/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103896

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	<1.40		5.00	1.40	mg/L			06/27/14 09:00	1
SGT-HEM	<1.40		5.00	1.40	mg/L			06/27/14 09:00	1

Lab Sample ID: LCS 560-103896/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103896

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	39.2	41.30		mg/L		105	78 - 114
SGT-HEM	19.4	15.70		mg/L		81	64 - 132

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 560-103921/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103921

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	<1.00		1.00	1.00	NTU			06/20/14 14:45	1

Lab Sample ID: LCS 560-103921/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103921

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	10.0	9.932		NTU		99	90 - 110

Lab Sample ID: 560-48170-4 MS — **Client Sample ID: WQS4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103921

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Turbidity	11.5	H	10.0	21.34		NTU		99	75 - 125

QC Sample Results

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Method: 180.1 - Turbidity, Nephelometric (Continued)

Lab Sample ID: 560-48170-4 MSD — **Client Sample ID: WQS4**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103921

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Turbidity	11.5	H	10.0	21.03		NTU		96	75 - 125	1	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 560-103708/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103708

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	<3.00		3.00	3.00	mg/L			06/23/14 17:45	1

Lab Sample ID: LCS 560-103708/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103708

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			200	197.0		mg/L		99	80 - 120		

Lab Sample ID: 560-48170-6 DU — **Client Sample ID: WQS6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 103708

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	37.0			37.50		mg/L				1	20

Lab Chronicle

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Client Sample ID: WQS1 — Lab Sample ID: 560-48170-1

Date Collected: 06/18/14 13:30 — **Matrix: Water**
Date Received: 06/20/14 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	103702	06/24/14 08:50	FR1	TAL CC
Total/NA	Analysis	180.1		1	103921	06/20/14 14:45	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	103708	06/23/14 17:45	HMZ	TAL CC

Client Sample ID: WQS2 — Lab Sample ID: 560-48170-2

Date Collected: 06/18/14 13:00 — **Matrix: Water**
Date Received: 06/20/14 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	103702	06/24/14 08:50	FR1	TAL CC
Total/NA	Analysis	180.1		2	103921	06/20/14 14:45	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	103708	06/23/14 17:45	HMZ	TAL CC

Client Sample ID: WQS3 — Lab Sample ID: 560-48170-3

Date Collected: 06/18/14 12:40 — **Matrix: Water**
Date Received: 06/20/14 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	103896	06/27/14 09:00	FR1	TAL CC
Total/NA	Analysis	180.1		2	103921	06/20/14 14:45	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	103708	06/23/14 17:45	HMZ	TAL CC

Client Sample ID: WQS4 — Lab Sample ID: 560-48170-4

Date Collected: 06/18/14 10:00 — **Matrix: Water**
Date Received: 06/20/14 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	103896	06/27/14 09:00	FR1	TAL CC
Total/NA	Analysis	180.1		1	103921	06/20/14 14:45	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	103708	06/23/14 17:45	HMZ	TAL CC

Client Sample ID: WQS5 — Lab Sample ID: 560-48170-5

Date Collected: 06/18/14 08:54 — **Matrix: Water**
Date Received: 06/20/14 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	103896	06/27/14 09:00	FR1	TAL CC
Total/NA	Analysis	180.1		1	103921	06/20/14 14:45	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	103708	06/23/14 17:45	HMZ	TAL CC

Lab Chronicle

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Client Sample ID: WQS6

Lab Sample ID: 560-48170-6

Date Collected: 06/18/14 11:00

Matrix: Water

Date Received: 06/20/14 10:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	103896	06/27/14 09:00	FR1	TAL CC
Total/NA	Analysis	180.1		2	103921	06/20/14 14:45	HMZ	TAL CC
Total/NA	Analysis	SM 2540D		1	103708	06/23/14 17:45	HMZ	TAL CC

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Certification Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Laboratory: TestAmerica Corpus Christi

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Texas	NELAP	6	T104704210	03-31-15

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
1664A		Water	HEM (Oil & Grease)
1664A		Water	SGT-HEM

Method Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Method	Method Description	Protocol	Laboratory
1664A	HEM and SGT-HEM	1664A	TAL CC
180.1	Turbidity, Nephelometric	MCAWW	TAL CC
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL CC

Protocol References:

1664A = EPA-821-98-002

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CC = TestAmerica Corpus Christi, 1733 N. Padre Island Drive, Corpus Christi, TX 78408, TEL (361)289-2673

Sample Summary

Client: Naismith Engineering
Project/Site: Tule Creek Water Analysis

TestAmerica Job ID: 560-48170-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
560-48170-1	WQS1	Water	06/18/14 13:30	06/20/14 10:35
560-48170-2	WQS2	Water	06/18/14 13:00	06/20/14 10:35
560-48170-3	WQS3	Water	06/18/14 12:40	06/20/14 10:35
560-48170-4	WQS4	Water	06/18/14 10:00	06/20/14 10:35
560-48170-5	WQS5	Water	06/18/14 08:54	06/20/14 10:35
560-48170-6	WQS6	Water	06/18/14 11:00	06/20/14 10:35

TestAmerica Corpus Christi
1733 N. Padre Island Drive
Corpus Christi, TX 78408
Phone (361) 289-2673 Fax (361) 289-2471

Chain of Custody Record

TestAm

Loc: 560
48170

Client Information	Sampler: SH, KT	Lab PM: Kellogg, Timothy L.	Carrier Tracking No(s):	COC No: 560-13226-1094.2
Client Contact: Ms. Sandy Hart	Phone: 361-814-9900	E-Mail: tim.kellogg@testamericainc.com		Page: Page 2 of 2
Company: Naismith Engineering				Job #: 48170
Address: 4501 Gollihar	Due Date Requested:			
City: Corpus Christi	TAT Requested (days):			
State, Zip: TX, 78411				
Phone: 361-814-9900	PO #: Purchase Order not required			
Email: chart@naismith-engineering.com	WO #:			
Project Name: Tule Creek Water Analysis	Project #: 56003895			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	180.1, 2540D	1664A_NP - Oil & Grease	2540D - TSS	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	A			
WQS1	6/18/14	13:30	G	Water			✓	✓	✓	3	
WQS2		13:00	G				✓	✓	✓	3	
WQS3		12:40	G				✓	✓	✓	3	
WQS4		10:00	G				✓	✓	✓	3	
WQS5		8:54	G				✓	✓	✓	3	
WQS6	↓	11:00	G	↓			✓	✓	✓	3	

560-48170 Chain of Custody

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date: 6/20/14	Time: 10:35 am	Method of Shipment:		
Relinquished by:	Date/Time: 6/20/14 10:35a	Company	Received by:	Date/Time: 6/20/14 1035	Company TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: Obs 1.9°C Corr 2.4°C Obs 4.4°C Corr 4.9°C

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6/30/2014

Login Sample Receipt Checklist

Client: Naismith Engineering

Job Number: 560-48170-1

Login Number: 48170

List Source: TestAmerica Corpus Christi

List Number: 1

Creator: Hicks, Kristina M

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix F

SWQMIS Electronic Data Files, Final Data Review Checklists, Validator Reports

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0000N	21185	09/14/2012	10:20	0.445							NE	NE	BFBA
NE0001N	21189	09/14/2012	10:50	0.660							NE	NE	BFBA
NE0002N	21190	09/14/2012	09:50	0.483							NE	NE	BFBA
NE0003N	21191	09/14/2012	11:45	0.457							NE	NE	BFBA
NE0004N	21192	09/14/2012	13:55	0.241							NE	NE	BFBA
NE0005N	21193	09/14/2012	09:30	0.610							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0000N	09/14/2012	00400		7.64				
NE0000N	09/14/2012	00301		73.00				
NE0000N	09/14/2012	00094		1180.00				
NE0000N	09/14/2012	00556	<	5.00		5		
NE0000N	09/14/2012	00010		24.40				
NE0000N	09/14/2012	82079	>	1.00		1		
NE0000N	09/14/2012	82903		0.44				
NE0000N	09/14/2012	00530	>	3.00		3		
NE0000N	09/14/2012	74069		11.50				
NE0001N	09/14/2012	00400		7.82				
NE0001N	09/14/2012	00301		70.10				
NE0001N	09/14/2012	00094		480.00				
NE0001N	09/14/2012	00556	<	5.00		5		
NE0001N	09/14/2012	00010		23.53				
NE0001N	09/14/2012	82079	>	1.00		1		
NE0001N	09/14/2012	82903		0.66				
NE0001N	09/14/2012	00530	>	3.00		3		
NE0001N	09/14/2012	74069		14.78				
NE0002N	09/14/2012	00400		7.86				
NE0002N	09/14/2012	00301		67.50				
NE0002N	09/14/2012	00094		300.00				
NE0002N	09/14/2012	00556	<	5.00		5		
NE0002N	09/14/2012	00010		23.06				
NE0002N	09/14/2012	82079	>	1.00		1		
NE0002N	09/14/2012	82903		0.48				
NE0002N	09/14/2012	00530	>	3.00		3		
NE0002N	09/14/2012	74069		10.83				
NE0003N	09/14/2012	00400		7.15				
NE0003N	09/14/2012	00301		59.30				
NE0003N	09/14/2012	00094		1500.00				
NE0003N	09/14/2012	00556	<	5.00		5		
NE0003N	09/14/2012	00010		26.52				
NE0003N	09/14/2012	82079	>	1.00		1		
NE0003N	09/14/2012	82903		0.46				
NE0003N	09/14/2012	00530	>	3.00		2		
NE0003N	09/14/2012	74069		6.21				
NE0004N	09/14/2012	00400		7.08				
NE0004N	09/14/2012	00301		52.00				
NE0004N	09/14/2012	00094		2580.00				
NE0004N	09/14/2012	00556	<	5.00		5		
NE0004N	09/14/2012	00010		30.81				
NE0004N	09/14/2012	82079	>	1.00		1		
NE0004N	09/14/2012	82903		0.24				
NE0004N	09/14/2012	00530	>	3.00		3		
NE0004N	09/14/2012	74069		11.19				
NE0005N	09/14/2012	00400		7.81				
NE0005N	09/14/2012	00301		78.90				
NE0005N	09/14/2012	00094		1980.00				
NE0005N	09/14/2012	00556	<	5.00		5		
NE0005N	09/14/2012	00010		24.38				
NE0005N	09/14/2012	82079	>	1.00		1		
NE0005N	09/14/2012	82903		0.63				
NE0005N	09/14/2012	00530	>	3.0		3		
NE0005N	09/14/2012	74069		15.04				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X	A.	Are there any duplicate *Tag ID* numbers?
√	B.	Are the *Tag prefixes* correct?
√	C.	Are all *Tag ID* numbers 7 characters?
√	D.	Are TCEQ station location (SLOC) numbers assigned?
√	E.	Are sampling *Dates* in the correct format, MM/DD/YYYY?
√	F.	Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A	G.	Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√	H.	Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√	I.	Is the sampling date in the *Results* file the same as the one in the *Events* file?
√	J.	Values represented by a valid parameter code with the correct units?
√	K.	Are there any duplicate parameter codes for the same *Tag Id*?
X	L.	Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X	M.	Are there any tag numbers in the *Results* file that are not in the *Events* file?
√	N.	Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A	O.	Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√	A.	Are all the values reported at or below the AWRL?
√	B.	Have the outliers been verified?
√	C.	Checks on correctness of analysis or data reasonableness performed? e.g.: Is ortho-phosphorus less than total phosphorus? e.g.:Are dissolved metal concentrations less than or equal to total metals?
√	D.	Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√	E.	Are all parameter codes in the data set listed in the QAPP?
√	F.	Are all stations in the data set listed in the QAPP?

Documentation Review

N/A	A.	Are blank results acceptable as specified in the QAPP?
N/A	B.	Were control charts used to determine the acceptability of field duplicates?
N/A	C.	Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X	D.	Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X	E.	Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/11/2014

Tag ID Series: NE000N, NE0001N, NE0002N, NE0003N, NE0004N, NE0005N

Date Range: September 14, 2012

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-11 Date Loaded:2014-07-11

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0000N to NE0005N Date Range:2012-09-14 to 2012-09-14

Event File: 09.14.12 Event.txt Number of Events:6

Results File: 09.14.12 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		23.1	25.45000	30.8	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		300	1336.66667	2580	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		52	66.80000	78.9	6
PH (STANDARD UNITS)	00400		7.1	7.56667	7.9	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	6
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		6.21	11.59167	15.04	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.24	0.48167	0.66	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records
NE0000N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		11.5	0.5	0.5	0.5	1
NE0001N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		14.78	0.5	0.5	0.5	1
NE0002N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		10.83	0.5	0.5	0.5	1
NE0003N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		6.21	0.5	0.5	0.5	1
NE0004N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		11.19	0.5	0.5	0.5	1
NE0005N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		15.04	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00010		30.8	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00010		26.5	0.457
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00010		24.4	0.445
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00010		24.4	0.61
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00010		23.5	0.66
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00010		23.1	0.483
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00094		2580	0.241
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00094		1980	0.61
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00094		1500	0.457
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00094		1180	0.445
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00094		480	0.66
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00094		300	0.483
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00301		78.9	0.61
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00301		73	0.445

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00301		70.1	0.66
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00301		67.5	0.483
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00301		59.3	0.457
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00301		52	0.241
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00400		7.9	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00400		7.8	0.66
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00400		7.8	0.61
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00400		7.6	0.445
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00400		7.2	0.457
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00400		7.1	0.241
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00530	>	3	0.445
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00530	>	3	0.483
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00530	>	3	0.457
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00530	>	3	0.61

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00530	>	3	0.241
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00530	>	3	0.66
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00556	<	5	0.445
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00556	<	5	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00556	<	5	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00556	<	5	0.457
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00556	<	5	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00556	<	5	0.66
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	74069		15.04	0.61
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	74069		14.78	0.66
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	74069		11.5	0.445
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	74069		11.19	0.241
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	74069		10.83	0.483
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	74069		6.21	0.457

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	82079	>	1	0.445
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	82079	>	1	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	82079	>	1	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	82079	>	1	0.457
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	82079	>	1	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	82079	>	1	0.66
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	82903		0.66	0.66
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	82903		0.61	0.61
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	82903		0.48	0.483
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	82903		0.46	0.457
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	82903		0.44	0.445
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	82903		0.24	0.241

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00010		23.1	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00010		23.5	0.66
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00010		24.4	0.445

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00010		24.4	0.61
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00010		26.5	0.457
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00010		30.8	0.241
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00094		300	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00094		480	0.66
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00094		1180	0.445
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00094		1500	0.457
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00094		1980	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00094		2580	0.241
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00301		52	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00301		59.3	0.457
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00301		67.5	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00301		70.1	0.66
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00301		73	0.445

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00301		78.9	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00400		7.1	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00400		7.2	0.457
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00400		7.6	0.445
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00400		7.8	0.66
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00400		7.8	0.61
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00400		7.9	0.483
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00530	>	3	0.445
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00530	>	3	0.483
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00530	>	3	0.457
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00530	>	3	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00530	>	3	0.241
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00530	>	3	0.66
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	00556	<	5	0.445
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	00556	<	5	0.61

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	00556	<	5	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	00556	<	5	0.457
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	00556	<	5	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	00556	<	5	0.66
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	74069		6.21	0.457
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	74069		10.83	0.483
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	74069		11.19	0.241
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	74069		11.5	0.445
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	74069		14.78	0.66
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	74069		15.04	0.61
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	82079	>	1	0.445
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	82079	>	1	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	82079	>	1	0.241
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	82079	>	1	0.457

21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	82079	>	1	0.483
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	82079	>	1	0.66
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	09/14/2012	01:55:00 PM	82903		0.24	0.241
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	09/14/2012	10:20:00 AM	82903		0.44	0.445
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	09/14/2012	11:45:00 AM	82903		0.46	0.457
21190	TULE CREEK AT TRAYLOR BOULEVARD	09/14/2012	09:50:00 AM	82903		0.48	0.483
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	09/14/2012	09:30:00 AM	82903		0.61	0.61
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	09/14/2012	10:50:00 AM	82903		0.66	0.66

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0006N	21185	03/06/2013	13:10	0.372							NE	NE	BFBA
NE0007N	21189	03/06/2013	12:55	0.229							NE	NE	BFBA
NE0008N	21190	03/06/2013	11:20	0.274							NE	NE	BFBA
NE0009N	21191	03/06/2013	09:45	0.198							NE	NE	BFBA
NE0010N	21192	03/06/2013	09:13	0.122							NE	NE	BFBA
NE0011N	21193	03/06/2013	11:04	0.335							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0006N	03/06/2013	00400		7.85				
NE0006N	03/06/2013	00301		97.3				
NE0006N	03/06/2013	00094		2620				1
NE0006N	03/06/2013	00556	<	5		5		
NE0006N	03/06/2013	00010		18.19				
NE0006N	03/06/2013	82079	>	1		1		
NE0006N	03/06/2013	82903		0.372				
NE0006N	03/06/2013	00530	>	3.000		3		
NE0006N	03/06/2013	74069		6.520				
NE0007N	03/06/2013	00400		7.71				
NE0007N	03/06/2013	00301		106.4				
NE0007N	03/06/2013	00094		2638				1
NE0007N	03/06/2013	00556	<	5		5		
NE0007N	03/06/2013	00010		18.26				
NE0007N	03/06/2013	82079	>	1		1		
NE0007N	03/06/2013	82903		0.229				
NE0007N	03/06/2013	00530	>	3		3		
NE0007N	03/06/2013	74069		5.83				
NE0008N	03/06/2013	00400		7.43				
NE0008N	03/06/2013	00301		93.3				
NE0008N	03/06/2013	00094		2145				1
NE0008N	03/06/2013	00556	<	5		5		
NE0008N	03/06/2013	00010		14.18				
NE0008N	03/06/2013	82079	>	1		1		
NE0008N	03/06/2013	82903		0.274				
NE0008N	03/06/2013	00530	>	3		3		
NE0008N	03/06/2013	74069		4.92				
NE0009N	03/06/2013	00400		7.83				
NE0009N	03/06/2013	00301		85.7				
NE0009N	03/06/2013	00094		2599				
NE0009N	03/06/2013	00556	<	5		5		
NE0009N	03/06/2013	00010		14.09				
NE0009N	03/06/2013	82079	>	1		1		
NE0009N	03/06/2013	82903		0.198				
NE0009N	03/06/2013	00530	>	3.000				
NE0009N	03/06/2013	74069		1.720				
NE0010N	03/06/2013	00400		7.33				
NE0010N	03/06/2013	00301		60				
NE0010N	03/06/2013	00094		2633				
NE0010N	03/06/2013	00556	<	3.93		5		
NE0010N	03/06/2013	00010		14.94				
NE0010N	03/06/2013	82079	>	1		1		
NE0010N	03/06/2013	82903		0.122				
NE0010N	03/06/2013	00530	>	3.000		3		
NE0010N	03/06/2013	74069		16.430				
NE0011N	03/06/2013	00400		7.93				
NE0011N	03/06/2013	00301		89				
NE0011N	03/06/2013	00094		2632				
NE0011N	03/06/2013	00556	<	3.62		5		
NE0011N	03/06/2013	00010		15.75				
NE0011N	03/06/2013	82079	>	1		1		
NE0011N	03/06/2013	82903		0.335				
NE0011N	03/06/2013	00530		3		3		
NE0011N	03/06/2013	74069		3.14				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X A. Are there any duplicate *Tag ID* numbers?
√ B. Are the *Tag prefixes* correct?
√ C. Are all *Tag ID* numbers 7 characters?
√ D. Are TCEQ station location (SLOC) numbers assigned?
√ E. Are sampling *Dates* in the correct format, MM/DD/YYYY?
√ F. Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A G. Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√ H. Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√ I. Is the sampling date in the *Results* file the same as the one in the *Events* file?
√ J. Values represented by a valid parameter code with the correct units?
√ K. Are there any duplicate parameter codes for the same *Tag Id*?
X L. Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X M. Are there any tag numbers in the *Results* file that are not in the *Events* file?
√ N. Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A O. Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√ A. Are all the values reported at or below the AWRL?
√ B. Have the outliers been verified?
√ C. Checks on correctness of analysis or data reasonableness performed?
e.g.: Is ortho-phosphorus less than total phosphorus?
e.g.:Are dissolved metal concentrations less than or equal to total metals?
√ D. Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√ E. Are all parameter codes in the data set listed in the QAPP?
√ F. Are all stations in the data set listed in the QAPP?

Documentation Review

N/A A. Are blank results acceptable as specified in the QAPP?
N/A B. Were control charts used to determine the acceptability of field duplicates?
N/A C. Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X D. Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X E. Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/14/2014

Tag ID Series: NE0006N, NE0007N, NE0008N, NE0009N, NE0010N, NE0011N

Date Range: March 6, 2013

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-14 Date Loaded:2014-07-14

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0006N to NE0011N Date Range:2013-03-06 to 2013-03-06

Event File: 03.06.13 Event.txt Number of Events:6

Results File: 03.06.13 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		14.1	15.91667	18.3	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		2150	2545.00000	2640	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		60	88.61667	106.4	6
PH (STANDARD UNITS)	00400		7.3	7.65000	7.9	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	5
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530		3	3.00000	3	1
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	3.62	4.59167	5	6
STREAM FLOW ESTIMATE (CFS)	74069		1.72	6.42667	16.43	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.122	0.25500	0.372	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records
NE0006N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		6.52	0.5	0.5	0.5	1
NE0007N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		5.83	0.5	0.5	0.5	1
NE0008N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		4.92	0.5	0.5	0.5	1
NE0009N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		1.72	0.5	0.5	0.5	1
NE0010N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		16.43	0.5	0.5	0.5	1

NE0011N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		3.14	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00010		18.3	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00010		18.2	0.372
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00010		15.8	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00010		14.9	0.122
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00010		14.2	0.274
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00010		14.1	0.198
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00094		2640	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00094		2630	0.122
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00094		2630	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00094		2620	0.372
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00094		2600	0.198
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00094		2150	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00301		106.4	0.229

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00301		97.3	0.372
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00301		93.3	0.274
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00301		89	0.335
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00301		85.7	0.198
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00301		60	0.122
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00400		7.9	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00400		7.8	0.372
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00400		7.8	0.198
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00400		7.7	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00400		7.4	0.274
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00400		7.3	0.122
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00530	>	3	0.372
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00530	>	3	0.274
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00530	>	3	0.198
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00530		3	0.335

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00530	>	3	0.122
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00530	>	3	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00556	<	5	0.372
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00556	<	5	0.198
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00556	<	5	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00556	<	5	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00556	<	3.93	0.122
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00556	<	3.62	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	74069		16.43	0.122
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	74069		6.52	0.372
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	74069		5.83	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	74069		4.92	0.274
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	74069		3.14	0.335
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	74069		1.72	0.198

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	82079	>	1	0.372
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	82079	>	1	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	82079	>	1	0.122
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	82079	>	1	0.198
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	82079	>	1	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	82079	>	1	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	82903		0.372	0.372
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	82903		0.335	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	82903		0.274	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	82903		0.229	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	82903		0.198	0.198
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	82903		0.122	0.122

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00010		14.1	0.198
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00010		14.2	0.274

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00010		14.9	0.122
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00010		15.8	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00010		18.2	0.372
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00010		18.3	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00094		2150	0.274
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00094		2600	0.198
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00094		2620	0.372
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00094		2630	0.122
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00094		2630	0.335
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00094		2640	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00301		60	0.122
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00301		85.7	0.198
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00301		89	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00301		93.3	0.274
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00301		97.3	0.372

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00301		106.4	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00400		7.3	0.122
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00400		7.4	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00400		7.7	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00400		7.8	0.372
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00400		7.8	0.198
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00400		7.9	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00530	>	3	0.372
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00530		3	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00530	>	3	0.274
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00530	>	3	0.198
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00530	>	3	0.122
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00530	>	3	0.229
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	00556	<	3.62	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	00556	<	3.93	0.122

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	00556	<	5	0.372
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	00556	<	5	0.198
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	00556	<	5	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	00556	<	5	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	74069		1.72	0.198
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	74069		3.14	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	74069		4.92	0.274
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	74069		5.83	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	74069		6.52	0.372
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	74069		16.43	0.122
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	82079	>	1	0.372
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	82079	>	1	0.122
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	82079	>	1	0.335
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	82079	>	1	0.198
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	82079	>	1	0.274

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	82079	>	1	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	03/06/2013	09:13:00 AM	82903		0.122	0.122
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	03/06/2013	09:45:00 AM	82903		0.198	0.198
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	03/06/2013	12:55:00 PM	82903		0.229	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	03/06/2013	11:20:00 AM	82903		0.274	0.274
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	03/06/2013	11:04:00 AM	82903		0.335	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	03/06/2013	01:10:00 PM	82903		0.372	0.372

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0012N	21185	05/15/2013	11:37	0.366							NE	NE	BFBA
NE0013N	21189	05/15/2013	11:20	0.351							NE	NE	BFBA
NE0014N	21190	05/15/2013	10:50	0.152							NE	NE	BFBA
NE0015N	21191	05/15/2013	14:30	0.213							NE	NE	BFBA
NE0016N	21192	05/15/2013	09:55	0.229							NE	NE	BFBA
NE0017N	21193	05/15/2013	13:56	0.762							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0012N	05/15/2013	00400		8.02				
NE0012N	05/15/2013	00301		86.30				
NE0012N	05/15/2013	00094		2.48				1
NE0012N	05/15/2013	00556	<	5.00		5		
NE0012N	05/15/2013	00010		25.48				
NE0012N	05/15/2013	82079	>	1.00		1		
NE0012N	05/15/2013	82903		0.37				
NE0012N	05/15/2013	00530	>	3.00		3		
NE0012N	05/15/2013	74069		9.55				
NE0013N	05/15/2013	00400		7.97				
NE0013N	05/15/2013	00301		88.70				
NE0013N	05/15/2013	00094		1.93				1
NE0013N	05/15/2013	00556	<	5.00		5		
NE0013N	05/15/2013	00010		25.30				
NE0013N	05/15/2013	82079	>	1.00		1		
NE0013N	05/15/2013	82903		0.35				
NE0013N	05/15/2013	00530	>	3.00		3		
NE0013N	05/15/2013	74069		3.60				
NE0014N	05/15/2013	00400		7.55				
NE0014N	05/15/2013	00301		56.90				
NE0014N	05/15/2013	00094		2.29				1
NE0014N	05/15/2013	00556	<	5.00		5		
NE0014N	05/15/2013	00010		25.20				
NE0014N	05/15/2013	82079	>	1.00		1		
NE0014N	05/15/2013	82903		0.15				
NE0014N	05/15/2013	00530	>	3.00		3		
NE0014N	05/15/2013	74069		7.43				
NE0015N	05/15/2013	00400		7.99				
NE0015N	05/15/2013	00301		101.30				
NE0015N	05/15/2013	00094		2.32				1
NE0015N	05/15/2013	00556	<	5.00		5		
NE0015N	05/15/2013	00010		25.50				
NE0015N	05/15/2013	82079	>	1.00		1		
NE0015N	05/15/2013	82903		0.21				
NE0015N	05/15/2013	00530	>	3.00		3		
NE0015N	05/15/2013	74069		1.28				
NE0016N	05/15/2013	00400		7.64				
NE0016N	05/15/2013	00301		58.80				
NE0016N	05/15/2013	00094		1.04				1
NE0016N	05/15/2013	00556	<	5.00		5		
NE0016N	05/15/2013	00010		24.67				
NE0016N	05/15/2013	82079	>	1.00		1		
NE0016N	05/15/2013	82903		0.23				
NE0016N	05/15/2013	00530		3.00		3		
NE0016N	05/15/2013	74069		10.60				
NE0017N	05/15/2013	00400		8.03				
NE0017N	05/15/2013	00301		88.10				
NE0017N	05/15/2013	00094		2.55				1
NE0017N	05/15/2013	00556	<	5.00		5		
NE0017N	05/15/2013	00010		26.13				
NE0017N	05/15/2013	82079	>	1.00		1		
NE0017N	05/15/2013	82903		0.76				
NE0017N	05/15/2013	00530	>	3		3		
NE0017N	05/15/2013	74069		6.6				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X	A.	Are there any duplicate *Tag ID* numbers?
√	B.	Are the *Tag prefixes* correct?
√	C.	Are all *Tag ID* numbers 7 characters?
√	D.	Are TCEQ station location (SLOC) numbers assigned?
√	E.	Are sampling *Dates* in the correct format, MM/DD/YYYY?
√	F.	Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A	G.	Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√	H.	Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√	I.	Is the sampling date in the *Results* file the same as the one in the *Events* file?
√	J.	Values represented by a valid parameter code with the correct units?
X	K.	Are there any duplicate parameter codes for the same *Tag Id*?
X	L.	Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X	M.	Are there any tag numbers in the *Results* file that are not in the *Events* file?
√	N.	Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A	O.	Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√	A.	Are all the values reported at or below the AWRL?
√	B.	Have the outliers been verified?
√	C.	Checks on correctness of analysis or data reasonableness performed? e.g.: Is ortho-phosphorus less than total phosphorus? e.g.:Are dissolved metal concentrations less than or equal to total metals?
√	D.	Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√	E.	Are all parameter codes in the data set listed in the QAPP?
√	F.	Are all stations in the data set listed in the QAPP?

Documentation Review

N/A	A.	Are blank results acceptable as specified in the QAPP?
N/A	B.	Were control charts used to determine the acceptability of field duplicates?
N/A	C.	Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X	D.	Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X	E.	Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/17/2014

Tag ID Series: NE0012N, NE0013N, NE0014N, NE0015N, NE0016N, NE0017N

Date Range: May 15, 2013

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-17 Date Loaded:2014-07-17

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0012N to NE0017N Date Range:2013-05-15 to 2013-05-15

Event File: 5.15.13 Event.txt Number of Events:6

Results File: 5.15.13 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		24.7	25.38333	26.1	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		1	2.00000	3	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		56.9	80.01667	101.3	6
PH (STANDARD UNITS)	00400		7.6	7.86667	8	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	5
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530		3	3.00000	3	1
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		1.28	6.51000	10.6	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.15	0.34500	0.76	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum
NE0017N	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	Y	05/15/2013	00094		3	30	60000
NE0016N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	05/15/2013	00094		1	30	60000
NE0012N	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	Y	05/15/2013	00094		2	30	60000
NE0014N	TULE CREEK AT TRAYLOR BOULEVARD	Y	05/15/2013	00094		2	30	60000
NE0013N	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	Y	05/15/2013	00094		2	30	60000
NE0015N	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	Y	05/15/2013	00094		2	30	60000

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

NE0012N	20-SAN ANTONIO-NUECES COASTAL	21185	00094		2	128	6644.48182	74100	330
NE0013N	20-SAN ANTONIO-NUECES COASTAL	21189	00094		2	128	6644.48182	74100	330
NE0014N	20-SAN ANTONIO-NUECES COASTAL	21190	00094		2	128	6644.48182	74100	330
NE0015N	20-SAN ANTONIO-NUECES COASTAL	21191	00094		2	128	6644.48182	74100	330
NE0016N	20-SAN ANTONIO-NUECES COASTAL	21192	00094		1	128	6644.48182	74100	330
NE0017N	20-SAN ANTONIO-NUECES COASTAL	21193	00094		3	128	6644.48182	74100	330
NE0012N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		9.55	0.5	0.5	0.5	1
NE0013N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		3.6	0.5	0.5	0.5	1
NE0014N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		7.43	0.5	0.5	0.5	1
NE0015N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		1.28	0.5	0.5	0.5	1
NE0016N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		10.6	0.5	0.5	0.5	1
NE0017N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		6.6	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00010		26.1	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00010		25.5	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00010		25.5	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00010		25.3	0.351
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00010		25.2	0.152

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00010		24.7	0.229
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00094		3	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00094		2	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00094		2	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00094		2	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00094		2	0.351
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00094		1	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00301		101.3	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00301		88.7	0.351
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00301		88.1	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00301		86.3	0.366
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00301		58.8	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00301		56.9	0.152
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00400		8	0.366

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00400		8	0.351
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00400		8	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00400		8	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00400		7.6	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00400		7.6	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00530	>	3	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00530	>	3	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00530	>	3	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00530	>	3	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00530		3	0.229
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00530	>	3	0.351
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00556	<	5	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00556	<	5	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00556	<	5	0.229

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00556	<	5	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00556	<	5	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00556	<	5	0.351
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	74069		10.6	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	74069		9.55	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	74069		7.43	0.152
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	74069		6.6	0.762
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	74069		3.6	0.351
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	74069		1.28	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	82079	>	1	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	82079	>	1	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	82079	>	1	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	82079	>	1	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	82079	>	1	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	82079	>	1	0.351

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	82903		0.76	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	82903		0.37	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	82903		0.35	0.351
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	82903		0.23	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	82903		0.21	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	82903		0.15	0.152

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00010		24.7	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00010		25.2	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00010		25.3	0.351
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00010		25.5	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00010		25.5	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00010		26.1	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00094		1	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00094		2	0.366

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00094		2	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00094		2	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00094		2	0.351
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00094		3	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00301		56.9	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00301		58.8	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00301		86.3	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00301		88.1	0.762
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00301		88.7	0.351
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00301		101.3	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00400		7.6	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00400		7.6	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00400		8	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00400		8	0.351
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00400		8	0.213

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00400		8	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00530	>	3	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00530	>	3	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00530	>	3	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00530	>	3	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00530		3	0.229
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00530	>	3	0.351
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	00556	<	5	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	00556	<	5	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	00556	<	5	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	00556	<	5	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	00556	<	5	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	00556	<	5	0.351
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	74069		1.28	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	74069		3.6	0.351

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	74069		6.6	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	74069		7.43	0.152
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	74069		9.55	0.366
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	74069		10.6	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	82079	>	1	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	82079	>	1	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	82079	>	1	0.229
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	82079	>	1	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	82079	>	1	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	82079	>	1	0.351
21190	TULE CREEK AT TRAYLOR BOULEVARD	05/15/2013	10:50:00 AM	82903		0.15	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	05/15/2013	02:30:00 PM	82903		0.21	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	05/15/2013	09:55:00 AM	82903		0.23	0.229
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	05/15/2013	11:20:00 AM	82903		0.35	0.351
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	05/15/2013	11:37:00 AM	82903		0.37	0.366

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	05/15/2013	01:56:00 PM	82903		0.76	0.762

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0018N	21185	07/17/2013	12:57	0.366							NE	NE	BFBA
NE0019N	21189	07/17/2013	12:35	0.335							NE	NE	BFBA
NE0020N	21190	07/17/2013	12:20	0.152							NE	NE	BFBA
NE0021N	21191	07/17/2013	10:05	1.07							NE	NE	BFBA
NE0022N	21192	07/17/2013	08:42	0.152							NE	NE	BFBA
NE0023N	21193	07/17/2013	11:09	0.762							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0018N	07/17/2013	00400		7.84				
NE0018N	07/17/2013	00301		69.50				
NE0018N	07/17/2013	00094		2.47				1
NE0018N	07/17/2013	00556	<	5.00		5		
NE0018N	07/17/2013	00010		27.82				
NE0018N	07/17/2013	82079	>	1.00		1		
NE0018N	07/17/2013	82903		0.37				
NE0018N	07/17/2013	00530	>	3.00		3		
NE0018N	07/17/2013	74069		9.55				
NE0019N	07/17/2013	00400		7.67				
NE0019N	07/17/2013	00301		54.10				
NE0019N	07/17/2013	00094		1.90				1
NE0019N	07/17/2013	00556	<	5.00		5		
NE0019N	07/17/2013	00010		26.93				
NE0019N	07/17/2013	82079	>	1.00		1		
NE0019N	07/17/2013	82903		0.34				
NE0019N	07/17/2013	00530	>	3.00		3		
NE0019N	07/17/2013	74069		5.06				
NE0020N	07/17/2013	00400		7.35				
NE0020N	07/17/2013	00301		20.90				
NE0020N	07/17/2013	00094		2.08				1
NE0020N	07/17/2013	00556	<	5.00		5		
NE0020N	07/17/2013	00010		26.48				
NE0020N	07/17/2013	82079	>	1.00		1		
NE0020N	07/17/2013	82903		0.15				
NE0020N	07/17/2013	00530	>	3.00		3		
NE0020N	07/17/2013	74069		1.76				
NE0021N	07/17/2013	00400		7.87				
NE0021N	07/17/2013	00301		69.60				
NE0021N	07/17/2013	00094		2.30				1
NE0021N	07/17/2013	00556	<	5.00		5		
NE0021N	07/17/2013	00010		27.26				
NE0021N	07/17/2013	82079	>	1.00		1		
NE0021N	07/17/2013	82903		1.070				
NE0021N	07/17/2013	00530	>	3		3		
NE0021N	07/17/2013	74069		24.500				
NE0022N	07/17/2013	00400		7.35				
NE0022N	07/17/2013	00301		31.50				
NE0022N	07/17/2013	00094		1.48				1
NE0022N	07/17/2013	00556	<	5.00		5		
NE0022N	07/17/2013	00010		27.12				
NE0022N	07/17/2013	82079	>	1.00		1		
NE0022N	07/17/2013	82903		0.15				
NE0022N	07/17/2013	00530	>	3.00		3		
NE0022N	07/17/2013	74069		3.30				
NE0023N	07/17/2013	00400		7.99				
NE0023N	07/17/2013	00301		24.90				
NE0023N	07/17/2013	00094		37.60				1
NE0023N	07/17/2013	00556	<	5.00		5		
NE0023N	07/17/2013	00010		28.96				
NE0023N	07/17/2013	82079	>	1.00		1		
NE0023N	07/17/2013	82903		0.76				
NE0023N	07/17/2013	00530	>	3		3		
NE0023N	07/17/2013	74069		7.7				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X	A.	Are there any duplicate *Tag ID* numbers?
√	B.	Are the *Tag prefixes* correct?
√	C.	Are all *Tag ID* numbers 7 characters?
√	D.	Are TCEQ station location (SLOC) numbers assigned?
√	E.	Are sampling *Dates* in the correct format, MM/DD/YYYY?
√	F.	Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A	G.	Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√	H.	Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√	I.	Is the sampling date in the *Results* file the same as the one in the *Events* file?
√	J.	Values represented by a valid parameter code with the correct units?
X	K.	Are there any duplicate parameter codes for the same *Tag Id*?
X	L.	Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X	M.	Are there any tag numbers in the *Results* file that are not in the *Events* file?
√	N.	Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A	O.	Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√	A.	Are all the values reported at or below the AWRL?
√	B.	Have the outliers been verified?
√	C.	Checks on correctness of analysis or data reasonableness performed? e.g.: Is ortho-phosphorus less than total phosphorus? e.g.:Are dissolved metal concentrations less than or equal to total metals?
√	D.	Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√	E.	Are all parameter codes in the data set listed in the QAPP?
√	F.	Are all stations in the data set listed in the QAPP?

Documentation Review

N/A	A.	Are blank results acceptable as specified in the QAPP?
N/A	B.	Were control charts used to determine the acceptability of field duplicates?
N/A	C.	Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X	D.	Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X	E.	Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/17/2014

Tag ID Series: NE0018N, NE0019N, NE0020N, NE0021N, NE0022N, NE0023N

Date Range: July 17, 2013

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-17 Date Loaded:2014-07-17

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0018N to NE0023N Date Range:2013-07-17 to 2013-07-17

Event File: 7.17.13 Event.txt Number of Events:6

Results File: 7.17.13 Results revised.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		26.5	27.43333	29	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		1	7.83333	38	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		20.9	45.08333	69.6	6
PH (STANDARD UNITS)	00400		7.4	7.70000	8	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	6
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		1.76	8.64500	24.5	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.15	0.47333	1.07	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum
NE0022N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	07/17/2013	00094		1	30	60000
NE0018N	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	Y	07/17/2013	00094		2	30	60000
NE0020N	TULE CREEK AT TRAYLOR BOULEVARD	Y	07/17/2013	00094		2	30	60000
NE0019N	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	Y	07/17/2013	00094		2	30	60000
NE0021N	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	Y	07/17/2013	00094		2	30	60000

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records
NE0018N	20-SAN ANTONIO-NUECES COASTAL	21185	00094		2	128	6644.48182	74100	330

NE0019N	20-SAN ANTONIO-NUECES COASTAL	21189	00094		2	128	6644.48182	74100	330
NE0020N	20-SAN ANTONIO-NUECES COASTAL	21190	00094		2	128	6644.48182	74100	330
NE0021N	20-SAN ANTONIO-NUECES COASTAL	21191	00094		2	128	6644.48182	74100	330
NE0022N	20-SAN ANTONIO-NUECES COASTAL	21192	00094		1	128	6644.48182	74100	330
NE0023N	20-SAN ANTONIO-NUECES COASTAL	21193	00094		38	128	6644.48182	74100	330
NE0018N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		9.55	0.5	0.5	0.5	1
NE0019N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		5.06	0.5	0.5	0.5	1
NE0020N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		1.76	0.5	0.5	0.5	1
NE0021N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		24.5	0.5	0.5	0.5	1
NE0022N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		3.3	0.5	0.5	0.5	1
NE0023N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		7.7	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00010		29	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00010		27.8	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00010		27.3	1.07
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00010		27.1	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00010		26.9	0.335

21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00010		26.5	0.152
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00094		38	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00094		2	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00094		2	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00094		2	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00094		2	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00094		1	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00301		69.6	1.07
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00301		69.5	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00301		54.1	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00301		31.5	0.152
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00301		24.9	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00301		20.9	0.152
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00400		8	0.762
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00400		7.9	1.07

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00400		7.8	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00400		7.7	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00400		7.4	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00400		7.4	0.152
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00530	>	3	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00530	>	3	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00530	>	3	1.07
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00530	>	3	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00530	>	3	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00530	>	3	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00556	<	5	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00556	<	5	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00556	<	5	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00556	<	5	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00556	<	5	0.152

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00556	<	5	0.335
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	74069		24.5	1.07
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	74069		9.55	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	74069		7.7	0.762
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	74069		5.06	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	74069		3.3	0.152
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	74069		1.76	0.152
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	82079	>	1	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	82079	>	1	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	82079	>	1	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	82079	>	1	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	82079	>	1	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	82079	>	1	0.335
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	82903		1.07	1.07
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	82903		0.76	0.762

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	82903		0.37	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	82903		0.34	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	82903		0.15	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	82903		0.15	0.152

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00010		26.5	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00010		26.9	0.335
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00010		27.1	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00010		27.3	1.07
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00010		27.8	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00010		29	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00094		1	0.152
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00094		2	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00094		2	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00094		2	0.152

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00094		2	0.335
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00094		38	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00301		20.9	0.152
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00301		24.9	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00301		31.5	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00301		54.1	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00301		69.5	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00301		69.6	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00400		7.4	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00400		7.4	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00400		7.7	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00400		7.8	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00400		7.9	1.07
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00400		8	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00530	>	3	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00530	>	3	0.152

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00530	>	3	1.07
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00530	>	3	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00530	>	3	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00530	>	3	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	00556	<	5	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	00556	<	5	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	00556	<	5	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	00556	<	5	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	00556	<	5	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	00556	<	5	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	74069		1.76	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	74069		3.3	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	74069		5.06	0.335
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	74069		7.7	0.762
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	74069		9.55	0.366

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	74069		24.5	1.07
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	82079	>	1	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	82079	>	1	0.762
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	82079	>	1	0.152
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	82079	>	1	1.07
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	82079	>	1	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	82079	>	1	0.335
21190	TULE CREEK AT TRAYLOR BOULEVARD	07/17/2013	12:20:00 PM	82903		0.15	0.152
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	07/17/2013	08:42:00 AM	82903		0.15	0.152
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	07/17/2013	12:35:00 PM	82903		0.34	0.335
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	07/17/2013	12:57:00 PM	82903		0.37	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	07/17/2013	11:09:00 AM	82903		0.76	0.762
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	07/17/2013	10:05:00 AM	82903		1.07	1.07

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0024N	21185	08/26/2013	13:35	0.762							NE	NE	BFBA
NE0025N	21189	08/26/2013	13:19	0.945							NE	NE	BFBA
NE0026N	21190	08/26/2013	13:06	0.488							NE	NE	BFBA
NE0027N	21191	08/26/2013	11:03	0.427							NE	NE	BFBA
NE0028N	21192	08/26/2013	10:23	0.366							NE	NE	BFBA
NE0029N	21193	08/26/2013	12:30	0.777							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0024N	08/26/2013	00400		8.31				
NE0024N	08/26/2013	00301		84.70				
NE0024N	08/26/2013	00094		1.29				1
NE0024N	08/26/2013	00556	<	5.00		5		
NE0024N	08/26/2013	00010		28.16				
NE0024N	08/26/2013	82079	>	1.00		1		
NE0024N	08/26/2013	82903		0.76				
NE0024N	08/26/2013	00530	>	3.00		3		
NE0024N	08/26/2013	74069		13.57				
NE0025N	08/26/2013	00400		8.42				
NE0025N	08/26/2013	00301		87.80				
NE0025N	08/26/2013	00094		1.66				1
NE0025N	08/26/2013	00556	<	5.00		5		
NE0025N	08/26/2013	00010		28.56				
NE0025N	08/26/2013	82079	>	1.00		1		
NE0025N	08/26/2013	82903		0.95				
NE0025N	08/26/2013	00530	>	3.00		3		
NE0025N	08/26/2013	74069		98.14				
NE0026N	08/26/2013	00400		8.09				
NE0026N	08/26/2013	00301		65.10				
NE0026N	08/26/2013	00094		1.18				1
NE0026N	08/26/2013	00556	<	5.00		5		
NE0026N	08/26/2013	00010		28.19				
NE0026N	08/26/2013	82079	>	1.00		1		
NE0026N	08/26/2013	82903		0.49				
NE0026N	08/26/2013	00530	>	3.00		3		
NE0026N	08/26/2013	74069		7.91				
NE0027N	08/26/2013	00400		8.27				
NE0027N	08/26/2013	00301		69.00				
NE0027N	08/26/2013	00094		1.50				1
NE0027N	08/26/2013	00556	<	5.00		5		
NE0027N	08/26/2013	00010		27.94				
NE0027N	08/26/2013	82079	>	1.00		1		
NE0027N	08/26/2013	82903		0.43				
NE0027N	08/26/2013	00530	>	3.00		3		
NE0027N	08/26/2013	74069		11.93				
NE0028N	08/26/2013	00400		7.36				
NE0028N	08/26/2013	00301		35.60				
NE0028N	08/26/2013	00094		1.62				1
NE0028N	08/26/2013	00556	<	5.00		5		
NE0028N	08/26/2013	00010		28.34				
NE0028N	08/26/2013	82079	>	1.00		1		
NE0028N	08/26/2013	82903		0.37				
NE0028N	08/26/2013	00530	>	3.00		3		
NE0028N	08/26/2013	74069		34.82				
NE0029N	08/26/2013	00400		8.14				
NE0029N	08/26/2013	00301		77.70				
NE0029N	08/26/2013	00094		1.22				1
NE0029N	08/26/2013	00556	<	5.00		5		
NE0029N	08/26/2013	00010		27.94				
NE0029N	08/26/2013	82079	>	1.00		1		
NE0029N	08/26/2013	82903		0.78				
NE0029N	08/26/2013	00530	>	3		3		
NE0029N	08/26/2013	74069		22.6				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X	A.	Are there any duplicate *Tag ID* numbers?
√	B.	Are the *Tag prefixes* correct?
√	C.	Are all *Tag ID* numbers 7 characters?
√	D.	Are TCEQ station location (SLOC) numbers assigned?
√	E.	Are sampling *Dates* in the correct format, MM/DD/YYYY?
√	F.	Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A	G.	Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√	H.	Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√	I.	Is the sampling date in the *Results* file the same as the one in the *Events* file?
√	J.	Values represented by a valid parameter code with the correct units?
X	K.	Are there any duplicate parameter codes for the same *Tag Id*?
X	L.	Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X	M.	Are there any tag numbers in the *Results* file that are not in the *Events* file?
√	N.	Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A	O.	Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√	A.	Are all the values reported at or below the AWRL?
√	B.	Have the outliers been verified?
√	C.	Checks on correctness of analysis or data reasonableness performed? e.g.: Is ortho-phosphorus less than total phosphorus? e.g.:Are dissolved metal concentrations less than or equal to total metals?
√	D.	Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√	E.	Are all parameter codes in the data set listed in the QAPP?
√	F.	Are all stations in the data set listed in the QAPP?

Documentation Review

N/A	A.	Are blank results acceptable as specified in the QAPP?
N/A	B.	Were control charts used to determine the acceptability of field duplicates?
N/A	C.	Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X	D.	Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X	E.	Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/18/2014

Tag ID Series: NE0024N, NE0025N, NE0026N, NE0027N, NE0028N, NE0029N

Date Range: August 26, 2013

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-18 Date Loaded:2014-07-18

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0024N to NE0029N Date Range:2013-08-26 to 2013-08-26

Event File: 8.26.13 Event.txt Number of Events:6

Results File: 8.26.13 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		27.9	28.18333	28.6	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		1	1.50000	2	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		35.6	69.98333	87.8	6
PH (STANDARD UNITS)	00400		7.4	8.10000	8.4	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	6
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		7.91	31.49500	98.14	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.37	0.63000	0.95	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum
NE0029N	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	Y	08/26/2013	00094		1	30	60000
NE0028N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	08/26/2013	00094		2	30	60000
NE0024N	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	Y	08/26/2013	00094		1	30	60000
NE0026N	TULE CREEK AT TRAYLOR BOULEVARD	Y	08/26/2013	00094		1	30	60000
NE0025N	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	Y	08/26/2013	00094		2	30	60000
NE0027N	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	Y	08/26/2013	00094		2	30	60000

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

NE0024N	20-SAN ANTONIO-NUECES COASTAL	21185	00094		1	128	6644.48182	74100	330
NE0025N	20-SAN ANTONIO-NUECES COASTAL	21189	00094		2	128	6644.48182	74100	330
NE0026N	20-SAN ANTONIO-NUECES COASTAL	21190	00094		1	128	6644.48182	74100	330
NE0027N	20-SAN ANTONIO-NUECES COASTAL	21191	00094		2	128	6644.48182	74100	330
NE0028N	20-SAN ANTONIO-NUECES COASTAL	21192	00094		2	128	6644.48182	74100	330
NE0029N	20-SAN ANTONIO-NUECES COASTAL	21193	00094		1	128	6644.48182	74100	330
NE0024N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		13.57	0.5	0.5	0.5	1
NE0025N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		98.14	0.5	0.5	0.5	1
NE0026N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		7.91	0.5	0.5	0.5	1
NE0027N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		11.93	0.5	0.5	0.5	1
NE0028N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		34.82	0.5	0.5	0.5	1
NE0029N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		22.6	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00010		28.6	0.945
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00010		28.3	0.366
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00010		28.2	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00010		28.2	0.488

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00010		27.9	0.427
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00010		27.9	0.777
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00094		2	0.945
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00094		2	0.427
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00094		2	0.366
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00094		1	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00094		1	0.777
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00094		1	0.488
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00301		87.8	0.945
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00301		84.7	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00301		77.7	0.777
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00301		69	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00301		65.1	0.488
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00301		35.6	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00400		8.4	0.945

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00400		8.3	0.762
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00400		8.3	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00400		8.1	0.488
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00400		8.1	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00400		7.4	0.366
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00530	>	3	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00530	>	3	0.488
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00530	>	3	0.427
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00530	>	3	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00530	>	3	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00530	>	3	0.945
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00556	<	5	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00556	<	5	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00556	<	5	0.366

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00556	<	5	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00556	<	5	0.488
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00556	<	5	0.945
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	74069		98.14	0.945
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	74069		34.82	0.366
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	74069		22.6	0.777
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	74069		13.57	0.762
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	74069		11.93	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	74069		7.91	0.488
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	82079	>	1	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	82079	>	1	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	82079	>	1	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	82079	>	1	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	82079	>	1	0.488
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	82079	>	1	0.945

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	82903		0.95	0.945
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	82903		0.78	0.777
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	82903		0.76	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	82903		0.49	0.488
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	82903		0.43	0.427
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	82903		0.37	0.366

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00010		27.9	0.427
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00010		27.9	0.777
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00010		28.2	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00010		28.2	0.488
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00010		28.3	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00010		28.6	0.945
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00094		1	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00094		1	0.488
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00094		1	0.777

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00094		2	0.945
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00094		2	0.427
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00094		2	0.366
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00301		35.6	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00301		65.1	0.488
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00301		69	0.427
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00301		77.7	0.777
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00301		84.7	0.762
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00301		87.8	0.945
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00400		7.4	0.366
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00400		8.1	0.488
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00400		8.1	0.777
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00400		8.3	0.762
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00400		8.3	0.427

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00400		8.4	0.945
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00530	>	3	0.762
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00530	>	3	0.488
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00530	>	3	0.427
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00530	>	3	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00530	>	3	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00530	>	3	0.945
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	00556	<	5	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	00556	<	5	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	00556	<	5	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	00556	<	5	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	00556	<	5	0.488
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	00556	<	5	0.945
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	74069		7.91	0.488
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	74069		11.93	0.427

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	74069		13.57	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	74069		22.6	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	74069		34.82	0.366
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	74069		98.14	0.945
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	82079	>	1	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	82079	>	1	0.777
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	82079	>	1	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	82079	>	1	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	82079	>	1	0.488
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	82079	>	1	0.945
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	08/26/2013	10:23:00 AM	82903		0.37	0.366
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	08/26/2013	11:03:00 AM	82903		0.43	0.427
21190	TULE CREEK AT TRAYLOR BOULEVARD	08/26/2013	01:06:00 PM	82903		0.49	0.488
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	08/26/2013	01:35:00 PM	82903		0.76	0.762
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	08/26/2013	12:30:00 PM	82903		0.78	0.777

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	08/26/2013	01:19:00 PM	82903		0.95	0.945

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0030N	21185	11/06/2013	14:20	0.549							NE	NE	BFBA
NE0031N	21189	11/06/2013	14:00	0.518							NE	NE	BFBA
NE0032N	21190	11/06/2013	13:30	0.213							NE	NE	BFBA
NE0033N	21191	11/06/2013	12:30	0.213							NE	NE	BFBA
NE0034N	21192	11/06/2013	12:45	0.213							NE	NE	BFBA
NE0035N	21193	11/06/2013	14:55	0.823							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0030N	11/06/2013	00400		7.92				
NE0030N	11/06/2013	00301		91.10				
NE0030N	11/06/2013	00094		3.03				1
NE0030N	11/06/2013	00556	<	5.00		5		
NE0030N	11/06/2013	00010		26.55				
NE0030N	11/06/2013	82079	>	1.00		1		
NE0030N	11/06/2013	82903		0.55				
NE0030N	11/06/2013	00530	>	3.00		3		
NE0030N	11/06/2013	74069		7.62				
NE0031N	11/06/2013	00400		7.76				
NE0031N	11/06/2013	00301		78.60				
NE0031N	11/06/2013	00094		2.75				1
NE0031N	11/06/2013	00556	<	5.00		5		
NE0031N	11/06/2013	00010		27.65				
NE0031N	11/06/2013	82079	>	1.00		1		
NE0031N	11/06/2013	82903		0.52				
NE0031N	11/06/2013	00530	>	3.00		3		
NE0031N	11/06/2013	74069		11.27				
NE0032N	11/06/2013	00400		7.39				
NE0032N	11/06/2013	00301		67.80				
NE0032N	11/06/2013	00094		2.43				1
NE0032N	11/06/2013	00556	<	5.00		5		
NE0032N	11/06/2013	00010		27.17				
NE0032N	11/06/2013	82079	>	1.00		1		
NE0032N	11/06/2013	82903		0.21				
NE0032N	11/06/2013	00530	>	3.00		3		
NE0032N	11/06/2013	74069		2.15				
NE0033N	11/06/2013	00400		8.09				
NE0033N	11/06/2013	00301		91.00				
NE0033N	11/06/2013	00094		2.99				1
NE0033N	11/06/2013	00556	<	5.00		5		
NE0033N	11/06/2013	00010		27.83				
NE0033N	11/06/2013	82079	>	1.00		1		
NE0033N	11/06/2013	82903		0.21				
NE0033N	11/06/2013	00530	>	3.00		3		
NE0033N	11/06/2013	74069		1.02				
NE0034N	11/06/2013	00400		7.41				
NE0034N	11/06/2013	00301		47.30				
NE0034N	11/06/2013	00094		3.17				1
NE0034N	11/06/2013	00556	<	5.00		5		
NE0034N	11/06/2013	00010		29.41				
NE0034N	11/06/2013	82079	>	1.00		1		
NE0034N	11/06/2013	82903		0.21				
NE0034N	11/06/2013	00530	>	3.00		3		
NE0034N	11/06/2013	74069		10.74				
NE0035N	11/06/2013	00400		7.88				
NE0035N	11/06/2013	00301		84.50				
NE0035N	11/06/2013	00094		13.67				1
NE0035N	11/06/2013	00556	<	5.00		5		
NE0035N	11/06/2013	00010		26.44				
NE0035N	11/06/2013	82079	>	1.00		1		
NE0035N	11/06/2013	82903		0.82				
NE0035N	11/06/2013	00530	>	3.00		3		
NE0035N	11/06/2013	74069		7.32				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X A. Are there any duplicate *Tag ID* numbers?
√ B. Are the *Tag prefixes* correct?
√ C. Are all *Tag ID* numbers 7 characters?
√ D. Are TCEQ station location (SLOC) numbers assigned?
√ E. Are sampling *Dates* in the correct format, MM/DD/YYYY?
√ F. Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A G. Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√ H. Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√ I. Is the sampling date in the *Results* file the same as the one in the *Events* file?
√ J. Values represented by a valid parameter code with the correct units?
X K. Are there any duplicate parameter codes for the same *Tag Id*?
X L. Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X M. Are there any tag numbers in the *Results* file that are not in the *Events* file?
√ N. Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A O. Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√ A. Are all the values reported at or below the AWRL?
√ B. Have the outliers been verified?
√ C. Checks on correctness of analysis or data reasonableness performed?
e.g.: Is ortho-phosphorus less than total phosphorus?
e.g.:Are dissolved metal concentrations less than or equal to total metals?
√ D. Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√ E. Are all parameter codes in the data set listed in the QAPP?
√ F. Are all stations in the data set listed in the QAPP?

Documentation Review

N/A A. Are blank results acceptable as specified in the QAPP?
N/A B. Were control charts used to determine the acceptability of field duplicates?
N/A C. Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X D. Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X E. Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/22/2014

Tag ID Series: NE0030N, NE0031N, NE0032N , NE0033N, NE0034N, NE0035N

Date Range: November 6, 2013

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-22 Date Loaded:2014-07-22

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0030N to NE0035N Date Range:2013-11-06 to 2013-11-06

Event File: 11.6.13 Event.txt Number of Events:6

Results File: 11.6.13 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		26.4	27.50000	29.4	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		2	4.66667	14	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		47.3	76.71667	91.1	6
PH (STANDARD UNITS)	00400		7.4	7.75000	8.1	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	6
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		1.02	6.68667	11.27	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.21	0.42000	0.82	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum
NE0035N	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	Y	11/06/2013	00094		14	30	60000
NE0034N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	11/06/2013	00094		3	30	60000
NE0030N	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	Y	11/06/2013	00094		3	30	60000
NE0032N	TULE CREEK AT TRAYLOR BOULEVARD	Y	11/06/2013	00094		2	30	60000
NE0031N	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	Y	11/06/2013	00094		3	30	60000
NE0033N	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	Y	11/06/2013	00094		3	30	60000

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

NE0030N	20-SAN ANTONIO-NUECES COASTAL	21185	00094		3	128	6644.48182	74100	330
NE0031N	20-SAN ANTONIO-NUECES COASTAL	21189	00094		3	128	6644.48182	74100	330
NE0032N	20-SAN ANTONIO-NUECES COASTAL	21190	00094		2	128	6644.48182	74100	330
NE0033N	20-SAN ANTONIO-NUECES COASTAL	21191	00094		3	128	6644.48182	74100	330
NE0034N	20-SAN ANTONIO-NUECES COASTAL	21192	00094		3	128	6644.48182	74100	330
NE0035N	20-SAN ANTONIO-NUECES COASTAL	21193	00094		14	128	6644.48182	74100	330
NE0030N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		7.62	0.5	0.5	0.5	1
NE0031N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		11.27	0.5	0.5	0.5	1
NE0032N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		2.15	0.5	0.5	0.5	1
NE0033N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		1.02	0.5	0.5	0.5	1
NE0034N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		10.74	0.5	0.5	0.5	1
NE0035N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		7.32	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00010		29.4	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00010		27.8	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00010		27.6	0.518
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00010		27.2	0.213

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00010		26.6	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00010		26.4	0.823
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00094		14	0.823
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00094		3	0.549
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00094		3	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00094		3	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00094		3	0.518
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00094		2	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00301		91.1	0.549
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00301		91	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00301		84.5	0.823
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00301		78.6	0.518
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00301		67.8	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00301		47.3	0.213

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00400		8.1	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00400		7.9	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00400		7.9	0.823
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00400		7.8	0.518
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00400		7.4	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00400		7.4	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00530	>	3	0.549
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00530	>	3	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00530	>	3	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00530	>	3	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00530	>	3	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00530	>	3	0.518
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00556	<	5	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00556	<	5	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00556	<	5	0.213

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00556	<	5	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00556	<	5	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00556	<	5	0.518
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	74069		11.27	0.518
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	74069		10.74	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	74069		7.62	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	74069		7.32	0.823
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	74069		2.15	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	74069		1.02	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	82079	>	1	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	82079	>	1	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	82079	>	1	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	82079	>	1	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	82079	>	1	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	82079	>	1	0.518

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	82903		0.82	0.823
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	82903		0.55	0.549
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	82903		0.52	0.518
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	82903		0.21	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	82903		0.21	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	82903		0.21	0.213

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00010		26.4	0.823
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00010		26.6	0.549
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00010		27.2	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00010		27.6	0.518
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00010		27.8	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00010		29.4	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00094		2	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00094		3	0.549

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00094		3	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00094		3	0.518
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00094		3	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00094		14	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00301		47.3	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00301		67.8	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00301		78.6	0.518
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00301		84.5	0.823
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00301		91	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00301		91.1	0.549
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00400		7.4	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00400		7.4	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00400		7.8	0.518
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00400		7.9	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00400		7.9	0.823

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00400		8.1	0.213
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00530	>	3	0.549
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00530	>	3	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00530	>	3	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00530	>	3	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00530	>	3	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00530	>	3	0.518
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	00556	<	5	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	00556	<	5	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	00556	<	5	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	00556	<	5	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	00556	<	5	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	00556	<	5	0.518
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	74069		1.02	0.213

21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	74069		2.15	0.213
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	74069		7.32	0.823
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	74069		7.62	0.549
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	74069		10.74	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	74069		11.27	0.518
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	82079	>	1	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	82079	>	1	0.823
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	82079	>	1	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	82079	>	1	0.213
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	82079	>	1	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	82079	>	1	0.518
21190	TULE CREEK AT TRAYLOR BOULEVARD	11/06/2013	01:30:00 PM	82903		0.21	0.213
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	11/06/2013	12:45:00 PM	82903		0.21	0.213
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	11/06/2013	12:30:00 PM	82903		0.21	0.213
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	11/06/2013	02:00:00 PM	82903		0.52	0.518

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	11/06/2013	02:20:00 PM	82903		0.55	0.549
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	11/06/2013	02:55:00 PM	82903		0.82	0.823

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0036N	21185	04/08/2014	12:00	0.558							NE	NE	BFBA
NE0037N	21189	04/08/2014	11:35	0.128							NE	NE	BFBA
NE0038N	21190	04/08/2014	10:00	0.253							NE	NE	BFBA
NE0039N	21191	04/08/2014	08:30	0.229							NE	NE	BFBA
NE0040N	21192	04/08/2014	10:50	0.052							NE	NE	BFBA
NE0041N	21193	04/08/2014	09:20	0.509							NE	NE	BFBA

TAG ID	END DATE	PARAMETER CODE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0036N	04/08/2014	00400		7.23				
NE0036N	04/08/2014	00301		64.90				
NE0036N	04/08/2014	00094		2.79				1
NE0036N	04/08/2014	00556	<	5.00		5		
NE0036N	04/08/2014	00010		20.35				
NE0036N	04/08/2014	82079	>	1.00		1		
NE0036N	04/08/2014	82903		0.56				
NE0036N	04/08/2014	00530	>	3.00		3		
NE0036N	04/08/2014	74069		9.82				
NE0037N	04/08/2014	00400		7.38				
NE0037N	04/08/2014	00301		73.40				
NE0037N	04/08/2014	00094		2.82				1
NE0037N	04/08/2014	00556	<	5.00		5		
NE0037N	04/08/2014	00010		23.79				
NE0037N	04/08/2014	82079	>	1.00		1		
NE0037N	04/08/2014	82903		0.13				
NE0037N	04/08/2014	00530	>	3.00		3		
NE0037N	04/08/2014	74069		4.26				
NE0038N	04/08/2014	00400		6.89				
NE0038N	04/08/2014	00301		41.80				
NE0038N	04/08/2014	00094		2.56				1
NE0038N	04/08/2014	00556	<	5.00		5		
NE0038N	04/08/2014	00010		17.24				
NE0038N	04/08/2014	82079	>	1.00		1		
NE0038N	04/08/2014	82903		0.25				
NE0038N	04/08/2014	00530	>	3.00		3		
NE0038N	04/08/2014	74069		2.58				
NE0039N	04/08/2014	00400		7.34				
NE0039N	04/08/2014	00301		93.20				
NE0039N	04/08/2014	00094		2.78				1
NE0039N	04/08/2014	00556	<	5.00		5		
NE0039N	04/08/2014	00010		14.42				
NE0039N	04/08/2014	82079	>	1.00		1		
NE0039N	04/08/2014	82903		0.23				
NE0039N	04/08/2014	00530	>	3.00		3		
NE0039N	04/08/2014	74069		2.11				
NE0040N	04/08/2014	00400		7.20				
NE0040N	04/08/2014	00301		78.90				
NE0040N	04/08/2014	00094		2.80				1
NE0040N	04/08/2014	00556	<	5.00		5		
NE0040N	04/08/2014	00010		24.02				
NE0040N	04/08/2014	82079	>	1.00		1		
NE0040N	04/08/2014	82903		0.05				1
NE0040N	04/08/2014	00530	>	3.00		3		
NE0040N	04/08/2014	74069		3.57				
NE0041N	04/08/2014	00400		7.45				
NE0041N	04/08/2014	00301		36.10				
NE0041N	04/08/2014	00094		29.05				1
NE0041N	04/08/2014	00556	<	5.00		5		
NE0041N	04/08/2014	00010		21.65				
NE0041N	04/08/2014	82079	>	1.00		1		
NE0041N	04/08/2014	82903		0.51				
NE0041N	04/08/2014	00530	>	3.00		3		
NE0041N	04/08/2014	74069		4.77				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X A. Are there any duplicate *Tag ID* numbers?
√ B. Are the *Tag prefixes* correct?
√ C. Are all *Tag ID* numbers 7 characters?
√ D. Are TCEQ station location (SLOC) numbers assigned?
√ E. Are sampling *Dates* in the correct format, MM/DD/YYYY?
√ F. Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A G. Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√ H. Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√ I. Is the sampling date in the *Results* file the same as the one in the *Events* file?
√ J. Values represented by a valid parameter code with the correct units?
X K. Are there any duplicate parameter codes for the same *Tag Id*?
X L. Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X M. Are there any tag numbers in the *Results* file that are not in the *Events* file?
√ N. Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A O. Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√ A. Are all the values reported at or below the AWRL?
√ B. Have the outliers been verified?
√ C. Checks on correctness of analysis or data reasonableness performed?
e.g.: Is ortho-phosphorus less than total phosphorus?
e.g.:Are dissolved metal concentrations less than or equal to total metals?
√ D. Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√ E. Are all parameter codes in the data set listed in the QAPP?
√ F. Are all stations in the data set listed in the QAPP?

Documentation Review

N/A A. Are blank results acceptable as specified in the QAPP?
N/A B. Were control charts used to determine the acceptability of field duplicates?
N/A C. Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X D. Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X E. Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/22/2014

Tag ID Series: NE0036N, NE0037N, NE0038N, NE0039N, NE0040, NE0041N

Date Range: April 8, 2014

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-07-22 Date Loaded:2014-07-22

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0036N to NE0041N Date Range:2014-04-08 to 2014-04-08

Event File: 4.8.14 Event.txt Number of Events:6

Results File: 4.8.14 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		14.4	20.23333	24	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		3	7.33333	29	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		36.1	64.71667	93.2	6
PH (STANDARD UNITS)	00400		6.9	7.23333	7.4	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	6
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		2.11	4.51833	9.82	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.05	0.28833	0.56	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum
NE0040N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	04/08/2014	00094		3	30	60000
NE0039N	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	Y	04/08/2014	00094		3	30	60000
NE0038N	TULE CREEK AT TRAYLOR BOULEVARD	Y	04/08/2014	00094		3	30	60000
NE0037N	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	Y	04/08/2014	00094		3	30	60000
NE0036N	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	Y	04/08/2014	00094		3	30	60000
NE0041N	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	Y	04/08/2014	00094		29	30	60000
NE0040N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	04/08/2014	82903		0.05	0.1	80

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records
NE0036N	20-SAN ANTONIO-NUECES COASTAL	21185	00094		3	128	6644.48182	74100	330
NE0037N	20-SAN ANTONIO-NUECES COASTAL	21189	00094		3	128	6644.48182	74100	330
NE0038N	20-SAN ANTONIO-NUECES COASTAL	21190	00094		3	128	6644.48182	74100	330
NE0039N	20-SAN ANTONIO-NUECES COASTAL	21191	00094		3	128	6644.48182	74100	330
NE0040N	20-SAN ANTONIO-NUECES COASTAL	21192	00094		3	128	6644.48182	74100	330
NE0041N	20-SAN ANTONIO-NUECES COASTAL	21193	00094		29	128	6644.48182	74100	330
NE0038N	20-SAN ANTONIO-NUECES COASTAL	21190	00400		6.9	7	7.69245	8.9	331
NE0036N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		9.82	0.5	0.5	0.5	1
NE0037N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		4.26	0.5	0.5	0.5	1
NE0038N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		2.58	0.5	0.5	0.5	1
NE0039N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		2.11	0.5	0.5	0.5	1
NE0040N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		3.57	0.5	0.5	0.5	1
NE0041N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		4.77	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00010		24	0.052
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00010		23.8	0.128
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00010		21.6	0.509

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00010		20.4	0.558
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00010		17.2	0.253
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00010		14.4	0.229
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00094		29	0.509
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00094		3	0.558
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00094		3	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00094		3	0.052
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00094		3	0.253
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00094		3	0.128
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00301		93.2	0.229
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00301		78.9	0.052
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00301		73.4	0.128
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00301		64.9	0.558
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00301		41.8	0.253
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00301		36.1	0.509

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00400		7.4	0.128
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00400		7.4	0.509
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00400		7.3	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00400		7.2	0.558
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00400		7.2	0.052
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00400		6.9	0.253
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00530	>	3	0.558
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00530	>	3	0.253
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00530	>	3	0.229
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00530	>	3	0.509
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00530	>	3	0.052
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00530	>	3	0.128
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00556	<	5	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00556	<	5	0.509
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00556	<	5	0.052

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00556	<	5	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00556	<	5	0.253
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00556	<	5	0.128
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	74069		9.82	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	74069		4.77	0.509
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	74069		4.26	0.128
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	74069		3.57	0.052
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	74069		2.58	0.253
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	74069		2.11	0.229
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	82079	>	1	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	82079	>	1	0.509
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	82079	>	1	0.052
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	82079	>	1	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	82079	>	1	0.253
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	82079	>	1	0.128

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	82903		0.56	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	82903		0.51	0.509
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	82903		0.25	0.253
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	82903		0.23	0.229
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	82903		0.13	0.128
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	82903		0.05	0.052

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00010		14.4	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00010		17.2	0.253
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00010		20.4	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00010		21.6	0.509
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00010		23.8	0.128
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00010		24	0.052
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00094		3	0.558
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00094		3	0.052

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00094		3	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00094		3	0.253
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00094		3	0.128
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00094		29	0.509
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00301		36.1	0.509
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00301		41.8	0.253
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00301		64.9	0.558
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00301		73.4	0.128
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00301		78.9	0.052
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00301		93.2	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00400		6.9	0.253
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00400		7.2	0.558
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00400		7.2	0.052
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00400		7.3	0.229
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00400		7.4	0.128

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00400		7.4	0.509
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00530	>	3	0.558
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00530	>	3	0.253
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00530	>	3	0.229
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00530	>	3	0.509
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00530	>	3	0.052
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00530	>	3	0.128
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	00556	<	5	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	00556	<	5	0.509
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	00556	<	5	0.052
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	00556	<	5	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	00556	<	5	0.253
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	00556	<	5	0.128
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	74069		2.11	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	74069		2.58	0.253

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	74069		3.57	0.052
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	74069		4.26	0.128
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	74069		4.77	0.509
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	74069		9.82	0.558
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	82079	>	1	0.558
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	82079	>	1	0.509
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	82079	>	1	0.052
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	82079	>	1	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	82079	>	1	0.253
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	82079	>	1	0.128
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	04/08/2014	10:50:00 AM	82903		0.05	0.052
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	04/08/2014	11:35:00 AM	82903		0.13	0.128
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	04/08/2014	08:30:00 AM	82903		0.23	0.229
21190	TULE CREEK AT TRAYLOR BOULEVARD	04/08/2014	10:00:00 AM	82903		0.25	0.253
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	04/08/2014	09:20:00 AM	82903		0.51	0.509

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	04/08/2014	12:00:00 PM	82903		0.56	0.558

TAG ID	STATION ID	END DATE	END TIME	END DEPTH	START DATE	START TIME	START DEPTH	CATEGORY	TYPE	COMMENT	SUBMITTING ENTITY	COLLECTING ENTITY	MONITORING TYPE
NE0042N	21185	06/19/2014	13:30	0.610							NE	NE	BFBA
NE0043N	21189	06/19/2014	13:00	0.305							NE	NE	BFBA
NE0044N	21190	06/19/2014	12:40	0.204							NE	NE	BFBA
NE0045N	21191	06/19/2014	10:00	0.192							NE	NE	BFBA
NE0046N	21192	06/19/2014	08:54	0.171							NE	NE	BFBA
NE0047N	21193	06/19/2014	11:00	0.686							NE	NE	BFBA

TAG ID	END DATE	PARAMETE	GT/LT	VALUE	LOD	LOQ	QUALIFER CODE	VERIFY FLAG
NE0042N	06/19/2014	00400		7.83				
NE0042N	06/19/2014	00301		91.10				
NE0042N	06/19/2014	00094		2.49				1
NE0042N	06/19/2014	00556	<	5.00		5		
NE0042N	06/19/2014	00010		29.66				
NE0042N	06/19/2014	82079	>	1.00		1		
NE0042N	06/19/2014	82903		0.61				
NE0042N	06/19/2014	00530	>	3.00		3		
NE0042N	06/19/2014	74069		9.22				
NE0043N	06/19/2014	00400		7.74				
NE0043N	06/19/2014	00301		93.10				
NE0043N	06/19/2014	00094		2.56				1
NE0043N	06/19/2014	00556	<	5.00		5		
NE0043N	06/19/2014	00010		33.12				
NE0043N	06/19/2014	82079	>	1.00		1		
NE0043N	06/19/2014	82903		0.30				
NE0043N	06/19/2014	00530	>	3.00		3		
NE0043N	06/19/2014	74069		7.59				
NE0044N	06/19/2014	00400		7.49				
NE0044N	06/19/2014	00301		29.30				
NE0044N	06/19/2014	00094		3.05				1
NE0044N	06/19/2014	00556	<	5.00		5		
NE0044N	06/19/2014	00010		26.77				
NE0044N	06/19/2014	82079	>	1.00		1		
NE0044N	06/19/2014	82903		0.20				
NE0044N	06/19/2014	00530	>	3.00		3		
NE0044N	06/19/2014	74069		2.06				
NE0045N	06/19/2014	00400		7.83				
NE0045N	06/19/2014	00301		91.00				
NE0045N	06/19/2014	00094		2.50				1
NE0045N	06/19/2014	00556	<	5.00		5		
NE0045N	06/19/2014	00010		29.29				
NE0045N	06/19/2014	82079	>	1.00		1		
NE0045N	06/19/2014	82903		0.19				
NE0045N	06/19/2014	00530	>	3.00		3		
NE0045N	06/19/2014	74069		0.45				
NE0046N	06/19/2014	00400		7.55				
NE0046N	06/19/2014	00301		92.00				
NE0046N	06/19/2014	00094		2.46				1
NE0046N	06/19/2014	00556	<	5.00		5		
NE0046N	06/19/2014	00010		27.25				
NE0046N	06/19/2014	82079	>	1.00		1		
NE0046N	06/19/2014	82903		0.17				
NE0046N	06/19/2014	00530	>	3.00		3		
NE0046N	06/19/2014	74069		6.01				
NE0047N	06/19/2014	00400		7.73				
NE0047N	06/19/2014	00301		9.80				
NE0047N	06/19/2014	00094		50.12				
NE0047N	06/19/2014	00556	<	5.00		5		
NE0047N	06/19/2014	00010		29.44				
NE0047N	06/19/2014	82079	>	1.00		1		
NE0047N	06/19/2014	82903		0.69				
NE0047N	06/19/2014	00530	>	3.00		3		
NE0047N	06/19/2014	74069		5.72				

Clear Form

Data Review Checklist

✔, ✘, or N/A

Data Format and Structure

X A. Are there any duplicate *Tag ID* numbers?
√ B. Are the *Tag prefixes* correct?
√ C. Are all *Tag ID* numbers 7 characters?
√ D. Are TCEQ station location (SLOC) numbers assigned?
√ E. Are sampling *Dates* in the correct format, MM/DD/YYYY?
√ F. Is the sampling *Time* based on the 24-hour clock (e.g. 13:04)?
N/A G. Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)?
√ H. Were Submitting Entity, Collecting Entity & Monitoring Type Codes used correctly?
√ I. Is the sampling date in the *Results* file the same as the one in the *Events* file?
√ J. Values represented by a valid parameter code with the correct units?
X K. Are there any duplicate parameter codes for the same *Tag Id*?
X L. Are there any invalid symbols in the Greater Than/Less Than (*GT/LT*) field?
X M. Are there any tag numbers in the *Results* file that are not in the *Events* file?
√ N. Have confirmed outliers been identified? (with a "1" in the Verify_flg field)
N/A O. Have grab data (bacteria, for example) collected during 24-hr events been reported separately as RT samples?

Data Quality Review

√ A. Are all the values reported at or below the AWRL?
√ B. Have the outliers been verified?
√ C. Checks on correctness of analysis or data reasonableness performed?
e.g.: Is ortho-phosphorus less than total phosphorus?
e.g.:Are dissolved metal concentrations less than or equal to total metals?
√ D. Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?
√ E. Are all parameter codes in the data set listed in the QAPP?
√ F. Are all stations in the data set listed in the QAPP?

Documentation Review

N/A A. Are blank results acceptable as specified in the QAPP?
N/A B. Were control charts used to determine the acceptability of field duplicates?
N/A C. Was documentation of any unusual occurrences that may affect water quality included in the Event file Comments field?
X D. Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.
X E. Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.

Data Review Checklist

Describe any data reporting inconsistencies with AWRL specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary): _____

Date Submitted to TCEQ: 07/22/2014

Tag ID Series: NE0036N, NE0037N, NE0038N, NE0039N, NE0040, NE0041N

Date Range: April 8, 2014

Data Source: Naismith Engineering, Inc.

Comments (attach README.TXT file if applicable): _____

Contracting Agency's Data Manager Signature: _____

Date: _____

SWQMIS Data Loading Validator Report

Program Area/Contractor: NE

Date Received: 2014-08-04 Date Loaded:2014-08-04

Submitting Entity (Source Code 1)	Collecting Entity (Source Code 2)	Program/Monitoring Type
NAISMITH ENGINEERING, INC.(NE)	NAISMITH ENGINEERING, INC.(NE)	Monitoring targeted towards biased flow or runoff event and for determining effectiveness of Best Management Practices (BMPs)(BFBA)

Tag Range: NE0042N to NE0047N Date Range:2014-06-19 to 2014-06-19

Event File: Event.txt Number of Events:6

Results File: 6.19.14 Results.txt Number of Results:54

Frequency of Parameter Occurrence:

Parameter Description	Parameter Code	GTLT	Minimum	Mean	Maximum	Number of Occurrences
TEMPERATURE, WATER (DEGREES CENTIGRADE)	00010		26.8	29.25000	33.1	6
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	00094		2	10.50000	50	6
OXYGEN, DISSOLVED (PERCENT OF SATURATION)	00301		9.8	67.71667	93.1	6
PH (STANDARD UNITS)	00400		7.5	7.68333	7.8	6
RESIDUE, TOTAL NONFILTRABLE (MG/L)	00530	>	3	3.00000	3	6
OIL&GREASE,FREON EXTR-GRAV METH,TOT,REC (MG/L)	00556	<	5	5.00000	5	6
STREAM FLOW ESTIMATE (CFS)	74069		0.45	5.17500	9.22	6
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	82079	>	1	1.00000	1	6
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	82903		0.17	0.36000	0.69	6

Stations In Dataset:

Basin ID	Station ID Code	Station Description	Number of Sampling Events
20-SAN ANTONIO-NUECES COASTAL	21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	1
20-SAN ANTONIO-NUECES COASTAL	21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	1
20-SAN ANTONIO-NUECES COASTAL	21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	1
20-SAN ANTONIO-NUECES COASTAL	21190	TULE CREEK AT TRAYLOR BOULEVARD	1
20-SAN ANTONIO-NUECES COASTAL	21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	1
20-SAN ANTONIO-NUECES COASTAL	21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	1

Outliers:

Tag ID	Station Description	Submitter Verified	End Date	Parameter Code	GTLT	Value	Minimum	Maximum
NE0046N	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	Y	06/19/2014	00094		2	30	60000
NE0045N	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	Y	06/19/2014	00094		3	30	60000
NE0042N	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	Y	06/19/2014	00094		2	30	60000
NE0043N	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	Y	06/19/2014	00094		3	30	60000
NE0044N	TULE CREEK AT TRAYLOR BOULEVARD	Y	06/19/2014	00094		3	30	60000

Historical Basin Comparison:

Tag ID	Basin Id	Station ID	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records
NE0043N	20-SAN ANTONIO-NUECES COASTAL	21189	00010		33.1	7.9	22.57692	32.2	325

NE0042N	20-SAN ANTONIO-NUECES COASTAL	21185	00094		2	128	6179.59692	59800	325
NE0043N	20-SAN ANTONIO-NUECES COASTAL	21189	00094		3	128	6179.59692	59800	325
NE0044N	20-SAN ANTONIO-NUECES COASTAL	21190	00094		3	128	6179.59692	59800	325
NE0045N	20-SAN ANTONIO-NUECES COASTAL	21191	00094		3	128	6179.59692	59800	325
NE0046N	20-SAN ANTONIO-NUECES COASTAL	21192	00094		2	128	6179.59692	59800	325
NE0047N	20-SAN ANTONIO-NUECES COASTAL	21193	00094		50	128	6179.59692	59800	325
NE0042N	20-SAN ANTONIO-NUECES COASTAL	21185	74069		9.22	0.5	0.5	0.5	1
NE0043N	20-SAN ANTONIO-NUECES COASTAL	21189	74069		7.59	0.5	0.5	0.5	1
NE0044N	20-SAN ANTONIO-NUECES COASTAL	21190	74069		2.06	0.5	0.5	0.5	1
NE0045N	20-SAN ANTONIO-NUECES COASTAL	21191	74069		0.45	0.5	0.5	0.5	1
NE0046N	20-SAN ANTONIO-NUECES COASTAL	21192	74069		6.01	0.5	0.5	0.5	1
NE0047N	20-SAN ANTONIO-NUECES COASTAL	21193	74069		5.72	0.5	0.5	0.5	1

Historical Station Comparison:

Tag ID	Station Id	Station Description	Parameter Code	GTLT	Value	Min	Mean	Max	Number of Records

Highest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00010		33.1	0.305
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00010		29.7	0.61
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00010		29.4	0.686
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00010		29.3	0.192

21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00010		27.2	0.171
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00010		26.8	0.204
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00094		50	0.686
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00094		3	0.305
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00094		3	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00094		3	0.204
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00094		2	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00094		2	0.171
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00301		93.1	0.305
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00301		92	0.171
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00301		91.1	0.61
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00301		91	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00301		29.3	0.204
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00301		9.8	0.686
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00400		7.8	0.61

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00400		7.8	0.192
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00400		7.7	0.305
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00400		7.7	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00400		7.6	0.171
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00400		7.5	0.204
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00530	>	3	0.61
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00530	>	3	0.204
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00530	>	3	0.192
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00530	>	3	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00530	>	3	0.171
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00530	>	3	0.305
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00556	<	5	0.61
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00556	<	5	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00556	<	5	0.171

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00556	<	5	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00556	<	5	0.204
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00556	<	5	0.305
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	74069		9.22	0.61
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	74069		7.59	0.305
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	74069		6.01	0.171
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	74069		5.72	0.686
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	74069		2.06	0.204
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	74069		0.45	0.192
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	82079	>	1	0.61
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	82079	>	1	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	82079	>	1	0.171
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	82079	>	1	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	82079	>	1	0.204
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	82079	>	1	0.305

21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	82903		0.69	0.686
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	82903		0.61	0.61
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	82903		0.3	0.305
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	82903		0.2	0.204
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	82903		0.19	0.192
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	82903		0.17	0.171

Lowest Values Per Parameter:

Station Id	Station Description	End Date	End Time	Parameter Code	GTLT	Value	End Depth
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00010		26.8	0.204
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00010		27.2	0.171
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00010		29.3	0.192
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00010		29.4	0.686
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00010		29.7	0.61
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00010		33.1	0.305
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00094		2	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00094		2	0.171

21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00094		3	0.305
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00094		3	0.204
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00094		3	0.192
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00094		50	0.686
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00301		9.8	0.686
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00301		29.3	0.204
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00301		91	0.192
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00301		91.1	0.61
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00301		92	0.171
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00301		93.1	0.305
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00400		7.5	0.204
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00400		7.6	0.171
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00400		7.7	0.305
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00400		7.7	0.686
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00400		7.8	0.61

21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00400		7.8	0.192
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00530	>	3	0.61
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00530	>	3	0.204
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00530	>	3	0.192
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00530	>	3	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00530	>	3	0.171
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00530	>	3	0.305
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	00556	<	5	0.61
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	00556	<	5	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	00556	<	5	0.171
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	00556	<	5	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	00556	<	5	0.204
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	00556	<	5	0.305
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	74069		0.45	0.192

21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	74069		2.06	0.204
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	74069		5.72	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	74069		6.01	0.171
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	74069		7.59	0.305
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	74069		9.22	0.61
21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	82079	>	1	0.61
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	82079	>	1	0.686
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	82079	>	1	0.171
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	82079	>	1	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	82079	>	1	0.204
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	82079	>	1	0.305
21192	TULE CREEK 37M EAST AND 75M NORTH OF INTERSECTION OF NORTH LIVEOAK STREET AND DELTA STREET	06/19/2014	08:54:00 AM	82903		0.17	0.171
21191	TULE CREEK 77M EAST AND 117M SOUTH OF INTERSECTION OF CHERRY HILL DRIVE AND HENDERSON STREET	06/19/2014	10:00:00 AM	82903		0.19	0.192
21190	TULE CREEK AT TRAYLOR BOULEVARD	06/19/2014	12:40:00 PM	82903		0.2	0.204
21189	TULE CREEK ABOVE SEDIMENT POND CONFLUENCE	06/19/2014	01:00:00 PM	82903		0.3	0.305

21185	TULE CREEK SEDIMENT POND UPSTREAM OF STATE HIGHWAY 35	06/19/2014	01:30:00 PM	82903		0.61	0.61
21193	TULE CREEK IMMEDIATELY BELOW TULE PARK DRIVE	06/19/2014	11:00:00 AM	82903		0.69	0.686

Appendix G
Modeling Report

West Tule Creek Sediment Trap Pond Modeling

A component of work carried out under Federal Grants # 99614614, 99614616 and 99614617

Aransas County, Texas, 2014

LDP Consultants, Inc.
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PROBLEM DEFINITION AND BACKGROUND

This document provides information on modeling conducted in the context of Federal Grants #99614614, 99614616 and 99614617 which provided the basis for a project assessing BMP behavior in Tule Creek at Rockport, Texas. The modeling described herein was carried out fully in accordance with the QAPP developed for that project, namely 'West Tule Creek Sediment Trap Pond and Habitat Enhancement Quality Assurance Project Plan for Modeling Revision1.0 QUALHYMO'. Since the work corresponded closely to the QAPP, sections of this document have been taken from the QAPP verbatim, amended as necessary to reflect the timing and findings of the work carried out.

Problem Statement

Sediments and pollutants associated with sediment are primary pollutants of concern in Tule Creek and its receiving waterway, Little Bay. The modeling described in this section was conducted in the context of a wider effort launched to provide a better characterization of solids present in Tule Creek's runoff. As such, this modeling is not related to a wider modeling effort (e.g. TMDL or WPP) but was developed at a very small scale and limited scope, in order to gain a better understanding of facility performance. To do this, a simplified continuous simulation model was constructed, based on available local data, and applied as described below.

Background Information

Aransas County is located in the Coastal Bend area of South Texas, situated northeast of Corpus Christi. The County is typified by flat slopes and sandy soils in the urban areas. The population of Aransas County has increased significantly over the past 50 years and will continue to increase. This increase is threatening the pristine environment and rich quality of life. The County is situated along a flat coastal plain surrounded by seven bays. The three inland bays, Copano, Port and Mission Bays, located in western Aransas County, currently have a bacteria TMDL study in progress. The other bay systems located generally east of Aransas County meet the state's water quality standards. Aransas County and the City of Rockport are not included in an urbanized area as defined by the US Census and do not have regulated municipal separate storm sewer (MS4) systems. As a result, these local governments are not required to have a TCEQ municipal storm water permit.

The growth in population of both permanent and part-time residents is fueling development pressures which pose a serious threat to the quality of the wetlands, wildlife habitats, and water resources that make the region attractive. As more and more land is converted to residential or commercial uses, the potential for water quality degradation is increased.

This threat is most obvious in Little Bay, a shallow bay within the corporate boundaries of the City of Rockport that historically has supported a productive fishery, large flocks of wintering waterfowl, and large populations of nesting water birds. It is used year round with a variety of water-based recreation, including kayaking, boat pier and wade fishing, swimming, windsurfing, and birding. Water quality studies conducted by MA-NERR in Little Bay have documented high

levels of nitrogen loading and reduced salinity attributed to stormwater outflows. These conditions are further exacerbated by poor water exchange between Little Bay and Aransas Bay.

At present in Little Bay, a substantial delta is growing immediately downstream of Tule Creek's outfall. Erosion and construction activity are the primary activities that have contributed to this sediment accumulation in Little Bay. Sediments and pollutants associated with sediment are primary pollutants of concern found in Tule Creek and Little Bay.

Tule Creek is a 2,100 acre watershed that discharges both stormwater drainage and WWTP effluent into Little Bay. The stream drains areas of the City of Rockport, the Town of Fulton, and areas of Aransas County outside the jurisdiction of either municipality. The Tule Creek watershed is urbanizing, and all governmental entities in Aransas County are involved in a cooperative effort to protect Little Bay. There is consensus among these entities that the Tule Creek drainage and pollution of Little Bay are top-priority concerns.

In Aransas County, the Tule Creek watershed exhibits some of the changes to the hydrologic cycle components described above as a result of development. It was reconfigured and enlarged to better drain the urbanizing part of the watershed and discharge excess runoff downstream. The growing delta fan directly downstream of the Tule Creek discharge point into Little Bay is indicative of active erosion and sediment transport processes. Less obvious is the notion that as the flow line of a creek is deepened in a sandy bank system like Tule Creek, dewatering of creek banks, shallow water bearing sands and surface water depressions may occur and alter the various natural habitats and ecosystems that existed prior to development, affecting infiltration and shallow aquifer recharge.

Aransas County, along with the City of Rockport, Aransas County Navigation District, and the Town of Fulton, are cooperatively developing a regional storm water master plan, the Aransas County Regional Stormwater Management Plan (Plan). The Plan includes implementing storm water controls within the priority Tule Creek watershed. The program's approach is to integrate stormwater quantity and quality concerns with ecological habitat considerations to help guide land development, construction, and stormwater runoff requirements. The proposed project will help accomplish a decrease in the discharge of sediment and pollutant-clad sediments transported into Little Bay while helping to preserve the ecological integrity of the creek system through the removal of selected invasive species. It also introduces a regional and low maintenance approach toward water quality enhancement.

However, detailed local water quality information for Tule Creek is very limited. Data from other part of the country must be used to broadly assess water quality constituents, pollutant removal rates and long-term performance of stormwater quality control facilities. The County is unique when compared to the rest of the country, and using data derived from other areas of the country does not adequately assess local characteristics.

This portion of the coastal plain is generally devoid of riverine or creek systems because of the flat topography. Runoff is captured in pothole depression storage areas. Potholes are water-holding depressions that collect direct rainfall and stormwater runoff from shallow basin drainage areas and provide storage and infiltration opportunities. If enough runoff has been captured, the water level within the depression area will rise and cascade over the edge and flow

away towards a lower elevation, such as another depression area, swale or other flow path to the receiving salt flat, marsh, or bay.

Since it is the long term behavior of sediments that is of primary interest, a continuous simulation model was identified as a requirement to enable estimation of the system response continuously over time. It was noted that the model would need to have the ability to represent the contributing watershed, the BMP, and potentially the channel linking the two. It must also be able to represent flow and sediments carried by that flow, on a continuous basis. Finally, it must be a model that can be deployed and applied in the context of this project, namely a rapid and low level of effort, and one with only basic information on runoff relationships and on sediment generation. A model which is suitable for this condition is QUALHYMO.[1]

LITERATURE REVIEW

Overview

The US Geological Survey has identified sediment as one of the most prevalent urban runoff pollutants in its National Water Quality Assessment Program.[2] Transport and deposition of sediment into the receiving creek or bay during storm events can result in the depletion of

- dissolved oxygen
- increased turbidity
- aquatic habitat degradation
- nutrients

It can also transport and down-slope distribution of sediment clad pollutants, including

- phosphorus
- metals
- pathogen
- organic substances

National studies have shown that urban areas have been closely associated with the degradation of aquatic habitats and ecosystems.[3] Urban areas are likely to increase imperviousness which affect the natural flow regime of stormwater in predictable ways.[4] Development in Aransas County impacts the drainage systems, aquatic habitats, and ecosystems.

Rates of runoff change as the natural landscape is developed. Developed land has steeper slopes and smoother surfaces that are less pervious, resulting in excess runoff that arrives sooner with an increased volume. The National Urban Runoff Program (NURP) quantified much of this

[1] QUALHYMO USER Manual and Documentation, Version QUALHYMO0777v1c, March, 2009 (Appendix D).
[2] US Geological Survey National Water Quality Assessment Program Inventory, 1991 to 2001.
[3] Center for Watershed Protection , 2003, Impacts of Impervious Cover on Aquatic Systems.
[4] Struck, S. D., Rowney, A. C., and L.D. Pechacek, Innovative Approaches for Urban Watershed Wet-Weather Management and Control: State-of-the-Technology, for United States Environmental Protection Agency, Office of Research and Development, Washington DC 20460, (August 2009), EPA/600/R-09/128.

effect.[5] Opportunities for flow to infiltrate into the ground are decreased, as fill dirt is brought in and impervious surfaces such as streets, driveways, roof tops, etc., of the development are constructed. As more flow is discharged at a faster rate, more pollutants may become entrained and carried by the runoff. The potential for erosion is also increased, particularly along sandy creek banks or roadside drainage swales. Downstream ponding of excess runoff can increase and require that small receiving waterways or creeks be enlarged, or channelized to safely convey the increased runoff volume. These changes to the hydrologic cycle by human actions can also have impacts on a wide range of other factors, including water quality, drainage needs, natural habitats, water supply and flood protection.

Non-point or distributed source pollutants are entrained and transported by stormwater in drainage ways. Particles or sediment can transport occluded or adhered bacteria in a waterway. The Great Lakes beaches research program conducted by USGS over the past 15 years has found E. coli in highly variable counts in beach sands, forest soils, sediments surrounding stream margins and shallow ground water.[6] Researchers have recommended that increased settling rates be incorporated into models involving bacteria sedimentation.

Local Studies

Scientists have identified stormwater runoff as a principal cause of declining water quality and loss of wildlife habitat within Little Bay. Studies documented high levels of nitrogen loading from land-based activities, reduced salinity due to stormwater outflows (exacerbated by poor water exchange with Aransas Bay), and persistent eutrophication problems surrounding algal blooms during the summer months.[7] Over the past 15 years, a water quality study by MA-NERR reported that Little Bay has experienced a steady decline in the once extensive beds of submerged seagrasses, especially during the last five years.[8] Fishing is less productive, and winter flocks of waterfowl have declined in numbers and diversity in some recent years.

Other local efforts include the City of Rockport. The City of Rockport's Water Quality Committee has been collecting nutrient data at several designated sampling locations over the past several years.

[5] U.S. Environmental Protection Agency, Results of the Nationwide Runoff Study (NURP), 1983.

[6] http://greatlakesbeaches.usgs.gov/publications.html. Numerous studies cited including: Whitman, R. L and M.B Nevers. 2008. Summer E. coli patterns and responses along 23 Chicago beaches. Environmental Science & Technology 42:9217-9224. Webpage accessed November 20, 2011.

[7] Dunton, K. and C Wilson. 2010. An assessment of Little Bay Sediment and Water Quality in Relation to Indices of Seagrass Condition. University of Texas Marine Science Institute, Technical Report Number TR/10-001.

[8] Buskey, E.J, and B. Dean. 3/31/2011. Little Bay Water Quality Characterization. University of Texas Marine Science Institute, CBBEP Contract Number: 0922, Project No. 0922, Final Report.

PROJECT APPROACH

The technical approach for this project was specified in the QAPP, and the project was conducted accordingly. The major steps were:

1. Confirm approach

Develop and obtain approval for the modeling QAPP prior to undertaking model development or application tasks.

2. Obtain precipitation data

Obtain local rainfall data and/or design precipitation series and prepare them for input into the model.

3. Obtain monitoring data from the NEI project team

This was required as a part of the data input into the QUALHYMO model**.** As noted, details of monitoring are contained in a separate QAPP, and are not addressed in this document. However, the following basic information is provided for convenient reference in relation to the modeling effort.

   a. Six storm water monitoring locations (shown in Appendix B of the QAPP) were defined in the monitoring QAPP. For modeling purposes, data from these locations were evaluated, and the parameter monitored was TSS.
   b. Flow data were obtained from available physical measurements and mathematical estimates also identified in the monitoring QAPP. For modeling purposes, infiltration and runoff estimates were based on soil type and Curve Numbers available from prior modeling specified in the QAPP.
   c. Hydraulic information was obtained from the ICPR modeling of the Tule Creek watershed undertaken as a part of the prior Aransas County Stormwater Management Plan, supplemented if necessary for present purposes by outflow structure conveyance calculations.

4. Develop model input data set

The available data were put into a form suitable for modeling. This included:

   a. definition of contributing areas, and definition of land use types, based on available data from the earlier ICPR modeling of the Tule Creek watershed,
   b. definition of the volume/depth and area/depth characteristics of the sediment trap, based on available design information (GIS data were not needed as the design information adequately characterized the sediment trap),
   c. definition of initial estimates of hydrologic parameters, sediment characteristics (production rating curve based on observations from the monitoring program, and settling velocities based on information from the monitoring program), and

d. definition of connectivity between the contributing areas, sediment trap and channel between these features based on geophysical information contained in available GIS data sets as represented in the ICPR modeling report.

All model features was oriented towards surface flow capture and management. The model was then assessed to determine the need to adjust it to represent the available observations, largely by considering results in the light of typical hydrologic and hydraulic behavior, since monitoring data were insufficient for a formal calibration. Since the monitored flow values were mostly valuable as an added reasonableness check, the predicted runoff values were the principal data used in the development of wet weather flows.

The sequence of this assessment was to 1) develop representative and reasonable estimates of rainfall/runoff relationships, 2) develop hydraulically reasonable estimates of volumetric estimates of the routing (and bypass) of flows around the BMP sediment trap, and 3) develop physically reasonable estimates of sediment removal based on fall velocities consistent with observed sediment characteristics.

5. Assess BMP performance

BMP behavior was estimated based on volumetric routing through the sediment trap itself, as determined by QUALHYMO modeling. Model outputs include:

a. estimated flow mass balance accounting (inflow, outflow, bypass and evaporation),
b. estimated sediment load and removal, and
c. estimated volumetric detention time in the BMP.

6. Conduct internal QC

The modeling data results were reviewed and checked. Details to be verified included 1) data sources, 2) data reduction, 3) data storage, 4) model structure, 5) model parameter adjustment, and 6) predicted model results.

7. Complete reporting and submission

Documentation of the above development and activities, analysis and review processes was completed, and is the basis for this document.

MODEL DEVELOPMENT

QUALHYMO uses a derivative of the SCS method that enables finer/denser spatial resolution and temporal variability than the SCS method. The SCS method is effective in many situations, but is limited in that it is generally applied with a limited choice of antecedent moisture conditions (three cases, representing dry, wet and average conditions).[9] The basic approach to watershed hydrology that has been used in QUALHYMO is to view the rainfall runoff process as a series of multiple events that influence each other in succession, with antecedent moisture varying continuously from event to event as a result. This provides a more realistic response to varying dryness in the watershed over time.

The volumetric calculation is based on the following relation:

$$Qv = \frac{(P \quad Ia)^2}{(P \quad Ia + S)}$$

where

P = rain volume (mm or ins)

Ia = initial abstraction (mm or ins)

Qv = runoff volume (mm or ins)

S = loss parameter (mm or ins)

This is the original SCS relation.

In the SCS method, the initial abstraction was taken as a constant fraction of the S parameter:

$$Ia = 0.2S$$

and the S parameter was related to a curve number:

$$S = \frac{1000}{CN} \quad 10$$

QUALHYMO builds on this approach by letting the initial abstraction and S parameter vary continuously. In wet weather, the initial abstraction is reduced by moisture, and in dry weather it recovers due to evaporation. The S parameter varies between a maximum and minimum value, as a function of an antecedent precipitation index.

[9] NRCS.Part630 Hydrology, Chapter 10 Estimation of Direct Runoff from Storm Runoff, July 2004.

$$S = S_{\min} + \left(S_{\max} \quad S_{\min}\right)\exp(\ \ kS \quad API)$$

where

$S_{\min}$ = the minimum value of S

$S_{\max}$ = the maximum value of S

sK = a parameter

The antecedent precipitation index itself varies according to precipitation, and a reduction factor representing recovery:

$$API_{i+1} = kAPI \quad API_i + P_i^{i+1}$$

where

API_j =the antecedent precipitation index at some time j

P_i^{i+1} =the precipitation falling between time i and $i+1$

$kAPI$ = a reduction factor (0 $kAPI$ 1)

In short, both of the key parameters (initial abstraction and the loss parameter S) are much more variable in QUALHYMO, in response to prevailing moisture conditions. This makes the model an effective choice for long term simulations (for which the model was designed) when such variations can be important in determining rainfall/runoff relationships.

The model itself is coded as a series of commands that can be used in any physically reasonable sequence to represent processes of interest in the watershed.

Representation of the Watershed Areas

The object of this project was not to assess flows in the watershed per se, but to address conditions that may arise in the sediment trap. It was anticipated that the amount of measured flow data would be inadequate as a basis for evaluating conditions in the trap itself, and this proved to be the case. Therefore, a simulated flow record was needed to drive the simulation in the sediment trap. To do this, the watershed above the confluence west of Highway 35 was simulated, as was a small area between the confluence and the sediment trap. This resulted in two watershed areas, namely one south of the confluence, and one north of the confluence but extending to include a small area between the confluence and the sediment trap. As noted in the QAPP, the detailed information on the land surface included in these elements was obtained from a prior model of the area, the Tule Creek Watershed report.[10]

Table 1 provides the information used to estimate areas and characteristics for the modeling elements. As shown, the available data was for much smaller sub-catchments, and these were aggregated by areal weighting to develop infiltration, CN values, and other information on the modeling elements needed in the present analysis. A Tule Creek watershed map showing the

[10] Naismith Engineering Inc., Tule Creek Watershed Project Report, Aransas Count Stormwater Management Plan, August 2, 2010.

watershed boundaries in this project, adapted from the Tule Creek Watershed Project (August, 2010), is located in Appendix C.

In addition, piezometer data were checked to verify the prevailing depth of water below the watershed surface. It was found[11] that depths ranged from about 4 feet to about 10 feet during the monitoring period, as shown in Table 2. This confirms that the infiltration is not limited by sub-surface conditions, in that there were no instances where groundwater broached the surface, and in every measured instance there was ample depth to absorb any reasonably expected rainfall event. Specifically, with a minimum of 4.17 feet of depth to groundwater, and assuming a typical porosity of 0.3 for the sands present in this area, there is capacity for about 15 inches of rainfall infiltration, more than needed for any event of potential significance in the present analysis. Accordingly, the Curve Numbers developed in earlier modeling efforts were accepted as representative of infiltration potential. This information (i.e. the values provided in Table 1) was coded into the model. Input data are provided in Appendix A.

Table 1 Subcatchment Area, Imperviousness and CN Values

Basin No.	Area (acres)	Area (hectares)	Imperviousness (%)	CN	Flow Length (ft)
101	368.75	149.29	11.9	67.2	
102	272.24	110.22	18.1	69.5	
103	245.13	99.24	28.4	72.9	
104	208.24	84.31	28.9	73.1	
105	147.76	59.82	30.9	74.1	
South	**1242.12**	**502.88**	**21.6**	**70.6**	**5500**
202	241.44	97.75	32.6	74.4	
203	173.61	70.29	11.6	67.2	
204	88.04	35.64	34.75	75.1	
North	**415.05**	**168.04**	**25.7**	**72.0**	**4800**

Table 2 Depth to Groundwater as Established at Piezometer Sites

		Wet Conditions						Dry Conditions							
		9/14/2012		5/15/2013		8/26/2013		3/6/2013		11/6/2013		4/8/2014		6/19/2014	
Location	Pad Elevation (ft)	Elev (ft)	Depth (ft)	Elev (ft)	Depth (ft)	Elev (ft)	Depth (ft)	Elev (ft)	Depth (ft)	Elev (ft)	Depth (ft)	Elev (ft)	Depth (ft)	Elev (ft)	Depth (ft)
1A	15.56	9.00	6.56	10.14	5.42	9.34	6.22	10.34	5.22	9.44	6.12	10.14	5.42	9.84	5.72
1B	13	7.55	5.45	8.63	4.37	7.73	5.27	8.83	4.17	8.03	4.97	8.83	4.17	8.23	4.77
1C	13.65	6.79	6.86	8.01	5.64	6.91	6.74	8.16	5.49	7.11	6.54	8.11	5.54	7.51	6.14
2A	14.71	6.01	8.70	6.81	7.90	6.16	8.55	6.76	7.95	6.66	8.05	6.66	8.05	6.26	8.45
2B	12.55	5.98	6.57	6.98	5.57	6.13	6.42	7.23	5.32	7.23	5.32	7.23	5.32	6.43	6.12
2C	11.38	5.50	5.88	6.45	4.93	5.55	5.83	6.75	4.63	5.75	5.63	6.55	4.83	6.05	5.33
	Max	9.00	8.70	10.14	7.90	9.34	8.55	10.34	7.95	9.44	8.05	10.14	8.05	9.84	8.45
	Min	5.50	5.45	6.45	4.37	5.55	5.27	6.75	4.17	5.75	4.97	6.55	4.17	6.05	4.77
	Max	10.14						10.34							
	Min	4.37						4.17							

[11] Monitoring data are provided in the main body of this report.

Representation of the Channel Section

As with the watershed area simulation, the objective of this project is not to evaluate in-stream conditions. It was originally considered appropriate to represent the very short channel section above the sediment trap. However, when the geometry of the sediment trap was evaluated, it was recognized that the section below the confluence is not distinct from the creek or ponded area of the creek, but actually functions as the upper end of the creek. Therefore, instead of a separate channel section, which does not physically really exist, the volume in this section was accounted for as a part of the pond volume.

Representation of the Sediment Trap

This is the focus of the analysis. The watershed and channel sections discussed above provided an estimated flow series needed to enable simulation of routing through the sediment trap. The trap itself was simulated using the model. Basic characteristics of the trap simulation were:

- Sediments approaching the trap were simulated by applying concentrations measured in the monitoring program, and flows simulated as noted above.
- Sediment was simulated as removed by discrete settling.
- The sediment trap was simulated as completely mixed.
- The depth/area relationship for the sediment trap was based on its design geometry which was obtained from the design drawings during the course of the project. The sediment trap's area/depth and volume depth were as shown in Figures 1 and 2.
- The depth/outflow relationship for the trap was based on the constricted geometry at the trap outlet, using a standard broad crested weir relationship which was developed during the course of the analysis. The depth/outflow curve is shown in Figure 3; the outlet sill was set at one and a half feet (0.5 meters) above the impounded area bottom.
- Added simulation features available in the model but not present or material in this assessment (e.g. operated gates, overflows, bypasses, groundwater recharge, multiple orifices etc.) were not simulated.

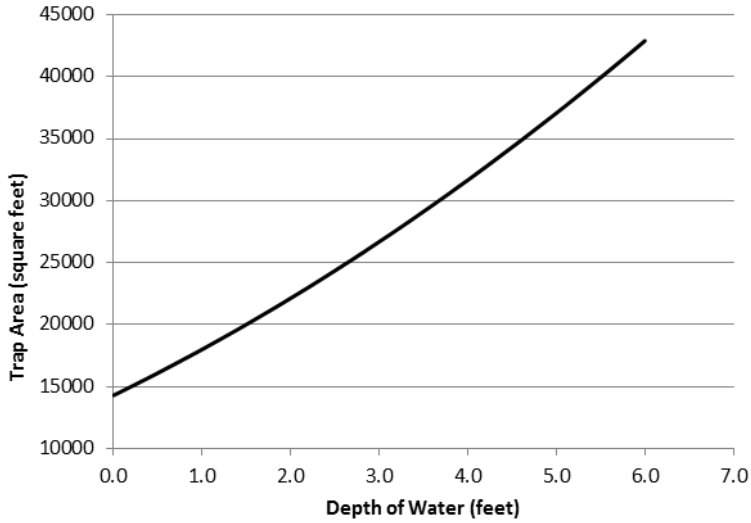


Figure 1 Horizontal Area of Trap vs Water Depth

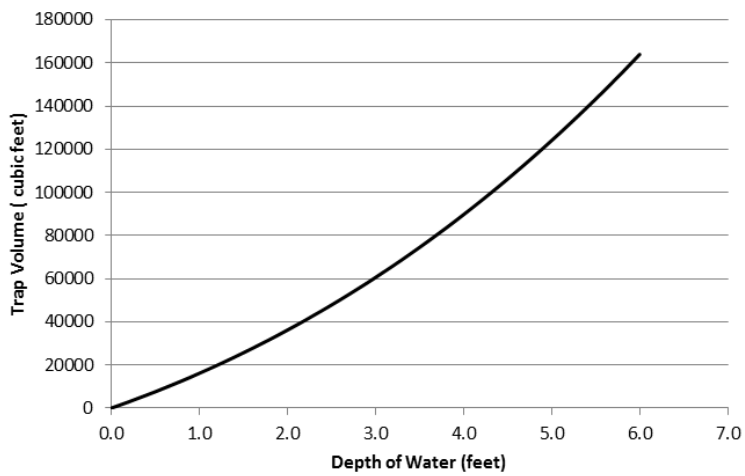


Figure 2 Volume of Sediment Trap vs Water Depth

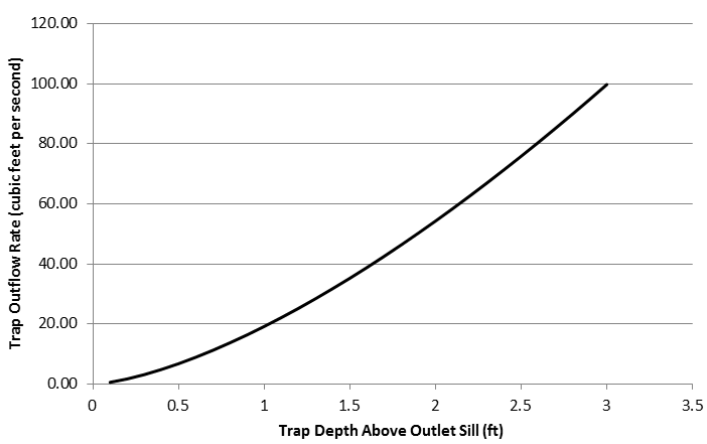


Figure 3 Sediment Trap Outflow Rate vs Water Depth Above the Outlet Sill

Results developed from the model included estimates of inlet and outlet flow rate behavior (i.e. controlled and uncontrolled) and estimates of volumetric sediment build-up, consistent with the sediment data obtained from field observations made for this purpose in the study area. To provide an indication of potential long term volumetric behavior, volume utilization was also assessed and a percent utilization curve generated. Input data are appended to this section. Results are provided below.

Representation of Other BMPs

Initially, there was interest in considering the impact of BMPs placed along the banks of the channel above the sediment trap, along west Tule Creek. However, assessment of the configuration of these BMPs shows that while they have benefits, they are not likely to materially affect the amount of sediment reaching the trap in the long term. This is because of the nature of sediment transport. The upper BMP is effective in its own right as a bank stabilization mechanism. The re-built slopes and surface cover will serve to protect and preserve the channel where this type of BMP has been placed, and this is a useful BMP measure in that regard. However, given the intent of the present analysis, the upper BMP has little impact. This is because the channel bed is mobile, consisting for the most part of sand and sediment. In this situation, the accumulated material is a function of stream power, or excess cumulative shear. Over the long term, the stream will tend to accommodate a reduction in supply (for example as a result of the upper BMP) by providing an increase in transported material. Conversely, an increase in supply (for example if the upper BMP were to be removed) would be balanced by a corresponding decrease. As a result, the sediment supply entering the pond will tend to be governed by flow rate in the stream rather than surface sediment protection mechanisms. Therefore, the upper BMP is not explicitly a part of the model. This is not inconsistent with the QAPP.

It is acknowledged that there is one case where the upper BMP might have a significance in sediment behavior in the stream. This is the case where massive erosion causes repeated bank failure, and the management response is to simply dump sediment along the reach rather than implement protective measures to stabilize it. This is inherently unpredictable given the information at hand, and in any case represents a management response that is considered unlikely and unrepresentative of the BMP concepts of interest in this project.

DATA SOURCES

Non-Direct Measurements (data acquisition requirements)

Table 3 provides a summary of all acquired data to be input into the QUALHYMO model. In general, the collection and use of data was direct and does not require significant discussion; all results are contained in the basic input and output data sets are appended to this section. However, the use of available model data, as well as the use of meteorological data, bear some detailed discussion.

<u>Available model data:</u> The ICPR Model was used for the hydrology and hydraulics modeling of the Tule Creek watershed component of the Aransas County Stormwater Management Plan. As

discussed in greater detail in Section A6 (modeling tasks 3 and 4), appropriate ICPR watershed data were input into QUALHYMO as acquired data. In addition to the ICPR watershed data, other key available data include precipitation data and evaporation data.

Precipitation Data: As indicated in the QAPP, precipitation records from the NWS/NOAA Aransas County Airport from 1998 to current were used as acquired data for use in the QUALHYMO Model. Also as indicated, to provide a design precipitation series, the data were contrasted with the longer period of record available at Corpus Christi.

The Aransas County Airport rainfall record is only available from NOAA's National Collection Data Center (NCDC) as a cumulative daily rainfall total value. Hourly precipitation data is preferred for use as input data into a continuous simulation model such as QUALHYMO, in order to simulate the actual rainfall and runoff characteristics of the rain event. Rainfall events in Aransas County are typically short duration events. In order to apply the Aransas County Airport rainfall data into a meaningful design precipitation series, the Corpus Christi rainfall data was reviewed and compared to the daily Aransas County Airport data.

The Corpus Christi rainfall data have advantages (i.e., hourly values and longer duration) over the daily Aransas County Airport data. To determine whether characteristics of the Corpus Christi data can be used to extend the Aransas County Airport data, a comparison between the two data sets was performed. The bulk rainfall behavior between the Corpus Christi and Aransas County Airport data sets is reasonably comparable. Total annual rainfall over the periods tested was 29.1 inches at Corpus Christi and 28.0 inches at Aransas County Airport – a difference of 4 percent.

Using data from 1998 to 2011, the correlation between the 2 gages shows

$$P_c = 1.065\ P_R - 0.061,$$

where P_c = average monthly precipitation of Corpus Christi
and P_R = average monthly precipitation of Aransas County Airport.

Fixing the intercept at zero yields a best fit line of

$$P_c = 1.04\ P_R.$$

Given the difference of bulk rainfall on an annual basis (4 %) and the best fit line of 4 % with a zero intercept at the two gages, it was considered persuasive that by adjusting the Corpus Christi rainfall downward by 4 %, the overall volumetric rainfall behavior of Aransas County Airport would be preserved and the hourly rainfall distribution of Corpus Christi could be applied. This conversion takes advantage of the longer Corpus Christi period of rainfall (1947/10/01 – 2012/07/23) rather than the shorter period rainfall available for Aransas County Airport (1998/04/01 – 2012/12/31).

To make this conversion, hourly hundreds-of-inch of rainfall records were divided by 1.04 to produce a rainfall design series for Aransas County Airport. Overall, the result matches monthly volumetric behavior at Aransas County Airport based on the Airport's daily rainfall records over

the period record at that station and internally contains the hourly distribution characteristics of Corpus Christi.

This adjustment was considered to provide an effective rainfall design series of the Aransas County Airport rainfall record for use in the present analysis. Because the Airport rainfall series is now available in an hourly form and given that the time of concentration in the watershed is known to be hourly or subhourly, this approach was considered to be superior to just using daily records available at Aransas County Airport. Using only the daily Airport rainfall records would tend to significantly under-estimate hourly peaks if simply averaged over the day or would introduce further uncertainties if some arbitrary synthetic or assumed distribution (such as dividing the daily rainfall value by 24 to get a synthetic rainfall design series) were to be used.

Evaporation Data: As indicated in the QAPP, evaporation Data from 1954 to 2010 for Aransas County and distributed by the Texas Water Development Board was used as acquired data for the QUALHYMO Model. The available monthly data obtained from this source were appropriate for the purposes of this study and were applied directly.

Sediment Data: The monitoring program developed TSS data during the course of this project, and these data were evaluated for applicability as a basis for the monitoring effort. It was found to be difficult to extract useful trends from the data. This is not interpreted as being due to any inadequacy in the monitoring technique per se, but is a common result when a limited number of grab samples, in this case 4 grab sample from 4 wet weather events, are the basis for interpretation. Complete details of the monitoring results are available in the associated Tule Creek monitoring section of this report, but two examples are provided below to highlight the approach used to TSS information development for modelling purposes.

As shown, the data do not display any useful correlation against flow. The correlation coefficients at the inlet and outlet of the trap are 0.365 and 0.179 respectively. This does not suggest that the data can be used to develop convincing representations of TSS concentration based on flow. Even partitioning the data according to wet and dry conditions provides little useful insights; at the inlet to the trap, the average TSS concentration during wet conditions was reported as 24.08 mg/l, and the average during dry conditions was 66.25 mg//l, a counter-experiential result. As a consequence, it was decided to use the bulk average at the inlet as the representative concentration, along with the standard deviation as an indicator of variability. The results of this are that the mean TSS concentration was taken as 45.16 mg/l, and the standard deviation as 44.76 mg/l.

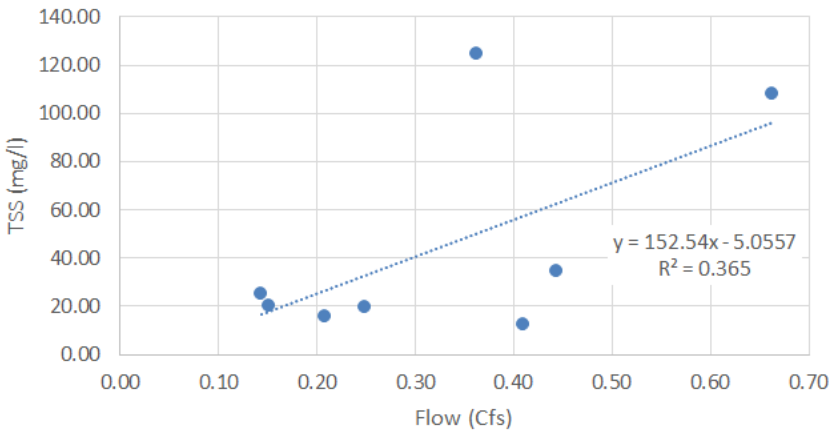


Figure 4 TSS vs Flow at the Trap Inlet

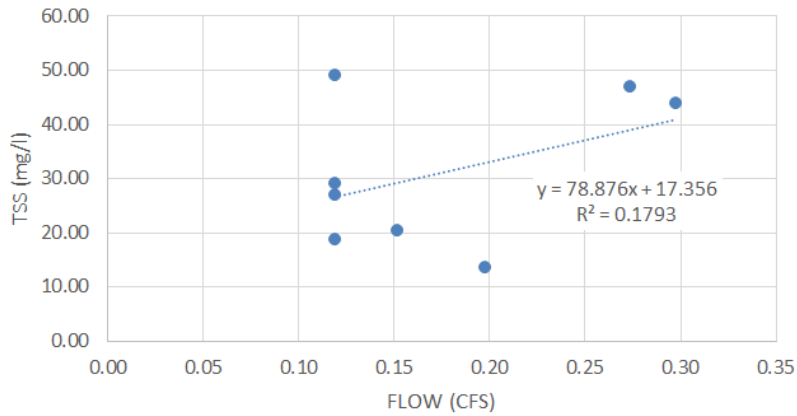


Figure 5 TSS vs Flow at the Trap Outlet

Quality Objectives and Criteria for model inputs/outputs

The QAPP specified specific criteria for mass balance closure requirements. All said requirements were met.

Model Calibration

The model was compared to the physical observations of surface recharge measured in this project. As was foreseen in the QAPP, calibration to the BMP inflows and outflows after construction was precluded because suitable monitoring data and observations were not available during the project period. Time series information on flow does not exist at this site. However, it was possible to compare model results to flows observed during sampling activity, and this was done.

Due to the very limited size of this project, there were only 4 wet-weather event flow observations available, measured as point estimates taken by crews at the time of sampling. A statistically significant metric for relative error beyond bulk or average error is therefore not

advisable or possible. As noted below and as specified in the QAPP, however, sensitivity analysis was possible and was undertaken.

Model Sensitivity

Sensitivity analysis determines the effect of a change in a model input parameter or variable on the model outcome. Sensitivity was evaluated as discussed in the QAPP, focusing on the S value, which was the parameter most sensitive for purposes of this evaluation. It was found that the final results, however, were not materially affected by perturbations in this value. Increasing the S value by 20 percent shifted the fraction removed from 71.1% to 75.2 %; decreasing it 20% reduced the removal to 70.9%. These results are consistent with the phenomena involved. The impact of discrete settling rates was also considered, and it was found that for coarse and fine size fractions settling velocity has only a minimal effect on results but that for values in the fine sand range (settling velocities of around ½ inch per second), removal is directly affected by settling velocity. This too is consistent with the facility and the problem at hand. Improved local data may be useful in the future; for the present, however, the values used have a solid foundation in peer practice, both within the State of Texas and elsewhere, and are considered useful for the present investigation.

Model Validation

As specified in the QAPP, validation was approached by applying an alternative precipitation data set to the watershed and BMP model data set, and verifying that under this condition the model behaves in a manner consistent with that which was predicted using the primary data set (Aransas County Airport). The alternative precipitation set was taken from the same precipitation station, but over a different period. To do this, the design series rainfall data were split into two sets; a recent 31 year period for analysis and interpretation (actual development of results), and an immediately preceding 20 year period strictly for validation.

The error criteria for model runs are set forth in the QAPP; these demanded errors in continuity of less than 5% in watershed flow, sediment trap flow mass balance, and sediment trap sediment balance. As shown in Table 3, both the main runs and validation were much less in error than the criteria would allow. This demonstrates that for the purposes of this study, the model performance was effective from a continuity perspective in the main runs, and also effective in the validation period.

Table 3 Continuity checks on model (main run and validation)

#	Case	Error Criterion	Actual Error (main run) 1/1/1980 - 12/31/2010	Actual Error (validation run) 1/1/1960 - 12/31/1979
1	Watershed flow mass balance	<5% error	0.001% error	0.003% error
2	Sediment trap flow mass balance	<5% error	-0.08% error	-0.06% error
3	Sediment trap sediment mass balance	<5% error	0.03% error	-0.002% error

Table 4 List of Data Sources Applicable to Model Development

Type of Data	Type of Data	Units	Source	QA Documentation	Use	Date Range
Precipitation	rainfall series	tenths of mm/day	NCDC records - NWS/NOAA Aransas County Airport	per NCDC standards	model basis	Extracted from period of record 1998-2011
Evaporation	monthly time series	inches/day	TWDB, NWS and NCDC records	per TWDB, NWS NCDC standards	model basis	Extracted from period of record 1954 -2010
ICPR watershed model inputs:	Tule Creek watershed parameters:	See parameters below	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	Model input data	2010
-Sub-basin drainage area	"	Acres	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	model input data	2010
-Land Use/ Impervious cover percent	"	non-dimensional	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	model input data	2010
-Soils Data: Soil Survey Geographic (SSURGO)	"	non-dimensional	Tule Creek Watershed Proj. Report, 8/2/2010	SSURGO - detailed soil maps by NRCS	model input data	2010
-Flow length	"	Feet	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	model input data	2010
-Slope	"	non-dimensional	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	model input data	2010
-Channel length	"	Feet	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	model input data	2010
-Channel velocity	"	feet/sec	Tule Creek Watershed Proj. Report, 8/2/2010	Tule Creek Watershed Proj. Report, 8/2/2010	model input data	2010
Particle Fall Velocity	Statistics	non-dimensional	Schueler and Lugbill, 1990[12]	Center for Watershed Protection	Model input data	1990
Initial Abstraction	Tule Creek watershed parameter	Inches	Aransas County Texas Stormwater Master Plan and Management Manual, 7/11/12	Aransas County Texas Stormwater Master Plan and Management Manual, 7/11/12	model input data	2012
City of Rockport WWTP recorded effluent flow	Tule Creek Parameter	MGD	City of Rockport WWTP Records	City of Rockport WWTP Records	Model input data	2007 to current date
Contractual monthly Rockport WWTP effluent reuse water	Tule Creek Parameter	Gallons	City of Rockport Records, City Manager's Office	City of Rockport Records, City Manager's Office	Model input data	2007 to current date

[12] Schueler, T. and J. Lugbill. 1990. Performance of Current Sediment Control Measures at Maryland Construction Sites. Metropolitan Washington Council of Governments. Silver Spring, MD.

RESULTS

The model results are as presented below.

Figure 6 shows the estimated flow/frequency relationship at the outlet point of the sediment trap with and without the BMPs in place, for flows greater than 0.5 cfs. As noted, the sediment trap has only a modest effect on flow behavior. This is because the volume is small relative to the volume of runoff, and the outlet is not highly restricted. As a result, during storm events it tends to be overwhelmed by the incoming volume, and has little impact on flow routing. This is less true for small events that are less taxing on the available volume, but is still generally the case. This is because the second factor is the nature of the outlet. The trap is bounded on the downstream side by a relatively unrestricted outlet, taking the form of a broad crested weir that is an appreciable fraction of the channel width. This is an appropriate design given the nature of that outlet, which must convey storm flows under Texas Highway 35 without causing undue flooding. With little restriction in place, little backup occurs and little hydraulic flow routing results. Given that the intended function of this device was not flood control, this is an appropriate result.

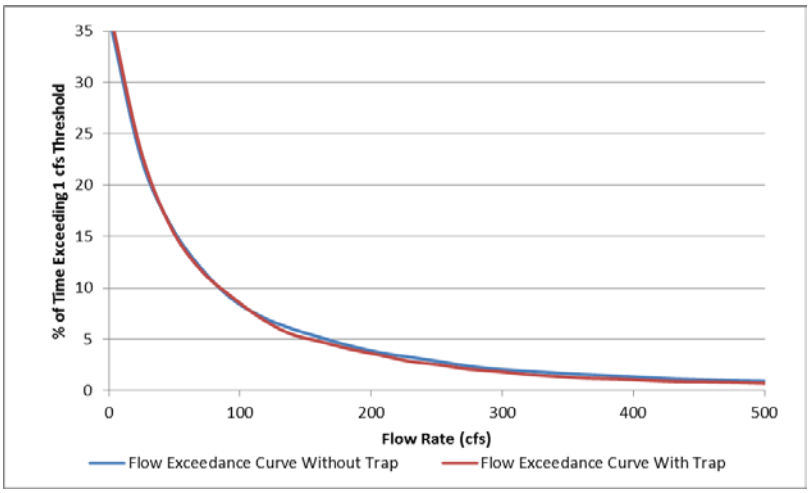


Figure 6 Impact of Trap on Flow Rates

Nevertheless, the sediment trap does provide an effective removal of sediments, particularly where size ranges in the sand category or larger are considered. This is because the widening and deepening of the channel constituted by the trap causes a drop in velocity and a reduction in turbulence which allows sediments to fall out of solution. The model predicts build-up of sediments in the pond accordingly. As shown in the modeling results provided in Appendix B, the rate of build-up of sediments is significant.

The total fraction of sediments removed is expected to be about 71.1%[13], representing almost complete removal of larger fractions (sands), partial removal of mid range particles (silts), and limited removal of fine particles (clays). This amounts to 2.31 x 10^12 milligrams over the simulation period (31 years), which implies a buildup volume of about 45 in situ cubic yards per

[13] Assuming sediments are distributed between coarse and fine sediments relatively evenly and that coarser fractions are removed efficiently.

year.[14] As discussed below, this rate implies a need to remove sediments from time to time so that the volume of the trap is not compromised in the long term. The removal of sediments in the coarser range was intentionally conservative since actual fall velocities and distributions are not known, but even so the amounts encountered in reality could be considerably larger. As noted in the discussion of measured TSS results above, the standard deviation of the estimated sediment fraction is nearly the same magnitude as the average. A rate of sediment arrival equal to the mean plus one standard deviation equates to a buildup of about 90 cubic yards per year.

Care must be taken in considering these results, since there can be physical activities within the watershed that can materially affect sediment supply but that are not represented by the modeling designed for this project. For example, in this case it was observed that construction above the sediment trap may have at times added an unknown but significant load to the creek, different in cause and nature than the sediments represented in the model.

Another factor to consider is that the pond volume is not infinite, and as sediments accumulate, trap efficiency will decrease. As a result, over the long term, if the pond is not maintained, it will eventually fill in and approximate the natural conditions that would prevail were the channel left intact and the sediment trap not placed. For the purposes of this project it is assumed that sediment trap maintenance is sufficient to keep it operating at close to design efficiency. Design of a maintenance schedule is beyond the scope of the present effort, and would require a better empirical basis for model calibration, but it is noted that a removal program can be designed in more than one way. For example, it could be designed to frequently remove small amounts of sediment, or to periodically (less often) remove larger amounts. Or, it could be designed to remove sediments not at some predetermined frequency but whenever a target accumulation amount has been reached. The tradeoff between operating costs and long term performance would need to be considered in developing a preferred approach to an operating maintenance schedule. In the absence of such an assessment, it is suggested that, given the available information, an appropriate approach to this problem would be to monitor actual sediment build-up, remove sediment when the facility is overly full of sediment, and based on experience over time, develop standard procedures that will keep the facility functioning reasonably well. As a starting point for consideration, it is suggested that keeping the accumulated sediment to less than a third of the available permanent pool facility volume be considered as a target.

Over all, the results of this assessment provide the information that was sought for this project. The hydraulic routing effects are minimal, but sediment removal (provided the sediment trap is maintained) is significant.

[14] Estimating a submerged bulk specific gravity of 2.19 based on sands with a porosity of about 30%.

APPENDIX A: MODEL INPUT DATA

Input Data:

```
**************** QUALHYMO run *******************
*
*
* Project:  Aransas County W. Tule Creek Sediment Trap Pond
* Location: Rockport, Aransas County, Texas
* Project description:
*     Analysis by LDP Consultants
*
* Scenario: Scenario 2 - 2 catchments
* Number:
* Scenario description:
*     This scenario matches expectations in the QAPP,
*     with two major catchments (north and south of
*     the confluence)
*
**********************************************
*
SET BUFFER DIR        <BUFFER FILE DIR=C:\Data\QUALHYMO\{800D5698-1E88-4B9A-9400-B44FFE2046E3}>
*
START                  SPANS FROM 1980 1 1 TO 2010 12 31
                       RAINFALL WILL BE READ ON DEVICE   IRAIN  9
                       PRECIP FORMAT                    IPFORM  5
                       FLOW FILE WILL BE READ ON DEVICE  IFLOW  0
                       TEMPERATURE FILE FORMAT          ITFORM  3
                       SET SURF EVAPORATION FLAG OFF   IDOEVAP  0
                       SET POND EVAPORATION FLAG ON   EVAPCASE  1  (USE MONTHLY VALUES)
                       POND EVAPORATION COEFFICIENT       PPAN = 0
                       MONTHLY EVAP AMOUNTS IN MM
                       JAN 0 FEB 0 MAR 0
                       APR 8 MAY 80 JUN 120
                       JUL 140 AUG 130 SEP 85
                       OCT 35 NOV 5 DEC 0
                       SET POLLUTANT FLAG OFF           IFDECA  0
                       SET SEDIMENT FLAG ON             IFSEDT  1
                       SEDIMENT RATES (M/S):
                          VELOCITIES ARE :
                           0.01940000
                           0.00008530
                           0.00000338
                           1.00000000
                           2.00000000
                          FOR FRACTIONS :
                           0.200
                           0.200
                           0.200
                           0.200
                           0.200
POLLUTANT SERIES       CASE = 3,   METHOD=1 (regression method),  COEFFICIENT = 45.16,  EXPONENT
= 0
POLLUTANT SERIES       CASE = 4,   METHOD=1 (regression method),  COEFFICIENT = 45.16,  EXPONENT
= 0
POLLUTANT SERIES       CASE = 6,  THIS CASE APPLIES TO BASE FLOW, SO REGRESSION METHOD USED ),
COEFFICIENT = 45,  EXPONENT = 0
*
*
WATERSHED            ID = 1 AND ISER=401
                     TIME STEP DT (hr) = 1.00 HRS
                     AREA (ha) = 168.04 AB= 0 (No PRINT), FRIMP= 0.257

                     IMPERVIOUS AREA
                        AA IMP = 1 (NASH HYD), XK IMP=2.5, TP IMP=0.5 HRs
                        ABSIMP (mm) =2.5 RIMP= 0.788

                     PERVIOUS AREA
                        AA PER = 1 (NASH HYD), XK PER=3.5 TP PER=1 HRs
```

```
                        Smin (mm) = 5.2 Smax (mm) =381 SK=0.00695
                        APIK = 0.95 API=200
                        ABSPER (mm) =20 mm

                     BASE FLOW
                        BASMIN (cu m / sec) = 0
                        SVOL (mm) =0.41382
                        SLOSKA = 0.0005 SLOSKB= 1
*
*
WATERSHED            ID = 2 AND ISER=501
                     TIME STEP DT (hr) = 1.00 HRS
                     AREA (ha) = 502.88 AB= 0 (No PRINT), FRIMP= 0.216

                     IMPERVIOUS AREA
                        AA IMP = 1 (NASH HYD), XK IMP=2.5, TP IMP=0.5 HRs
                        ABSIMP (mm) =2.5 RIMP= 0.788

                     PERVIOUS AREA
                        AA PER = 1 (NASH HYD), XK PER=3.5 TP PER=1 HRs
                        Smin (mm) = 5.2 Smax (mm) =381 SK=0.00659
                        APIK = 0.95 API=200
                        ABSPER (mm) =20 mm

                     BASE FLOW
                        BASMIN (cu m / sec) = 0.04
                        SVOL (mm) =0.41382
                        SLOSKA = 0.0005 SLOSKB= 1
*
ADD SERIES               ID OUT =3, ID SERIES =301, FIRST ID =1, SECOND ID =2
*
POND                   OUTFLOW ID = 4, SERIAL =-3021 AND INFLOW ID = 3
                     DETENTION TIME (TDET) = 0 HOURS
                     NUMBER OF CSTRS (NELS) = 1
                     HYDRUALIC TIME STEP (RTINC)= 1 HOUR
                     BASE FLOW (QBAS) = 0
                     PAN EVAP COEF (PPAN) = 1
                     BYPASS (IFQBY) = 0
                     APPROACH FLOW CURVE (NPTQQ) = 0
                     CONTINUOUS OUTFLOW CURVE
                       NUMBER OF POINTS NPTSQ(ONE)= 9
                     0      0
                     0.5      0.01
                     0.6      0.1
                     0.7      0.29
                     0.8      0.53
                     0.9      0.81
                     1      1.14
                     1.2      1.88
                     1.5      3.21
                     OPERATED OUTFLOW CURVE
                       ISIG=1 NPTSQ(TWO)=0
                     OVERFLOW CURVE
                       ISIG=1 NPTSV=0
                     STAGE / VOLUME CURVE
                       ISIG=1, NUMBER OF POINTS NPTSV= 8
                     0      0
                     0.1      138
                     0.2      287
                     0.4      621
                     0.7      1214
                     1      1930
                     1.5      3429
                     1.8      4528
                     STAGE / AREA CURVE
                       NUMBER OF POINTS NPTSA= 8
                     0      1329
                     0.1      1437
                     0.2      1550
                     0.4      1788
                     0.7      2177
```

```
                    1      2605
                    1.5      3403
                    1.8      3933
                    INITIAL STAGE (SBEGIN) = 2 m
                    MULTIPLICATION FACTOR FOR POLLUTANTS FEMULT=1
                    MULTIPLICATION FACTOR FOR SEDIMENT SEMULT=1
FINISH
```

APPENDIX B: MODEL OUTPUT DATA

Output Data:

```
**************** QUALHYMO run *******************
*
*
* Project:  Aransas County W. Tule Creek Sediment Trap Pond
* Location: Rockport, Aransas County, Texas
* Project description:
*     Analysis by LDP Consultants
*
* Scenario: Scenario 2 - 2 catchments
* Number:
* Scenario description:
*     This scenario matches expectations in the QAPP,
*     with two major catchments (north and south of
*     the confluence)
*
**********************************************
*
SET BUFFER DIR        <BUFFER FILE DIR=C:\Data\QUALHYMO\{800D5698-1E88-4B9A-9400-B44FFE2046E3}>
*
START                 SPANS FROM 1980 1 1 TO 2010 12 31
                      RAINFALL WILL BE READ ON DEVICE   IRAIN  9
                      PRECIP FORMAT                    IPFORM  5
                      FLOW FILE WILL BE READ ON DEVICE  IFLOW  0
                      TEMPERATURE FILE FORMAT          ITFORM  3
                      SET SURF EVAPORATION FLAG OFF   IDOEVAP  0
                      SET POND EVAPORATION FLAG ON   EVAPCASE  1  (USE MONTHLY VALUES)
                      POND EVAPORATION COEFFICIENT       PPAN = 0
                      MONTHLY EVAP AMOUNTS IN MM
                      JAN 0 FEB 0 MAR 0
                      APR 8 MAY 80 JUN 120
                      JUL 140 AUG 130 SEP 85
                      OCT 35 NOV 5 DEC 0
                      SET POLLUTANT FLAG OFF           IFDECA  0
                      SET SEDIMENT FLAG ON             IFSEDT  1
                      SEDIMENT RATES (M/S):
                         VELOCITIES ARE :
                          0.01940000
                          0.00008530
                          0.00000338
                          1.00000000
                          2.00000000
                         FOR FRACTIONS :
                          0.200
                          0.200
                          0.200
                          0.200
                          0.200
 - PRECIP IS EXPECTED TO BE HOURLY, READ IN NEW AES FORMAT (7X,I4,2I2,3X,24(I6,1
 X))
   - NO FLOW RECORDS WILL BE READ
   NO TEMPERATURE RECORDS WILL BE READ


POLLUTANT SERIES       CASE = 3,   METHOD=1 (regression method),  COEF = 45160,  EXPONENT = 1
POLLUTANT SERIES       CASE = 4,   METHOD=1 (regression method),  COEF = 45160,  EXPONENT = 1
POLLUTANT SERIES       CASE = 6,   BASE FLOW CASE SO REGRESSION METHOD USED,  COEF = 45160,
EXPON = 1
*
*
WATERSHED            ID = 1 AND ISER=401
                     TIME STEP DT (hr) = 1.00 HRS
                     AREA (ha) = 168.04 AB= 0 (No PRINT), FRIMP= 0.257
```

```
                      IMPERVIOUS AREA
                         AA IMP = 1 (NASH HYD), XK IMP=2.5, TP IMP=0.5 HRs
                         ABSIMP (mm) =2.5 RIMP= 0.788

                      PERVIOUS AREA
                         AA PER = 1 (NASH HYD), XK PER=3.5 TP PER=1 HRs
                         Smin (mm) = 5.2 Smax (mm) =381 SK=0.00695
                         APIK = 0.95 API=200
                         ABSPER (mm) =20 mm

                      BASE FLOW
                         BASMIN (cu m / sec) = 0
                         SVOL (mm) =0.41382
                         SLOSKA = 0.0005 SLOSKB= 1

====== IMPERVIOUS AREA UNIT HYDROGRAPH DATA ======

 - SHAPE CONSTANT, N =  2.500          - UNIT PEAK,QP =  0.1110 CMS
 - THE UH YIELDS   1.0111 MM VOL SO MULT BY   0.9891 WILL ENSURE A 1 MM UH.

======= PERVIOUS AREA UNIT HYDROGRAPH DATA =======

 - SHAPE CONSTANT, N =  3.500          - UNIT PEAK,QP =  0.2116 CMS
 - THE UH YIELDS   0.9630 MM VOL SO MULT BY   1.0384 WILL ENSURE A 1 MM UH.

API REDUCTION FACTOR IS  0.998E+00 PER TIME STEP OR  0.950E+00 PER DAY


   =========  WATER MASS BALANCE ========
     A-TOTAL RAINFALL               =    23514.65 MM
     B-TOTAL IMPERV+PERV RUNOFF     =     5290.62 MM
     C-TOTAL IMPERV+PERV INIT ABS.  =    11841.48 MM
     D-TOTAL IMPERV+PERV INFILTR.   =     6382.71 MM
     E-CHANGE IN AVAILABLE INIT ABS =       -0.41 MM
     F-TOTAL BASE FLOW              =        0.00 MM
     G-CHANGE IN GROUNDWATER STORAGE=       -0.41 MM
     H-LOSS TO DEEP GROUNDWATER     =     6382.71 MM

     SURFACE WATER BALANCE = A - B - C - D -E    =      -0.15 MM
     GROUND WATER BALANCE= D - F - G - H         =       0.41 MM

 RAINFALL AND DIRECT  RUNOFF TOTALS OVER THE SIMULATION TIME SPAN ==========
   RAINFALL  PERVIOUS  IMPERVIOUS   TOTAL
             RUNOFF     RUNOFF     RUNOFF
     (MM)      (MM)       (MM)       (MM)
  23514.650   1745.305  15540.313   5290.622
*
*
WATERSHED            ID = 2 AND ISER=501
                     TIME STEP DT (hr) = 1.00 HRS
                     AREA (ha) = 502.88 AB= 0 (No PRINT), FRIMP= 0.216

                     IMPERVIOUS AREA
                        AA IMP = 1 (NASH HYD), XK IMP=2.5, TP IMP=0.5 HRs
                        ABSIMP (mm) =2.5 RIMP= 0.788

                     PERVIOUS AREA
                        AA PER = 1 (NASH HYD), XK PER=3.5 TP PER=1 HRs
                        Smin (mm) = 5.2 Smax (mm) =381 SK=0.00659
                        APIK = 0.95 API=200
                        ABSPER (mm) =20 mm

                     BASE FLOW
                        BASMIN (cu m / sec) = 0.04
                        SVOL (mm) =0.41382
                        SLOSKA = 0.0005 SLOSKB= 1

====== IMPERVIOUS AREA UNIT HYDROGRAPH DATA ======

 - SHAPE CONSTANT, N =  2.500          - UNIT PEAK,QP =  0.2791 CMS
 - THE UH YIELDS   1.0111 MM VOL SO MULT BY   0.9891 WILL ENSURE A 1 MM UH.
```

```
======= PERVIOUS AREA UNIT HYDROGRAPH DATA =======

 - SHAPE CONSTANT, N =  3.500          - UNIT PEAK,QP =  0.6683 CMS
 - THE UH YIELDS   0.9630 MM VOL SO MULT BY   1.0384 WILL ENSURE A 1 MM UH.

API REDUCTION FACTOR IS  0.998E+00 PER TIME STEP OR  0.950E+00 PER DAY


   =========  WATER MASS BALANCE ========
     A-TOTAL RAINFALL               =    23514.65 MM
     B-TOTAL IMPERV+PERV RUNOFF     =     4705.90 MM
     C-TOTAL IMPERV+PERV INIT ABS.  =    12285.58 MM
     D-TOTAL IMPERV+PERV INFILTR.   =     6523.32 MM
     E-CHANGE IN AVAILABLE INIT ABS =       -0.41 MM
     F-TOTAL BASE FLOW              =        0.00 MM
     G-CHANGE IN GROUNDWATER STORAGE=       -0.41 MM
     H-LOSS TO DEEP GROUNDWATER     =     6523.32 MM

     SURFACE WATER BALANCE = A - B - C - D -E    =      -0.16 MM
     GROUND WATER BALANCE= D - F - G - H         =       0.42 MM

 RAINFALL AND DIRECT  RUNOFF TOTALS OVER THE SIMULATION TIME SPAN ==========
   RAINFALL  PERVIOUS  IMPERVIOUS   TOTAL
             RUNOFF     RUNOFF     RUNOFF
     (MM)      (MM)       (MM)       (MM)
  23514.650   1720.915  15540.313   4705.903
*
ADD SERIES               ID OUT =3, ID SERIES =301, FIRST ID =1, SECOND ID =2

                ADD BEGINS AT  1980  1  1
                USES TIME STEP OF  0.100E+01 HOURS
                AND ENDS AT    2010 12 31

*
POND                  OUTFLOW ID = 4, SERIAL =-3021 AND INFLOW ID = 3
                    DETENTION TIME (TDET) = 0 HOURS
                    NUMBER OF CSTRS (NELS) = 1
                    HYDRUALIC TIME STEP (RTINC)= 1 HOUR
                    BASE FLOW (QBAS) = 0
                    PAN EVAP COEF (PPAN) = 1
                    BYPASS (IFQBY) = 0
                    APPROACH FLOW CURVE (NPTQQ) = 0
                    CONTINUOUS OUTFLOW CURVE
                      NUMBER OF POINTS NPTSQ(ONE)= 9
                    0      0
                    0.5      0.01
                    0.6      0.1
                    0.7      0.29
                    0.8      0.53
                    0.9      0.81
                    1      1.14
                    1.2      1.88
                    1.5      3.21
                    OPERATED OUTFLOW CURVE
                      ISIG=1 NPTSQ(TWO)=0
                    OVERFLOW CURVE
                      ISIG=1 NPTSV=0
                    STAGE / VOLUME CURVE
                      ISIG=1, NUMBER OF POINTS NPTSV= 8
                    0      0
                    0.1      138
                    0.2      287
                    0.4      621
                    0.7      1214
                    1      1930
                    1.5      3429
                    1.8      4528
                    STAGE / AREA CURVE
                      NUMBER OF POINTS NPTSA= 8
                    0      1329
```

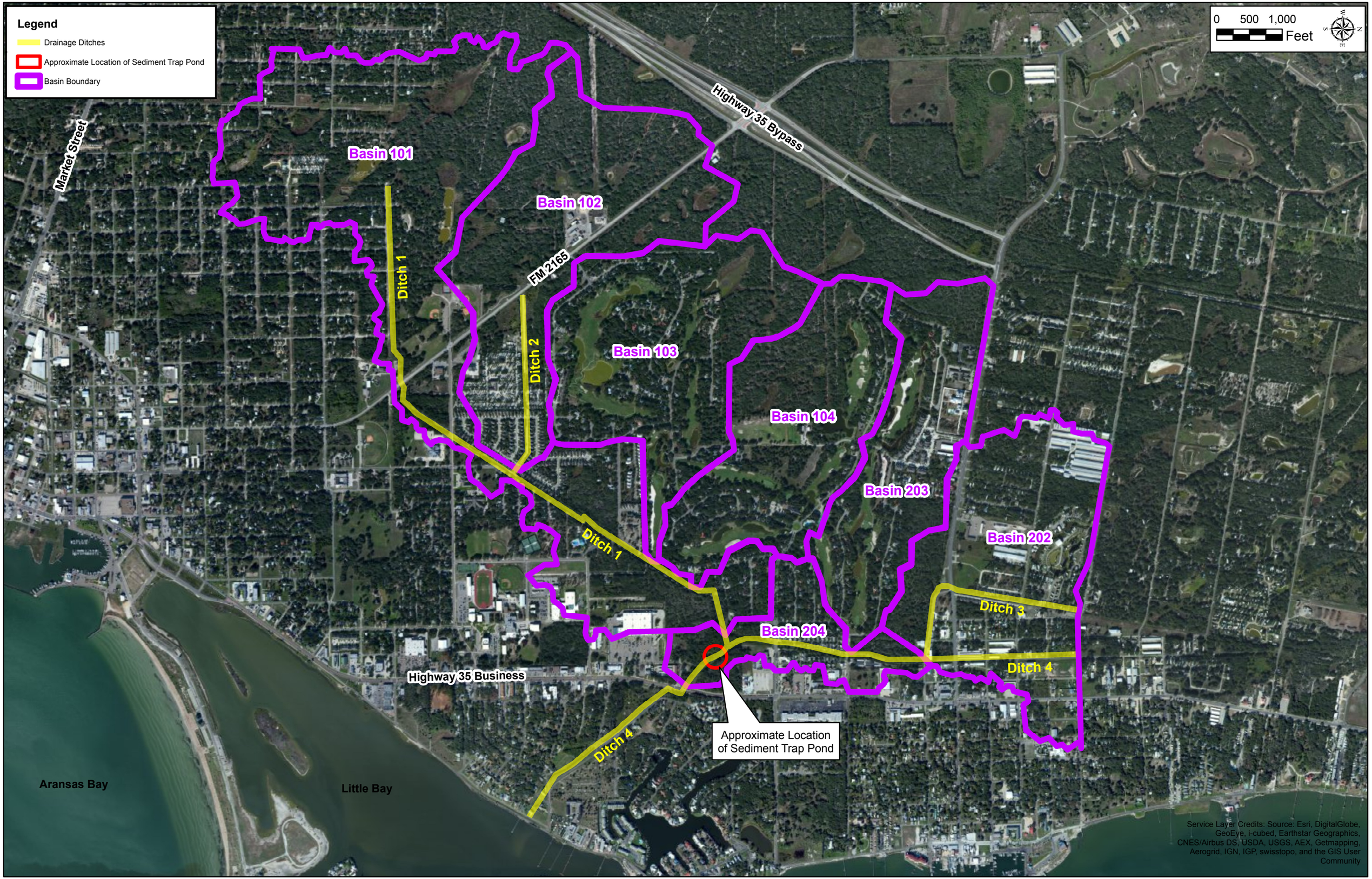
```
                    0.1      1437
                    0.2      1550
                    0.4      1788
                    0.7      2177
                    1      2605
                    1.5      3403
                    1.8      3933
                    INITIAL STAGE (SBEGIN) = 2 m
                    MULTIPLICATION FACTOR FOR POLLUTANTS FEMULT=1
                    MULTIPLICATION FACTOR FOR SEDIMENT SEMULT=1

  ====== BASIC PARAMETER INPUT CHECKS ======
APPROACH FLOW NPTQQ -      0
CONTINUOUS OUTFLOW NPTSQ1 -      9
OPERATED OUTFLOW NPTSQ2 -      0
OVERFLOW NPTSQV -      0
STAGE VOLUME NPTSV -      8
STAGE AREA NPTSA -      8
DETENTION TIME -   0.0000000E+00
BASE FLOW -   0.0000000E+00
STARTING STAGE IN POND IS               0.200E+01 M
MULTIPLICATION FACTOR FOR POLLUTANT IS  0.100E+01
MULTIPLICATION FACTOR FOR SEDIMENT IS   0.100E+01
TIME STEP OF INPUT FILE IS     1.000 HOURS
CALCULATION STEP SELECTED IS    1.0000 HOURS

  ============ COMBINED OUTFLOW CURVES ============
                  --- TOTAL ----         ---- TOTAL ----
                   CONTINUOUS              OPERATED
                 OUTFLOW  CURVE           OUTFLOW  CURVE
 STAGE          ST. IND.      FLOW        ST. IND.     FLOW
                COEFF.                    COEFF.
  (M)           (CMS)        (CMS)        (CMS)      (CMS)

 0.000000E+00 0.000000E+00 0.000000E+00 0.000000E+00 0.000000E+00
 0.100000E+00 0.393333E-01 0.200000E-02 0.393333E-01 0.200000E-02
 0.200000E+00 0.817222E-01 0.400000E-02 0.817222E-01 0.400000E-02
 0.400000E+00 0.176500E+00 0.800000E-02 0.176500E+00 0.800000E-02
 0.500000E+00 0.232407E+00 0.100000E-01 0.232407E+00 0.100000E-01
 0.600000E+00 0.332315E+00 0.100000E+00 0.332315E+00 0.100000E+00
 0.700000E+00 0.482222E+00 0.290000E+00 0.482222E+00 0.290000E+00
 0.800000E+00 0.668519E+00 0.530000E+00 0.668519E+00 0.530000E+00
 0.900000E+00 0.874815E+00 0.810000E+00 0.874815E+00 0.810000E+00
 0.100000E+01 0.110611E+01 0.114000E+01 0.110611E+01 0.114000E+01
 0.120000E+01 0.164267E+01 0.188000E+01 0.164267E+01 0.188000E+01
 0.150000E+01 0.255750E+01 0.321000E+01 0.255750E+01 0.321000E+01
 0.180000E+01 0.318378E+01 0.385200E+01 0.318378E+01 0.385200E+01

AN INITIAL STAGE OF        0.200000E+01 M.,
A VOLUME OF                0.503111E+04 CU.M.
AN AREA OF                 0.437000E+04 SQ.M.
A THROUGHFLOW RATE OF      0.400000E-01 CU.M./SEC.
AND AN S.I. VALUE OF       0.141753E+01 CU.M./SEC.
ARE ASSUMED.

======= POND HYDRAULIC CONTINUITY CHECK =========
===== BASED ON CALCS AT HYDRAULIC TIME STEP =====
INFLOW            0.717E+08 M**3
OUTFLOW           0.717E+08 M**3
LOSSES            0.372E+05 M**3
VOLUME CHANGE     0.415E+04 M**3
CONTINUITY ERROR   -0.08% OF AVERAGE THROUGHFLOW
====================================================

========= FACILITY MASS ACCOUNTING=============

     ------- FLOW MASS TOTALS -------

INITIAL VOLUME IN POND:                0.503E+04 M**3

TOTAL VOLUME OF APPROACH FLOW:         0.717E+08 M**3
```

```
TOTAL VOLUME BYPASSING:                0.000E+00 M**3
TOTAL VOLUME INTO POND:                0.717E+08 M**3


TOTAL VOLUME OF DEPARTING FLOW:        0.717E+08 M**3
TOTAL VOLUME BYPASSING:                0.000E+00 M**3
TOTAL VOLUME OUT OF POND:              0.717E+08 M**3

FINAL VOLUME IN POND:                  0.885E+03 M**3



     ---- SEDIMENT MASS TOTALS ----


     - SEDIMENT FRACTION  1
TOTAL QUANTITY INTO POND IS:     0.650E+12
TOTAL QUANTITY OUT OF POND IS:   0.119E+11
TOTAL QUANTITY LEFT IN POND IS:  0.466E+04
TOTAL QUANTITY REMOVED IS:       0.638E+12
FRACTION OF QUANTITY REMOVED IS: 0.982E+00


     - SEDIMENT FRACTION  2
TOTAL QUANTITY INTO POND IS:     0.650E+12
TOTAL QUANTITY OUT OF POND IS:   0.329E+12
TOTAL QUANTITY LEFT IN POND IS:  0.771E+06
TOTAL QUANTITY REMOVED IS:       0.320E+12
FRACTION OF QUANTITY REMOVED IS: 0.493E+00


     - SEDIMENT FRACTION  3
TOTAL QUANTITY INTO POND IS:     0.650E+12
TOTAL QUANTITY OUT OF POND IS:   0.597E+12
TOTAL QUANTITY LEFT IN POND IS:  0.343E+07
TOTAL QUANTITY REMOVED IS:       0.524E+11
FRACTION OF QUANTITY REMOVED IS: 0.807E-01


     - SEDIMENT FRACTION  4
TOTAL QUANTITY INTO POND IS:     0.650E+12
TOTAL QUANTITY OUT OF POND IS:   0.239E+09
TOTAL QUANTITY LEFT IN POND IS:  0.663E+02
TOTAL QUANTITY REMOVED IS:       0.649E+12
FRACTION OF QUANTITY REMOVED IS: 0.100E+01


     - SEDIMENT FRACTION  5
TOTAL QUANTITY INTO POND IS:     0.650E+12
TOTAL QUANTITY OUT OF POND IS:   0.120E+09
TOTAL QUANTITY LEFT IN POND IS:  0.334E+02
TOTAL QUANTITY REMOVED IS:       0.650E+12
FRACTION OF QUANTITY REMOVED IS: 0.100E+01

     - TOTAL SEDIMENT
TOTAL SEDIMENT QUANTITY INTO POND IS:     0.325E+13
TOTAL SEDIMENT QUANTITY OUT OF POND IS:   0.939E+12
TOTAL SEDIMENT QUANTITY LEFT IN POND IS:  0.420E+07
TOTAL SEDIMENT QUANTITY REMOVED IS:       0.231E+13
FRACTION OF QUANTITY REMOVED IS: 0.711E+00

========= VOLUME USE OVER 0.2718E+06 HRS,==========
    STAGE        VOLUME              ATTAINED
     (M)         (CU.M.)      (HOURS)   (% OF TIME)

0.000000E+00 0.0000E+00 0.2718E+06     100.00
0.900000E-01 0.1242E+03 0.2717E+06      99.97
0.180000E+00 0.2572E+03 0.2716E+06      99.95
0.270000E+00 0.4039E+03 0.2715E+06      99.91
0.360000E+00 0.5542E+03 0.2714E+06      99.86
0.450000E+00 0.7198E+03 0.2711E+06      99.76
```

0.540000E+00	0.8977E+03	0.7924E+04	2.92
0.630000E+00	0.1076E+04	0.5316E+04	1.96
0.720000E+00	0.1262E+04	0.3992E+04	1.47
0.810000E+00	0.1477E+04	0.3067E+04	1.13
0.900000E+00	0.1691E+04	0.2460E+04	0.91
0.990000E+00	0.1906E+04	0.1994E+04	0.73
0.108000E+01	0.2170E+04	0.1615E+04	0.59
0.117000E+01	0.2440E+04	0.1312E+04	0.48
0.126000E+01	0.2709E+04	0.1105E+04	0.41
0.135000E+01	0.2979E+04	0.9110E+03	0.34
0.144000E+01	0.3249E+04	0.7820E+03	0.29
0.153000E+01	0.3539E+04	0.6890E+03	0.25
0.162000E+01	0.3869E+04	0.6330E+03	0.23
0.171000E+01	0.4198E+04	0.5840E+03	0.21
0.180000E+01	0.4528E+04	0.5390E+03	0.20
0.189000E+01	0.4754E+04	0.5020E+03	0.18

FINISH

APPENDIX C: TULE CREEK WATERSHED MAP
(adapted from Tule Creek Watershed Report, August 2010)


Legend
Drainage Ditches
Approximate Location of Sediment Trap Pond
Basin Boundary
0 500 1,000
Feet
Market Street
Highway 35 Bypass
Basin 101
Basin 102
Basin 103
Basin 104
Basin 202
Basin 203
Basin 204
FM 2165
Ditch 1
Ditch 2
Ditch 3
Ditch 4
Highway 35 Business
Approximate Location of Sediment Trap Pond
Aransas Bay
Little Bay
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Appendix H
USACE Jurisdictional Determination

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
CORPUS CHRISTI REGULATORY FIELD OFFICE
5151 FLYNN PARKWAY, SUITE 306
CORPUS CHRISTI, TEXAS 78411

April 23, 2013

REPLY TO ATTENTION OF:

Corpus Christi Regulatory Field Office

SUBJECT: File No. SWG-2013-00070

Aransas County
Attn: David Reid
301 N. Live Oak
Rockport, Texas 78382

Dear Mr. Reid:

This is in regard to Naismith Engineering's request, dated January 23, 2013 and submitted on your behalf, to determine whether a Department of the Army permit is required for drainage ditch improvements and maintenance activities, located in the Upper Tule Drainage Ditch, in Rockport, Aransas County, Texas. The project area reviewed is enclosed in 2 sheets.

We have reviewed your request and have concluded that there are no waters of the U.S. in the project area; therefore, your proposed project is not subject to our jurisdiction under Section 10 of the Rivers and Harbors Act of 1899 or Section 404 of the Clean Water Act. As such, a Department of the Army permit is not required. This determination is an approved jurisdictional determination for your specific project site. This approved determination is valid for 5 years from the date of this letter unless new information warrants a revision of the determination prior to the expiration date. Please be aware that Tule Creek is a water of the U.S. subject to our jurisdiction under Section 404 of the Clean Water Act and a Department of the Army permit is required for any discharge of fill material into Tule Creek. Fill material is defined as material placed in waters of the United States where the material has the effect of replacing any portion of a water of the United States with dry land; or changing the bottom elevation of any portion of a water of the United States, as per 33 CFR 323.2(e)(1).

Corps determinations are conducted to identify the limits of the Corps Clean Water Act jurisdiction for particular sites. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331.5. Also enclosed are a combined Notification of Administrative Appeal Options and Process (NAP) and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA to the Southwestern Division Office at the following address:

Mr. Elliott Carman
Regulatory Appeals Officer
Southwest Division USACE (CESWD-PD-O)
1100 Commerce Street, Suite 831
Dallas, Texas 75242-1317
Telephone: 469-487-7061; FAX: 469-487-7199

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete; that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within **60 days** of the date of the NAP. It is not necessary to submit an RFA form to the Division office if you do not object to the determination in this letter.

Please reference file number **SWG-2013-00070** in future correspondence pertaining to this subject. If you have any questions, please contact Desireé Wilson at the letterhead address or by telephone at 361-814-5847, ext. 1006. To assist us in improving our service to you, please complete the survey found at http://per2.nwp.usace.army.mil/survey.html.

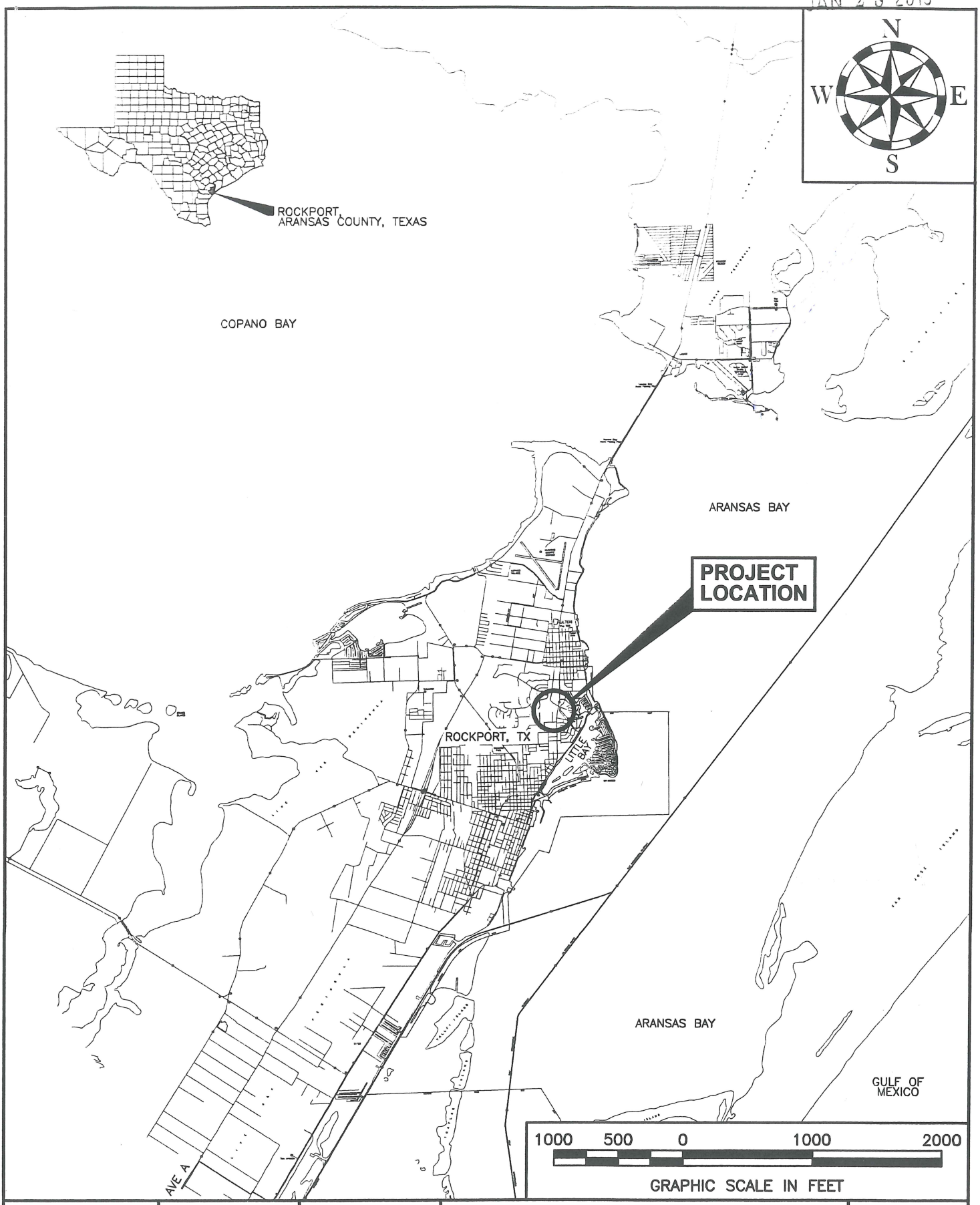
Sincerely,

Lloyd Mullins, Supervisor
Corpus Christi Regulatory Field Office

Enclosures

Copy:
Naismith Engineering, Inc.
Attn: Sandi Hart
4501 Gollihar Road
Corpus Christi, Texas 78411

JAN 28 2013



Drawn By	:	TS
Checked By	:	CH
Approved By	:	CBT
Project No.	:	8722
Scale	:	AS SHOWN
Date	:	01/2013
Revision	:	0

OFFICE LOCATION :

4501 Gollihar Rd.
Corpus Christi, Texas 78411
P.O. Box 3099
Corpus Christi, Texas 78463
(361)-814-9900

NEI
Naismith Engineering, Inc
TBPE No. F-355

LOCATION MAP

UPPER TULE WEST DRAINAGE DITCH

ROCKPORT, ARANSAS COUNTY, TEXAS

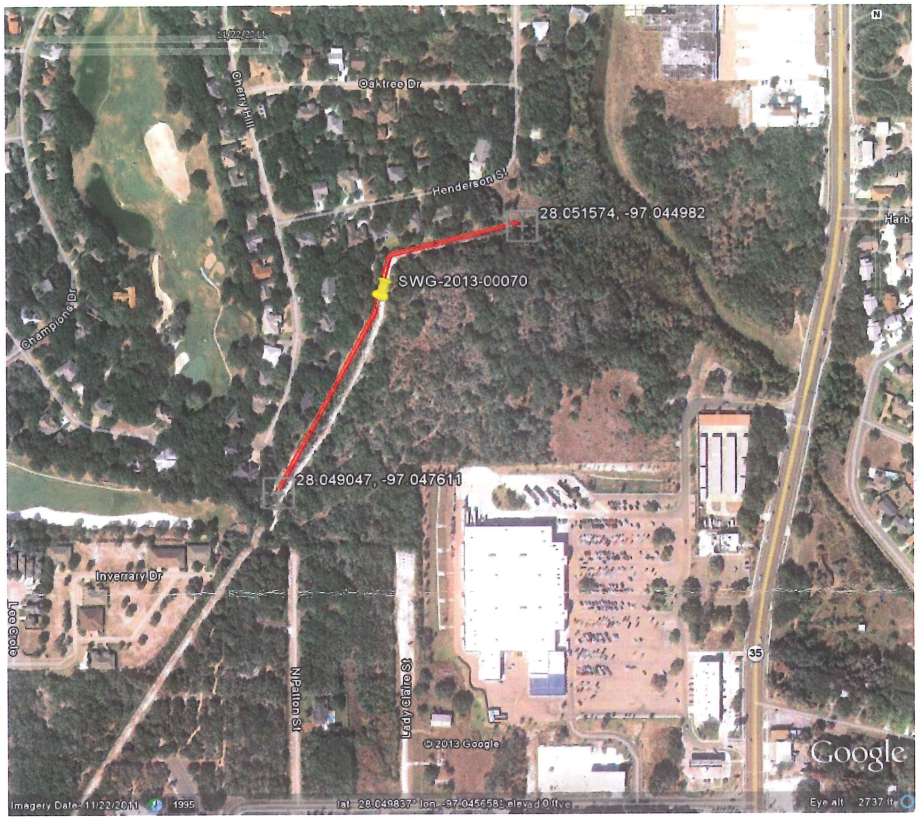
Dwg. File: 8722-LOC

1

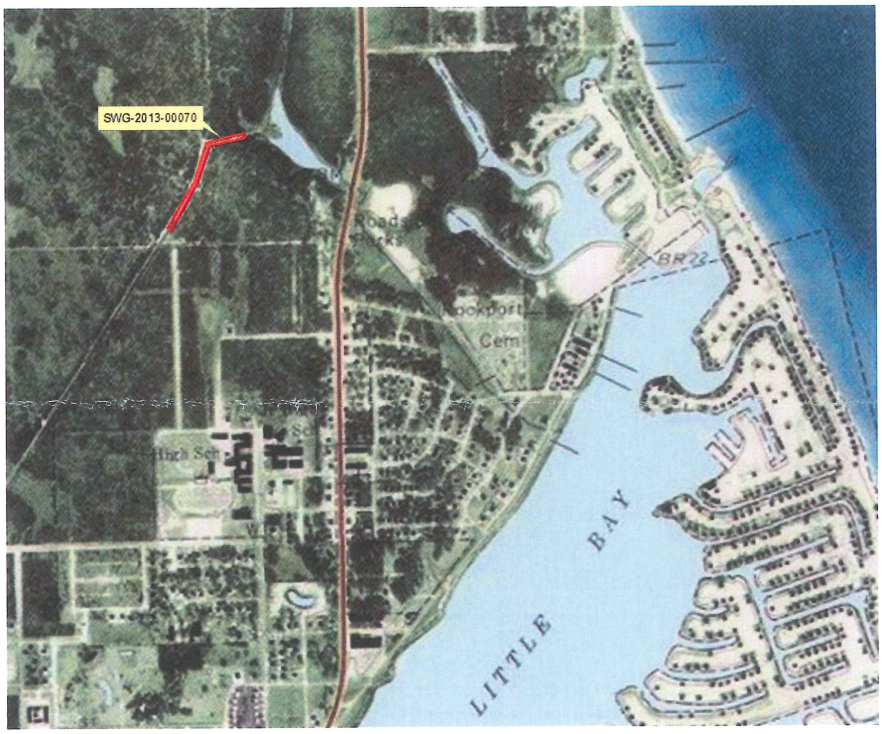
Sheet 1 Of 6

Reviewed for: SWG-2013-00070 Sheet 1 of 2

Resources Reviewed for Jurisdictional Determination



2011 Google Earth Image



USA Topo Map in ArcMap – Zoomed to Project Location

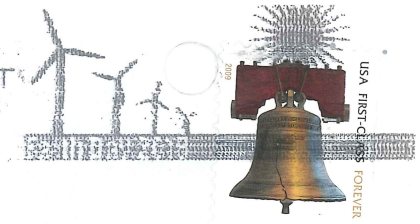
Reviewed for
SWG-2013-00070
Sheet 2 of 2

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
GALVESTON DISTRICT
REGULATORY FIELD OFFICE
5151 FLYNN PARKWAY, SUITE 306
CORPUS CHRISTI, TX 78411-4318

CORPUS CHRISTI TX 784
RIO GRANDE DISTRICT
23 APR 2013 PM 1 L

RECEIVED

APR 24 2013



NAISMITH ENGINEERING INC
ATTN: SANDI HART
4501 GOLLIHAR RD
CORPUS CHRISTI, TX 78411-2909

78411$2909