

**101 E. Southwest Pkwy, Ste 114
Lewisville, TX 75067
(972) 436-9669
FAX: (972) 436-9667**

July 3, 2014

Lisa A. Pyles
Director of Infrastructure Operations and Services
Town of Addison
16801 Westgrove Drive
Addison, TX 75001-5190

Subject: Response to TRC Technical Memorandum Sponsored by the City of Farmers Branch

Dear Ms. Pyles:

KBA EnviroScience, Ltd. (KBA) was contracted by the Town of Addison (Town) to respond to the Technical Memorandum (Report) developed for the City of Farmers Branch by TRC. TRC was commissioned by the City of Farmers Branch to perform stream discharge measurements, estimate gross evaporation losses, develop a water quantity budget, sample groundwater from the Town's groundwater well, and evaluate the water quality of the groundwater well. These activities were conducted, in part, to evaluate the Town of Addison's compliance with their amended Water Use Permit No. 5383A issued on May 31, 2011 by the Texas Commission on Environmental Quality (TCEQ) (the "Permit"). The TRC report is dated April 29, 2014 and was provided to the Town on May 15, 2014 by the City of Farmers Branch.

KBA has read the Report and this document is our analysis of the Report's findings. Section headings in this document refer to the headings in the Report.

Introduction

In the introduction of the report, TRC states that Farmers Branch Creek is perennial, spring fed stream that is a tributary to the Elm Fork of the Trinity River (Segment 0822). When KBA performed the "Delineation of Jurisdiction Waters" on the portion of Farmers Branch Creek that flows through Vitruvian Park, the U.S. Army Corps of Engineers informed us that they consider Farmers Branch Creek an intermittent stream. Springs in the area do contribute water to the stream in the winter, as noted later in the TRC report, but these springs may not be contributing water in the summer during dry years.

Also in the Introduction, TRC states that the total area of the impoundments is 3.06 acres; however, only 2.02 acres of impounded water was the result of the Vitruvian Park development. The remainder of the area (1.04 acres) is the area of the original impoundment by Dam No. 1,

which was there prior to the Vitruvian Park development and permitted to impound state water. The report uses the 3.06 acres to make assumptions and conclusions, while the actual area attributable to the Vitruvian Park development is 2.02 acres.

Stream Discharge

The Report states that TRC performed stream discharge measurements of water entering and exiting the Vitruvian Park reservoirs. Ten sets of measurements were performed at two locations using approved USGS equipment and techniques. TRC concluded that stream flow into the Vitruvian Park reservoirs averaged 0.533 cubic feet per second (cfs), while stream flow out of the Vitruvian Park reservoirs averaged 0.665 cfs. TRC states that this indicates there is no loss of water from seepage out of the reservoirs; rather, there is a net increase in flow through the system. Springs and other groundwater additions were concluded to be the cause of the increased flow. An additional input, which TRC did not note, was that the Town had been adding groundwater through pumping up until the study was conducted. As previously mentioned, it would be typical of an intermittent stream to gain flow from groundwater during February. The groundwater contribution would not, however, be expected to continue through the summer months, especially during drought years.

Evaporation Losses

This section of the Report gives an in depth discussion on how TRC determined the amount of water that would evaporate due to the impoundments and the additional water features of Vitruvian Park. TRC concludes that the gross evaporative losses from the impoundments would average 14.6 acre-ft/year using Texas Water Development Board (TWDB) coefficients. As mentioned previously, TRC used 3.06 surface water acres to estimate these evaporative losses. However, only 2.02 acres of additional surface area was created by the Vitruvian Park development. Therefore, using TWDB coefficients, average gross annual evaporative losses from the reservoirs at Vitruvian Park would be 9.6 acre-feet/year, which is slightly higher than KBA's estimate included in the Water Use Permit application submitted to the TCEQ on behalf of the Town. KBA estimated 8.9 acre-ft/year of evaporation loss using TCEQ protocols. Although KBA calculated 8.9 acre-ft/year of evaporation loss, the Permit requires a minimum of 5.82 acre-ft/year of groundwater be added to the reservoirs.

The Report then calculates estimated enhanced and forced evaporation losses due to the falls and other water features at Vitruvian Park. Enhanced evaporation is due to the increase surface area of the falls and cascades that are exposed to the air. TRC calculates this number to be 0.38 ac-ft, but this number includes the falls over Dam No. 1, which was in place before the construction of the Vitruvian Park development. Assuming the rest of their calculations are correct and removing the falls over Dam No. 1, the average enhanced evaporation loss would be 0.25 acre-ft/year.

Forced evaporation is the evaporation due to the increase in water temperature as it is flows over warm surfaces such as the concrete of the water features in the Vitruvian Park development. Using water temperature measurements provided by City of Farmers Branch and TRC personnel, and using historical meteorological data, TRC calculated the forced evaporation loss to be 0.13 acre-ft/year. These calculations appear correct.

Total evaporation from the Vitruvian Park development was then calculated by adding gross evaporation, enhanced evaporation, and forced evaporation. **Table 1** presents a summary of TRC’s and KBA’s calculations for all evaporative losses from the Vitruvian Park development.

Source	TRC Calculation		KBA Calculation	
	Acre-ft/year	Gallons per Minute (pumping)	Acre-ft/year	Gallons per Minute (pumping)
Gross Evaporation	14.6	9.02	9.6	5.95
Average Enhanced Evaporation	0.38	0.24	0.25	0.16
Average Forced Evaporation	0.13	0.08	0.13	0.08
Total Evaporation	15.08	9.34	9.98	6.19

The current TCEQ Water Use permit does not require the Town of Addison to make up for enhanced or forced evaporation, but if the Town was required to make up for this loss, the current well and pump could easily manage the job. The Town’s Water Use Permit requires 5.82 acre-ft/year to be pumped.

Water Quantity Budget

TRC discusses how make-up water for future evaluation can be determined on a daily, weekly, or monthly basis by using data provided by the USACE for Grapevine Lake. This statement is generally accurate but the Town’s TCEQ Water Use Permit mentions no such requirement. The permit states that the Town of Addison “shall supplement the reservoirs with water from the groundwater well in the amount of a minimum of 5.82 acre-feet per year”. There is no mention of calculating replacement water on a weekly or monthly, or even a yearly basis.

The Report goes on to discuss the make-up of historical evaporation losses that, it is contended, the Town did not account for during construction and prior to the completion of the groundwater well. The Report contends that water began to be impounded by Vitruvian Park in late 2010 or early 2011 and no pumping of groundwater occurred until August 2012. The report also provides that during this time, State water was impounded and eventually used to conduct the initial filling of the reservoir created by Dam No. 2 and for the increase in capacity of the reservoir behind Dam No. 1.

The reservoir behind Dam No. 1 is the same size and volume as it was prior to construction of the Vitruvian Park development. No construction occurred below Dam No. 2 during the construction of Vitruvian Park, although Dam No. 1 was rebuilt at the original elevation subsequent to the construction of the park. The change in volume of the Dam No. 1 reservoir in the permit was only a correction to reflect the actual conditions on site. The original permit for Dam No. 1 had inaccurate information. Therefore, no State waters were used to fill the added capacity of this reservoir since no added capacity of reservoir No. 1 occurred. Also, during the construction of Vitruvian Park, water was diverted around the construction zone to facilitate the work. Photos provided in **Appendix A** show pumps and hoses used to divert water from

upstream of the construction zone to below the construction zone, which then passed over Dam No. 1 as required by the Permit.

The Report continues with a discussion as to how much water the Town of Addison “owes” for not pumping groundwater from early 2011 through August 2012 to account for evaporation during construction. Dam No. 2 was not completed until October 2011 and prior to that, water was being diverted from upstream of Vitruvian Park to below the construction zone so no water was impounded until October 2011. The groundwater well was installed in July 2012. Based on an average annual evaporation rate of 9.6 acre-ft/year (using TRC’s higher evaporation coefficient), the evaporative loss for that period is estimated to be 7.2 acre-ft or 2,346,127 gallons, as compared to the evaporative losses calculated by TRC of 10.95 acre-ft or 3,568,073 gallons.

The initial filling of the reservoir behind Dam No. 2 was accomplished through a rain event, not through impounding state water as the City of Farmers Branch contends. However, even if state water was used to initially fill this impoundment, the total water impounded to initially fill the reservoir behind Dam No. 2 would have been 11.0281 acre-ft or 3,593,517 gallons.

Based on these calculations, the maximum amount of historical water the Town could “owe” is 7.2 acre-ft (evaporation) + 11.0281 acre-ft (filling reservoir) = 18.28 acre-ft or 5,956,556.2 gallons.

From the time the Town of Addison began pumping from the groundwater well in August 2012 through May 31, 2014, a total of 13,166,100 gallons of water has been pumped and discharged over Dam No. 1 (see pumping data in **Appendix B**). During this time, the Town was required by the Permit to pump 3.3 million gallons; therefore, the Town has already pumped approximately 9,866,100 gallons in excess of that required by the Permit, more than compensating for the approximately 6 million gallons of historically impounded water and (theoretical) initial filling of the reservoir behind Dam No. 2.

Groundwater Sampling

TRC collected and analyzed samples from the groundwater well and compared the results of the laboratory analysis to surface water quality standards. These samples exceeded surface water quality standards for dissolved oxygen, total dissolved solids, chloride and sulfate. The Town’s Permit provides that combined stream water and groundwater should meet surface water quality standards. TRC’s study did not include surface water quality analysis. Subsequent to the Report, the City of Farmers Branch conducted surface water quality sampling at the Vitruvian Park Development. Samples were collected upstream of the discharge of the Town’s groundwater pump and downstream of Dam No. 1, the most downstream location of the Vitruvian Park development. Samples were analyzed for pH, TDS, chloride, and sulfate (**Appendix D**). Laboratory analysis showed that water quality for water discharging over Dam No. 1 met the applicable surface water quality standards.

Well and Groundwater Evaluation

TRC evaluated the quality and quantity of groundwater underlying the Vitruvian Park reservoirs. The report notes that the Town's Permit states that groundwater from the Trinity Aquifer would be used to replace evaporation losses from the Vitruvian Park reservoirs but the well the Town is using for the make-up water was installed in the Woodbine Aquifer. The report also states that the Woodbine Aquifer has poor water quality relative to the Trinity Aquifer.

The Town's groundwater well was installed in the Woodbine Aquifer; however, a letter dated February 7, 2013 (**Appendix C**) describing how the well was installed in the Woodbine Aquifer was provided to the TCEQ. Based on a telephone conversation KBA had with Mr. Chris Kozlowski of the TCEQ Water Rights group on February 3, 2014, TCEQ is in receipt of that letter and no further action is required regarding this issue.

TRC also considered the capacity of the well to compensate for evaporation losses from the Vitruvian Park reservoirs. They conclude that the well and aquifer can meet the volume needs to make up for the evaporation losses. KBA agrees with this finding.

TRC's Conclusions / Recommendations and KBA's Response

TRC lists several conclusions and recommendations based on their findings:

- TRC concluded that there are no net seepage losses in the Vitruvian reservoirs. KBA agrees with this conclusion.
- TRC concluded that gross evaporation rates, using Grapevine Lake pan data, for the Vitruvian Park reservoirs average 14.6 acre-ft/year based on the 3.06 surface acres of the Vitruvian Park reservoirs. KBA contends that although the total area of the reservoirs in the Vitruvian Park development is 3.06 acres, the increased surface area due to that development is 2.02 acres not 3.06 acres, which results in 9.6 acre-ft/year of gross evaporation losses.
- TRC concluded that an average of an additional 0.38 acre-ft/year of water is lost from enhanced evaporation due to the falls and water features in the development. KBA notes that this calculation includes the falls over Dam No. 1, which were there prior to the Vitruvian Park development. Therefore, the total enhanced evaporation should only be 0.25 acre-ft/year. The Town's TCEQ permit does not require this evaporation to be taken into account. Nevertheless, the amount of groundwater pumped by the Town has compensated for any enhanced evaporation losses.
- TRC concluded that an additional 0.13 acre-ft/year of forced evaporation occurs on the site. KBA does not dispute this calculation; however, the Town's TCEQ permit does not require this evaporation to be taken into account. Regardless, the amount of groundwater pumped by the Town has replaced any losses due to forced evaporation.
- TRC concluded that total average annual evaporation losses from the Vitruvian Park reservoirs are estimated to be 15.08 acre-ft. KBA calculations show the estimated average annual evaporation losses including enhanced and forced evaporation totals 9.98 acre-ft.

- TRC concluded that the Town began impounding water in late 2010 or early 2011 prior to the installation of the groundwater well and before the Town's Permit was issued. They also conclude that state water was impounded during this time. In fact, no state water was impounded during this time. Water began to be impounded in October 2011, after the Permit was issued. During the course of construction, prior to October 2011, water was diverted from upstream, around the construction zone, and directed back into the stream channel below the construction area.
- TRC concluded that an inadequate volume of water was pumped from the well between August 2012 through December 2013 to make up for water impounded before pumping began and for the initial filling of the reservoir. KBA's calculations indicate that more than twice the amount of water required to compensate for the initial filling of the reservoir and to make up for historic evaporation losses has occurred. Also, as mentioned previously, no State water was used during the initial filling of the reservoir behind Dam No. 2.
- TRC concluded that the groundwater well used for make-up water has the capability to meet long-term quantity and short-term peak quantity needs during the highest evaporation month of record. KBA notes that no short-term peaking needs are required by the Permit. The TCEQ permit requires that a minimum of 5.82 acre-ft/year be pumped into the system; no periodicity is written into the permit.
- TRC concluded that the groundwater well be used to make-up evaporation losses was installed in the Woodbine Aquifer and not the Trinity Aquifer as stated in the Permit. KBA confirmed that TCEQ is aware of this fact and the TCEQ stated that no further action is required by the Town in regards to this issue.
- TRC concluded that groundwater samples taken from the Town's make-up water well contained total dissolved solids (TDS) concentrations of approximately 2,000 – 2,400 mg/L, and that the ground water does not meet the Texas Surface Water Quality Standards for TDS, chloride, or sulfate. However, the Town's Permit states that the "[d]ischarge of commingled groundwater from the reservoirs should be of sufficient quality to meet the Surface Water Quality Standards for Segment No. 0822". That is indeed the case based upon subsequent sampling data taken by the City of Farmers Branch. No issues regarding water quality are present.
- TRC recommended that Grapevine Lake evaporation pan data be used on a real-time basis to determine the amount of make-up water required. KBA disagrees with this recommendation. The Town's TCEQ permit does not require real-time make-up of evaporation losses and KBA discourages this activity due to the demanding logistics. Furthermore, it would not serve any purpose because the Town's pumping of groundwater is meeting all evaporation losses by keeping the reservoirs full.
- TRC recommended that an effective surface area of 3.14 acres plus average monthly values for forced evaporation should be used to calculate evaporation losses. As discussed above, KBA disputes this number. This area includes the area of the reservoir behind Dam No. 1 and the area of the falls over Dam No. 1, both of which were present before the Vitruvian Park development was constructed. The actual area should be 2.09 acres.

- TRC recommended that total evaporation losses and groundwater pumped should be reconciled on at least a weekly basis to maintain streamflows downstream of the reservoirs. However, the Permit requires that the Town keep the reservoirs full. The Permit does not require any other measurements.
- TRC recommended that the use of the Woodbine Aquifer be discontinued and that a new well be installed in the Trinity Aquifer. KBA disagrees with this recommendation. As demonstrated by the City of Farmers Branch data, the water quantity and quality is sufficient to meet Permit requirements.
- TRC recommended that a higher-capacity pump be considered so that if the pump goes out of service, a higher-capacity pump could compensate for lost pumping time. The Permit does not require a higher-capacity pump and the current pump has been demonstrated to be sufficient to meet all evaporation losses.

Based on our review, no further action is required by the Town to meet the requirements of its TCEQ permit. Please let us know if additional information is needed.

Sincerely,

A handwritten signature in blue ink, appearing to read "Joseph Schwartz".

Joseph Schwartz
KBA EnviroScience, Ltd.

A handwritten signature in blue ink, appearing to read "C. Keith Bradley".

C. Keith Bradley, REP, CWB
KBA EnviroScience, Ltd.

APPENDICES

APPENDIX A
CONSTRUCTION PHOTOS



View, facing upstream, of hose used for diverting water from above Dam No. 2 around construction area. Photo taken by the USACE during field visit 9/28/10.



View, facing north, of water being diverted downstream around construction area. Photo taken by the USACE during field visit 9/28/10.



View of pumps and hoses to transfer water from upstream of construction zone to downstream of construction zone. Photo taken by Town of Addison Staff



View of hoses used to divert water around construction area and discharge downstream. Photo taken by Town of Addison staff.



View of hoses used to divert water around construction area and discharge below Dam No. 1.
Photo taken by Town of Addison staff.



View of water being discharged below the newly constructed Dam No. 2. Photo taken by Town of Addison staff,



View of hoses used to divert water around construction area.

APPENDIX B

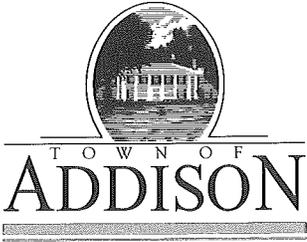
TOWN OF ADDISON PUMPING DATA

Vitruvian Park Water Well Flow Log			Recirculation Pumps Hours		
Date	Day	Gallons	M1	M2	M3
8/6/2012	Monday	367,200			
8/24/2012	Friday	732,200			
9/4/2012	Tuesday	943,300			
9/21/2012	Friday	1,240,600			
9/24/2012	Monday	1,292,600			
9/28/2012	Friday	1,359,400			
10/5/2012	Friday	1,477,600			
10/12/2012	Friday	1,590,400			
10/19/2012	Friday	1,705,800			
11/2/2012	Friday	1,918,000			
11/9/2012	Friday	2,021,500			
11/16/2012	Friday	2,124,600			
11/30/2012	Friday	2,334,400			
12/7/2012	Friday	2,438,500			
12/14/2012	Friday	2,540,900			
12/21/2012	Friday	2,643,200			
12/28/2012	Friday	2,744,400			
1/4/2013	Friday	2,841,800			
1/11/2013	Friday	2,938,600			
1/18/2013	Friday	3,035,400			
1/25/2013	Friday	3,129,600			
2/1/2013	Friday	3,222,200			
2/8/2013	Friday	3,312,600			
2/15/2013	Friday	3,403,000			
2/22/2013	Friday	3,492,700			
3/1/2013	Friday	3,580,500			
3/8/2013	Friday	3,667,200			
3/15/2013	Friday	3,752,300	3318.38	8717.2	8346.4
3/22/2013	Friday	3,835,800	3439.96	8828.57	8457.76
3/29/2013	Friday	3,917,500	3509.29	8946.99	8576.08
4/5/2013	Friday	3,997,600	3601.63	9069.98	8699.16
4/19/2013	Friday	4,159,000	3601.63	9313.81	8949.99
4/26/2013	Friday	4,239,800	3770.73	9883.31	9112.48
5/10/2013	Friday	4,614,600			
5/17/2013	Friday	4,941,600	4236.46	9960.29	9589.49
5/24/2013	Friday	5,266,000	4260.35	10082.76	9711.95
6/7/2013	Friday	5,823,100	4337.92	10399.12	10028.31
6/14/2013	Friday	6,047,000			

Vitruvian Park Water Well Flow Log			Recirculation Pumps Hours		
Date	Day	Gallons	M1	M2	M3
6/21/2013	Friday	6,115,600	4377.92	10703.56	10332.75
6/28/2013	Friday	6,199,600	4377.92	10871.06	10500.25
7/5/2013	Friday	6,276,200			
7/12/2013	Friday	6,422,650			
7/19/2013	Friday	6,748,200	4377.92	11352.76	10981.95
7/26/2013	Friday	7,068,400	4377.92	11519.2	11148.39
8/2/2013	Friday	7,323,500	4377.92	11688.5	11317.69
8/9/2013	Friday	7,507,500			
8/16/2013	Friday	7,660,000	4377.92	12023.95	11653.13
8/30/2013	Friday	8,045,500			
9/6/2013	Friday	8,368,700	4377.92	12527.95	12157.13
9/13/2013	Friday	8,692,200	4377.92	12696.4	12325.65
9/20/2013	Friday	9,028,700			
9/27/2013	Friday	9,282,600	4377.92	13033.63	12662.82
10/4/2013	Friday	9,367,400			
10/11/2013	Friday	9,569,750			
10/18/2013	Friday	9,779,799			
10/25/2013	Friday	9,992,000			
11/1/2013	Friday	10,203,500			
11/8/2013	Friday	10,416,400			
11/15/2013	Friday	10,630,100	4377.92	13943.01	13621.9
11/22/2013	Friday	10,880,800	4377.92	14033.72	13718.81
11/29/2013	Friday	11,031,750	4,460.37	14,123.81	13,804.56
12/6/2013	Friday	11,050,800	4,591.51	14,263.40	13,942.85
12/13/2013	Friday	11,416,200	4,740.56	14,418.21	14,097.10
12/20/2013	Friday	11,404,400	4,908.86	14,586.52	14,265.41
12/27/2013	Friday	11,540,400	5,066.63	14,756.04	14,434.95
1/3/2014	Friday	11,621,650	5,234.00	14,923.38	14,602.27
1/10/2014	Friday	11,621,650	5,401.33	15,090.71	14,769.60
1/17/2014	Friday	11,621,675	5,584.51	15,295.60	14,954.49
1/24/2014	Friday	11,636,200	5,706.56	15,438.38	15,077.28
1/31/2014	Friday	11,691,850	5,852.67	15,565.60	15,244.50
2/7/2014	Friday	11,692,900	5,852.67	15,708.81	15,387.71
2/14/2014	Friday	11,706,200	5,900.85	15,726.99	15,405.89
2/21/2014	Friday	11,789,700	6,064.27	15,752.47	15,431.37
2/28/2014	Friday	11,873,400	6,232.64	15,780.83	15,459.72
3/7/2014	Friday	11,933,350	6,404.44	15,826.48	15,505.34

Vitruvian Park Water Well Flow Log			Recirculation Pumps Hours		
Date	Day	Gallons	M1	M2	M3
3/14/2014	Friday	12,009,900	6,567.45	15,989.47	15,668.35
3/21/2014	Friday	12,207,900	6,731.31	16,157.22	15,836.11
3/28/2014	Friday	12,405,400	6,899.40	16,325.31	16,004.20
4/4/2014	Friday	12,418,450	7,067.61	16,493.52	16,172.41
4/11/2014	Friday	12,418,450	7,208.33	16,640.95	16,319.84
4/18/2014	Friday	12,418,450	7,373.09	16,809.17	16,488.06
4/25/2014	Friday	12,418,450	7,534.80	16,976.50	16,655.39
5/2/2014	Friday	12,509,000	7,702.37	17,144.07	16,822.97
5/9/2014	Friday	12,673,000	7,848.08	17,289.78	16,968.67
5/16/2014	Friday	12,837,700	7,895.56	17,337.26	17,016.15
5/23/2014	Friday	13,002,000	8,064.27	17,505.97	17,184.88
5/30/2014	Friday	13,166,100	8,225.39	16,673.61	17,352.50

APPENDIX C
TCEQ LETTER



Post Office Box 9010

Addison, Texas 75001-9010

5300 Belt Line Road

(972) 450-7000

FAX (972) 450-7043

February 7, 2013.

Chris Kozlowski, Application Manager
Water Rights Permitting Team
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

RE: Permit No. 5383A for the Town of Addison

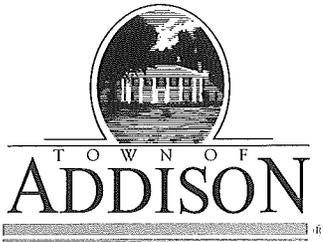
Dear Mr. Kozlowski:

The Town of Addison (Town) is required by the referenced permit (Permit) to maintain and operate an alternate source of water to replace any loss by evaporation due to the Vitruvian Park ponds on Farmers Branch Creek. The supplemental amount required under the Permit is 5.82 acre-feet per year.

The recitals section of the Permit refers to the Trinity Aquifer, stating that it "will be used to maintain the reservoirs at a constant elevation in order to pass inflows of state water." Again, in Section 6.B, the Permit states that the Town "has identified groundwater from the Trinity Aquifer as the alternate source of water for this project."

While drilling and testing the well depths and water quality, the Town's consulting engineer on the well project, Kleinfelder Central, Inc. (Kleinfelder) determined that the Woodbine Aquifer yielded more than adequate water to meet the Permit requirements at substantially less cost (see attached Kleinfelder letter). The well, installed by C. Miller Drilling is at a depth of 642 feet and can produce as much as 16 gpm (over 25 acre-feet per year).

When Kleinfelder verified that sufficient water could be produced from the Woodbine Aquifer to more than meet the Permit requirements, Keith Bradley with KBA EnviroScience, the Town's consultant on this project, contacted the Texas Commission on Environmental Quality (TCEQ) to ask that the Permit be changed from "Trinity Aquifer" to "an aquifer that will supply sufficient water to maintain the reservoirs at a constant elevation in order to pass inflows of state water." Mr. Bradley was told that a letter from the Town stating the Woodbine Aquifer would be used as the alternate source of replacement water, rather than the Trinity Aquifer, with Kleinfelder's supporting documentation, placed in the Town's Permit file, would be acceptable and that a change to the Permit language was not necessary.



PUBLIC WORKS DEPARTMENT
Post Office Box 9010 Addison, Texas 75001-9010

(972) 450-2871 FAX (972) 450-2837
16801 Westgrove

Additionally, we want to clarify that the language in Section 6.B. does not require that the Town release "a minimum of 5.82 acre feet per year ... over the weir in Reservoir No. 1" (the original weir). It means, as stated earlier in Section 6.A, that the Town will replace evaporated water in the two reservoirs with 5.82 acre-feet of groundwater, and will maintain stated elevations in each reservoir, which under normal circumstances will release water over the original weir.

Please add this letter, and the attached letter from Kleinfelder, to the Town of Addison's Permit file to note that the Woodbine Aquifer had sufficient water to meet the alternate source of water requirements in the Permit and to clarify any misunderstanding that may arise from Section 6.B.

Thank you, and please let me know if additional information is needed.

Sincerely,

Lea Dunn
Deputy City Manager

Attachment: Kleinfelder Letter dated July 5, 2012

APPENDIX D

**FARMERS BRANCH CREEK
SURFACE WATER QUALITY DATA**

May 27, 2014

Stacy Wright
City of Farmers Branch
13000 William Dodson Pkwy
Farmers Branch, TX 75381

RE: Project: None Provided
Pace Project No.: 7515422

Dear Stacy Wright:

Enclosed are the analytical results for sample(s) received by the laboratory on May 21, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Lauren Carriker
lauren.carriker@pacelabs.com
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

CERTIFICATIONS

Project: None Provided

Pace Project No.: 7515422

Dallas Certification IDs:

400 West Bethany Dr Suite 190 75013 Allen TX 75013

Texas Certification #: T104704232-13-5

Kansas Certification #: E-10388

Arkansas Certification #: 88-0647

Oklahoma Certification #: 2012-080

Louisiana Certification #: 02007

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: None Provided

Pace Project No.: 7515422

Lab ID	Sample ID	Matrix	Date Collected	Date Received
7515422001	Upstream FB	Water	05/21/14 14:02	05/21/14 15:00
7515422002	Dam 1 Outflow	Water	05/21/14 14:19	05/21/14 15:00

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SAMPLE ANALYTE COUNT

Project: None Provided
Pace Project No.: 7515422

Lab ID	Sample ID	Method	Analysts	Analytes Reported
7515422001	Upstream FB	SM 2540C	MRU	1
		EPA 9056A	BAF	2
7515422002	Dam 1 Outflow	SM 2540C	MRU	1
		EPA 9056A	BAF	2

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ANALYTICAL RESULTS

Project: None Provided

Pace Project No.: 7515422

Sample: Upstream FB		Lab ID: 7515422001	Collected: 05/21/14 14:02	Received: 05/21/14 15:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Field Data		Analytical Method:						
Collected By	Chris Windham	no units		1		05/21/14 14:02		
Collected Date	05/21/14	no units		1		05/21/14 14:02		
Collected Time	14:02	no units		1		05/21/14 14:02		
Field pH	7.5	Std. Units		1		05/21/14 14:02		
Field pH Ref	SM4500	no units		1		05/21/14 14:02		
Field Temperature	25.2	deg C		1		05/21/14 14:02		
Field Temp Ref	TNI Vol. 1 Module 2	no units		1		05/21/14 14:02		
2540C Total Dissolved Solids		Analytical Method: SM 2540C						
Total Dissolved Solids	361	mg/L	25.0	1		05/21/14 16:12		
9056 IC Anions		Analytical Method: EPA 9056A						
Chloride	35.2	mg/L	1.0	10		05/21/14 18:39	16887-00-6	
Sulfate	81.3	mg/L	1.0	10		05/21/14 18:39	14808-79-8	

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ANALYTICAL RESULTS

Project: None Provided

Pace Project No.: 7515422

Sample: Dam 1 Outflow		Lab ID: 7515422002	Collected: 05/21/14 14:19	Received: 05/21/14 15:00	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Field Data		Analytical Method:						
Collected By	Chris Windham	no units		1		05/21/14 14:19		
Collected Date	05/21/14	no units		1		05/21/14 14:19		
Collected Time	14:19	no units		1		05/21/14 14:19		
Field pH	7.8	Std. Units		1		05/21/14 14:19		
Field pH Ref	SM4500	no units		1		05/21/14 14:19		
Field Temperature	25.5	deg C		1		05/21/14 14:19		
Field Temp Ref	TNI Vol.1 Module 2	no units		1		05/21/14 14:19		
2540C Total Dissolved Solids		Analytical Method: SM 2540C						
Total Dissolved Solids	303	mg/L	25.0	1		05/21/14 16:12		
9056 IC Anions		Analytical Method: EPA 9056A						
Chloride	28.4	mg/L	1.0	10		05/21/14 19:50	16887-00-6	
Sulfate	58.2	mg/L	1.0	10		05/21/14 19:50	14808-79-8	

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QUALITY CONTROL DATA

Project: None Provided

Pace Project No.: 7515422

QC Batch: WET/4116

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 7515422001, 7515422002

METHOD BLANK: 76810

Matrix: Water

Associated Lab Samples: 7515422001, 7515422002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	25.0	05/21/14 16:08	

LABORATORY CONTROL SAMPLE: 76811

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	250	245	98	80-120	

SAMPLE DUPLICATE: 76812

Parameter	Units	7515302001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1080	1040	3	20	

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QUALITY CONTROL DATA

Project: None Provided

Pace Project No.: 7515422

QC Batch: WETA/4975 Analysis Method: EPA 9056A
 QC Batch Method: EPA 9056A Analysis Description: 9056 IC Anions
 Associated Lab Samples: 7515422001, 7515422002

METHOD BLANK: 76822 Matrix: Water

Associated Lab Samples: 7515422001, 7515422002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	0.10	05/21/14 18:21	
Sulfate	mg/L	ND	0.10	05/21/14 18:21	

LABORATORY CONTROL SAMPLE: 76823

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	93	90-110	
Sulfate	mg/L	5	4.7	95	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 76824 76825

Parameter	Units	7515422001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	MS Result	Spike Conc.	MSD Result						
Chloride	mg/L	35.2	50	81.2	50	81.8	92	93	80-120	1	15	
Sulfate	mg/L	81.3	50	130	50	131	97	100	80-120	1	15	

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QUALIFIERS

Project: None Provided

Pace Project No.: 7515422

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The Nelac Institute

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: None Provided

Pace Project No.: 7515422

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
7515422001	Upstream FB		FLD/		
7515422002	Dam 1 Outflow		FLD/		
7515422001	Upstream FB	SM 2540C		WET/4116	
7515422002	Dam 1 Outflow	SM 2540C		WET/4116	
7515422001	Upstream FB	EPA 9056A		WETA/4975	
7515422002	Dam 1 Outflow	EPA 9056A		WETA/4975	

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.



Section A

Required Client Information:

Company: City of Farmers Branch

Address: _____

Email To: _____

Phone: _____

Fax: _____

Requested Due Date/TAT: _____

Section B

Required Project Information:

Report To: _____

Copy To: _____

Purchase Order No.: _____

Project Name: _____

Project Number: _____

Section C

Invoice Information:

Attention: _____

Company Name: _____

Address: _____

Pace Quote Reference: _____

Pace Project Manager: _____

Pace Profile #: _____

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location: _____

STATE: _____

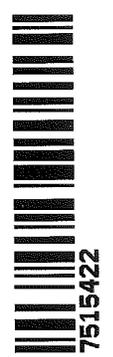
Page: _____ of _____

1767059

ITEM #	Section D Required Client Information		COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives			Y/N	Requested Analysis Filtered (Y/N)	Pace Project No. / Lab I.D.
	Matrix Codes MATRIX / CODE	Drinking Water Water Waste Water Product Soil/Solid	COMPOSITE START	COMPOSITE END/GRAB				DATE	TIME	DATE			
1	Upstream FB	DW			G	WT G	1						001
2	Down 1 outflow	WW			G	WT G	1						002
3		P											
4		SL											
5		OL											
6		WP											
7		AR											
8		TS											
9		OT											
10													
11													
12													

XX CL, TB, SO4

WO#: 7515422



ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP IN °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Upstream FB pH 7.5, 7.5°C Down 1 Outflows pH 7.8, 6.7°C	Moham M. Cuy PAF	5-21-14	1500	Moham M. Cuy PAF	5-21-14	1500	36	Y	Y	Y

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Chris Windham
 SIGNATURE of SAMPLER: [Signature]
 DATE Signed (MM/DD/YY): 05/21/14

ORIGINAL



Sample Condition Upon Receipt

Dallas

Client Name: City of Farmers Branch Project Work order: 7515422

Courier: FedEX UPS USPS Client Courier LSO PACE Other: _____

Tracking#: _____

Custody Seal on Cooler/Box: Yes No Seals Intact: Yes No NA

Packing Material: Bubble Wrap Bubble Bags Foam None Other

Thermometer Used: (IR-01) Type of Ice: Wet Blue None Sample Received on ice, cooling process has begun

Cooler Temp: 3.6°C (Temp should be above freezing to 6°C)

Chain of Custody Present	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	1
Chain of Custody filled out	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	2
Chain of Custody relinquished	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	3
Sampler name & signature on COC	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	4
Sample received within HT	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	5
Short HT analyses (<72 hrs)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA <input type="checkbox"/>	6
Rush TAT requested	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	7
Sufficient Volume received	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	8
Correct Container used	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	9
Pace Container used	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
Container Intact	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	10
Unpreserved 5035A soil frozen within 48 hrs	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	11
Filtered volume received for Dissolved tests	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	12
Sample labels match COC	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	13
Include date/time/ID/analyses	Matrix: <u>water</u>	
All containers needing preservation have been checked	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	14a. Lot# of pH strip: _____ pH checked Yes <input type="checkbox"/> No <input type="checkbox"/> pH<2 <input type="checkbox"/> pH>9 <input type="checkbox"/> pH>12 <input type="checkbox"/> Lot# of Iodine strip: _____ Lot# of Lead Acetate strip: _____
Do containers require preservation at the lab	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	14b. Preservation: _____ Lot#: _____
All containers needing preservation are found to be in Compliance with EPA recommendation	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	14c. _____
Exception: VOA, coliform, O&G	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Trip Blank present	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	15
Trip Blank Custody Seals Intact	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	
Pace Trip Blank Lot# (if purchased):	_____	
Headspace in VOA (>6mm)	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	16
Project sampled in USDA Regulated Area:	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>	17. List State _____

Client Notification/Resolution/Comments:

Person Contacted: _____ Date: _____

Comments/Resolution: _____

Person Examining Contents: mm Date: 5-21-14

