SOAH Docket No. 582-22-0585
TCEQ Docket No. 2021-1001-MWD

APPLICATION BY CITY OF GRANBURY FOR NEW TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT NO. WQ0015821001	**§**	**STATE OFFICE OF ADMINISTRATIVE HEARINGS**

CLOSING ARGUMENTS

OF

CITY OF GRANBURY

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I. Introduction

Granbury, Texas, the county seat of Hood County, is a historic city situated just southwest of the Dallas-Fort Worth metro area.[1] The community has established itself as a major conference destination, a financial hub for the area, and a popular tourist destination.[2] It was recognized in USA Today in 2019, 2020, and 2021 as the Best Historic Small Town in America.[3]

Granbury has also become a wildly popular place to call home.[4] The community grew from 7,758 residents in 2010 to almost 10,000 in 2019—a 28 percent increase.[5] By comparison, the growth rate for the Dallas-Fort Worth metropolitan service area was 18.95 percent.[6] Statewide growth was 16.24 percent during the same period.[7] Granbury ISD enrollment jumped 8.3 percent between the 2017-'18 school year and the 2021-'22 school year.[8] The number of kids in the Granbury ISD is expected to increase another 40 percent over the next decade.[9]

The breakneck growth pace has come with a price for the City's wastewater treatment system.[10] The City currently has a single wastewater treatment plant—

[1] COG Exh. 800 at 17:3 – 18:3.
[2] COG Exh. 800 at 17:3 – 18:6.
[3] COG Exh. 800 at 6-7.
[4] COG Exh. 800 at 18:15.
[5] COG Exh. 800 at 18:15 – 19:3.
[6] COG Exh. 800 at 19:1-3.
[7] COG Exh. 800 at 19:1-3.
[8] COG Exh. 800 at 37:14-15.
[9] COG Exh. 800 at 37:16-17.
[10] COG Exh. 400 at 8-12.

the South Plant.[11] The tremendous population growth now threatens to push the capacity of the South Plant to the limits.[12] More wastewater is now being created on the City's east side.[13] That influent is carried across town to the South Plant.[14] But the South Plant does not have the capacity to handle the growing demands, and key wet wells and lift stations along the way do not have the ability to handle the increasing volumes of flow.[15] In 2017, the City initiated a study of its wastewater system treatment and collection system.[16] The study confirmed that the City's treatment capacity challenges could be traced to stresses on the wastewater system created largely by the rapid demand growth on the eastern side of the service area.[17]

The results from the 2017 study led to a multi-fold solution.[18] The City chose to expand and upgrade the South Plant, replace and upgrade certain lift stations, wet wells, and transmission mains, and add additional treatment capacity in the eastern portion of the system through construction of the East Plant.[19] The East Plant is the facility that is proposed in the Application and that is the subject of the Draft Permit.[20]

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[11] COG Exh. 100 at 2:5-7.
[12] COG Exh. 300 at 34:10 – 35:4; COG Exh. 400 at 9:2 – 10:3
[13] COG Exh. 100 at 3:16-19.
[14] COG EXh. 100 at 3:16-19.
[15] COG Exh. 100 at 3:6-10.
[16] COG Exh. 100 at 2:11-17; COG Exh. 101; COG Exh. 400 at 5:3-7.
[17] COG Exh. 400 at 5:3-20
[18] COG Exh. 400 at 6:13-17; COG Exh. 101; COG Exh. 302
[19] COG Exh. 400 at 12:5-22
[20] COG Exh. 102

The East Plant would be strategically situated to intercept existing wastewater flows—particularly flow surges caused by stormwater infiltration and inundation—before they hit the already stressed collection system en route to the South Plant.[21] In addition, the East Plant would accommodate additional treatment capacity driven by the tremendous growth on the eastern side of Granbury.[22]

Timing of this project is of the essence for the Granbury community.[23] The South Plant is currently treating at 75 percent capacity.[24] However, there are a significant number of connections that were approved through the platting process years ago but that remain dormant.[25] The current economic climate for Granbury is changing that.[26] The South Plant will be at or beyond its capacity when these committed connections are brought online.[27]

This has left the community with little choice but to close its doors to new growth until the East Plant is permitted and operational.[28] Through a series of building moratoria, the City no longer issues any plat applications or construction permits, or provides any other authorizations related to construction and land

[21] COG Exh. 400 5:15-18; COG Exh. 300 at 37:8-15; COG Exh. 100 at 2:19 – 3:13.
[22] COG Exh. 400 5:18-20.
[23] COG Exh. 100 at 2:9-10; COG Exh. 400 at 10:1-3.
[24] COG Exh. 400 at 9:2-4.
[25] COG Exh. 300 at 34:13-16; COG Exh. 400 at 9:6-13.
[26] COG Exh. 400 at 9:10-13; COG Exh. 800 at 37:17 – 38:2.
[27] COG Exh. 300 at 34:18-23; COG Exh. 400 at 9:20 – 10:3.
[28] COG Exh. 100 at 9:12-17; COG Exh. 400 at 9:21 – 10:3; COG Exh. 800 at 42:9-14.

development activities.[29] This is a drastic but necessary decision to address an unsustainable situation.[30]

And the situation is truly unsustainable.[31] If the Draft Permit is not issued, the economic and social ramifications to the Granbury community could be staggering.[32] The City will be required to continue prohibiting new development.[33] In as little as three years, the loss of the East Plant capacity would cost Granbury 179 jobs, $8 million in personal income, and $23 million in lost retail sales.[34] These impacts continue to domino to over 320 jobs by 2030 and 464 jobs by 2035.[35] This creates spinoff consequences of loss of state and local tax revenues, which will negatively impact local government services.[36] Granbury ISD is seeking bond authority from voters in May 2022 to, among other things, construct a new high school needed to address potential overcrowding.[37] The City does not have wastewater capacity to serve the new proposed high school and ancillary demands without the additional capacity provided by the Draft Permit.[38] The lack of ability to treat and discharge pursuant to the terms of the Draft Permit will undoubtedly

[29] COG Exh. 100 at 9:21 – 10:5; COG Exh. 105; COG Exh. 106; COG Exh. 107; COG Exh. 108; COG Exh. 400 at 10:6-12.
[30] COG Exh. 400 at 10:1-3.
[31] COG Exh. 100 at 2:9-10; COG Exh. 800 at 1:15-21.
[32] COG Exh. 800 at 3:5-10; COG Exh. 800 at 33:6-8.
[33] COG Exh. 100 at 9:13-17; COG Exh. 400 at 9:21 – 10:3.
[34] COG Exh. 800 at 35.
[35] COG Exh. 800 at 35.
[36] COG Exh. 800 at 36:10-20.
[37] COG Exh. 400 at 6:3-7; COG Exh. 800 at 38:3-6.
[38] COG Exh. 800 at 39:3-12.

negatively impact the quality of education and school safety in the community.[39] It will also exacerbate potential environmental hazards.[40] There is an undeniable tie between authorizing the discharges in the Draft Permit and economic and social development and public wellbeing within Granbury and across Hood County.[41]

A. The East Plant

The East Plant will use biological nutrient removal and membrane bioreactor technologies.[42] The use of these treatment technologies in wastewater treatment has been proven repeatedly around the world to be capable of producing high quality effluent with constituent concentrations well below that of any other treatment technology currently available.[43] The proposed design meets the City's goal of having a compact treatment footprint, capable of producing the highest level of effluent quality as compared to other current wastewater treatment technologies.[44] A properly designed, well operated MBR plant can produce effluent quality even better than the anticipated performance standards noted above.[45] The City fully expects that the East Plant will produce effluent quality significantly better than the currently proposed Draft Permit limits.[46]

B. The Draft Permit

[39] COG Exh. 800 at 39:7-12.
[40] COG Exh. 300 at 36:6:18.
[41] COG Exh. 300 at 36:20 – 37:6; COG Exh. 800 at 39:10-11.
[42] COG Exh. 300 at 42:5-10.
[43] COG Exh. 300 at 39:14-18.
[44] COG Exh. 300 at 20:8-10.
[45] COG Exh. 300 at 22:20 – 23:3.
[46] COG Exh. 300 at 23:4-14.

The Draft Permit will authorize an Interim Phase and a Final Phase.[47] For the Interim Phase, the proposed annual average discharge flow is limited to 1.0 MGD, with a maximum average two-hour peak discharge of 2,083 gallons per minute. The maximum effluent limits for the Interim Phase of the Draft Permit includes a 5 mg/L limit of BOD. In addition, the maximum effluent limits include a 12 mg/L limit of TSS, and a 1.6 mg/L limit of NH3-N. These limits are an enhanced effluent set used by TCEQ to regulate discharges into high water quality waters like Rucker Creek and Lake Granbury.[48] The Interim Phase also has a limit of 126 cfu of *E. coli* bacteria per 100 milliliters to protect recreational use. The Interim Phase of the Draft Permit also has a 1.0 mg/L limit on total phosphorus.[49]

The proposed maximum annual discharge in the Draft Permit Final Phase is 2.0 MGD, with a maximum average two-hour peak discharge of 2,083 gallons per minute. The maximum effluent limits in the Draft Permit Final Phase include a 5 mg/L limit for BOD, 12 mg/L limit of TSS, and 1.0 mg/L limit of NH3-N. In addition, the Draft Permit Final Phase includes a limit of 126 cfu of *E. coli* bacteria per 100 milliliters, and a 0.5 mg/L limit on total phosphorus. Both Interim and

[47] COG Exh. 102.
[48] COG Exh. 700 at 6:21-22.
[49] COG Exh. 102.

Final phases of the Draft Permit have standard requirements for pH, 6.0-9.0 standard units, and minimum dissolved oxygen, or DO of 6.0 mg/L.[50]

II. Procedural History

The City filed the Application on September 16, 2019.[51] The Chief Clerk declared the Application to be administratively complete on November 12, 2019.[52] The Notice of Receipt of Application and Intent to Obtain Water Quality Permit ("NORI") was published on November 16, 2019 in *The Hood County News*.[53] A Spanish language version of the NORI was published on November 25, 2019 in *La Prensa Comunidad*, which is a newspaper regularly circulated in Hood County, Texas.[54] On March 18, 2020, the ED of the TCEQ completed technical review of the Application and on May 4, 2020, prepared draft TPDES Permit No. WQ0015821001 (Draft Permit).[55] The Notice of Application and Preliminary Decision for TPDES Permit for Municipal Wastewater ("NAPD") was published on May 9, 2020 in the *The Hood County News*.[56] A Spanish language version of the NAPD was published on May 11, 2020 in *La Prensa Comunidad*, which is a newspaper regularly circulated in Hood County, Texas.[57] The Notice of Public Meeting was

[50] COG Exh. 102.
[51] ARE A at 0209.
[52] ARE A at 0095.
[53] ARE A at 0084.
[54] ARE A at 0087.
[55] ARE A at 0065.
[56] ARE A at 0057.
[57] ARE A at 0060.

published on August 5, 2020, in *The Hood County News*.[58] A Public Meeting was held on September 10, 2020, via webcast. The TCEQ received public comments on the application and the Executive Director prepared a Response to Comments, which was filed with the Chief Clerk on May 26, 2021.

The TCEQ Commission considered and granted several contested case hearing requests at its regular public meeting on September 22, 2021. The Commission referred 13 issues to SOAH on September 29, 2021, for a contested case hearing on the Application:[59]

A) Whether the draft permit complies with applicable requirements to abate and control nuisance odors, as set forth in 30 TAC § 309.13(e);
B) Whether the draft permit is protective of water quality;
C) Whether the draft permit is protective of groundwater and wells;
D) Whether the draft permit is protective of the health of the requesters and their families, livestock, and wildlife, including endangered species;
E) Whether the proposed discharge will adversely impact recreational activities;
F) Whether the application is accurate and complete;
G) Whether the modeling complies with applicable regulations to ensure the draft permit is protective of water quality;
H) Whether the ED's antidegradation review was accurate;
I) Whether the nutrient limits in the draft permit comply with applicable Texas Surface Water Quality Standards;
J) Whether the Commission should deny or alter the terms and conditions of the draft permit based on the consideration of need under Texas Water Code § 26.0282;
K) Whether the Applicant's compliance history or technical capabilities raise any issues regarding the Applicant's ability to comply with the material terms of the permit that warrant denying or altering the terms of the draft permit;

[58] ARE A at 0033.
[59] TCEQ Interim Order concerning the application by City of Granbury for new Texas Pollutant Discharge Elimination System Permit No. WQ0015821001; TCEQ Docket No. 2021-1001-MWD; September 29, 2021, at ARE 0002 [hereinafter Interim Order].

L) Whether the proposed location for the Facility complies with the 100-year flood plain and wetland location standards found in 30 TAC § 309.13(a) and (b); and
M) Whether Applicant substantially complied with applicable public notice requirements.

The TCEQ Chief Clerk filed certified copies of all documents with SOAH that are required by title 30, Section 80.118 of the Texas Administrative Code.[60] The Notice of Hearing was published on November 6, 2021 in *The Hood County News*.[61] In accordance with the Texas Water Code and TCEQ rules, the Notice of Hearing stated the date, time, and place of the hearing; a brief description of the nature and purpose of the hearing, including all applicable rules and procedures; and a general description of the location of the proposed discharge point and the name of the receiving water. On December 13, 2021, the presiding Administrative Law Judge admitted Administrative Record Exhibits A and B into evidence and took jurisdiction of the contested case.[62]

III. Burden of Proof

The administrative record filed with SOAH establishes a prima facie demonstration that the executive director's draft permit meets all state and federal legal and technical requirements and would protect human health and safety, the

[60] ARE A-0001.
[61] ARE A at 0721.
[62] Order No. 1.

environment, and property.[63] Protestants may present evidence regarding the referred issues demonstrating that the Executive Director's draft permit violates a specifically applicable state or federal legal or technical requirement.[64] If rebuttal evidence is presented, the applicant and the executive director may provide additional evidence in support of the draft permit.[65]

IV. Resolution of Referred Issues

The Administrative Record is prima facie evidence that the Draft Permit meets all applicable state and federal requirements and would protect human and environmental health and safety as well as property.[66] None of the arguments made below should be interpreted as, and are not, a waiver of any presumptions that are not specifically rebutted by any other party.

A. The Draft Permit complies with applicable requirements to abate and control nuisance odors, as set forth in 30 TAC § 309.13(e).

The Draft Permit requires the City to comply with Section 309.13(e) of the TCEQ Rules.[67] The rules provide three ways that an applicant like the City can comply with the permit terms: (1) owning the buffer zone area; (2) receiving a restrictive easement from the adjacent property owners for any part of the buffer

[63] *In re Lipsky*, 460 S.W.3d 579, 590 (Tex. 2015) (describing a prima facie case as enough evidence as a matter of law to establish a particular fact if it is not rebutted or contradicted); Tex. Gov't Code § 2003.047(i-1); 30 Tex. Admin. Code §§ 80.17(c)(1), 80.117(c)(1).
[64] Tex. Gov't Code § 2003.047(i-2); 30 Tex. Admin. Code §§ 80.17(c)(2), 80.117(c)(3).
[65] Tex. Gov't Code § 2003.047(i-3); 30 Tex. Admin. Code §§ 80.17(c)(3), 80.117(c)(3).
[66] ARE A; ARE B.
[67] ARE A at 0147.

zone not owned by the applicant; or (3) providing nuisance odor control.[68] By accepting a final permit in the form of the Draft Permit, the City would be explicitly committing to maintaining compliance with this requirement, as well as all applicable TCEQ Rules and Commission orders.[69] The City would be violating TCEQ Rules, various applicable statutes, and the permit itself, if it failed to satisfy these requirements.[70] Violations can result in enforcement actions, mandated permit amendments, permit suspensions, denials of permit renewals, and denials of applications for other wastewater treatment plant discharges.[71] The City takes these obligations seriously, and it has committed to following the applicable rules and ensuring proper facility operation.[72]

Section 309.13(e)(1) imposes distance proximity requirements—*i.e.*, buffer zones—as one method for abating and controlling nuisance odors.[73] Lagoons with zones of anaerobic activity must be located no closer than 500 feet from the nearest property line.[74] All other wastewater treatment plant units must be located no closer than 150 feet from the nearest property line.[75]

[68] ED-1 at 0011:14-19; ED-10 at 26.
[69] ARE A at 0122.
[70] ARE A at 0122.
[71] ARE A at 0122.
[72] COG Exh. 100 at 8:3-7.
[73] ED-10 at 0020.
[74] 30 Tex. Admin. Code § 309.13(e)(1); COG Exh. 300 at 24:6-17.
[75] *Id.*

A lagoon is a pond-like impoundment, often created by digging a hole in the ground or building a berm, and then lining the impoundment with a clay or synthetic liner.[76] A zone of anaerobic activity is stratification within ponded effluent where biological activity occurs without any oxygen.[77] When allowed to stay in this condition undisturbed for an extended period of time—usually longer than 48 hours—the anaerobic zone begins to produce odor-laden gasses.[78] TCEQ Rules consider 500 feet to be an appropriate property line buffer to abate the presence of odor created by these types of treatment units.[79]

There will be no lagoons with zones of anaerobic activity at the East Plant.[80] The East Plant will use an MBR process operated in the continuous flow mode.[81] This technology is recognized as producing highly treated wastewater effluent without creating nuisance odor.[82] The main treatment basins will either be covered, oxygenated, mixed, equipped with air scrubbers, or possess a combination of these features to control and marginalize potential odors.[83] In addition, none of the effluent within the treatment process, including stormwater-diluted flow surges

[76] COG Exh. 300 at 24:18 – 25:2.
[77] COG Exh. 300 at 25:15-17.
[78] COG Exh. 300 at 25:18 – 26:3.
[79] COG Exh. 300 at 25:18 – 26:3.
[80] ARE A at 304.
[81] ARE A at 0694; ED-10 at 0026.
[82] ED-10 at 0026.
[83] COG Exh. 300 at 27:17 – 28:1; COG Exh. 300 at 28:5-17; COG Exh. 300 at 30:15-23; COG Exh. 300 1: 17-21; COG Exh. 304; COG Exh. 305.

captured and temporarily held in the proposed equalization basin, will have a detention time long enough to become anaerobic—*i.e.*, completely deoxygenated.[84]

Because none of the Plant Units proposed in the Application are designed to have, or will have, lagoons with zones of anaerobic activity, the Plant Units are subject to the 150-foot buffer requirement in the TCEQ Rules.[85] The City owns the Facility Property.[86] The East Plant, as authorized by the Draft Permit, will be situated on the Facility Property so that all Plant Units are located no closer than 150 feet from the nearest property line.[87]

The TCEQ Water Quality Plans and Specifications Team will conduct an engineering review of the plans and specifications of the East Plant prior to construction to ensure this is the case.[88] The plans and specifications must be approved by the team before the City can begin construction of the East Plant.[89] This ensures that the East Plant will be sited and constructed in the manner proposed in the Application.[90] In addition, the 150-foot buffer—and the condition precedent regarding the prohibition of lagoons with zones of anaerobic activity closer to 500 feet of the nearest property line—are incorporated into the Draft Permit.[91]

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[84] ARE A at 0601; COG Exh. 300 at 29:8-15; COG Exh. 300 at 30:15-23
[85] ARE A at 0664-0672; ARE A at 0675-0677; ARE A at 06698; COG Exh. 300 at 27:8-10; COG Exh. 300 at 32:2-5; COG Exh. 30
[86] COG Exh. 100 at 10-13; COG 103; ED-1 at 0011:24 – 0012:2.
[87] ARE A at 0665.
[88] ED-10 at 0018.
[89] ED-10 at 0018.
[90] ARE A at 0604; ED-10 at 0014.
[91] ARE A at 0122; ARE A at 0147; ED-10 at 0014.

The Administrative Record establishes a prima facie demonstration that the Draft Permit satisfies these and all other specifically applicable state and federal laws and technical requirements regarding abatement and control of nuisance odors.[92] The preponderance of all other evidence in the record demonstrates that the Draft Permit complies with applicable requirements to abate and control nuisance odors, as set forth in Section 309.13(e) of the TCEQ Rules.[93]

B. The draft permit is protective of water quality.

The Draft Permit protects water quality.[94] TCEQ has adopted surface water quality standards for all designated stream segments in Texas.[95] The relevant surface water quality standards in this matter are those applicable to stream segment 1205 of the Brazos River Basin.[96] Segment 1205 is the immediate downstream segment, which is described as "from De Cordova Bend Dam in Hood County to a point 100 meters (110 yards) upstream of FM 2580 in Parker County, up to the normal pool elevation of 693 feet (impounds Brazos River)".[97] Segment 1205 is the segment into which the City proposes to discharge treated wastewater effluent from the East Plant.[98]

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[92] ARE A; ARE B.
[93] *E.g.*, COG Exh. 102 at 0035; COG Exh. 300 at 32:5-8; ED-1 at 0011:20 – 12:5; ED-10 at 0026.
[94] COG Exh. 600 at 40:21 – 41:5; COG Exh. 700 at 41:1-4; ED-13 at 0024:22-25.
[95] Tex. Admin. Code §§ 307.1-.10.
[96] COG Exh. 700 at 5:21 – 6:3.
[97] COG Exh. 700 at 5:21 – 6:3.
[98] COG Exh. 102.

TCEQ staff concluded that Rucker Creek is a perennial stream.[99] Staff assigned a high aquatic life use and corresponding 5.0 mg/L DO criterion to the watercourse.[100] The TCEQ Standards Implementation Team determines the applicable aquatic life use designation for water bodies along a proposed discharge route, either based on characteristics of the receiving water bodies or on already established criteria, such as those included in Appendix A or Appendix D of the Texas Surface Water Quality Standards.[101]

TCEQ's surface water quality standards can generally be separated into two categories, (*i*) numerical standards prescribed under Sections 307.4 and 307.10 of the TCEQ Rules, and (*ii*) narrative standards described in Sections 307.4 and 307.5.[102] TCEQ's numerical standards for segment 1205 are listed in Section 307.10, Appendix A, of the TCEQ Rules.[103] The narrative standards include nutrient criteria identified in Section 307.4 and antidegradation requirements in Section 307.5.

TCEQ uses prescribed effluent limitations as the primary mechanism to ensure maintenance of the numerical surface water quality standards. The purpose for these effluent limitations is to maintain water quality in accordance with the

[99] ED-11 at 0008:28-32.
[100] ED-13 at 0005:12-14.
[101] 30 Tex. Admin. Code § 307.10.
[102] 30 Tex. Admin. Code § 307.3(64).
[103] 30 Tex. Admin. Code § 307.10(1) (Appendix A—Brazos River Basin Designated Uses and Numeric Criteria).

adopted standards.[104] Numerical surface water quality standards are maintained if the concentration of each constituent does not exceed maximum, or fall below minimum, numerical criteria with the permitted activity.[105] The numerical criteria or standards for segment 1205 are as follows: 1,000 mg/L for chloride, 600 mg/L for sulfate, 2,500 mg/L for total dissolved solids, 5.0 mg/L for dissolved oxygen, 6.5-9.0 standard units for pH, 126 colony forming units for *E. coli* bacteria, and 93 degrees Fahrenheit for temperature.[106] The numerical standards for both phases in the Draft Permit are consistent with each of these parameters.[107]

Of these constituents, DO is used as a primary indicator of overall water quality health in a surface watercourse like the unnamed tributary of Rucker Creek, Rucker Creek, and Segment 1205.[108] A DO criterion is a representation of the 24-hour mean concentration of dissolved oxygen needed to protect aquatic life in the receiving waters.[109] It typically enters a water body from the atmosphere and from photosynthesis.[110] DO concentrations can be impacted by a number of different factors that are influenced by conditions created by permitted discharges.[111] As such,

[104] Tex. Admin. Code § 309.1(a).
[105] ED-6 at 0006; ED-11 at 0012.
[106] 30 Tex. Admin. Code § 307.10(1) (Appendix A—Brazos River Basin Designated Uses and Numeric Criteria).
[107] COG Exh. 102.
[108] COG Exh. 600 at 15:1-6.
[109] ED-13 at 0005:1-3.
[110] ED-13 at 0003:29-31.
[111] COG Exh. 600 at 15:1-6.

DO is the main criteria that TCEQ uses to assess potential impacts to water quality from a proposed discharge.[112]

TCEQ uses the QUAL-TX model to assess potential impacts of DO discharges on receiving water quality health at critical low flow and to confirm the appropriateness of the effluent limitations prescribed in TCEQ's rules for types of streams.[113] Critical low flow conditions can create stress on biological communities living in the stream.[114] These conditions are based on historical or site-specific data or, in the absence of these sources, conservative assumptions.[115] For lakes such as Segment 1205, the equivalent of the critical low flow scenario is assuming the reservoir is at its full (conservation stage) capacity.[116] Modeling a lake at its conservation elevation shortens the distance between a tributary discharge point, such as would be authorized in the Draft Permit, and the lake body itself.[117] This shortened distance-scenario provides less opportunity for the receiving water to oxygenate, which skews the DO prediction upward.[118] The QUAL-TX model shows maximum authorized discharge volume and maximum effluent concentration levels when the receiving stream's flows are low and temperatures are high.[119] This

[112] COG Exh. 700 at 19:14-18.
[113] COG Exh. 600 at 15:6-9.
[114] COG Exh. 600 at 15:1-6.
[115] COG Exh. 600 at 15:1-6.
[116] ED-13 at 0013: 31 – 0014:2.
[117] ED-13 at 0014:2-6.
[118] ED-13 at 0014:2-6.
[119] ED-13 at 0018:5-10.

makes QUAL-TX a conservative model, in that it reflects a conservative (or worst-case-scenario) DO prediction.[120] TCEQ uses QUAL-TX in this manner to determine whether effluent limits in a proposed discharge permit will maintain applicable water quality standards.[121]

The QUAL-TX model runs produced by TCEQ's staff demonstrate that the 5 mg/L BOD, 1.6 mg/L ammonia-nitrogen, and 6.0 mg/L minimum DO in the Draft Permit Interim Phase is protective of water quality.[122] The model also demonstrates that the 5 mg/L BOD, 1.0 mg/L, and 6.0 mg/L minimum DO effluent set for the Draft Permit Final Phase is protective of water quality.[123] The City's independent QUAL-TX modeling conducted arrived at the same conclusion.[124]

Additionally, the Draft Permit limits concentration of *E. coli* bacteria to 126 cfu per 100 milliliters of effluent discharged from the proposed outfall.[125] The limit on *E. coli* concentration is the same numerical concentration as the applicable water quality standard.[126] As discussed throughout this brief, the 126-cfu is protective of the primary contact recreation designated use.[127]

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[120] ED-13 at 0022:5-8.
[121] COG Exh. 600 at 15:1-6; ED-13 at 0004:17-19.
[122] COG Exh. 600 at 15:22 – 16:3; ED-5; ED-13 at 0024:4-8.
[123] COG Exh. 600 at 15:22 – 16:3; ED-5; ED-13 at 0024:4-8.
[124] COG Exh. 600 at 15:22 – 16:3.
[125] COG Exh. 102 at 2-3
[126] 30 Tex. Admin. Code §§ 307.7, 309.3(h).
[127] COG Exh. 707.

As discussed throughout this brief, the TCEQ staff conducted a nutrient screening as part of their technical review of the Application.[128] As a result, the staff included a nutrient limit for total phosphorus in the Draft Permit.[129] For the Interim Phase, the Draft Permit includes a total phosphorous limit of 1.0 mg/L.[130] For the Final Phase, the Draft Permit includes a total phosphorous limit of 0.5 mg/L.[131] These limits are based on the recommendations found in the IPs and meet the requirements of the Texas Surface Water Quality Standards.[132]

C. The draft permit is protective of groundwater and wells.

The Draft Permit protects groundwater and wells.[133] TCEQ's site characteristics and selection rules govern the locations of proposed wastewater treatment plant units like the East Plant.[134] The record evidence demonstrates that the location of the East Plant, and the Draft Permit, meet these requirements and consequently protect groundwater and wells.[135]

No Plant Unit will be located within 500 feet of any public water supply well, spring, or other similar public drinking water source.[136] No Plant Unit will be located within 250 feet of any private water well.[137] All Plant Units will be at least 150 feet

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[128] ED-11 at 0013:25-28.
[129] ED-11 at 0011:10-12.
[130] COG Exh. 102.
[131] COG Exh. 102.
[132] 30 Tex. Admin. Code § 307.4(e); COG Exh. 600 at 41:13-19; COG Exh. 700 at 42:1-6; ED-3 at 0029.
[133] COG Exh. 12:3; COG Exh. 102; ED-1 at 0013:24-28; ED-10 at 0005.
[134] 30 Tex. Admin. Code §§ 209.41(c)(1)(B), 309.12, 309.13(c)(4), 309.12(2); *e.g.*, COG 500 at 6:7-14.
[135] ARE A at 0655-63; ARE A at 0692; COG Exh. 500 at 10:3-5; COG Exh. 500 at 10:10-18.
[136] COG 200 9:1-6, 9:21 – 10:7 (testimony corrected at HOM v.2, 224:01-13); COG 500 9:1-3.
[137] COG 200 9:7-12; COG 500 9:3-5.

from all private water wells.[138] All Plant Units will be located at least 500 feet from all elevated or ground potable-water storage tanks.[139] All Plant Units will be located at least 500 feet from all surface water treatment plants.[140] In addition, wet wells and pump stations at the East Plant will be located at least 300 feet from a public water well, spring, or other similar public drinking water source.[141]

Taken together, the information in the Application regarding the East Plant site characteristics indicate that the proposed site complies with all applicable location standards and does not create a potential for any surface water or groundwater contamination.[142] The Draft Permit is issued based on these site characteristics and proposed facility design.[143] The Administrative Record establishes a prima facie demonstration that the Draft Permit satisfies these and all other state and federal laws and technical requirements specifically applicable to the Application that relate to groundwater and groundwater wells.[144] The preponderance of evidence in the record demonstrates that the Draft Permit is protective of groundwater and wells.[145]

[138] COG 200 9:7-12; COG 500 9:3-5.
[139] COG Exh. 500 at 9:11-13, 14-16.
[140] COG Exh. 200 at 8-20.
[141] COG Exh. 500 at 9:5-8.
[142] COG Exh. 200 at 9:21 – 10:7; COG Exh. 500 at 11:16 – 12:3; ED-1 at 0013:13-28; ED-10 at 0005.
[143] ED-1 at 0013:24-28.
[144] ARE A; ARE B.
[145] *E.g.*, COG Exh. 200 at 9:21 – 10:7; COG Exh. 500 at 12:3; ED-1 at 0013:18-20, 24-28.

D. The draft permit is protective of the health of the requesters and their families, livestock, and wildlife, including endangered species.

The Draft Permit provides multiple layers of protection to human, livestock, and wildlife health, including endangered species, beginning with DO. Much of the focus of the Draft Permit is to protect the receiving waters' aquatic life uses, which the City and TCEQ staff determined by identifying the discharge route, water body types, and flow characteristics.[146] The level of protection in the Draft Permit is determined in large part by this assignment of use and includes maintaining dissolved oxygen levels for aquatic life in the receiving water,[147] as well as determining if there are threatened and endangered species that could be impacted by the discharge and performing a nutrient screening to determine if additional protection is warranted.[148] All of these steps were taken as part of the Application review and were done in accordance with the Texas Surface Water Quality Standards and Implementation Procedures.[149] TCEQ staff agree that the proposed discharge will meet the requirements of the Standards related to dissolved oxygen levels.[150] The Draft Permit protects the most sensitive aquatic organisms in the receiving waters.[151] As a

[146] ARE A at 0200; COG Exh. 700 at 25:12-17; ED-11 at 0013:18-21.
[147] COG Exh. 700 at 32:14-21; ED-13 at 0025:1-7.
[148] COG Exh. 700 at 27:20 – 29:7; ED-11 at 0013:23-27
[149] ED-11 at 0014:12-16
[150] ED-13 at 0025:1-7
[151] COG Exh. 700 at 30:4-7.

result, the Draft Permit is protective of the human health, and that of livestock and wildlife, including endangered species.[152]

In addition, the Draft Permit's protection of incidental and sustainable fisheries uses, limited and high aquatic life uses, and contact recreation is inherently protective of human health, and that of livestock and wildlife, including endangered species.[153] The Draft Permit imposes the appropriate toxics criteria for the receiving waters.[154] This ensures that the proposed discharge will not adversely affect the health of people consuming fish from these water bodies.[155] Toxics criteria, especially the chronic toxicity criteria, are often more restrictive than the fisheries criteria to protect human health; therefore, the toxics criteria also protect human health.[156]

Additionally, the Draft Permit has end-of-pipe bacteria limits that are consistent with segment criterion, which are more stringent than other types of point discharges that would take the receiving water's ability to more readily dissipate and dissolve effluent into account.[157] Because these limits are placed on the effluent before it mixes with receiving waters, they help to preclude any adverse impacts on contact recreation use of the receiving waters, thereby protecting human health.[158]

[152] COG Exh. 700 at 40:5-12; ARE A at 0204-0205.
[153] ED-11 at 0012:1-4
[154] ED-11 at 0012:5-9.
[155] ED-11 at 0012:9-12.
[156] ED11 at 0012:5-15
[157] ED11 at 0012:15-18
[158] ED11 at 0012:18-19

The bacteria limit in the Draft Permit is consistent with the limits EPA considers to be protective of human health through contact recreation.[159]

In addition, groundwater quality will not be degraded.[160] The closest elevated or ground potable-water storage tank is about 2,200 feet away from the Facility Property.[161] The Plant Units are separated from wells and other facilities and features identified in Section 309.13(c) of TCEQ Rules by distances greater than those required by the rule.[162] And the geologic formations in that area are restrictive of vertical leakage.[163] It is unlikely that any effluent will impact human health through well water.[164] There is also no surface water treatment plant within 500 feet of any proposed treatment unit[165], eliminating the potential for effluent to affect such a plant and therefore human health.

The East Plant effluent will be safe for direct human contact.[166] The City is determined to operate, monitor, and maintain the East Plant in accordance with the Draft Permit requirements and all other applicable regulations[167], thus protecting the health of the requestors and their families, livestock, and wildlife, including endangered species.

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[159] COG Exh. 707.
[160] COG Exh. 500 at 11:21-23
[161] COG Exh. 500 at 9:11-13
[162] COG Exh. 500 at 11:16-18
[163] COG Exh. 500 at 11:4-7
[164] COG Exh. 200 at 9:21 – 10:7; COG Exh. 500 at 11:16 – 12:3; ED-1 at 0013:13-28; ED-10 at 0005
[165] COG Exh. 200 at 7:3-1; COG Exh. 500 at 9:19-21.
[166] COG Exh. 302 at 8.
[167] COG Exh. 302 at 8.

The Administrative Record establishes a prima facie demonstration that the Draft Permit satisfies all state and federal laws and technical requirements specifically applicable to the protection of the health of the requesters and their families, livestock, and wildlife, including endangered species.[168] The preponderance of the other evidence in the record demonstrates that the Draft Permit is protective of the health of the requesters and their families, livestock, and wildlife, including endangered species.[169]

E. The proposed discharge will not adversely impact recreational activities.

The discharge authorized by the Draft Permit will not adversely impact recreational activities.[170] As discussed elsewhere in this brief, the Draft Permit imposes the appropriate toxics criteria for the receiving waters.[171] This ensures that the proposed discharge will not adversely affect fish health or the health of people consuming fish from the receiving waters.[172] Toxics criteria, especially the chronic toxicity criteria, are often more restrictive than the fisheries criteria; therefore, the toxics criteria protects this component of recreational activities.[173]

[168] ARE A; ARE B.
[169] *E.g.*, Brown water snake.
[170] COG Exh. 600 at 38:18 – 39:2; ED-4
[171] ED-11 at 0012:5-9.
[172] ED-11 at 0012:9-12.
[173] ED11 at 0012:5-15

The Draft Permit discharges will also meet water quality standards through the bacteria limit.[174] Specifically, the *E. coli* numerical standard of 126 colony-forming units, or most probable number per 100 mL, will protect the primary contact recreation designated use for Rucker Creek and Segment 1205.[175] Contact recreation as defined by the 2018 Texas Surface Water Quality Standards is presumed to involve significant risk of ingestion of water and include: wading by children, swimming, water skiing, diving, tubing, surfing, handfishing as defined by Texas Parks and Wildlife Code section 66.115, and kayaking, canoeing and rafting.[176] The bacteria limit in the Draft Permit is consistent with the limits EPA considers to be protective of human health through contact recreation.[177]

Furthermore, as also discussed elsewhere in this brief, the Draft Permit's end-of-pipe bacteria limits are consistent with segment criteria, making the discharge restrictions measured at the point of discharge, rather than after having the benefit of mixing further downstream.[178] Because these discharge limits are imposed on the effluent before it mixes with receiving waters, the limits help to preclude any adverse impacts on contact recreation use of the receiving waters, thereby protecting human health.[179]

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[174] COG Exh. 102 at 1.
[175] COG Exh. 707 at 1.
[176] COG Exh. 707 at 1.
[177] COG Exh. 707.
[178] ED11 at 0012:15-18.
[179] ED11 at 0012:18-19.

F. The application is accurate and complete.

The Application is accurate and complete.[180] The Application was subjected to both an administrative and technical review.[181] During the administrative review, the ED staff requested additional information from the City.[182] The City answered every question the ED staff posed, and the City provided all information the ED staff requested, in a complete and timely manner.[183] In addition to witness testimony,[184] the NORI,[185] and NAPD,[186] the issuance of the Draft Permit alone is evidence that the Application is accurate and complete.[187] The Administrative Record establishes a prima facie demonstration that the Draft Permit satisfies these and all other specifically applicable state and federal laws and technical requirements that relate to the accuracy and complete nature of the Application. The preponderance of the other evidence in the record demonstrates that the Application is accurate and complete.[188]

G. The modeling complies with applicable regulations to ensure the draft permit is protective of water quality.

[180] COG 200 at 17:6-9; ED-1 at 0016:16-18; ARE A at 0395-96.
[181] ARE A at 0395-96; ARE A at 0431-32; ED-1 at 0016:1-3.
[182] COG 200 at 14:11-21; ED-1 at 0016:9-10.
[183] COG 200 at 16:1 - 17:3; ED-1 at 0016:11-15.
[184] *E.g.*, COG 200 at 14:4 – 17:9; ED-1 at 0016:1-8.
[185] ARE A at 0400-0408.
[186] ARE A at 0431-0438.
[187] ED-1 at 0016:11-15; ED-7; COG 102.
[188] *E.g.*, COG 200 at 17:6-9, and ED-1 at 0016:16-18.

DO is a primary indicator of overall water quality in a surface watercourse like the receiving waters.[189] As such, DO is the main criteria that TCEQ uses to assess potential impacts to water quality from a proposed discharge.[190] QUAL-TX is a water quality model used to assess potential water quality impacts and to establish effluent limits.[191] Essentially, QUAL-TX is used to confirm the appropriateness of the effluent limitations prescribed in the TCEQ rules for particular types of streams.[192] The QUAL-TX model is TCEQ's preferred method for modeling DO.[193]

TCEQ staff derived effluent limits for BOD, NH-3, and DO by using the QUAL-TX water quality model as required by the IPs.[194] TCEQ staff used the QUAL-TX model, along with TCEQ's published rules and guidance, to confirm the appropriateness of the 5/12/1.6 Interim Phase, 5/12/1.0 Final Phase, and 6.0 mg/L minimum DO effluent limits derived from standards implementation.[195] The QUAL-TX model run produced by TCEQ staff confirms the appropriateness of the Draft Permit effluent set of 5 mg/L BOD, 1.6 mg/L NH-3 Interim Phase, and 5 mg/L BOD, 1.0 mg/L NH-3 Final Phase, with 6.0 mg/L minimum DO for the

[189] COG Exh. 600 at 15:1-4; COG Exh. 700 at 18:14-18.
[190] COG Exh. 700 at 18:14-18; ED-13 at 12:25-31.
[191] COG Exh. 600 at 14:19-9:15; ED-13 at 12:25-31.
[192] COG Exh. 600 at 14:19-7:16; ED-13 at 12:25-31, ED-13 at 14:16-30.
[193] ED-3 at 84; ED-13 at 0012:25-31.
[194] COG Exh. 600 at 18:17-20; ED-3 at 84
[195] COG Exh. 600 at 18:17-20; ED-3 at 84.

proposed discharge to the unnamed tributary of Rucker Creek, Rucker Creek, and Segment 1205.[196] The applicable numerical stream standards will be maintained.[197]

The QUAL-TX model is a conservative model because it shows maximum authorized discharge volume and maximum effluent concentration levels when the receiving stream flow is low and Segment 1205 is at conservation pool.[198] Modeled river flow is based on the designated critical low flow condition for the unnamed tributary of Rucker Creek and Rucker Creek.[199] The TCEQ Rules define critical low flow, in relevant part, as a "[l]ow-flow condition that consists of the seven-day, two-year low flow (7Q2 flow)[.]"[200] The 7Q2 flow is defined in the rules as "[t]he lowest average stream flow for seven consecutive days with a recurrence interval of two years, as statistically determined from historical data."[201] According to the IPs, if base flow information is not available to estimate the 7Q2, then a value of 0.1 cubic feet per second is usually assumed for perennial streams, and a value of 0.0 cubic feet per second is used for intermittent streams.[202] TCEQ staff used these assumed 7Q2 values for unnamed tributary of Rucker Creek (0.0 ft^3/second) and Rucker Creek (0.1 ft^3/second) in the QUAL-TX model for the application.[203]

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[196] ED-13 at 0014:24-30.
[197] COG Exh. 600 at 18:17 – 19:6; ED-13 at 0014:24-30.
[198] ED-13 at 0013:22 – 0014:6.
[199] COG Exh. 600 at 16:21 – 17:7.
[200] 30 Tex. Admin. Code § 307.3.
[201] 30 Tex. Admin. Code § 307.3.
[202] ED-3 at 86.
[203] ED-5; ED-13 at 0014:24-30.

Using the assumed 7Q2 flow figure described above, TCEQ staff developed a QUAL-TX model to determine whether the 5/12/1.6 Interim Phase and 5/12/1 Final Phase effluent sets, with 6.0 mg/L minimum dissolved oxygen, would maintain DO in the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205 above the numerical surface water quality standards.[204] For lakes such as Segment 1205, the equivalent of the critical low flow scenario is assuming the reservoir is at its full (conservation stage) capacity.[205] Modeling a lake at its conservation elevation shortens the distance between a tributary discharge point, such as would be authorized in the Draft Permit, and the lake body itself.[206] This shortened distance-scenario provides less opportunity for the receiving water to oxygenate, which skews the DO prediction upward.[207]

H. The ED's antidegradation review was accurate.

The ED followed the correct protocol for determining that the Draft Permit satisfied the antidegradation review. In addition, the ED's conclusion that the Draft Permit will not violate the State's antidegradation policy was correct. The ED's antidegradation review was accurate from each perspective.

[204] ED-5.
[205] ED-13 at 0013:31 – 0014:2.
[206] ED-13 at 0014:2-6.
[207] ED-13 at 0014:2-6.

The State's antidegradation policy is structured in three tiers, two of which apply to the Application and Draft Permit.[208] Tier 1 requires that proposed discharges maintain existing uses and water quality sufficient to protect existing uses.[209] Tier 2 prohibits proposed discharges if they would cause degradation of waters that exceed fishable/swimmable quality unless the lowering of water quality is necessary for important economic or social development.[210] Fishable/swimmable quality waters have quality sufficient to support propagation of indigenous fish, shellfish, terrestrial life, and recreation in and on the water.[211] Degradation is the lowering of water quality by more than an *de minimus* extent, but not to the extent that the lowering impairs an existing use.[212] Therefore, the term de minimus is referring to the scientific concept of assimilative capacity which is "the natural ability to dilute, disperse and assimilate a pollutant or waste material without adverse effects on its biological users.[213] Rucker Creek and Lake Granbury each have a high aquatic life use, so the discharge permit requested in the Application, and the Draft Permit, were subject to a Tier 1 and a Tier 2 review.[214]

[208] 30 Tex. Admin. Code § 307.5(b)(1), (2).
[209] *Id.* § (b)(1).
[210] *Id.* § (b)(2).
[211] *Id.*
[212] *Id.*
[213] COG Exh. at 23:1-21
[214] ED-11 at 0010:7-13.

For Tier 1 reviews, the TCEQ staff typically determines the appropriate criteria for the receiving waters.[215] They look to the IPs for implementation guidance, and they use site-specific data sources such as the Texas Integrated Surface Water Quality Report.[216] And they conduct QUAL-TX modeling to determine whether proposed DO limits protect existing uses of the receiving waters.[217] Staff memorializes their findings and conclusions in a Standards Implementation Team Interoffice Memo.[218]

TCEQ staff have a similarly regimented protocol for conducting Tier 2 reviews.[219] In addition to the Tier 1 assessment, TCEQ staff considers in greater detail characteristics of local aquatic communities, presence of endangered species, as well as potential parameters of concern that might be associated with the constituents in the proposed discharge.[220] Staff will also conduct a nutrient screening where appropriate to assess whether a nutrient limit is necessary.[221] Staff also follow the guidance in the IPs for Tier 2 implementation.[222] The results of the Tier 2 assessment are similarly recorded in a Standards Implementation Team Interoffice Memo and Water Quality Modeling Memo.[223]

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[215] ED-11 at 0006:12-13.
[216] ED-11 at 0006:14-18.
[217] ED-11 at 0006:22-22.
[218] ED-11 at 0006:22-24.
[219] ED-11 at 0006:33 – 0007:8.
[220] ED-11 at 0007:1-8.
[221] ED-11 at 0010:23 – 0011:7.
[222] ED-11 at 0007:6-7; ED-13 at 0004:25-30.
[223] ED-11 at 0007:7-8; ED-4; ED-5.

TCEQ accurately followed these procedures when conducting its Tier 1 and Tier 2 antidegradation review of the Application.[224] As a result of their review, the Standards Implementation Team determined that existing water quality uses will not be impaired because of the discharges that would be authorized by the Draft Permit.[225] The Standards Implementation Team also accurately determined that no lowering of water quality beyond a de minimis extent will occur as a result of the issuance of the Draft Permit.[226]

The City independently confirmed the ED's conclusions were accurate using two expert witnesses with significant experience performing antidegradation reviews.[227] The preponderance of the evidence demonstrates that existing uses in Rucker Creek and Segment 1205, and water quality sufficient to protect those uses, will be maintained.[228] In addition, the evidence thoroughly demonstrates that the draft permit—if issued—not only will maintain existing uses and a level of water quality that supports those uses, but will also assure that any lowering of water quality in Rucker Creek and Segment 1205 that results from proposed discharge will be insignificant—i.e., de minimis.[229]

[224] ED-11 at 00010:7-19; ED-13 at 0007:24-27.
[225] ED-11 at 0010:7-10.
[226] ED-11 at 0010:14-22; 0014:25 – 0015:7.
[227] COG Exh. 600; COG Exh. 700.
[228] COG Exh. 700 at 40:18-22.
[229] COG Exh. 700 at 40:18-22; ED Exh. ED-4 at 1.

A water quality modeling and engineering expert, Mr. Tim Osting, testified about an advanced water quality model he designed to confirm that the proposed discharge will meet the Tier 2 antidegradation standard.[230] Mr. Osting used an EPA-sponsored model known as QUAL2K.[231] Unlike the QUAL-TX model used by TCEQ staff to evaluate maintenance of numerical stream standards, the QUAL2K model is capable of evaluating time-varying conditions, and it takes into account more variables than QUAL-TX.[232] Mr. Osting used QUAL2K to model changes in stream conditions during a diurnal—or day and night—period that includes sunlight patterns, air and water temperature, and constituents in the water like nutrients, total suspended solids, multiple types of algae, and DO.[233] Mr. Osting used similar background parameters for the QUAL2K model that the TCEQ's IPs required for the QUAL-TX model.[234]

The QUAL2K model confirmed the QUAL-TX model's conclusion that the proposed maximum discharge will not violate the numerical criteria for either Rucker Creek or Segment 1205.[235] More than that, however, the QUAL2K model outputs indicate that DO concentrations will be significantly higher than those modeled in the conservative QUAL-TX runs when numerous other variable

[230] COG Exh. 600 at 25:3-5
[231] COG Exh. 600 at 23:4-6
[232] COG Exh. 600 at 23:4-12
[233] COG Exh. 600 at 23:6-12
[234] COG Exh. COG-600 at 25:7-9
[235] COG Exh. COG-600 at 33:19-34:8

conditions in Rucker Creek and Segment 1205 are considered.[236] In addition, Mr. Osting was also able to determine from the comparative QUAL2K model runs that the discharges authorized in the Draft Permit will not significantly impact existing DO conditions.[237] The advanced and sophisticated QUAL2K model shows that the existing water quality conditions in Rucker Creek and Segment 1205 will not be impacted in any significant way if TCEQ issues the draft permit.[238]

The City also retained an aquatic biology consultant, Mr. David Flores, who worked with Mr. Osting to develop the QUAL2K model.[239] As an aquatic biologist with experience evaluating impacts of various water quality conditions to aquatic life and stream characteristics, site-specific knowledge of the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205, and aquatic biology training, Mr. Flores is a uniquely qualified witness in this case to evaluate real-world impacts that might occur as a result of modeled water quality conditions.[240] Mr. Flores used the QUAL2K model outputs produced by Mr. Osting to form opinions regarding the practical impacts that the proposed discharge might reasonably have on uses of, and water quality in, Rucker Creek and Segment 1205 in the context of the antidegradation policy.[241] In addition to analyzing the QUAL2K model outputs, Mr.

[236] COG Exh. 604; COG Exh. 615.
[237] COG Exh. 600 at 33:19-34:8; COG Exh. 615
[238] COG Exh. COG-600 at 25:18-22; COG Exh. COG-600 at 40:1-4; COG Exh. COG-700 at 41:3-4
[239] COG Exh. COG-600 at 25:18-22; COG Exh. COG-700 at 1:12-16; COG Exh. COG-700 at 5:8-11
[240] COG Exh. COG-700 at 10:13-11:10, 26:16-27:2; COG Exh. COG-701
[241] COG Exh. COG-700 at 17:9, 17:14-18:12, 19:3-20.

Flores conducted a thorough review of data and information concerning historical water quality and aquatic community conditions in Rucker Creek and Segment 1205.[242] Mr. Flores also conducted a field study comprised of four separate site visits to the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205 near the proposed discharge location, and along the discharge route.[243]

Mr. Flores developed several important opinions with respect to use and water quality impacts anticipated to occur from the discharges authorized by the Draft Permit.[244] Mr. Flores based those opinions on the following:

1. Mr. Osting's QUAL2K model outputs;[245]

2. the four-visit field study Mr. Flores personally conducted that involved sampling of indicator game species, numerous sources of existing data and information on water quality conditions in—and uses of—the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205;[246]

3. a comprehensive review of literature, databases, monitoring stations, and other information relating to biological organisms—such as fish, mussels, and endangered species;[247] and

4. Mr. Flores's considerable previous experience conducting scientific research, studies, and reviews relating to the TCEQ's antidegradation policy, the Brazos River and similar water bodies.[248]

[242] COG Exh. COG-700 at 26:16-27:11
[243] COG Exh. COG-700 at 10:13-11:10.
[244] COG Exh. COG-700 at 36:21-37:6, 37:-10-38:4, 40:1-22, 41:1-4.
[245] COG Exh. COG-700 at 17:5-9, 19:8-10, 31:19-22, 33:2-23, 34:18-35:13.
[246] COG Exh. COG-700 at 10:11-11:10, 40:1-12.
[247] COG Exh. COG-700 at 9:1-5, 26:14-28:8, 28:17-31:14.
[248] COG Exh. COG-700 at 36:15-19, 40:1-12; COG Exh. COG-701.

Mr. Flores concluded that the proposed discharge of 1.0 MGD of treated effluent at a maximum 5/12/1.6, 1.0 total phosphorus effluent limit with a minimum 6.0 mg/L DO concentration, and the proposed discharge of 2.0 MGD of treated effluent at a maximum 5/12/1.0, 1.0 total phosphorus effluent limit with a minimum 6.0 mg/L DO concentration, will not lower water quality in the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205 by more than a de minimis extent.[249] More specifically, Mr. Flores concluded that proposed discharge (interim and final phases) will maintain water quality standards and will not exceed the assimilative capacity—*i.e.*, not significantly impact the biological community or existing uses of the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205.[250]

Based on Mr. Osting's and Mr. Flores's extensive review of numerous variable modeled stream conditions, existing water quality data, and physical examination of aquatic wildlife specimens and stream conditions, water quality and existing uses—including those of aquatic and terrestrial wildlife—in and on the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205 will be maintained if the TCEQ issues the draft permit as prepared by the Executive Director and the City conducts activities as authorized therein. Moreover, any lowering of water quality in the unnamed tributary of Rucker Creek, Rucker Creek and Segment 1205 that occurs

[249] COG Exh. COG-700 at 40:1-41:4.
[250] COG Exh. 700 at 37:15-17, 40:1-22.

as a result of the proposed discharge will not exceed the assimilative capacity of the waterbodies therefore will be insignificant—*i.e.*, de minimis.[251]

I. The nutrient limits in the draft permit comply with applicable Texas Surface Water Quality Standards.

Nutrients are chemical constituents, most commonly nitrogen and phosphorus, that can contribute to undesirable growth of aquatic vegetation and impact uses as defined by the rules when in excessive concentrations.[252] The Draft Permit limits concentrations of daily average total phosphorus to 1.0 mg/L for Interim Phase and 0.5 mg/L for Final Phase.[253] Unlike the basic effluent constituents discussed above, TCEQ has not adopted specific numerical criteria, standards, or effluent limits for nutrients such as phosphorus, for rivers.[254] TCEQ Rules instead prohibit permitted discharges from causing excessive growth of aquatic vegetation that impairs an existing, designated, presumed, or attainable use.[255] The TCEQ establishes permit limitations for nutrients on a case-by-case basis.[256] The Draft Permit limit for total phosphorus was developed within the TCEQ staff's discretion to include nutrient permit limitations when such permit limitations are appropriate.[257]

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[251] COG Exh. 700 at 37:15-17.
[252] 30 Tex. Admin. Code § 307.3
[253] COG Exh. 102 at 2-3
[254] ED-3 at 0026.
[255] 30 Tex. Admin. Code § 307.4(e).
[256] 30 Tex. Admin. Code § 307.4(e).
[257] 30 Tex. Admin. Code § 307.4(e)

Guidance on the development of nutrient permit limitations is published in TCEQ's Procedures to Implement the Texas Surface Water Quality Standards, more commonly known as the Implementation Procedures or IPs.[258] The IPs establish a general screening approach by which the Executive Director's staff evaluates TPDES applications to determine if an effluent limit is needed for nutrients.[259] IPs provide a methodology by which TCEQ makes a qualitative determination of whether or not a nutrient limit is appropriate for a particular TPDES permit.[260]

The Executive Director's staff performed nutrient screening for segment 1205 and determined that a phosphorus in the Draft Permit was appropriate.[261] TCEQ staff recommended a 1.0 mg/L limit on total phosphorus Interim Phase of the Draft Permit and a 0.5 mg/L limit for the Final Phase.[262] Because the 1.0 mg/L total phosphorus limit for the Interim phase and 0.5 mg/L total phosphorus limit for the Final phases will minimize nutrient loading, it will not cause excessive growth of aquatic vegetation that will impair existing uses.[263] The 1.0 mg/L Interim phase and 0.5 mg/L Final phase total phosphorus limit prescribed in the Draft Permit complies

[258] ED-3 at 26-27.
[259] ED-3 at 26; ED-4.
[260] COG Exh. 700 at 25:3-07.
[261] COG Exh. 700 at 19:17-20; ED-3 at 0029; ED-4; ED-11 at 0015:9-14.
[262] COG Exh. 102; ED-4; ED-11 at 0015:9-14.
[263] COG Exh. 616; COG Exh. 617; COG Exh. 618; COG Exh. 700 at 31:19-22; COG Exh. 700 at 33:1-23; COG Exh. 700 at 42:1-6.

with TCEQ's narrative standard for nutrients in the Texas Surface Water Quality Standards.[264]

J. The Commission should not deny or alter the terms and conditions of the draft permit based on the consideration of need under Texas Water Code § 26.0282.

Based on considerations of need, the Commission should issue the Draft Permit without changes to its terms or conditions.[265] Granbury has been a high-growth community for several years.[266] This growth has spurred demand for wastewater services.[267] With this increased demand has come the need for new and additional infrastructure, including additional treatment capacity.[268] This is particularly true within the City's eastern wastewater service area.[269]

The City had 6,639 living unit equivalent wastewater connections in 2017.[270] However, at the time the City submitted the Application, it had platted, approved, and authorized the development of an additional 2,670 living unit equivalent wastewater connections.[271] If the units were built and the connections were activated, demands on the existing wastewater treatment infrastructure would increase substantially.[272] The City's capacity analysis and cost estimates justified

[264] 30 Tex. Admin. Code §§ 307.4(e), 307.10.
[265] COG Exh. 400 at 13:17-21; COG Exh. 400 14:1-5; COG Exh. 800 at 25:10-15; ED-1 at 0017:1-3.
[266] ARE A at 0688.
[267] ARE A at 0688.
[268] ARE A at 0688.
[269] ARE A at 0680; COG Exh. 105 at 10; COG Exh. 108 at 9.
[270] ARE A at 0685.
[271] ARE A at 0685.
[272] ARE A at 0685.

expanding its wastewater treatment capacity to 4.0 MGD, with 2.0 MGD of that capacity being created by the East Plant.[273] The 2.0 MGD that would be authorized by the Draft Permit accounts for treatment capacity needed for near-term demands and the demands from anticipated future growth in the City's eastern growth corridor.[274] No other systems in the area are capable of accommodating the City's needed wastewater treatment capacity.[275]

Population growth and additional strains on the City's wastewater infrastructure have bolstered the justifications for the East Plant since the time the Application was filed.[276] The South Plant is currently at 75 percent of its capacity.[277] There are, in addition, still a significant number of wastewater connections platted, approved, and ready for development within the City's service area.[278] A significant number of these developments are approaching construction stage.[279] If all of these committed connections came online today, the South Plant would be at, or perhaps over, 100 percent of its treatment capacity.[280] Many of these connections were approved several years ago for property development.[281] This existing committed

[273] ARE A at 0685; COG Exh. 101 at 13; COG Exh. 400 at 12:1-22.
[274] ARE A at 0687-88; COG Exh. 101 at 15.
[275] ARE A at 0691; COG Exh. 101; COG Exh. 302 at 3.
[276] COG Exh. 300 at 36:2-4.
[277] COG Exh. 300 at 9:14; COG Exh. 400 at 9:2-4.
[278] ARE A at 0318; COG 300 at 43:6-17; COG Exh. 400 at 9:18-23.
[279] COG Exh. 400 at 9:8-13.
[280] COG Exh. 300 at 34:18-23; COG Exh. 400 at 8:18-21.
[281] COG Exh. 400 at 9:8-13.

treatment capacity challenge does not take into account increases in demand from growth.[282]

Such a constraint on growth would be challenging for any community, but the economic implications are particularly significant for Granbury.[283] Without the additional treatment capacity provided by the East Plant, the City's economic and social development picture changes significantly.[284] Dr. Ray Perryman, perhaps the leading expert in Texas on economic and community growth forecasting, considered the potential impacts to economic and social development opportunities in Granbury if the capacity from the East Plant is not authorized.[285] Dr. Perryman assessed the economic and social development impacts that would result from the City not being able to discharge under the Draft Permit.[286] He considered multiple factors, including impacts on employment, gross product, the community and countywide tax base.[287] He examined current and future population and economic growth data and the growth constraints created by insufficient wastewater treatment capacity, the consequential impacts to development, and other attributable restrictions on growth.[288] Dr. Perryman compiled a profile of the Granbury workforce considering multiple economic sectors, including retail, restaurant, health

[282] COG Exh. 400 at 9:16 – 10:1.
[283] COG Exh. 800 at 21:5 – 22:6.
[284] COG Exh. 800 at 3:11-17; COG Exh. 800 at 33:6-8.
[285] COG Exh. 800 at 1:8-21; COG Exh. 801; COG Exh. 802.
[286] COG Exh. 800 at 33:9-11.
[287] COG Exh. 800 at 13:7 – 15:8; COG Exh. 800 at 33:9 – 34:4.
[288] COG Exh. 800 at 2:7-10.

service, financial service, and personnel service.[289] He combined that data with baseline growth projections for Granbury and used multiple economic models to assess the economic impact attributable to denial of the Draft Permit.[290]

These assessments reveal that the lack of the treatment capacity that would be allowed by the Draft Permit would have a significant negative effect on economic and social development in the area.[291] His assessment shows that by denying Draft Permit, the Hood County economy would could expect to lose 298 jobs by 2025 with a loss of retail expenditures totaling $44.5 million.[292] Granbury alone could expect to see a loss of employment of almost 180 jobs, with a $28.8 million loss of total expenditures.[293]

These potential losses in business activity by themselves demonstrate the need of adequate treatment capacity for economic and social development.[294] However, the impacts will domino for years. Dr. Perryman concluded that these short-term impacts will carry over to a potential loss to Hood County of about 4.1 percent in wage and salary employment and 3.4 percent of real earnings as of 2040 (in 2021

[289] COG 800 at 33:9-19
[290] COG 800 at 33:9-14.
[291] COG Ech. 800 at 33:6-8.
[292] COG Exh. 800 at 35.
[293] COG Exh. 800 at 35.
[294] COG Exh. 800 at 34:10-12.

dollars) if the City's permit were to be denied.[295] The percentage declines for the City of Granbury are substantially higher.[296]

These levels of losses are well in excess of the threshold levels that the EPA considers as significant impairment to economic and social development for purposes of a Tier 2 antidegradation review.[297] If the Application is denied, there could be substantial costs in terms of future opportunities for area residents, housing availability, school crowding, and other problems.[298] The negative effects on economic and social development resulting from the lack of adequate wastewater treatment facilities would be significant.[299] As Dr. Perryman observed, these effects are already occurring—additional delays in allowing the City to add the East Plant capacity will only magnify these impacts.[300]

The East Plant is needed on its own right.[301] But it is also a critical part of the City's efforts to address existing problems throughout its wastewater treatment system.[302] SSOs have become more prevalent along portions of the collection system that carry wastewater from the City's eastern side to the South Plant.[303] These overflows are caused in large part from stormwater inflow and infiltration during

[295] COG Exh. 800 at 35:3 – 36:4.
[296] COG Exh. 804.
[297] COG Exh. 800 at 36:1-4; 30 Tex. Admin. Code § 307.5(b)(2).
[298] COG Exh. 800 at 43:6-9.
[299] COG Exh. 800 at 43:9-13.
[300] COG Exh. 800 at 43:9-13.
[301] ARE A at 0681-89; ED-1 at 0018:5-7.
[302] COG Exh. 105 at 9; COG Exh. 300 at 11:7-10; COG Exh. 400 at 10:21 – 11:2.
[303] COG Exh. 300 at 36:9-13; COG Exh. 400 at 5:3-11.

rainfall events.[304] Increased flows attributable to demand growth leave less capacity available to handle storm surges.[305]

These flows overwhelm existing lift stations and wet wells on the way to the South Plant.[306] At some points in the collection system, lift stations are at over 130 percent capacity due to the additional flows from the City's eastern segment.[307] That number exceeds 200 percent at other points.[308] At the same time, these additional flows dominate much of the treatment capacity at the South Plant.[309] The issue only becomes more challenging when accounting for committed connections.[310] Because the South Plant is the City's only current source of treatment capacity, all portions of the City's wastewater system is impacted by these issues.[311]

The East Plant addresses these critical issues in multiple ways.[312] It will capture storm surges in its temporary equalization basin, reducing bottlenecks further down the collection system.[313] It will intercept current demands from the eastern portion of the City's wastewater system, removing some of the capacity burden now borne solely by the South Plant.[314] And the East Plant will

[304] COG Exh. 300 at 38:16-18.
[305] COG Exh. 100 at 2:22 – 3:13; COG Exh. 300 at 37:10-15.
[306] COG Exh. 100 at 2:19 – 3:5; COG Exh. 105 at 10; COG Exh. 400 at 36:13-16.
[307] COG Exh. 105 at 8-9.
[308] COG Exh. 105 at 9.
[309] COG Exh. 100 at 3:16-19.
[310] COG Exh. 400 at 10:18-22.
[311] COG Exh. 108 at 8.
[312] COG Exh. 400 at 13:11-16.
[313] COG Exh. 300 at 27:11-17.
[314] COG Exh. 100 at 2-6.

accommodate projected growth, minimizing strain on the balance of the wastewater system.[315] Once the Draft Permit is issued and the East Plant is constructed and operational, the bottlenecks and other constraints on the City's wastewater treatment system overall will be resolved.[316]

The Administrative Record establishes a prima facie demonstration that the City's need for the Draft Permit justifies its issuance without modification.[317] The preponderance of the other evidence in the record demonstrates supports the same conclusion—the City of Granbury needs the Draft Permit.[318] The consequences to social and economic development for the community are substantial enough to the State's antidegradation policy regardless of circumstances.[319]

K. Neither the Applicant's compliance history nor technical capabilities raise any issues regarding the Applicant's ability to comply with the material terms of the permit that warrant denying or altering the terms of the draft permit.

The City's compliance history and technical competency do not raise any issues that would justify denying or changing the terms of the Draft Permit.[320] The TCEQ Compliance History Report shows that the City has a "High" compliance classification, with no repeat violations.[321] This demonstrates that the City has a

[315] COG Exh. 400 at 5:18-20.
[316] COG Exh. 105 at 9.
[317] ARE A; ARE B.
[318] *E.g.*, COG Exh. 100 at 9-17; COG Exh. 300 at 38:22 – 39:3; COG Exh. 400 at 13:17 – 14:5; COG Exh. 800 at 10-15; ED-1 at 0018:5-7.
[319] 30 Tex. Admin. Code § 307.5(b)(2) (recognizing the significance of impacts to important social and economic development issues).
[320] ED-1 at 0011:2-4; ED-1 at 0018:20-26; ED-9.
[321] ED-1 at 0010:28-29; ED-9.

proven record of technical competency for environmental performance in wastewater treatment.[322]

The City takes its obligations to provide safe and effective wastewater treatment seriously.[323] The City Public Works Department is staffed with highly competent and capable employees.[324] The East Plant must be designed, operated, and maintained to comply with all applicable TCEQ rules.[325] The City is committed to fully complying with these obligations, including the terms and conditions of the Draft Permit.[326] The Administrative Record establishes a prima facie demonstration that no changes to the Draft Permit terms and conditions is warranted and the City's compliance history offers no justification for denying the Draft Permit.[327] A preponderance of all other evidence in the record demonstrates the same.[328]

L. The proposed location for the Facility complies with the 100-year flood plain and wetland location standards found in 30 TAC § 309.13(a) and (b).

Section 309.13(a) of the TCEQ Rules prohibit location of a wastewater treatment plant unit within the 100-year flood plain unless the treatment unit is protected from flood-induced inundation and damage.[329] Section 309.13(b)

[322] ED-1 at 10:15-17.
[323] COG 100 at 9:3-4; COG 100 at 10:8-11.
[324] COG 100 at 10:12-18; COG 400 at 8:15-18.
[325] ED-10 at 0015, 0033.
[326] COG 100 at 10:8-11; ED-10 at 0021, 0026.
[327] ARE A; ARE B.
[328] ED-1 at 0011:2-4; ED-1 at 0018-20-22.
[329] ED-1 at 0019:19-20; ED-10 at 0029.

prohibits the location of a wastewater treatment plant unit within wetlands.[330] None of the Plant Units will be located within the 100-year floodplain of the Facility Property, and each will be protected from flood-borne inundation and damage.[331] Additionally, no Plant Unit will be located within wetlands.[332]

The Administrative Record establishes a prima facie demonstration that the proposed location for the East Plant complies with the 100-year flood plain and wetland location standards found in Section 309.13(a) and (b) of the TCEQ Rules.[333] A preponderance of all other evidence in the record demonstrates the same.[334]

M. Applicant has substantially complied with applicable public notice requirements.

The City complied with all applicable public notice requirements.[335] ED staff conducted an administrative review of the Application.[336] The ED declared the Application administratively complete on November 12, 2019.[337] The NORI was published in the *Hood County News*—the newspaper of largest circulation within the Hood County, Texas—on November 16, 2019.[338] Hood County, Texas, is the county where the East Plant and the discharge point proposed on the Draft Permit

[330] ED-10 at 0031; COG 200 at 11:17-12; COG 700 at 7-13.
[331] ARE A at 0665; COG 103; COG 200 at 12:1-2; COG 200 at 12:10-20; COG 400 at 15:6-13; COG 400 at 16:1-6.
[332] ARE A at 0257; COG 200 at 13:1-5; ED-1 at 0020:1-2.
[333] ARE A.
[334] COG 200 at 13:5-8; COG 400 at 16:1-6;COG 700 at 42:10-13; ED-1 at 0020:5-8.
[335] ARE A at 0001, 0395-0423, 0431-0533, and 0535-0546; ARE B; COG Exhibit 200 at 19:10-15; ED-1 at 0019:6-7; ED-10 at 0023.
[336] ED-1 at 0016:1-5.
[337] ARE A at 0395-96.
[338] ARE A at 0419-21.

are both located.[339] Additionally, the NORI was published in *La Prensa Comunidad*—an alternative language newspaper generally circulated in Hood County, Texas—on November 25, 2019.[340] Both notices were published within 30 days of the date the Application was declared administratively complete.[341] A copy of the complete Application, including revisions, was placed at a place for public viewing and copying from the first day of publication of the NORI until the end of the designated comment period.[342] The City provided the Chief Clerk with proof of publication and proof of viewing location.[343] On December 17, 2019, the Chief Clerk submitted notice of the Application required by Senate Bill 709.[344]

The Chief Clerk notified the City on May 4, 2020, that the ED had completed technical review of the Application and prepared a preliminary decision and the Draft Permit.[345] The NAPD was published in the *Hood County News* on May 9, 2020.[346] The NAPD was also published in *La Prensa Comunidad* on May 11, 2020.[347] The NAPD provided the public with instructions on how to submit comments and requests for a contested case hearing on the Application.[348] The City provided the

[339] ARE A at 0665; COG 102 at 0001.
[340] ARE A at 0422-23.
[341] COG 200 at 17:13-23; ED-1 at 0019:6-7.
[342] ARE A at 0417.
[343] ARE A, Tab B; ARE A at 0416-23; COG 200 at 18:1-5.
[344] ARE A at 0082-83.
[345] ARE A at 0431-32.
[346] COG 200 at 18:13-17.
[347] ARE A at 0532-33; COG 200 at 18:13-17.
[348] ARE A at 0530-33.

Chief Clerk with proof of publication of the NAPD and proof of viewing location.[349] Both notices were published within 45 days of the date on the Chief Clerk's cover letter regarding the NAPD.[350] The notice provided the public with instructions on how to submit comments and requests for a contested case hearing on the Application.[351]

At the request of then-Representative Mike Lang, the TCEQ held a public meeting regarding the Application on September 10, 2020.[352] Notice of the public meeting was published in the *Hood County News* on August 5, 2020, which was within 30 days prior to the meeting date.[353]

SOAH held a preliminary hearing regarding the contested Application on December 13, 2021.[354] Notice of the preliminary hearing was published in the *Hood County News* on November 6, 2021, which was at least 30 calendar days prior to the hearing date.[355]

The Administrative Record establishes a prima facie demonstration that the City substantially complied with applicable public notice requirements.[356] A preponderance of all other evidence in the record demonstrates the same.[357]

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[349] ARE A at 0526-33; COG 200 at 18:1-17.
[350] ARE A, Tab B; COG 200 at 18:13-17; ED-1 at 0019:6-7.
[351] ARE A at 0530-33.
[352] ARE A at 0543; COG Exhibit 200 at 18:20.
[353] ARE A at 0544-0546; COG Exhibit 200 at 19:1-9.
[354] Order No. 1.
[355] ARE B.
[356] ARE A, Tab B; ARE B.
[357] *E.g.*, COG Exhibit 200 at 19:10-15, ED-1 at 0019:6-7, and ED-10 at 0023.

V. Assessment of Transcript Costs

TCEQ Rules allow the assessment of reporting and transcription costs incurred for court reporting services rendered during the hearing on the merits in this matter.[358] In addition, the rules authorize the ALJs to include a recommendation for the assessment of transcription and reporting costs in the proposal for decision.[359]

Kennedy Reporting performed all court reporting services provided during this contested case. The parties agreed to a March 14, 2022 deadline for delivery of transcripts, which was incorporated into Order No. 2. Kennedy Reporting required overnight transcript delivery to meet this deadline, which increased the costs for transcript preparation. The total costs for Kennedy Reporting's transcription and reporting services amounted to $8,053.05. A true and correct copy of the invoices generated by Kennedy Reporting for its services during the contested case hearing is included in the Appendices as Attachment A.

The TCEQ may not assess any portion of these costs to the Executive Director or the Office of Public Interest Counsel.[360] It is equitable to distribute the transcript costs as follows: one third of the total costs to the City, one third to Granbury Fresh and Victoria Calder, and one third to Bennett RV Ranch and Jim and Stacy Rist.

[358] 30 Tex. Admin. Code § 80.23(d).
[359] *Id.* § (d)(3).
[360] 30 Tex. Admin. Code § 80.23(d)(2).

Accordingly, the City proposes that the ALJs recommend in the proposal for decision the following assessments:

City of Granbury	$2,684.35
Granbury Fresh	$1,342.18
Victoria Calder	$1,342.18
Bennett's RV Ranch	$1,342.18
Jim and Stacy Rist	$1,342.18

VI. Summary of Bases for Approval of Application

The City of Granbury has demonstrated that a need exists for the Draft Permit. The great weight of evidence in the record in this proceeding shows that the East Plant and the treated effluent discharge is ideally located and will be fully protective of human health and water quality in Rucker Creek, Rucker Cove, and Lake Granbury.

The evidentiary record overwhelmingly demonstrates that the Application satisfies each applicable statutory and administrative regulation imposed on it by each specifically applicable state and federal legal or technical requirement, within the scope of the issues referred by the TCEQ to SOAH in the Interim Order. As a result, the record fully supports a proposal for the TCEQ to approve the Application and issue the Draft Permit as drafted by the Executive Director without modification.

VII. Glossary of Terms

Application - the application by the City for new Texas Pollutant Discharge Elimination System Permit No. WQ0015821001, contained in the Administrative Record Exhibit A, Tab D, beginning at page Admin Record 0209.

ARE - Administrative Record Exhibit (*E.g.*, *ARE A at 0001* is a reference to Administrative Record Exhibit A, page 0001; *e.g.*, *ARE A, Tab B*, is a reference to the materials included in Tab B of ARE A, as described at ARE A at 0001).

BOD or CBOD5 - five-day Carbonaceous Biochemical Oxygen Demand.

cfu - colony forming units.

Chief Clerk – the Chief Clerk of the TCEQ, including authorized designees and representatives of the TCEQ Office of Chief Clerk.

City – the City of Granbury, a home-rule municipality, and its authorized and designated representatives.

DO – dissolved oxygen.

Draft Permit - the ED's draft Texas Pollutant Discharge Elimination System Permit No. WQ0015821001 permit prepared by the ED based on the administrative and technical review of the Application and recommended by the ED to be issued. (ARE A at 0443-0513; COG Exh. 102; ED-7).

East Plant – the City's proposed East Wastewater Treatment Plant that is the subject of the Application and that will be authorized by the Draft Permit, if issued, which is a new facility within the meaning of title 30, Section 309.11(5) of the Texas Administrative Code.

ED – the Executive Director of the Texas Commission on Environmental Quality.

Facility Property – the property identified in the Application as the proposed location for the East Plant, 3121 Old Granbury Road, Granbury, Texas 76049, as identified and as would be authorized in the Draft Permit, if issued.

IPs – the Procedures to Implement the Texas Surface Water Quality Standards (RG-194), also known as the IPs, developed and used by the TCEQ when applying the Standards to permits issued under the TPDES program.

MBR – membrane bioreactor.

MGD – million gallons per day.

mg/L - milligrams per liter.

NH3-N – ammonia nitrogen.

NAPD – Notice of Application and Preliminary Decision for the Application, generally found at ARE A, Tab B, and ARE A at 0431-0533.

NORI – Notice of Receipt and Intent to Obtain Permit for the Application, generally found at ARE A, Tab B, and ARE A at 0395-04223.

Plant Unit – one of any wastewater treatment plant units proposed for the East Plant in the Application, and that would be authorized by the Draft Permit, if issued, as wastewater treatment plant unit is defined by title 30, Section 309.11(9) of the Texas Administrative Code.

SOAH – the State Office of Administrative Hearings.

South Plant – the City's single existing wastewater treatment plant.

TCEQ – the Texas Commission on Environmental Quality.

TCEQ Rules – rules promulgated by TCEQ as published in title 30 of the Texas Administrative Code.

TDS – total dissolved solids.

TSS – total suspended solids.

All terms not defined have the meaning ascribed by TCEQ rules unless context indicates otherwise.

VIII. Appendices

A. Kennedy Reporting invoices.

B. Prefiled testimony of Tim Osting, P.E., D.WRE, CFM, with line numbers.

KENNEDY
REPORTING SERVICE
A record of excellence

Invoice

DATE	INVOICE NO.
3/13/2022	2203032

BILL TO

JT Hill, PLLC
3508 Far West Blvd., Ste. 170
Austin, TX 78731

PLEASE NOTE NEW ADDRESS FOR REMITTANCE!

Kennedy Reporting Service, Inc.
100 E. Whitestone Blvd. Ste. 148
Cedar Park, TX 78613

JOB NUMBER	SERVICE ORDERED BY	DOCKET NUMBER	CASE NAME
22053-1	Jason Hill	582.22.0585	City of Granbury

DATE TAKEN	DESCRIPTION	QUANTITY	RATE	AMOUNT
	State Office of Administrative Hearings			
	Texas Commission on Environmental Quality			
	Hearing on the Merits, Volume 1 Via Zoom Videoconference			
3/7/2022	Hourly Reporting Fee	5	45.00	225.00
3/7/2022	Original & Two Copies - Daily	182	14.15	2,575.30
	Administrative Fee		35.00	35.00
	Tax ID# 74-1837735			
	THANK YOU FOR YOUR BUSINESS!			
		Total		$2,835.30
	TERMS: Due on receipt			

Payments/Credits $0.00

Balance Due **$2,835.30**

Direct all inquiries to:
Amy Burt
512-474-2233
order@kennedyreporting.com

KENNEDY
REPORTING SERVICE
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Invoice

DATE	INVOICE NO.
3/13/2022	2203033

BILL TO

JT Hill, PLLC
3508 Far West Blvd., Ste. 170
Austin, TX 78731

PLEASE NOTE NEW ADDRESS FOR REMITTANCE!

Kennedy Reporting Service, Inc.
100 E. Whitestone Blvd. Ste. 148
Cedar Park, TX 78613

JOB NUMBER	SERVICE ORDERED BY	DOCKET NUMBER	CASE NAME
22053-2	Jason Hill	582.22.0585	City of Granbury

DATE TAKEN	DESCRIPTION	QUANTITY	RATE	AMOUNT
	State Office of Administrative Hearings			
	Texas Commission on Environmental Quality			
	Hearing on the Merits, Volume 2 Via Zoom Videoconference			
3/8/2022	Hourly Reporting Fee	6.25	45.00	281.25
3/8/2022	Original & Two Copies - Daily	262	14.15	3,707.30
	Administrative Fee	1	35.00	35.00
	Tax ID# 74-1837735			
	THANK YOU FOR YOUR BUSINESS!			
		Total		$4,023.55
	TERMS: Due on receipt			

Payments/Credits $0.00

Balance Due **$4,023.55**

Direct all inquiries to:
Amy Burt
512-474-2233
order@kennedyreporting.com

KENNEDY
REPORTING SERVICE
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Invoice

DATE	INVOICE NO.
3/13/2022	2203034

BILL TO

JT Hill, PLLC
3508 Far West Blvd., Ste. 170
Austin, TX 78731

PLEASE NOTE NEW ADDRESS FOR REMITTANCE!

Kennedy Reporting Service, Inc.
100 E. Whitestone Blvd. Ste. 148
Cedar Park, TX 78613

JOB NUMBER	SERVICE ORDERED BY	DOCKET NUMBER	CASE NAME
22053-3	Jason Hill	582.22.0585	City of Granbury

DATE TAKEN	DESCRIPTION	QUANTITY	RATE	AMOUNT
	State Office of Administrative Hearings			
	Texas Commission on Environmental Quality			
	Hearing on the Merits, Volume 3 Via Zoom Videoconference			
3/9/2022	Hourly Reporting Fee	2.25	45.00	101.25
3/9/2022	Original & Two Copies - Daily	73	14.15	1,032.95
	Commission Filing & Delivery fee		25.00	25.00
	Administrative Fee		35.00	35.00
	Tax ID# 74-1837735			
	THANK YOU FOR YOUR BUSINESS!			
		Total		$1,194.20
	TERMS: Due on receipt			

Payments/Credits	$0.00
Balance Due	**$1,194.20**

Direct all inquiries to:
Amy Burt
512-474-2233
order@kennedyreporting.com

SOAH DOCKET NO. 582-22-0585

TCEQ DOCKET NO. 2021-1001-MWD

IN THE MATTER OF THE	**§**	**BEFORE THE STATE OFFICE**
APPLICATION BY THE CITY	**§**	
OF GRANBURY FOR	**§**	**OF**
TPDES PERMIT NO.	**§**	
WQ0015821001	**§**	**ADMINISTRATIVE HEARINGS**

DIRECT EXAMINATION OF TIM OSTING, P.E., D.WRE, CFM BY THE CITY OF GRANBURY

FEBRUARY 18, 2022

DIRECT EXAMINATION OFTIM
OSTING, P.E., D.WRE, CFM

TABLE OF CONTENTS

Section **Page**

I. INTRODUCTION AND QUALIFICATIONS

Q. Mr. Osting, what is your full name.

A. My full name is Timothy Dennis Osting.

Q. Where are you currently employed, Mr. Osting?

A. I am currently employed at Aqua Strategies Incorporated.

Q. How long have you been employed by Aqua Strategies?

A. I have been employed at Aqua Strategies since July 2014.

Q. Can you describe generally what you do for Aqua Strategies?

A. Yes. My job title is Principal Engineer. I conduct environmental studies, engineering analyses, and engineering design for public and private water projects. My work generally includes identification of needs, field data collection, data compilation, modeling, analysis, and development of recommendations. Recent projects include watershed, river, lake and coastal water quality evaluations, river and coastal sediment modeling, hydrographic surveying, permit development, outfall plume modeling, and environmental flows studies.

Q. Where were you employed prior to Aqua Strategies?

A. I was employed at Espey Consultants, Incorporated, dba RPS, between September 2005 and June 2014. Prior to that, I was employed at the Texas Water Development Board—commonly known by its acronym TWDB — between 2001 and 2005, and also between 1996 and 1998. Before that time, I was employed at Steger and Bizzell Engineering between 1998 and 2001. Between 1996 and 1998, I worked as a technician at the TWDB assisting with river studies and bay and estuary studies, including field studies, data processing and computer programming.

Q. What did you do for those entities, respectively?

A. At Espey, which was acquired by RPS in 2011, I was a Managing Engineer conducting projects similar to those that I am conducting in my current position at Aqua Strategies. At TWDB, I was Team Lead for Instream Flows where I participated in development of the Senate Bill 2 Texas Instream Flow Program, conducted river and coastal field studies, conducted river hydraulic and habitat modeling studies, and oversaw instream flow staff that included hydrologists, biologists, and a fluvial morphologist. At Steger and Bizzell Engineering, I was a designer responsible for reduction of field survey data, and design of site development projects that generally included drainage, water, sewer, roadway, and environmental project components. I also worked on permitting, approvals, and construction oversight.

Q. What school did you attend for your undergraduate education, and what degree did you receive?

A. I graduated from the University of Texas at Austin with a Bachelor of Science in Civil Engineering.

Q. And when did you receive that degree?

A. I received that degree in 1998.

Q. Would you please describe any degrees you have earned since receiving your degree in 1998?

A. I graduated in 2007 from the University of Texas at Austin with a Master of Science in Engineering with focus in Environmental and Water Resources Engineering.

Q. Your name is followed by the designation "P.E." Does that mean you are a registered professional engineer in the State of Texas?

A. Yes. I hold Professional Engineer License No. 91931 issued by the Texas Board of Professional Engineers.

Q. Is your professional engineering registration current and otherwise in good standing?

A. Yes.

Q. Your name is also followed by the designation, "D.WRE." Would you please explain what that designation indicates?

A. Yes. I have been certified as a Diplomate Water Resources Engineer, or D.WRE, by the American Academy of Water Resources Engineers, or AAWRE. The AAWRE defines a Diplomate as "a professional engineer who has attained certification as a board certified specialist in the field of water resources engineering with advanced education, advanced experience and expertise, and body of knowledge."

Q. And your name is followed by the designation "CFM." Would you please explain what that designation indicates?

A. Yes. I am a Certified Floodplain Manager, as certified by the Texas Floodplain Management Association, an accredited chapter of the national Association of State Floodplain Managers. The certification indicates knowledge of floodplain management,

flood hazard mitigation, the National Flood Insurance Program, flood preparedness, warning and disaster recovery.

Q. What, if any, professional organizations or associations do you have involvement with in connection with your engineering license, or otherwise with your work in the water resources industry?

A. I am a member of the American Society of Civil Engineers.

Q. Would you please identify any papers or articles you have written that relate to municipal wastewater treatment?

A. I have written a number of reports considering the effect of municipal wastewater discharges and river flow on river ecosystems. The reports were generally conducted for water rights and environmental flow evaluations and use the same model approaches and model inputs to evaluate the impact of fully-permitted effluent permits on stream segments. These projects include a water quality evaluation for the TCEQ for the Senate Bill 2 Texas Instream Flow Program, Identification of Needs and Statewide Approach. I also wrote another water quality evaluation for the TCEQ and San Antonio River Authority for its Texas Instream Flow Program, San Antonio River Case Study, where the QUAL2K water quality model was used. Another example of my work for the TCEQ, the TWDB, and for the Brazos River Authority was the Brazos River Instream Flow Program, which was an instream flow water quality evaluation for the Brazos River, the Navasota River, and for the Little River where QUAL2K and EPD-RIV1 were used on all of those rivers. I also co-authored a Senate Bill 2 water quality model of the main stem of the Trinity River for the TWDB that was recently completed. For TPDES permits, I have completed CSTR, QUAL-TX and QUAL2K models on the Guadalupe River, on a small

unnamed tributary within the San Marcos River basin, on the Gulf Intracoastal Water Way, on an unnamed tributary of the Devils River, as well as for this TPDES permit application. I oversaw and completed a two-volume report on water quality modeling in the Cypress Basin for the North East Texas Municipal Water District and the TCEQ for a Watershed Protection Plan for Caddo Lake, where watershed nutrient and bacteria loading was combined with treated effluent loading to evaluate instream and in-lake conditions. I conducted water quality modeling and assessment for the San Marcos River Watershed Protection Plan. As a consultant to the Brazos River Authority, I managed completion of portions of the Lake Granbury Watershed Protection Plan, including conducting and overseeing field studies, modeling, management measure selection, and cost benefit analyses.

Q. Can you identify any seminars, conferences, classes, or courses you have attended that are related to municipal wastewater treatment?

A. Over the years, I have participated in the Texas Water conferences that focus on municipal water and wastewater, and I have been selected to submit papers and posters for various projects. My undergraduate and graduate course work included courses in modeling, water quality, treatment, and specifically water quality modeling. I have participated in a multi-day NPDES permitting training course. I have taken an extended training course for the Soil Water Assessment Tool, or SWAT, which is an integrated watershed and receiving stream water quality model. I have participated with the developer of the CE-QUAL-W2 model to identify additional advanced features to add to that model. CE-QUAL-W2 is a model that is more complex than QUAL2K in that CE-QUAL-W2 is fully time-varying, considers vertical stratification and is a coupled

hydrodynamic and water quality model. I have participated in two separate week-long seminars conducted by U.S. Army Corps of Engineers Hydrologic Engineering Center, or HEC, staff on the hydrology, sediment, and water quality functions of the HEC suite of models, with at least seven of those days devoted to sediment and water quality modeling. As part of a model screening and comparison study conducted for TCEQ, I coordinated some improvements to the HEC-RAS water quality model with the developers at HEC and their contractors working on the model code. I have recently taken a training course on CORMIX, a model designed to evaluate discharge plumes.

As part of my regular job functions over the years, I have taught modeling concepts and scenario development to other engineering and scientist staff, stakeholder groups like those for the Caddo Lake Watershed Protection Plan, the Lake Granbury Watershed Protection Plan, the Trinity River Vision Authority, the Tarrant Regional Water District, and the City of Fort Worth, staff of various state agencies, clients and others. I have taught colleagues and clients the details of how to use numerous water quality model codes such as those previously listed as well as other EPA-derived codes like EFDC, WASP, EPD-RIV1, HSPF, and other customized project-specific models.

Q. Have you taught any seminars, conferences, classes, or courses on water quality modeling?

A. As part of a project for TCEQ, I conducted a six-hour seminar on water quality evaluation for the Texas Instream Flow Program. I repeated the seminar as part of another TCEQ project in a shortened form the following year. The seminars included a segment on choosing an appropriate model for a particular project and included a discussion of QUAL2K.

Q. Through your education, professional development, and practical experiences, have you developed an understanding of the statutes, rules, and other regulatory considerations relevant to wastewater discharge permit applications like the application that is the subject of this contested case?

A. Yes.

Q. I am handing you what has been marked as COG Exhibit 601. Can you please describe what this document is?

A. This is my professional résumé.

Q. Is COG Exhibit 601 a true and correct copy of your professional résumé?

A. Yes.

Q. Does COG Exhibit 601 fairly and accurately summarize your professional and educational experiences that you just described in your testimony?

A. It does, yes.

The City of Granbury offers COG Exhibit 601 for admission into evidence.

Q. Your résumé indicates, and you have mentioned in your testimony, that you have experience with water quality modeling. What does that mean?

A. I have completed numerous projects where site-specific data was not available to determine impact of future conditions on surface water quality. In those instances where data was not available during the time period, at the location, or under the conditions that were desired to be evaluated, I developed models to estimate the surface water quality under those conditions. For example, I have completed water quality models to estimate the potential future dissolved oxygen concentration in a water

body if a food processing operation discharges the maximum amount of effluent into that water body the operation can generate. That model was used by TCEQ staff to make a permitting decision. I also completed a plume modeling study to determine density-driven mixing of an effluent discharge in a lake; that model is being used by the owner and TCEQ staff to make a permitting decision. These are just examples of the types of modeling I have been asked to perform and that have been relied on by applicants and TCEQ alike throughout my career.

Q. Can you explain other contexts in which you have used water quality models?

A. Yes. I have used hydrodynamic and water quality models to evaluate current and post-development water quality conditions for a proposed major downtown redevelopment project in Fort Worth, including proposed flood gate operational strategies that benefit water quality. I have also used water quality models to evaluate dissolved oxygen conditions relevant to endangered species to recommend dissolved oxygen augmentation technologies in a spring-fed lake system and I have presented those findings to the National Academies of Science for their review. I have used hydrodynamic and water quality models to estimate dissolved oxygen conditions in proposed coastal canal systems and in proposed lake canal systems.

Q. Approximately how many times have you used water quality models in your professional career?

A. Since July 2014 for public and private clients, I have used 11 different existing hydrodynamic or water quality model codes and developed three customized water quality codes for 17 distinct projects on 14 Texas water bodies, and additional projects in Oklahoma and New Mexico. In prior years, I conducted water quality modeling on at

least 19 water bodies for at least 13 projects involving at least four additional existing model codes and three customized water quality codes. For one project in particular conducted for the TCEQ, I evaluated over 50 existing water quality model codes and made a recommendation for which of those 50 models could be most appropriate for use in Texas streams for evaluating temperature and dissolved oxygen conditions. I, with staff under my direction, conducted a case study to compare performance of different models for the same scenarios.

II. PURPOSE OF TESTIMONY

Q. Can you please explain your role in the project and what you have done to prepare for your testimony, including your involvement with the application?

A. Yes. I have worked with David Flores to create an advanced water quality model to determine impacts on water quality in the unnamed tributary, Rucker Creek, the Rucker Creek cove, and Lake Granbury that is expected to result from the discharge that the City is requesting through its application, and that would be authorized by the Executive Director's draft permit. I have developed QUAL-TX and QUAL2K water quality models that evaluate more parameters than the one used, and required by TCEQ to be used, by applicants for permitting to evaluate impacts of proposed wastewater discharges.

Q. When you refer to the City's application, are you referring to the City's application to TCEQ for a renewal and major amendment of Texas Pollutant Discharge Elimination System Permit No. WQ0015281001?

A. Yes.

Q. For purposes of simplicity, can we agree to refer to that application simply as "the application" during your testimony today?

A. Yes.

Q. Can we agree that when either of us uses the term "draft permit" during your testimony today we are referring to the draft permit that TCEQ's Water Quality Division staff prepared in response to the application?

A. Yes.

Q. I am handing you what has already been admitted as COG Exhibit 102. Is COG Exhibit 102 what you know to be the draft permit?

A. Yes.

Q. Can you explain your understanding of what activity will be authorized when the TCEQ ultimately issues the draft permit?

A. The draft permit would authorize the City to discharge effluent into an unnamed tributary of Rucker Creek. There are two phases of the draft permit. The first phase, labeled Interim I, would authorize the City to discharge effluent from a new outfall location east of Old Granbury Road at a maximum daily average of 1.0 million gallons per day, or MGD. The interim I phase would require concentrations of 5, 12, 1.6, and 1.0 milligrams per liter, or mg/L, for five-day carbonaceous biochemical oxygen demand, total suspended solids, ammonia-nitrogen, and phosphorus, respectively.

The Final phase would authorize the City to begin discharging effluent from the new outfall location at an annual average flow rate of 2.0 MGD. The Final phase would authorize a new effluent limit set. It would authorize the City to discharge effluent with concentrations of 5, 12, 1, and 0.5 milligrams per liter, or mg/L, for five-day

carbonaceous biochemical oxygen demand, total suspended solids, ammonia-nitrogen, and phosphorus, respectively. Those are four potentially harmful constituents that are commonly found in treated municipal wastewater effluent that TCEQ regularly limits through discharge permits. The effluent limits for this draft permit are generally expressed as 5/1.6/6 (CBOD5/Ammonia/Dissolved Oxygen) for the interim phase, and 5/1/6 for the final phase, with the ammonia limit less than 3 indicating a plant designed for nitrification. There are also several other standard effluent limits and requirements.

Q. What are you prepared to testify about today?

A. I am prepared to testify about my work evaluating the application and the draft permit. Specifically, I am prepared to testify about water quality modeling and the various input and output parameters involved in my water quality modeling work.

Q. Can you identify the exhibits that you have prepared and relied upon for your testimony today?

A. COG Exhibit 602 is the TCEQ staff modeling memo. COG Exhibit 603 is the TCEQ Dissolved Oxygen modeling checklist. COG Exhibit 604 is the TCEQ QUAL-TX model results. COG Exhibit 605 is a collection of maps, model layouts, and SWQM station. COG Exhibit 606 is modeled geometry inputs for QUAL-TX and QUAL2K modeling. COG Exhibit 607 is my updated QUAL-TX results. COG Exhibit 608 is a comparison of Esmond's Lake Lavon model with QUAL-TX. COG Exhibit 609 is QUAL2K boundary conditions. COG Exhibit 610 is expected MBR effluent quality. COG Exhibit 611 is QUAL2K calibration model results. COG Exhibit 612 is calibration Figures A1. COG Exhibit 613 is Run A2 at 1 MGD. COG Exhibit 614 is Run A3 at 2 MGD. COG Exhibit 615

is a calibrated QUAL2K run for critical conditions. COG Exhibit 616 is QUAL2K run B1 no load. COG Exhibit 617 is QUAL2K Run B2 at 1 MGD. COG Exhibit 618 is QUAL2K Run B3 at 2 MGD. COG Exhibit 619 is my QUAL2k Run C1 no load with low lake level. COG Exhibit 620 is my QUAL2K Run C2 at 1 MGD with low lake level. COG Exhibit 621 is my QUAL2K Run C3 at low lake level. COG Exhibit 622 is a USGS observed lake levels of Lake Granbury. COG Exhibit 623 is a collection of summary plots of observed SWQM monitoring data. COG Exhibit 624 is a Baylor University report on bioassessment of Hill Country streams.

Q. Mr. Osting, are the data contained and depicted in these exhibits the type of information that you find reliable in your field of modeling expertise?

A. Yes.

Q. Is the data contained and depicted in each of these exhibits of the type that you use in comprehensive water quality modeling and analyses that you perform?

A. It is.

City of Granbury askes that COG Exhibits 602 through 624 be admitted into the record.

III. WATER QUALITY MODELING

Q. Mr. Osting, you mentioned that your work in this matter has involved using a water quality model that is different from the one used by TCEQ to evaluate wastewater treatment permit applications. Can you please briefly explain what model TCEQ uses?

A. Yes. TCEQ uses a model called "QUAL-TX" to evaluate potential impacts to water quality from proposed discharges of treated wastewater. QUAL-TX is a dissolved oxygen,

or DO, model. DO is used as an indicator of overall water quality health in a watercourse because DO concentrations in a water body are affected by a number of different factors including water temperature, depth, velocity, flow, and other constituents in the water like nutrients, algae and oxygen-demanding organic matter. So, TCEQ uses QUAL-TX to determine whether a proposed discharge will maintain established water quality standards for DO in the stream to which the discharge will occur. QUAL-TX is a steady-state, one-dimensional model that is typically set up by a modeler to estimate impacts to DO at critical low flow conditions, for factors pertinent to each individual discharge.

Q. To your knowledge, was QUAL-TX used during the preparation of the application?

A. Yes, it was. The TCEQ staff, James Michalk, used QUAL-TX to formulate certain proposed permit terms and conditions for the application. Mr. Michalk documented that work in a technical memorandum to TCEQ staff.

Q. Please direct your attention to page 1 of COG Exhibit 602. Is this Mr. Michalk's water quality modeling technical memorandum?

A. Yes, it is.

Q. Have you reviewed the information contained in this exhibit?

A. Yes, I have.

Q. Can you explain what you understand Mr. Michalk's QUAL-TX model to indicate?

A. Mr. Michalk's memorandum states that QUAL-TX modeling was conducted and used to determine that DO in the receiving waters would satisfy water quality standards, including

after the discharge is discharging at limits identified in the draft permit at the interim and final flow and concentration levels. That indicates that QUAL-TX predicts that the water quality standards for DO will be maintained with the proposed discharge. The conditions under which the permit is evaluated in the QUAL-TX model are called critical low flow conditions. Inputs used in the QUAL-TX model analysis include permitted flow, ammonia nitrogen, CBOD, and dissolved oxygen, as well as stream flow upstream, and lake conditions downstream.

Q. Earlier, you used the term "critical low flow conditions." Can you please explain what that term means and how it relates to QUAL-TX?

A. Yes. Generally, critical low flow conditions are stream conditions that are uncommon without being extreme and that can be stressful to the biological communities living in the stream. The TCEQ estimates stream conditions at the critical low flow condition, where the critical low flow value is the 7Q2 flow value. The TCEQ also estimates water temperature and water constituent concentrations in the stream at the critical low flow condition based upon historical data or upon conservative assumptions. For lake conditions, the TCEQ uses normal pool elevation. The methods and assumptions used for all permits, including this draft permit, are documented in the TCEQ's Procedures to Implement the Texas Surface Water Quality Standards, RG-194, commonly referred to as the "IP".

Q. What is the critical low flow condition of Rucker Creek?

A. The critical low flow condition, which is the 7Q2 flow rate, is 0.1 cubic feet per second, or cfs, for this segment.

Q. How do you know that 0.1 cfs is the 7Q2 value for Rucker Creek upstream of the confluence with Lake Granbury?

A. TCEQ's Dissolved Oxygen Modeling Permit Review Checklist dated January 1, 2020, identifies that 0.1 cfs is used as the headwater flow for Rucker Creek used in the model. Because there is insufficient stream flow data to calculate a 7Q2 value, and because Rucker Creek was classified as an intermittent stream with perennial pools, and the 0.1 cfs is assigned based upon the IP document. I agree with this assignment.

Q. Look at the document marked as COG Exhibit 603. Do you recognize this document?

A. I do. It's the Dissolved Oxygen Modeling Permit Review Checklist I just mentioned.

Q. Is COG Exhibit 603 a document that you reviewed in forming your opinions in this case?

A. It is.

The City of Granbury offers COG Exhibit 603 for admission into the record.

Q. What is the critical low flow condition of the unnamed tributary where the proposed outfall is located?

For the unnamed tributary, a headwater flow value of 0.0 cfs is assigned because the unnamed tributary is an unclassified intermittent stream with assumed limited aquatic life use. I agree with this assignment based upon the IP document.

Q. Can you summarize the work you conducted for this project?

A. I performed additional water quality modeling work to augment what James Michalk's QUAL-TX modeling indicated during the preparation of the application. My work was conducted for the purposes of an antidegradation analysis. My work has been to review

the application and the existing water quality modeling on which the proposed effluent limits are based, and to perform additional water quality modeling work after the fact.

Q. Did you use QUAL-TX as part of your evaluation of the City's application or your preparation for your testimony today?

A. Yes. I did run the QUAL-TX model as part of my evaluation.

Q. Have you personally used QUAL-TX to evaluate effluent limits for other proposed municipal wastewater treatment permit applications?

A. I have.

Q. Do you have an opinion regarding the sufficiency of the QUAL-TX water quality modeling on which the application effluent limits is based?

A. I do.

Q. What is your opinion based on?

A. It is based on my experience with QUAL-TX and my understanding of the modeling that was performed to determine the effluent limits proposed by TCEQ through the draft permit.

Q. What is your opinion?

A. The QUAL-TX modeling that supports the application is appropriate. TCEQ's modeler, James Michalk, used all of the inputs required by TCEQ's Implementation Procedures, or IPs, for modeling the proposed discharge at the design flow and proposed effluent limits. He conducted the modeling as required and as accepted by TCEQ. Mr. Michalk's modeling predicted a minimum DO concentration of 4.82 mg/L for the Final phase and 4.84 mg/L for the Interim phase, which you can see in COG Exhibit 604 Tables 1 and 2. These QUAL-TX dissolved oxygen predictions are acceptable and meeting the Texas

surface water quality standard of 5.0 mg/L in both Rucker Creek and Lake Granbury. Because the model is based upon a conservative critical low flow condition including high temperatures and low ambient flow, a model prediction of up to 0.2 mg/L below the standard is considered to meet the water quality standard. This is part of the TCEQ modeling guidance referenced in the IP and in associated standard operating procedures for modeling.

Q. Do you have any reason to dispute Mr. Michalk's conclusion that, based on the QUAL-TX water quality modeling he performed, the proposed effluent limits at the proposed maximum daily average discharge authorization will maintain water quality standards in Rucker Creek?

A. I do not. However, additional site-specific data can be used to modify and improve Mr. Michalk's model. Specifically, the barometric pressure of 1013.25 millibars can be reset from a sea level elevation, 0.0 feet, value to a barometric pressure value of 987.88 millibars that is consistent with topography near Rucker Creek and Lake Granbury's normal pool, or conservation pool, elevation of 692.70 feet. I used a National Weather Service tool to determine the local pressure.

Q. Would that change affect the model results?

A. Yes. Lower atmospheric pressure results in lower dissolved oxygen saturation concentration. I made that change to the TCEQ model and the minimum predicted DO concentration is reduced by 0.18 mg/L, from 4.81 mg/L to 4.63 mg/L.

Q. Did you make any other changes?

A. Yes. I also changed the depths and widths of the model segments located inside the lake. These are the segments shown in white outlines on the TCEQ exhibit

"15821001_modeling_map.pdf" also attached as COG Exhibit 605 Figure 1. What I am referring to as model segments are referred to as model reaches inside the QUAL-TX model, but I will continue to use the term segments for purposes of my discussion. Using point data publicly available from the Texas Water Development Board (TWDB), the same point survey data that the TWDB used to complete a 2015 volumetric survey of Lake Granbury, I determined average depth inside each model segment, average width inside each model segment. These values are shown in Table 3 of COG Exhibit 606. I used the average depth and average width to update the QUAL-TX model geometry. Because the model geometry changed, I also followed the TCEQ IP procedure to re-initialize the sediment oxygen demand (SOD) coefficients within the model. Had I allowed the original TCEQ coefficients for SOD to remain in the model, the predicted DO concentration would have been higher than the TCEQ would have intended in this uncalibrated model approach, and would have been higher than my final result after re-initializing.

Q. Did these changes to the model inputs affect the model results?

A. Yes. The geometry change and the SOD re-initialization change resulted in an increase of 0.36 mg/L in DO, from my prior DO concentration result of 4.63 mg/L with modified barometric pressure to my final result of 4.99 mg/L including all three changes. Therefore, after all changes to TCEQ's model were combined, the minimum predicted DO concentration was 4.99 mg/L for the Final 2.0 MGD permit condition, as you can see in COG Exhibit 607 at Table 5. Using the same model to evaluate the Interim 1.0 MGD permit discharge at permitted limits results in a predicted DO concentration of 4.82 mg/L , as shown in COG Exhibit 607 at Table 4.

Q. Do your results change Mr. Michalk's conclusion that, based on the QUAL-TX water quality modeling he performed, the proposed effluent limits at the proposed maximum daily average discharge authorization will maintain water quality standards in Rucker Creek?

A. No. My QUAL-TX dissolved oxygen predictions are consistent with Mr. Michalk's conclusion. My QUAL-TX predications are acceptable and meet the Texas surface water quality standard of 5.0 mg/L in both Rucker Creek and Lake Granbury. Therefore, QUAL-TX supports the conclusion that the proposed discharge of 1.0 MGD at the proposed 5/1.6/5 effluent limit set, and the proposed final discharge at 2.0 MGD at the proposed 5/1/6 effluent limit set, for five day carbonaceous biochemical oxygen demand (CBOD), total suspended solids, and ammonia nitrogen, respectively, will maintain water quality standards in Rucker Creek and in Lake Granbury.

Q. Does Mr. Michalk's QUAL-TX model evaluation cover proposed permit limits for bacteria or phosphorus?

A. No. The TCEQ determined a total phosphorus limit was necessary in this draft permit and the TCEQ set effluent concentration permit limits of 1.0 mg/L for the Interim phase and 0.5 mg/L for the Final phase. The TCEQ also placed a draft permit limit of 126 MPN/100mL of E. coli bacteria on the effluent concentration. The unit of MPN is Most Probable Number and is used by EPA-approved laboratories to report bacteria pathogen levels.

Q. Does the water quality modeling approach suggested by Protestants, specifically the Lake Lavon model, have the capability of being used to further evaluate permit limits?

A. The Lake Lavon model identified in the report labeled GF EXHIBIT 302 is a one-dimensional model that assumes broad, uniform dimensions along the discharge path, and that evaluates dissolved oxygen using only CBOD in the water column. The Lake Lavon approach is less detailed than TCEQ's approach that uses a segmented QUALTX model. While the driving equations and dissolved oxygen prediction approach are comparable to those embedded in TCEQ's QUALTX model, the applied QUALTX model used to evaluate this permit allows for many more factors, specifically, changing dimensions and residence time along the discharge path, ammonia-nitrogen oxidation, sediment oxygen demand, and assignment of varying kinetics inside each segment. The TCEQ QUALTX model is a generally more conservative approach, and the choice of coefficients used in the QUALTX model are more suited for the site-specific permit conditions.

Q. Is COG Exhibit 608 a comparison of model inputs?

A. Yes. COG Exhibit 608 is a table that summarizes some differences between the Lake Lavon model and the QUAL-TX model used for this permit application.

Q. Did you conduct further analysis of phosphorus or E. coli?

A. I did. I conducted additional analysis, including development of an additional water quality model that included those substances.

Q. Mr. Osting, can you explain how the additional modeling you performed differs from the modeling that was done in preparation of the draft permit?

A. I can. I used a different water quality model from QUAL-TX. The model that I used for my modeling work is an EPA-sponsored model called "QUAL2K." Like QUAL-TX, QUAL2K is a one-dimensional model; however, QUAL2K is capable of evaluating time-varying conditions that QUAL-TX is not capable of evaluating. In other words, it can take more variables into account than QUAL-TX, and it can look at how variables change throughout a day. I used QUAL2K to evaluate how stream conditions would change over the course of a day considering a night and day, or diurnal, pattern of sunlight, air temperature, water temperature, and other constituents in the water including nutrients, total suspended solids, water column algae, benthic algae, and DO.

Q. Is QUAL2K regularly relied on by water quality modelers to determine impacts to water quality resulting from discharges of treated municipal wastewater effluent?

A. QUAL2K is a reliable water quality model and it is used in other states for this purpose. The QUAL2K is an updated version of the US EPA's QUAL2E model. There is no question about that the reliability of QUAL2K. But because TCEQ requires the use of QUAL-TX for TPDES permitting decisions like the one requested by Granbury in the application, QUAL2K is not typically used in Texas by TCEQ for permitting. The QUAL2K model has been used in Texas by TCEQ, or TCEQ's contractors, to develop and approve Total Maximum Daily Load for waste water discharges.

Q. Have you used QUAL2K prior to your work in this matter?

A. Yes. I have used QUAL2K to evaluate the effect of different flow values, both lower and higher than the critical low flow, on stream temperature and dissolved oxygen conditions considering existing effluent discharge permits, proposed discharge permit amendments, and other environmental conditions.

Q. How familiar are you with QUAL2K?

A. I am very familiar with QUAL2K, and I have used this model for several projects.

Q. Based on your understanding of the statutory and administrative regulations that apply to municipal wastewater treatment permitting, was the City required to use QUAL2K in order to obtain a TPDES permit amendment?

A. No. There is no requirement to use QUAL2K. The TCEQ used QUAL-TX, which, as I stated earlier, was used appropriately to obtain reliable outputs.

Q. Why did you use QUAL2K instead of QUAL-TX?

A. Rucker Creek and Lake Granbury are classified by TCEQ to have high aquatic life use and primary contact recreation use. Those designations mean, among other things, that the waters of Rucker Creek and Lake Granbury are fishable and swimmable waters. As such, TCEQ's regulations require effluent limits in the City's application and TCEQ's draft permit to meet a Tier 2 antidegradation standard. The Tier 2 antidegradation standard is in addition to TCEQ's normal water quality standards that apply statewide.

Protestants to this permit application have raised the subject of phosphorus and algae in the receiving water bodies. QUAL-TX does not indicate how much algae growth might be affected by a proposed wastewater effluent discharge. For instance, QUAL-TX does

not consider total suspended solids or phosphorus concentrations in the effluent. QUAL-TX also does not consider diurnal algae cycles and how algal activity influences DO concentrations in a watercourse. I performed more advanced water quality modeling for the proposed discharge as part of an effort to confirm that the proposed discharge will meet the Tier 2 antidegradation standard. I performed this modeling using the QUAL2K model mentioned earlier, and I incorporated algae and phosphorus into that model. A map shows the layout of the QUAL2K model in COG Exhibit 605 Figure 3. The QUAL2K model uses the same geometry and segmentation as the QUAL-TX model segmentation shown in COG Exhibit 605 Figure 1, and COG Exhibit 606 Table 3.

Q. Did you perform an analysis of whether the proposed effluent set and discharge rate will meet the TCEQ's Tier 2 antidegradation policy?

A. No. I input relevant parameters into the QUAL2K model to produce an output showing various ambient water quality conditions for comparison to the proposed discharge. I did not fully evaluate whether those modeled water quality conditions will meet the Tier 2 antidegradation policy. That function was performed by David Flores.

Q. How can your QUAL2K model outputs be translated to indicate whether the proposed discharge will meet the Tier 2 antidegradation standard?

A. As I mentioned before, I have done my modeling work in conjunction with work performed by the City of Granbury's aquatic biology consultant, David Flores. I have provided the outputs from the QUAL2K model runs that I have done to Mr. Flores for review. Mr. Flores has used those model outputs as part of his analysis of whether the proposed discharge will meet TCEQ's Tier 2 antidegradation standard.

Q. To what extent did you use QUAL2K to produce outputs of the various water quality conditions expected to result from the discharge proposed in the application and in the draft permit?

A. I used QUAL2K very extensively. Within the last month, I performed several model runs using a variety of inputs to produce outputs on several different water quality conditions for the proposed discharge. I produced outputs for both DO and phosphorus impacts that considered typical rates of algae activity. I ran the model at several different flow conditions and lake levels. The model outputs were consistent among the varying inputs.

Q. Will you please explain what parameters these the first three QUAL2K model runs represent on COG Exhibits 609, 610, 611, 612, 613 and 614?

A. These runs show summaries of a total of nine different scenarios. The COG Exhibit 609, along with the prior admitted COG Exhibit 606, show model inputs and boundary conditions. Concentrations in the effluent were derived from the permitted maximum limits and from information provided by the designer of the City of Granbury's proposed waste water treatment plant. That information on expected quality of the effluent is included in COG Exhibit 610.

COG Exhibit 611 Tables 7, 8 and 9 show model outputs for a model that has input coefficients calibrated, and are executed using ambient observed conditions on September 15, 2021. COG Exhibit 611 Table 7 shows a comparison between model predictions of an observed condition, and on-site observations, and several figures identified as COG Exhibit 612 RUNA1 show model predictions with observation points. The points are

denoted in each of the figure images as a black square denoted in the legend as "data." The lines are model prediction output. As described in the legend on each figure, the black lines are average, and the red lines are the minimum and maximum during a one-day (diel) cycle. The horizontal x-axis is marked below each figure. Unless noted otherwise, the x-axis values are distance upstream from the model's downstream boundary in the middle of the cove. The distance upstream to the interface between the lake and Rucker Creek is approximately 1.75 km, and at 2.35 km is the confluence of Rucker Creek with the downstream end of the unnamed tributary. The vertical y-axis denotes the value of the substance indicated in the legend. For example, if a legend entry says "Phytyo (ugA/L)", then the number 15 on the y-axis denotes that is the level of 15 micrograms per liter (ug/L) of Phytoplankton, which is another way of saying chlorophyll-*a*. A list of constituent names is included in COG Exhibit 611 Table 7.

COG Exhibit 611 Table 8 shows model results when the effluent with typical concentrations are added to the model, along with figures identified as COG Exhibit 613 RunA2. COG Exhibit 611 Table 9 shows model results when the effluent with typical concentrations are added to the model, along with figures identified as COG Exhibit 614 RunA3.

Q. Will you please explain what parameters these the last six QUAL2K model runs represent on COG Exhibits 615, 616, 617, 618, 619, 620, and 621?

COG Exhibit 615 Tables 10, 11, and 12 show results for critical conditions at full permit limits (Run B, see COG Exhibits 6r16, 617, 618), and for an alternate additional critical condition at full permit limits with a low lake level (Run C, see COG Exhibits 619, 620, 621).

All model runs indicate that the daily average dissolved oxygen concentration will meet the water quality standard.

Q. Do you have an opinion with respect to the reliability of the QUAL2K model outputs that you generated?

A. Yes.

Q. What is your opinion based on?

A. My opinion is based on my professional experience using QUAL2K and water quality modeling generally, and based on my understanding of the site-specific characteristics of the Rucker Creek and Lake Granbury.

Q. What is your opinion?

A. QUAL2K is a reliable tool for determining the impacts the City of Granbury's proposed discharge will have on the receiving waters of the Rucker Creek and Lake Granbury. The QUAL2K model I developed used input information derived from, and consistent with, Mr. Michalk's QUAL-TX model. Where additional information was needed, the input information I used was the best information I could find from available sources including site-specific data, agencies that report data, guidance for modeling assessments, and established literature.

Q. Based on your professional water quality modeling experience, do you have an opinion with respect to the reliability of the output data you produced using QUAL2K for determining whether the discharges proposed in the

application, and preliminarily approved by TCEQ in the draft permit, will meet TCEQ's Tier 2 antidegradation standard?

A. Yes. The outputs I produced using QUAL2K are the best available outputs for assessing whether the discharges proposed in the application, and preliminarily approved by TCEQ in the draft permit, will meet TCEQ's Tier 2 antidegradation standard.

Q. What did you intend to show in these model runs?

A. This suite of model results is intended to be taken as a relative comparison of water quality impacts in receiving water bodies before and after the proposed discharge. These models are calibrated, unlike the way that TCEQ's models are uncalibrated. That is to say that the model outputs you see in COG Exhibits 612 have been compared to observation data collected from Rucker Creek and Lake Granbury, and then the model was adjusted to match on-site observed conditions, as you can see in COG Exhibit 611 at Table 7.

Q. What did you do to calibrate these models?

A. The model was executed and calibrated at low flow conditions that were similar to the critical low flow condition of interest. I used actual conditions based on public records, onsite observations, and laboratory analysis for September 15, 2021, where those conditions include flow rate and weather and concentrations, that I input into the model.

Incorporating additional data and additional observed conditions would improve the model results and model calibration; however, I believe that these models are well calibrated to evaluate relative changes between different model scenarios, and to evaluate the face value of model results. Because these model outputs are intended to show

relative before and after impacts on an otherwise static environment, I am confident that the model is reliable for the relative comparison of the outputs. Further calibration would be able to improve the magnitude of model results, particularly magnitude of algae and relationship to nutrients and to existing historical data, though I am confident that the magnitude of model outputs reflect conditions in the field. The data I input into the models to simulate those conditions were based on established, reliable literature that is frequently relied on by water quality modelers when they construct the type of model I have constructed here.

Q. Can you give an example of some of the inputs you used and the sources of those inputs?

A. The model coefficients that I used are within the range identified in literature and consistent with default values recommended in the modeling program. The default values I used as recommended by TCEQ include SOD, aeration, nitrification, growth rate, and other inputs identified in the IP. The model inputs that I calibrated include dispersion (based upon Lake Granbury WPP canal data), light attenuation, light saturation, decay rates, and shading. The model inputs that I used as data include climate data (air temperature, dewpoint, cloud cover, wind from NWS at the Granbury Municipal Airport), algae bottom cover, concentrations from SWQM database, concentrations from new site-specific field data, and bathymetry from TWDB.

Q. Mr. Osting, would you please generally explain what the QUAL2K model outputs you generated indicate about impacts to water quality conditions

in Rucker Creek and Lake Granbury before and after the proposed construction of the new wastewater treatment plant discharge outfall?

A. Yes. I analyzed a number of different stream and permit conditions using QUAL2K to benefit Mr. Flores's antidegradation analysis. I generated three sets of models. All sets of models are based as closely as possible on my modified geometry of the QUAL-TX model, and as closely as possible on the TCEQ approved inputs, constants, and kinetic rates. Results of the calibration and critical conditions scenarios show that dissolved oxygen concentration does not go lower than 5.5 mg/L for the daily average condition and does not go lower than 4.2 mg/L during any part of the day, as you can see in COG Exhibit 611 and 615. The mean DO standard for Rucker Creek and Lake Granbury, designated by TCEQ as segments 1205E and 1205, respectively, is 5.0 mg/L. The model showed that DO standards would be maintained in both segments. Notably, for the September 15, 2021 scenario without any discharge, which is depicted COG Exhibit 611 Table 7 and COG Exhibit 615 Table 10, the chlorophyll-*a* value of 42 ug/L in the cove is much higher than the values of 37 and 30 ug/L for the same location for conditions after adding the permitted discharge. I've captured this in COG Exhibit 611 at Tables 8 and 9, COG Exhibit 613 RunA2, and COG Exhibit 614 RunA3. This is because of the limited amount of circulation occurring without significant watershed inflow during that time period. Further, for the calibration Run A1, the predicted chlorophyll-*a* concentration of 42 micrograms per liter (ug/L) is lower than the observed concentration of 88 ug/L in the main body of the lake during the at the same time. A similar situation is exhibited in the critical condition set of models labeled RunB1, B2, B3 in COG Exhibit 615 Tables 10, 11, and 12. That situation is that the chlorophyll-*a* concentration is predicted to be 100 ug/L

for the no load scenario shown in COG Exhibit 616 Run B1, and after adding the discharge load the concentration is 32 ug/L (interim phase, COG Exhibit 617) and 27 ug/L (final phase, COG Exhibit 618). Evaluated against a baseline observation concentration of 30.6 ug/L in near the middle of Lake Granbury, the percent change in chlorophyll-a is a reduction of 4% (Interim) and a reduction of 12% (Final). I chose a baseline value of 30.6 ug/L because there is no chlorophyll-*a* criterion for Lake Granbury in 30 TAC 307.10(6) Appendix F of the Texas Surface Water Quality Standards. I chose the average value calculated from TCEQ records at stations 11861 and 20307 because the average value is between the 50 and 80 percentile values (27.3 and 43.5 ug/L, respectively) that is within a range that has been used by the EPA to characterize ambient water quality conditions.

Q. Did you analyze any other scenarios considering lake conditions?

A. I also analyzed a low lake level scenario, where the lake water level was at elevation 686 feet. The shoreline at the lower lake level is shown on COG Exhibit 605 Figure 3 and depicted as a blue dashed contour line labeled 686. This lower lake level is not a typical condition and occurred during June 2013, as you can see in COG Exhibit 622, in the middle of the drought of record for Lake Granbury. The drought of record was identified by the Brazos River Authority and approved by TCEQ in 2018 as part of the System Operation water rights permit. During ordinary non-drought periods, the Brazos River Authority maintains lake levels in Lake Granbury in conjunction with maintaining lake levels in Possum Kingdom Lake upstream.

To evaluate the low lake level scenario, I made changes to the model geometry, that is the model segment depth and width, to account for the lowered lake level, as shown in COG Exhibit 606 Table 3. I reinitialized the updated the SOD inputs to account for the

submerged lake segments that, at lake level 686 feet, are no longer submerged and that function more like a river channel than a lake. The model flow and loading scenario was the same as that used for the low flow critical conditions analysis. The model results are summarized in COG Exhibit 615 Tables 10, 11, 12 on the right side, in COG Exhibit 619 Run C1, COG Exhibit 620 Run C2, and COG Exhibit 621 Run C3.

Q. Can you explain the model results for the critical conditions model modified for a low lake level?

A. These runs tell us that the low lake scenario exhibits lower water quality without the effluent, because of the lack of flushing of the shallow non-refreshed waters. With the effluent discharge, the chlorophyll-*a* values are lower in the cove compared to without the effluent. Results without discharges authorized by the draft permit indicate high algal production in the lake with chlorophyll-*a* concentrations of over 400 ug/L. Results with discharges indicate lower chlorophyll-*a* concentrations of 60 ug/L (Interim) and 27 ug/L (Final). Dissolved oxygen conditions are lower under the final permit low lake level scenario compared to the final permit critical conditions scenario that is prescribed in the IP for evaluation against water quality standards.

Q. Can you explain how you know that DO standards would be maintained in both segments?

A. TCEQ's rules set a DO standard for segments 1205E and 1205 where the standard values are expected to be exceeded. As I said, the mean DO standard for both segments is 5.0 mg/L with a minimum DO standard of 3.0 mg/L. Minimum DO 3.0 mg/L standards are not allowed to occur for a period longer than 8 hours in a 24-hour day. When compared to model predictions, stream standards are generally considered to be

maintained as long as the daily average model-predicted DO concentration is not lowered more than 0.2 mg/L below the standard. The model showed that daily average DO would be maintained above 5.25 mg/L at all times of the day at all locations for low flow critical conditions. The model also showed that minimum DO would not be lowered beyond 4.2 mg/L in Rucker Creek 1205E which is higher than the minimum water quality standard of 3.0 mg/L. The model showed that minimum DO would not be lowered beyond the 5.0 mg/L standard for segment 1205 at any time during low flow critical conditions prescribed by the IP.

For an additional more conservative scenario to evaluate a low lake level the model showed lower DO conditions, the lowest predicted diel DO concentration of 2.0 mg/L is for the no load condition. This low lake level condition occurred during 2013 during the drought of record event and it is unclear whether water quality standards apply in lakes because inflows were below 7Q2 for a significant portion of the period and the lake level was below conservation pool elevation.

Q. What does the model show, if anything, about bottom algae?

A. Bottom algae is predicted in addition to algae in the water column. The predicted density is below the nuisance level threshold of 200 mg/m2 discussed by Baylor University scientist Dr. Ryan King in a 2020 bioassessment of four Hill Country streams.

Q. What do you know about harmful algae?

A. Work conducted on harmful algae species specifically in Lake Granbury have not identified any significant fish kills as a result of cyanobacteria. The current Brazos River Authority website for Lake Granbury identifies cyanobacteria as "blue-green algae" and states that there "not been any recorded toxic blue-green alga blooms in the Brazos River

basin in more than 25 years." A study specifically in Lake Granbury did not identify species-specific cyanobacteria chlorophyll-*a* levels higher than 7 ug/mL (Harris et al. 2011 for US Army Corps of Engineers [USACE] "Approaches to Golden Algae Control…"). The same study documented general non-species-specific concentrations of chlorophyll-*a* up to 90 ug/L during 2009. Golden algae species have been documented in Lake Granbury to contribute to fish kill events, and the same study initiated investigations on methods to control Golden algae (P. parvum). This same study and subsequent USACE-funded studies by the same researchers showed increased circulation and water flow resulted in the lowest levels of golden algae and golden algae toxicity in Lake Granbury.

Q. Does your model characterize harmful algae?

A. Yes, my model characterizes harmful algae as part of the entire group of alga that currently exist in Lake Granbury. My model takes a standard generalized approach, to include together all algae and organisms that photosynthesize and contribute to chlorophyll-*a* in the water column. My model does not single out any specific harmful or non-harmful algae like green algae, bluegreen algae, zooplankton, diatom, or cyanobacteria species. To single out specific organisms would require far more data than is currently publicly available. Much effort in Lake Granbury has been spent by other researchers over the past 20 years attempting to predict conditions under which specific species, particularly cyanobacteria species like Microcystis and Golden algae species that produce toxins. The result of that research is not conclusive as to the cost or methods of how harmful algae can be singled out or managed. My work is the only work to specifically analyze how this proposed wastewater permit would relate to harmful algae.

Q. What conclusion does your model support related to harmful algae?

A. My model shows that the potential for highest chlorophyll-a concentrations, with corresponding highest potential for harmful alga, occur in the current without-permit conditions. This is because of limited circulation during extended periods, with very small or no flow entering the cove. My model also shows that the with-permit conditions are likely to support chlorophyll-a concentrations comparable to baseline chlorophyll-a concentrations already found in the main body of the lake. My model scenarios do not indicate a reduction in algae, nor do they indicate higher algae and higher chlorophyll-a concentrations with the plant operating at permit limits. Based on these model results and information available to me, I believe the potential for harmful algae in the cove is not made worse by the addition of this permitted discharge.

Q. Does increase in Total Phosphorus concentration impact uses?

A. Very low concentrations of phosphorus are needed for aquatic algae to grow. Currently in Lake Granbury, phosphorus is abundant enough in the natural water body for aquatic algae to grow. The existing concentration in Lake Granbury, even though concentrations are often below reportable levels from typical laboratory analysis, is high enough to support growth of algae. The addition of the amount of Phosphorus discharged in this proposed effluent will not have local impact in the cove to algae levels in the cove. The percent increase in phosphorus noted by the TCEQ staff, approximately 2% in Lake Granbury segment 1205 is an appropriate calculation because that location can be tied existing long term monitoring data used to assess water quality standards and to assess

associated levels of chlorophyll-*a* (e.g., TCEQ monitoring station 20307 or 11860, see COG Exhibit 605 Figure 2, and COG Exhibit 623).

The percent increase in phosphorus noted by the protestants is based upon a reduced area inside the upstream portion of the Rucker Creek cove. While orthophosphate data is available within the cove (COG Exhibit 623) and exhibits very low levels, no historical total phosphorus data or chlorophyll-*a* data inside the cove is available to evaluate. Observation data, if available, could confirm those high levels already exist in the cove across a range of conditions, in the same way high levels are confirmed in the main body of the lake using observation data (see COG Exhibit 616).

Q. Does increase in Total Nitrogen concentration impact uses?

A. The addition of nitrogen to the water body, with or without phosphorus, will promote growth of aquatic algae. The amount that is in the proposed effluent does not impact uses.

Q. What does the QUAL2K model indicate about scenarios with added permitted discharge?

A. In all cases, the model predicts that chlorophyll-a levels are decreased in the cove after the addition of flow from the discharge into the cove. The predicted decrease in travel time and associated increase in circulation resulting from the addition of flow are the factors that help to prevent stagnating conditions and prevent high chlorophyll-a concentrations. Based upon model scenarios for critical conditions that include increase in both phosphorus and nitrogen nutrients, there is no predicted impact to uses.

Q. Does E.coli permit limits impact uses?

A. For protection of recreational use, a water quality standard for bacteria is assessed by TCEQ. The bacteria indicator used for Rucker Creek and Lake Granbury is Escherichia

coli, a type of coliform bacteria commonly found in the intestines of warm blooded animals including humans. Escherichia coli, typically abbreviated as E. coli, has a Texas Water Quality Standard limit of 126 MPN/100mL. The unit Most Probable Number per 100 milliliters (MPN/100mL) is approved by EPA based upon laboratory testing methods as an approximation of coliform density generally reported as colony forming units per 100 milliliters (cfu/100mL). Model results show E. coli concentration of 0.0 MPN/100mL at the location that TCEQ most recently used for assessment of Rucker Creek, 20222 monitoring station. That location has not been assessed recently by TCEQ because existing records are older than 10 years. A new sample was collected for this study upstream on Rucker Creek during September 2021, and that resulted in a laboratory value of 70 MPN/100mL. Because the model predicted concentration at the TCEQ sample station is expected to be zero, no change to assessment status is to be expected to any monitoring assessment based upon station 20222. The model does predict an average E. coli concentration of 50 MPN/100mL in Rucker Creek at the confluence with the unnamed tributary, when combined with the 70 MPN/100mL at the Rucker Creek inflow boundary. The concentration decreases from that maximum amount in the downstream direction. No concentrations evaluated are predicted to exceed the water quality standard as a result of operating within the permit limits. Water quality standards for bacteria will

be maintained and the recreational use will be maintained by the limits placed in this draft permit.

Q. Is the proposed draft permit consistent with the Lake Granbury Watershed Protection Plan?

A. The main objective of the Lake Granbury Watershed Protection Plan (WPP) is for improvement of water quality in Lake Granbury through management of non-point source pollution. One overarching recommendation is for development of a regional wastewater collection and treatment system. The recommendation aims to reduce the risk of bacterial discharges from dispersed residential septic systems (On Site Sewage Facilities, OSSF) in the event old systems begin to fail. The intent is for residents of the watershed to move away from hundreds of residential septic systems and move toward centralized waste treatment at one or more waste water treatment plants. Goals related to bacteria concentrations in the WPP are non-binding and are not used by TCEQ or EPA for determining achievement of the water quality standards. While the goals, management measures and other tasks outlined in the WPP were accepted by both the TCEQ and EPA, those measures and plans are a way to demonstrate that a community-based plan has been developed, and to demonstrate to state and federal funding agencies that proposed projects are consistent with community needs. The proposed draft permit to the City of Granbury and subsequent construction of the central facility is consistent with the centralized waste treatment concept that is intended by the WPP.

Q. Mr. Osting, do you have an opinion whether the draft permit is protective of water quality?

A. Based upon the modeling results described in this testimony, and my review of available observations and available information, I believe the draft permit is protective of water quality, and that water quality standards will not be violated by operating this treatment plant at the permit limits.

Q. Mr. Osting, do you have an opinion whether the draft permit is protective of the heath of requesters, their families, livestock and wildlife, including endangered species?

A. Based upon the modeling results described in this testimony, and my review of available observations and available information, I believe the draft permit is protective of water quality and of the water quality standards. With protection of water quality standards designated by the conditions of this permit, the health of the requesters, families, livestock and wildlife will be protected.

Q. Mr. Osting, do you have an opinion whether the proposed discharge will adversely impact recreational activities?

A. Based upon the modeling results described in this testimony, and my review of available observations and available information, I believe the draft permit will not adversely impact recreational activities. Bacterial levels are not anticipated to increase above the bacteria water quality standard to protect recreational use. Chlorophyll-a concentrations are not predicted to be greater than conditions that already occur in the lake receiving waters. Benthic bottom algae is not predicted to exceed nuisance levels.

Q. Mr. Osting, do you have an opinion whether the modeling complies with applicable regulations to ensure the draft permit is protective of water quality?

A. Based on my review of TCEQ's QUAL-TX dissolved oxygen modeling, the modeling does comply with applicable regulations. My updated QUAL-TX modeling for the applicant confirms the findings of TCEQ's modeling. My additional QUAL2K model, while considering more water quality parameters, confirms the findings of the TCEQ's QUAL-TX dissolved oxygen modeling.

Q. Mr. Osting, do you have an opinion whether the executive director's antidegradation review is accurate?

A. Based upon my review of the information available to me, the executive director's (ED) antidegradation review was an accurate application of the standard antidegradation review guidelines outlined in the IP. The results of the ED's antidegradation review included more stringent ammonia limits than requested in the original application. The ED's results also included a phosphorus limit as a result of a nutrient screening.

Q. Mr. Osting, do you have an opinion whether the nutrient limits in the draft permit comply with applicable Texas surface water quality standards?

A. Based upon the modeling results described in this testimony, and my review of available observations and available information, the nutrient limits comply with applicable Texas surface water quality standards. The draft permit authorizes discharge of nitrogen and phosphorus at levels that will not impair the designated uses for the receiving water bodies.

Q. Thank you, Mr. Osting.

THE CITY OF GRANBURY HAS NO FURTHER QUESTIONS FOR THIS WITNESS AT THIS TIME.