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October 17, 2018
Project 6706180002

Mr. Craig York
Texas Municipal Power Agency
Gibbons Creek Steam Electric Station
12824 FM 244 Road
Anderson, Texas 77830

Re: Demonstration of Compliance with CCR Location Restriction: 40 CFR §257.60 – Placement Above the Uppermost Aquifer

Dear Mr. York:

Wood Environment & Infrastructure Solutions, Inc. (Wood) has completed a demonstration of compliance with United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) siting restrictions applicable to the Texas Municipal Power Agency (TMPA) Gibbons Creek Steam Electric Station (GCSES) in Anderson, Texas.

The GCSES currently operates two CCR surface impoundments, which are referred to as the Scrubber Sludge Pond and the Ash Ponds. These units are subject to regulation under 40 Code of Federal Regulations (CFR) §257 Subpart D. This document specifically pertains to the location restrictions found in 40 CFR §257.60 – Placement above the uppermost aquifer.

LIMITATIONS

Wood has relied in part upon information provided by others to evaluate environmental site conditions reported herein. We did not attempt to independently verify the accuracy or completeness of that information. To the extent that the opinion and conclusions in this report are based in whole or in part on such information, those conclusions are contingent on its accuracy and validity. We assume no responsibility for any consequence arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to us. This report does not constitute legal advice.

The opinions and conclusions presented in this demonstration are based only on the information reviewed at the time of this assessment. Information pertaining to site conditions or changes may exist of which we are not aware at the time of this report.

Within the limitations of the agreed upon scope, we have conducted our work in a professional manner in accordance with generally accepted practices, using the degree of skill and care ordinarily

exercised by environmental consultants under similar circumstances. No other warranties, expressed or implied, are made.

This report has been prepared by Wood for the express use of TMPA. No other parties shall rely on this report without written consent from Wood.

DESCRIPTION OF CCR UNITS

The GCSES is in a rural area of Grimes County approximately 10 miles northwest of Anderson, Texas. As stated previously, the GCSES operates the Scrubber Sludge Pond (SSP) and the Ash Ponds (APs). **Figure 1** presents the general GCSES location and identifies the CCR units. The demonstration of compliance with the location for placement above the uppermost aquifer is only required for the SSP and APs. These units are described below.

Ash Ponds

The APs were constructed in 1982 and are located east of the coal pile storage area and SSP, and west of the Gibbons Creek Reservoir. The APs occupy an overall footprint of approximately 33.5 acres. Each pond is approximately 265 feet wide, 1,820 feet long, and 20 feet deep. The APs were constructed with flat bottoms and 3:1 (horizontal to vertical) slopes, with a berm separating each pond. Design drawings provided by TMPA indicate that the bottom elevation of all three ponds is 250 feet above mean sea level (amsl).

Scrubber Sludge Pond

The SSP was constructed in 1978 and is located west of the Ash Ponds and south of the coal pile storage area. The SSP occupies approximately 7.4 acres and is 20 feet deep from the crest of the berm to the bottom of the pond. As-built drawings provided by TMPA indicate that the bottom elevation of the SSP is 260 feet amsl. A Hypalon® flexible membrane liner was installed in the SSP in February 1985.

PLACEMENT ABOVE THE UPPERMOST AQUIFER DETERMINATION

Applicable Regulatory Citation

40 CFR §257.60 Placement above the uppermost aquifer

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that locate no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including seasonal high water table).

GCSES Area Hydrogeologic Setting

The GCSES is constructed on an outcrop of the middle member of the Wellborn Formation of the Jackson Group. The Clairborne Group underlies the Jackson Group and the Yegua Formation within the Jackson Group is the only member present in in the vicinity of the GCSES. The Wellborn Formation in the area dips to the southeast at approximately 85 feet/mile. The middle member lies

between the Bedias sandstone and the Carlos sandstone and consists of interbedded clay, silt, sands, and occasional lignite seams.

Groundwater resources in the vicinity of the GCSES were described in the report "Preliminary Soils Investigation Proposed Steam Electric Station Bryan Lignite Project Grimes County, Texas" (NFS/National Soil Services, Inc, 1976). The preliminary soil investigation concluded that on-site formations which are the most likely to contain groundwater resources are the Eocene Yegua Formation of the Claiborne Group, the Eocene Jackson Group, and the flood plain alluvium of Holocene age. The Yegua Formation yields small to moderate amounts (0-500 gpm) of fresh to moderately saline water to public-supply, rural-domestic, and livestock wells on the outcrop of the aquifer and a few miles southeast of the outcrop. No wells tapping the Yegua were noted in the site area. The Caddell and Wellborn Formations of the Jackson Group yield small to moderate amounts of fresh to moderately saline water for irrigation, rural-domestic, and livestock wells on the outcrops of the aquifers and a few miles southeast of the outcrops.

At the time of preliminary soils investigation, the aquifers in the project area were believed to discharge by seepage into streams, spring flow, evaporation, and by pumping from wells. Although no seeps or springs were noted near the study site, landowners south of the site area noted that several springs once existed along Gibbons Creek, but the springs quit running several years prior to the investigation. A review of the 1960 U.S. Geological Survey topographic map (USGS Carlos Quadrangle, 7.5 Minute Series,1960) indicates that Gibbons Creek was a perennial stream at the time of the mapping (1960) with an elevation of approximately 220 feet amsl at the future GCSES plant site and the likely discharge point for regional groundwater units.

Historical water well records on the Texas Water Development Board (TWDB) online database of Texas Commission on Environmental Quality (TCEQ) files were reviewed to evaluate groundwater use in the vicinity of the GCSES. **Table 1** summarizes well data retrieved from the database. The location of the wells is shown in **Figure 2**. The records include two wells that were located on the GCSES plant area prior to construction of the plant. Wells in use are used for domestic or stock purposes. Shallow groundwater is not used as a resource in the area. In general, water wells vary in depth from approximately 150 to 450 feet in depth below land surface and the potentiometric surface elevation ranges from 241.5 ft amsl to 209 ft. amsl.

Ash Ponds/Scrubber Sludge Pond Hydrogeology

The APs and SSP are underlain by interbedded clays, silty and sandy clays, clay, clayey sands and silty sand. Hard sandstone intervals are intermittently present, as are thin layers of lignite or lignitic silts. The base of the APs and SSP are underlain by a low permeability unit comprised primarily of clay and silty clay with measured vertical hydraulic conductivities that generally range from 10^{-6} to 10^{-7} centimeters/second (cm/s). A contour map of the base of the clay unit developed from boring logs completed in the area of the APs and SSP by various investigators is shown in **Figure 3**. The low permeability unit is not found in borings just to the north of the APs and appears to also be absent at some boring locations to the east of the APs.

The uppermost shallow aquifer underlies the low permeability unit and is mainly comprised of fine-grained sand and silty sand. Borings that completely penetrate the aquifer unit indicate that the unit generally has a minimum thickness of 5 feet and can be over 10 feet thick. Groundwater monitoring wells at the CCR units are completed within this unit. Where the low permeability unit is not present, very fine-grained sands and silty sands are present. A vertical hydraulic conductivity value of 10^{-7} cm/s for the fine-grain sand unit was measured in a boring just north of the APs.

A review of boring logs completed before the Gibbons Creek Reservoir was impounded noted that water level elevations were generally 245 to 240 ft. amsl in the area of the APs and SSP. As described above, shallow groundwater at the time likely discharged to Gibbons Creek at an elevation of approximately 220 ft amsl prior to the impoundment of the Gibbons Creek Reservoir.

The reservoir is currently maintained at a pool level of 247 ft. amsl, compared to the 220 ft amsl elevation of Gibbons Creek depicted in the 1960 USGS topographic map. The creation of the Gibbons Creek Reservoir raised the elevation of the surface water discharge point for water bearing units in the area of the GCSES from 220 ft. amsl to 247 ft. amsl and saturated previously unsaturated sediments in the area of the APs and SSP.

Where the low permeability unit is present, the filling of the Gibbons Creek Reservoir resulted in the creation of a confined shallow aquifer. Observations made by Wood during monitoring well installation indicate that groundwater was first encountered in the fine-grained sand aquifer unit beneath the low permeability unit. After well completion the potentiometric surface in the wells rose to more than 250 ft. amsl or higher, indicating confined aquifer conditions. Where present, the low permeability unit confines the aquifer unit and prevents direct hydraulic connection between the aquifer and the base of the APs and SSP.

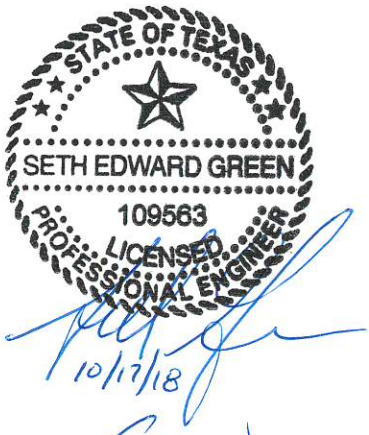
The base of the low permeability unit ranges in elevation from approximately 252 to 240 ft. amsl beneath the SSP. The base of the SSP is at an elevation of 260 ft. amsl. This results in a thickness of the low permeability unit that varies from 8 to 20 ft. beneath the SSP, which is greater than the 1.52 meters (5 feet) distance requirement between the base of the SSP and the top of the aquifer.

The base of the low permeability unit ranges in elevation from 244 to 224 ft. amsl beneath the APs. The base of the APs is at an elevation of 250 ft. amsl. Therefore, the thickness of the low permeability unit beneath the APs ranges from 6 to 25 ft., which is greater than the 1.52 meters (5 feet) distance requirement between the base of the APs and the top of the aquifer. Where the confining unit is not present to the north and east of the APs, the top of the unconfined aquifer is considered to be at an elevation of 247 ft. amsl, which corresponds to the pool elevation of the Gibbons Creek Reservoir. Although the 247 ft. amsl elevation is less than 1.52 meters (5 feet) below the base of the APs, the controlled maximum pool elevation of the adjacent reservoir results in a constant elevation for the designated top of the aquifer. Therefore, the top of the aquifer remains below the base of the APs year-round and meets the siting criteria.

CERTIFICATION

This Certification Statement documents that the Scrubber Sludge Pond and Ash Ponds at the Texas Municipal Power Agency Gibbons Creek Steam Electric Station meet the Placement Above the Uppermost Aquifer location restriction 40 CFR §257.60. The Scrubber Sludge Pond, and Ash Ponds are existing CCR units as defined by 40 CFR §257.53.

I, Seth Edward Green being a Registered Professional Engineer in good standing in the State of Texas, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Units, that the Placement Above the Uppermost Aquifer Certification dated October 17, 2018, meets the requirements of 40 CFR §257.63.



SETH EDWARD GREEN
Printed Name of Registered Professional Engineer

Signature of Registered Professional Engineer

October 17, 2018
Date

Company	License Number	State of Registration
Wood Environment & Infrastructure Solutions, Inc.	F-00012	Texas

We appreciate the opportunity to serve TMPA on this project. If you have any questions, feel free to contact us.

Sincerely,

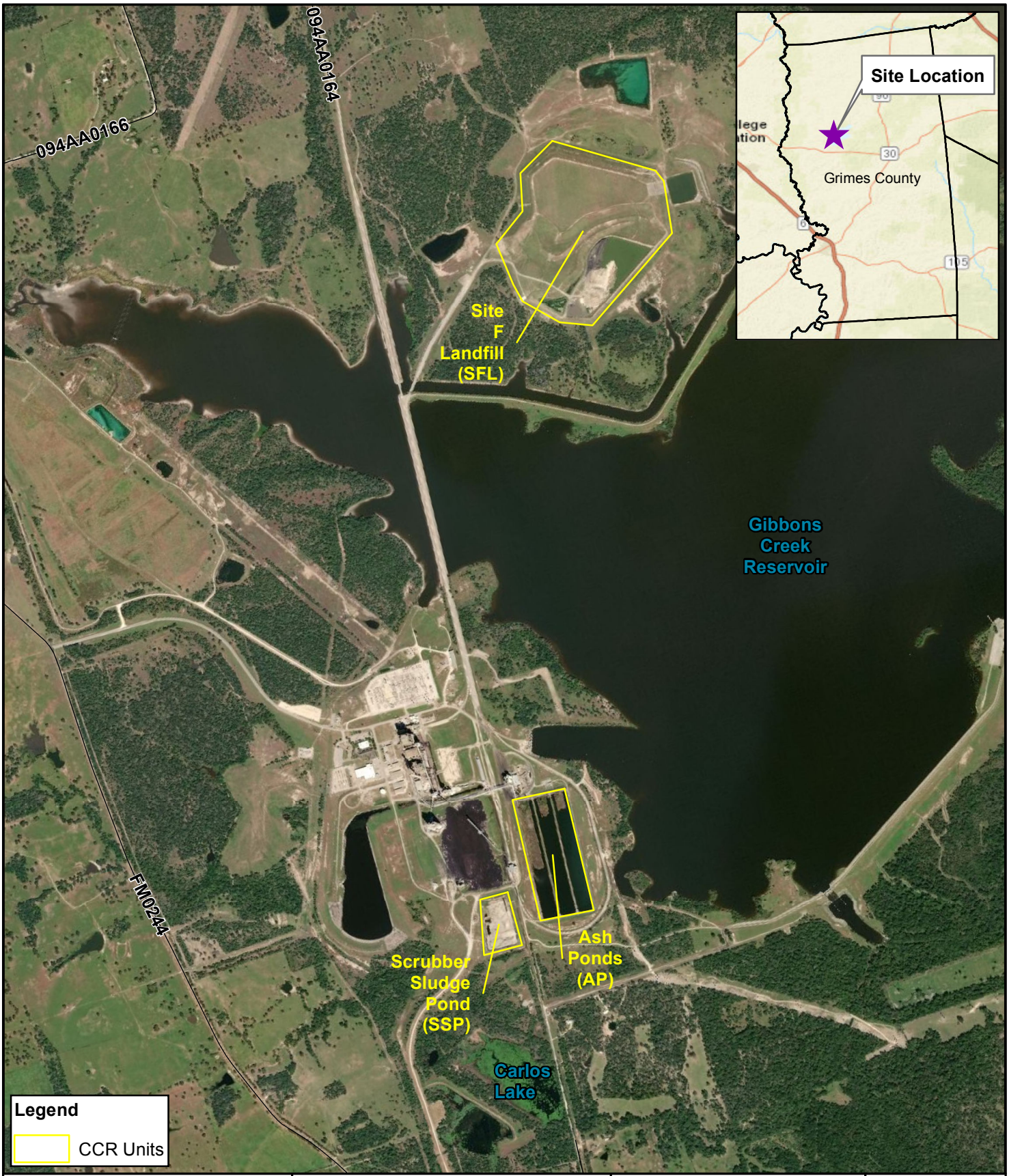
Wood Environment & Infrastructure Solutions, Inc.

Greg Seifert, P.G.
Principal Geologist

Reviewed by:

Seth Green, P.E.
Senior Engineer

Attachments:
Figure 1 – Site Location Map and CCR Units
Figure 2 – Water Well Locations
Figure 3 – Elevation of Bottom of Low Permeability Unit
Table 1 – Water Well Data



Texas Municipal Power Agency
Gibbons Creek Steam Electric Station
Grimes County, Texas

wood.

N

0 1,000 2,000
Feet

CCR Units

SITE LOCATION MAP

DATE
OCTOBER 2018

SCALE
1 " = 2,000 feet

PROJECT NO.
6706180002

FIGURE
1

DRAWN BY: CJR CHECKED BY: GS

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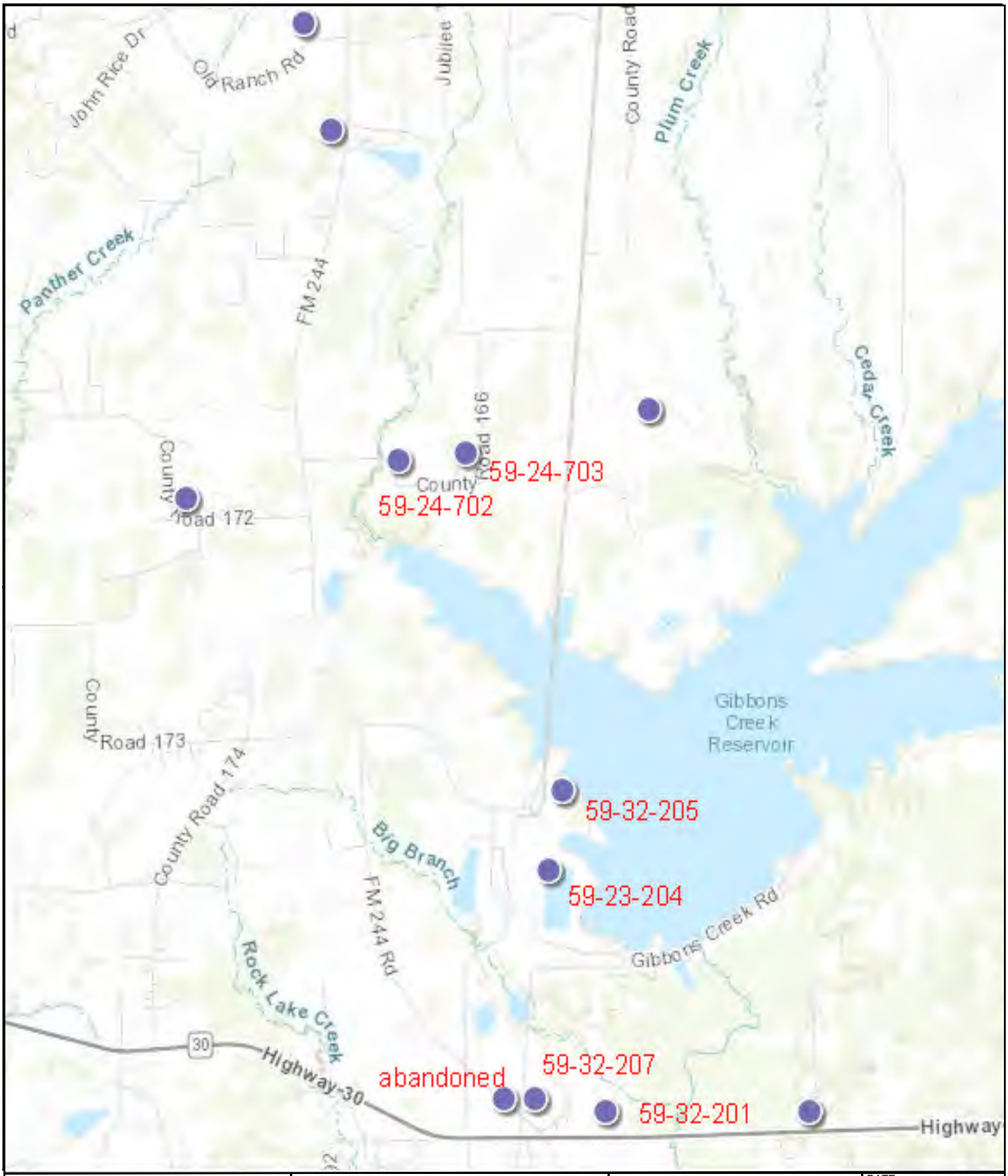

Texas Municipal Power Agency
Gibbons Creek Steam Electric Station
Grimes County, Texas

wood.

Texas Water Development Board

WATER WELL MAP

DATE: NOVEMBER 2018
SCALE: NOT TO SCALE
PROJECT NO.: 6706180002
FIGURE: 2

DRAWN BY: CJR CHECKED BY: GS

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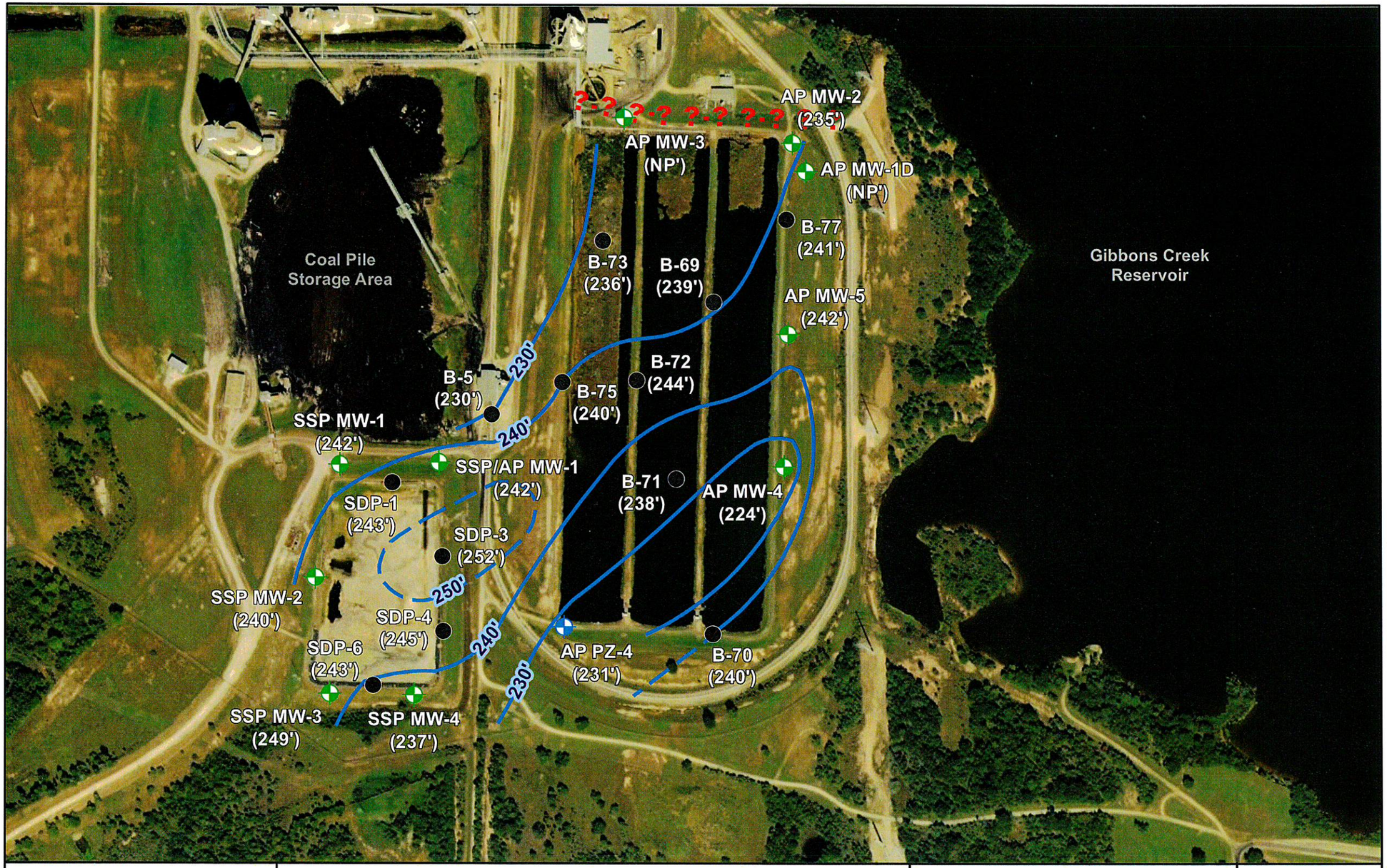

Texas Municipal Power Agency

Gibbons Creek Steam Electric Station
Grimes County, Texas

wood.

DRAWN BY: - PM CHECKED BY: - JKH

Legend

- Monitoring Well
- Piezometer
- Soil Boring
- Base of Low Permeability Unit Contour (feet)
- Inferred Base of Low Permeability Unit Contour (feet)
- ?-? Estimated End of Low Permeability Unit

N

0 250 500 Feet

BASE OF CLAY UNIT

DATE	DECEMBER 2018
SCALE	1 " = 500 feet
PROJECT NO.	6706180002
FIGURE	3

STATE OF TEXAS
GREGO[illegible]ERT
GE[illegible]
10077
LICENSED
PROFESSIONAL GEOLOGIST

10/17/18

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Table 1
Water Well Data

Well ID	Date Drilled	Use	Total Depth Below LS	Depth to Water	Date of Measurement	Approximate Well Elevation	Potentiometric Surface Elevation	Comment
59-24-702	9/25/1964	Domestic/Stock	449	44.3	12/17/1970	265	220.7	
59-24-703	11/18/1980	Domestic	446	65.8	12/19/1986	275	209.2	
59-24-801	1900(?)	Domestic/Stock	35 (est.)	25	reported	300	275	30 in. diameter concrete - questionable
59-32-201	9/26/1968	unused	150	40	9/26/1968	250	210	Formerly Reed McDonald
59-32-204	unk.	out of service	176	48.5	8/22/1977	290	241.5	formerly E.P. Doremus
59-32-207	1963	stock	263	35	8/22/1977	260	225	

LS = land surface
Elevation in feet above mean sea level

Source: Groundwater Data Viewer, Texas Water Development Board (October, 2018)