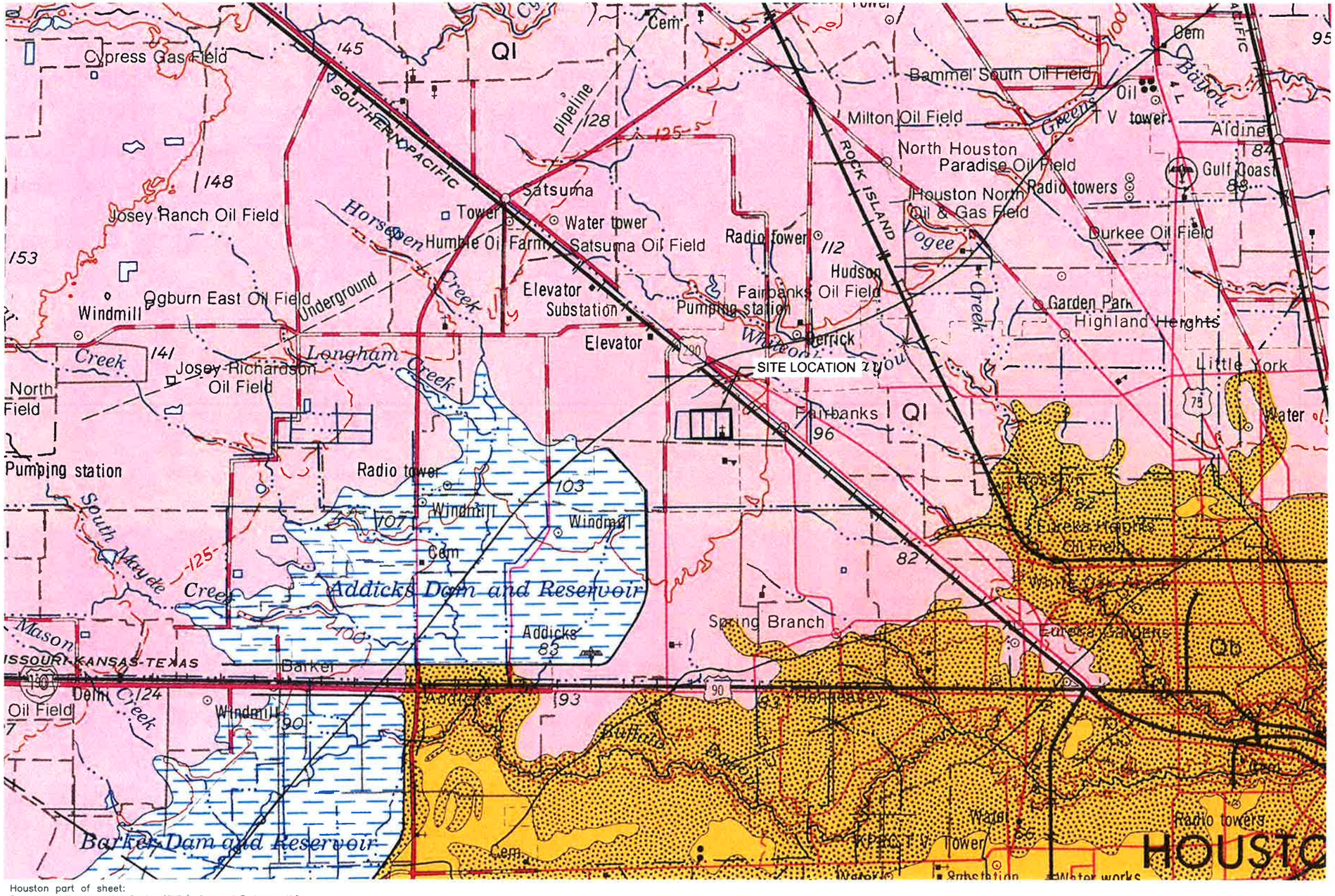
HAWTHORN PARK LANDFILL
APPENDIX III-4A



Houston part of sheet:
Prepared by the Army Map Service (GUDV), Corps of Engineers, U.S. Army, Washington, D.C. Compiled in 1956 from: United States Quadrangles, 1:24,000, U.S. Geological Survey, 1952; Texas 1:25,000, Army Map Service, 1947–49; United States Quadrangles, 1:31,680, U.S. Geological Survey, 1919–20; USC&GS Charts 1280 and 1282, 1945. Planimetric detail revised by photo-planimetric methods. Control by USGS, CE and USC&GS. Map field checked 1956.

CONTOUR INTERVAL 50 FEET
WITH SUPPLEMENTARY CONTOURS AT 25 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION
1981 MAGNETIC DECLINATION FOR THIS SHEET
IS 6°00'E. MEAN ANNUAL CHANGE IS 6.3' WESTERLY

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This revision of the Houston sheet of the Geologic Atlas of Texas relies heavily on recent publications and maps listed in the Index of Geologic Mapping. for credits and sources used for the original 1968 edition of the Houston sheet, the user is referred to that edition of the map. the base for the present edition of the Houston sheet was revised by R. L. Dillon, who also scribed the geologic mapping.

GEOLOGIC ATLAS OF TEXAS, HOUSTON SHEET

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INDEX OF GEOLOGIC MAPPING
For opinion on age of rocks on Hockley salt dome (area A), see Deussen, Alexander, and Lane, L. L. (1925) Hockley salt dome, Harris County, Texas: Bulletin of the American Association of Petroleum Geologists, v. 9, p. 1031–1060; and Stenzel, H. B. (1946) Gypsum resources and mining on the Hockley Dome, Harris County Texas: University of Texas Publication 4301, p. 207–226. For area B, see Fisher, W. L., McGowen, J. H., Brown, L. F., Jr., and Groat, C. G. (1972) Environmental geologic atlas of the Texas Coastal Zone--Galveston–Houston area: The University of Texas at Austin, Bureau of Economic Geology. For area C, see Fisher, W. L., Brown, L. F., Jr., McGowen, J. H., and Groat, C. G. (1973) Environmental geologic atlas of the Texas Coastal Zone--Beaumont–Port Arthur area: The University of Texas at Austin, Bureau of Economic Geology. For area D, see McGowen, J. H., Brown, L.F., Jr., Evans, T. J., Fisher, W. L., and Groat, C. G. (1976) Environmental geologic atlas of the Texas Coastal Zone--Bay City–Freeport area: The University of Texas at Austin, Bureau of Economic Geology. For area E, see St. Clair, A. E., Proctor, C. V., Jr., Fisher, W. L., Kreitler, C. W., and McGowen, J. H. (1975) Land and water resources--Houston–Galveston Area Council: The University of Texas at Austin, Bureau of Economic Geology. For area F, see Kier, R. S., Garner, L. E., and Brown, L. F., Jr. (1977) Land resources of Texas: The University of Texas at Austin, Bureau of Economic Geology. For area G, see Verbeek, E. R., and Clanton, U. S. (1978) Map showing surface faults in southeastern Houston metropolitan area, Texas: U.S. Geological Survey Open-File Report 78–797. for area H, see Verbeek, E. R., Ratzlaff, K. W., and Clanton, U. S. (1979) Faults in parts of north-central and western Houston metropolitan area, Texas: U.S. Geological Survey, Miscellaneous Field Studies, Map MF-1136. For references concerning caprock on Damon Mound, see Veatch, A. C., in Hayes, C. W., and Kennedy, William (1903) Oil fields of the Texas–Louisiana Gulf Coastal Plain: U.S. Geological Survey Professional Paper 126, p. 137; and Bevier, G. M. (1925) The Damon Mound oil field, Texas: Bulletin of the American Association of Petroleum Geologists, v. 9, p. 523.

NOTE:

1. SEE FIGURE III-4A-2 FOR LEGEND.

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GEOLOGIC VICINITY MAP

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TBPE FIRM NO. F-256 | TBPG FIRM NO. 50222

DSN. ESF | DATE : 01/2021
DWN. SRC | SCALE : GRAPHIC
CHK. JMS | DWG : III-4A-1_GeoVicinity.dwg

FIGURE
III-4A-1

J:\101\24\102\ATT E\III-4A-1_GeoVicinity.dwg Layout: Vicinity User: SCundiff

EXPLANATION

QUATERNARY

Holocene

FS

Fill and spoil

Fill, F, material dredged for raising land surface above alluvium and barrier-island deposits and for creating land. Spoil, S, dredged material along waterways

Qal

Alluvium

Clay, silt, and sand, organic matter abundant locally; includes point-bar, natural levee, stream channel, backswamp, coastal marsh, mud-flat, and narrow beach deposits that are shown by line symbol

Qbi

Barrier-island deposits

Sand, silt, and clay; mostly sand, well-sorted, fine-grained, abundant shells and shell fragments; interfingers with clay and silt in landward direction; includes beach ridge, spit, tidal channel, tidal-delta, and sand dune deposits

Holocene or late (?) Pleistocene

Qd | Qd?

Deweyville Formation

Sand, silt, and clay, some gravel; includes point-bar, natural levee, stream channel, and backswamp deposits at a level only slightly above that of the present floodplain; sand coarser than that in alluvium; surface characterized by relict meanders of much larger radius of curvature than those of present streams, some scattered pimple mounds; thickness locally more than 50 feet. High-level Deweyville, Qd?, surfaces cut into the Beaumont Formation, and high-level Deweyville deposits along Trinity River are intermediate in position between the surface of the Beaumont and the level of most Deweyville deposits

Pleistocene

Qbb | Qb | Qt

Beaumont Formation

Beaumont Formation, Qb, with barrier-island and beach deposits, Qbb, mapped separately. Beaumont Formation, Qb, mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud-flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of low, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 feet. The stippled overprint (source shown in Index to Geologic Mapping) shows areas that are "Dominantly clay and mud of low permeability, high water-holding capacity, high compressibility, high to very high shrink-swell potential, poor drainage, level to depressed relief, low shear strength, and high plasticity; geologic units include interdistributary muds, abandoned channel-fill muds, and overbank fluvial muds." The nonstippled areas are "Dominantly clayey sand and silt of moderate permeability and drainage, low to moderate compressibility and shrink-swell potential, level relief with local mounds and ridges, and high shear strength; geologic units include meanderbelt, levee, crevasse splay, and distributary sands"

Barrier-island and beach deposits, Qbb, mostly fine grained sand normally without shell material; surface slightly higher than that of surrounding deposits, characterized by numerous pimple mounds and rounded depressions; probably part of "Ingleside" barrier-island system; thickness less than 30 feet
Physical properties: "Dominantly sand, high to very high permeability, low water-holding capacity, low compressibility, low shrink-swell potential, good drainage, low ridge and depressed relief, high shear strength, and low plasticity. Geologic units include beach, foredunes, barrier-strandplain-chenier vegetated flats, Pleistocene barrier and strandplain sands"

QUATERNARY

Pleistocene

Ql

Lissie Formation

Upper part, clay, silt, sand, and very minor siliceous gravel of granule and small pebble size, gravel more abundant northwestward, locally calcareous, concretions of calcium carbonate, iron oxide, and iron-manganese oxides common in zone of weathering; fluviatile; surface fairly flat and featureless except for numerous rounded shallow depressions and pimple mounds. Lower part, clay, silt, sand, and minor amount of gravel; gravel slightly coarser than in upper part, noncalcareous, iron oxide concretions more abundant than in upper part; fluviatile; very gently rolling; thickness ± 200 feet

Qw

Willis Formation

Clay, silt, sand, and minor siliceous gravel of granule to pebble size including some petrified wood; sand coarser than in younger units. Deeply weathered and lateritic, indurated by clay and cemented by iron oxide locally, concretions of iron oxide numerous, noncalcareous; fluviatile; maximum thickness 75 feet

TERTIARY

Miocene

T

Tertiary rocks on Hockley salt dome

Sandstone, very fine grained, hard, abundant porcelaneous to opaline cement, poorly bedded, jointed, grayish white; possibly Catahoula Formation (Stenzel, 1946) (See Index of Geologic Mapping for reference.)

CR

Outcrop of caprock reported on Damon Mound

Not found. Reportedly used for building stone (Bevier, 1925)

U
D

Fault

U, upthrown; D, downthrown side

INDEX OF GEOLOGIC MAPPING

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GEOLOGIC ATLAS OF TEXAS, HOUSTON SHEET

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GEOLOGIC VICINITY LEGEND

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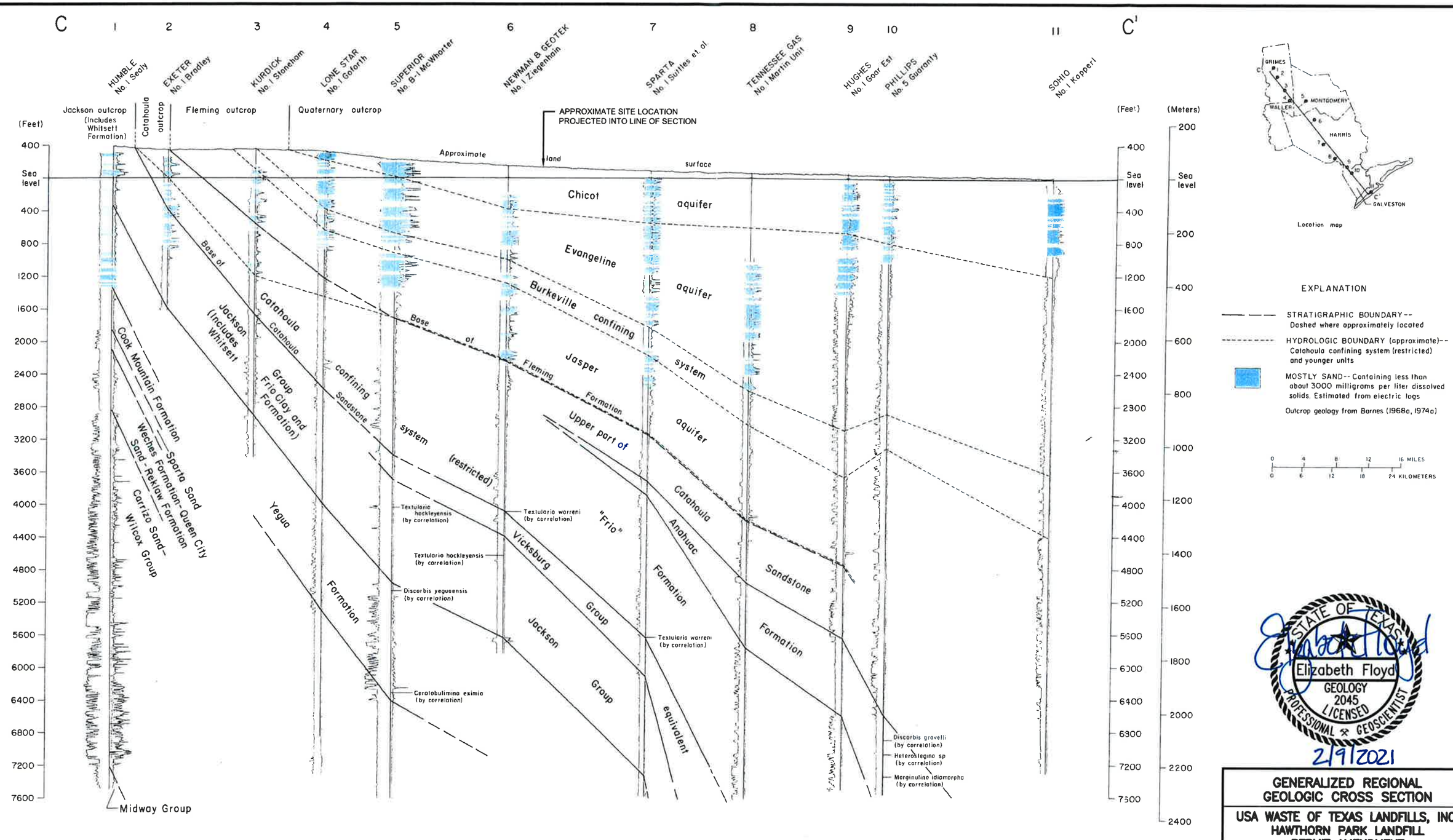
DSN. ESF	DATE : 01/2021	FIGURE	
DWN. SRC	SCALE : GRAPHIC	III–4A–2	
CHK. JMS	DWG : III–4A–1_GeoVicinity.dwg		

J:\101\24\102\ATT E\III–4A–1_GeoVicinity.dwg Layout: Legend User: SCundiff



REFERENCE:
BAKER, E.T., 1979 STRATIGRAPHIC AND HYDROGEOLOGIC FRAMEWORK OF PART OF COASTAL PLAIN OF TEXAS, TEXAS DEPARTMENT OF WATER RESOURCES, REPORT 236.

Figure 4
Stratigraphic and Hydrogeologic Section C-C'

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DSN. ESF | DATE : 01/2021
DWN. SRC | SCALE : GRAPHIC
CHK. JMS | DWG : III-4A-3_RegGeoXsecC-C.dwg

FIGURE III-4A-3

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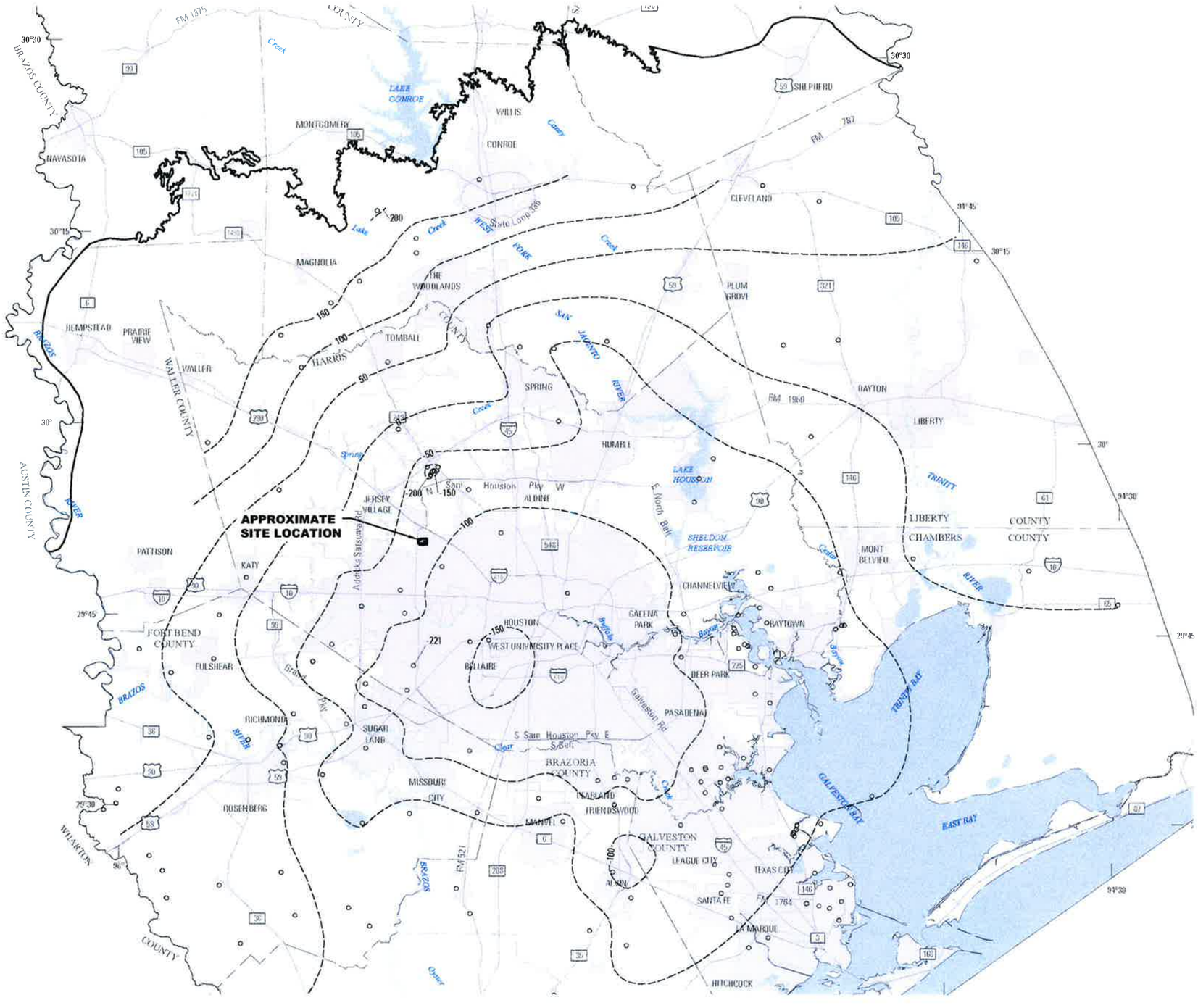

0 5 10

SCALE IN MILES

Note:
The annual regional depictions of water-level altitudes presented in this report are substantiated by water-level-measurement data collected during December 2015–March 2016 throughout an 11-county area encompassing about 11,000 square miles. Contour locations and orientations should be viewed in a regional context because the water-level surface of the aquifers is a dynamic surface, constantly changing because of the dense network of wells operating in the study area. Users should be aware that water-level changes may have occurred since the water levels were determined for this report. Inherent uncertainties exist in these data such as antecedent withdrawal rates and the pumping status of nearby wells. Users should be aware of the limitations of these data and use discretion when drawing conclusions or making policy decisions. These data should not be used for engineering applications.

SOURCE: Kasmarek, et al., 2016.

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REGIONAL POTENTIOMETRIC SURFACE MAP OF THE CHICOT AQUIFER

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DSN. ESF	DATE : 01/2021	FIGURE
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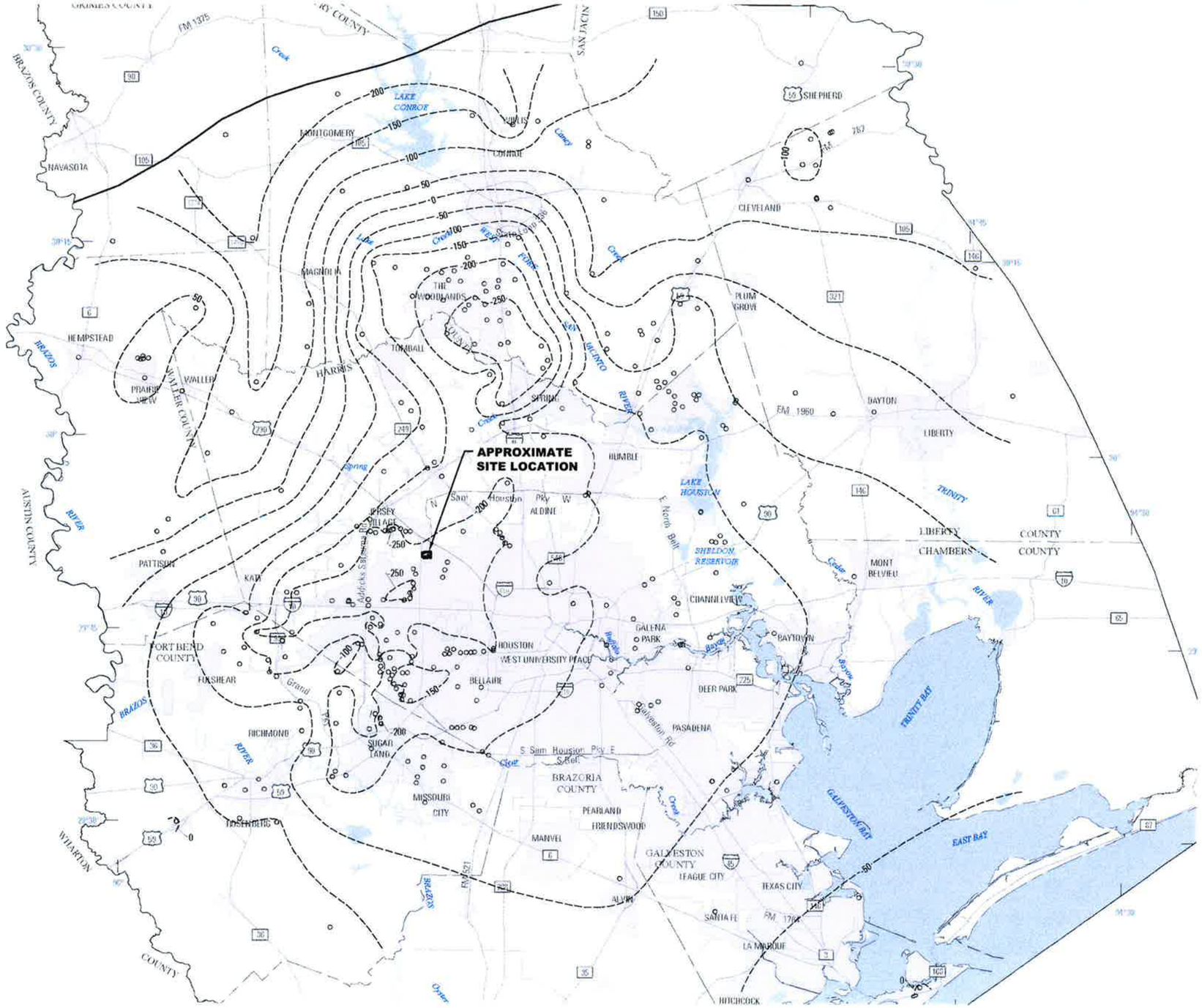
APPROXIMATE SITE LOCATION
SCALE IN MILES
0
5
10
EXPLANATION
200
Water-level contour—Shows altitude at which water level would have stood in tightly cased well. Contour interval 50 feet. Datum is North American Vertical Datum of 1988
Boundary of study area
Updip limit of Evangeline aquifer (Baker, 1979)
Data point—Well in which water-level measurement was made. One point can represent more than one well
Note:
The annual regional depictions of water-level altitudes presented in this report are substantiated by water-level-measurement data collected during December 2015–March 2016 throughout an 11-county area encompassing about 11,000 square miles. Contour locations and orientations should be viewed in a regional context because the water-level surface of the aquifers is a dynamic surface, constantly changing because of the dense network of wells operating in the study area. Users should be aware that water-level changes may have occurred since the water levels were determined for this report. Inherent uncertainties exist in these data such as antecedent withdrawal rates and the pumping status of nearby wells. Users should be aware of the limitations of these data and use discretion when drawing conclusions or making policy decisions. These data should not be used for engineering applications.
SOURCE: Kasmarek, et al., 2016.
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REGIONAL POTENTIOMETRIC SURFACE MAP OF THE EVANGELINE AQUIFER
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DSN. ESF
DATE : 01/2021
DWN. SRC
SCALE : GRAPHIC
CHK. JMS
DWG : III-4A-5_RegEvangeline.dwg
FIGURE
III-4A-5
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DATE
DESCRIPTION
DWN BY
DES BY
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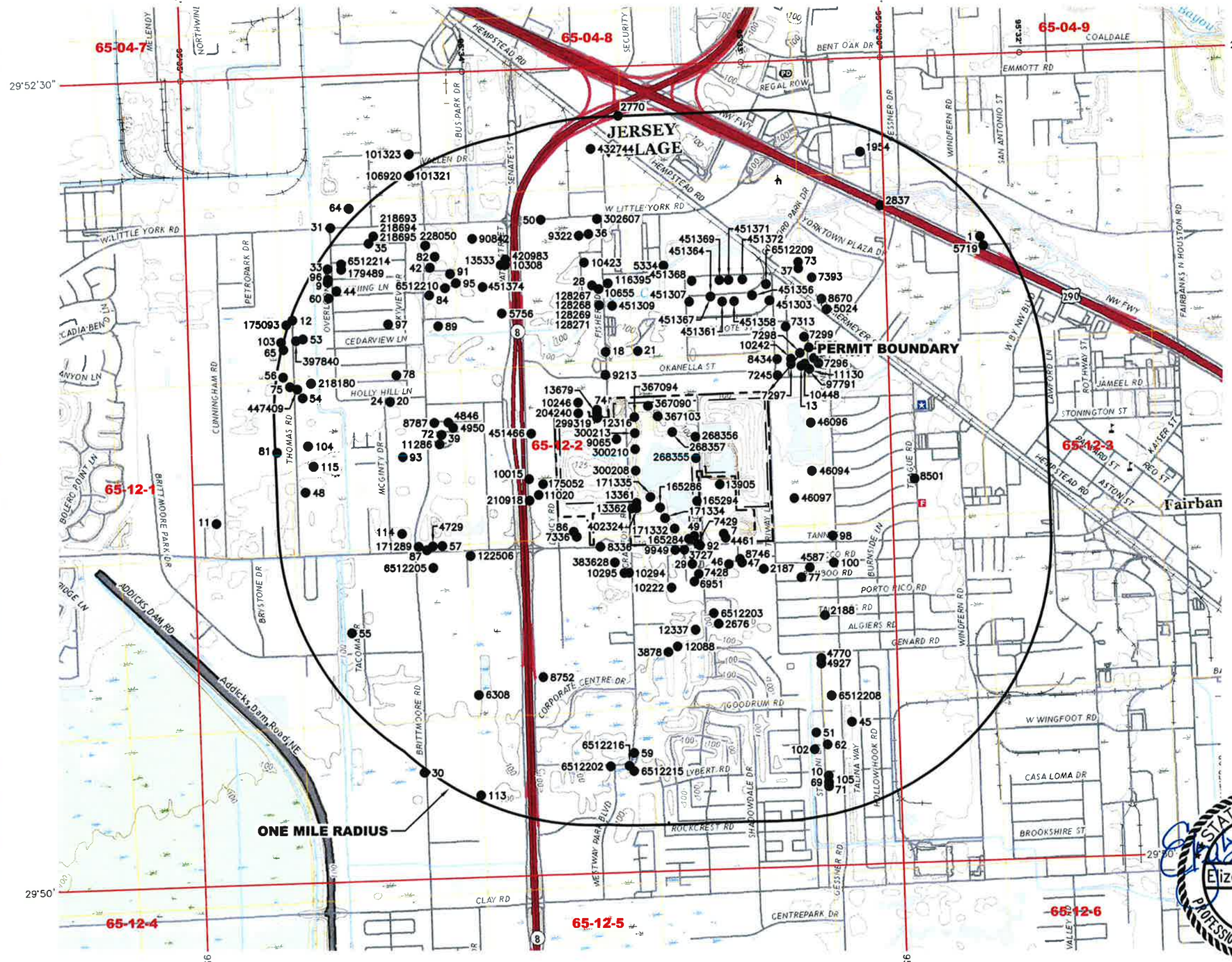
APP BY
J:\101\24\102\ATT E\III-4A-5_RegEvangeline.dwg Layout: EVANGELINE User: SCun



0 1000 2000

SCALE IN FEET

HEDWIG VILLAGE, TX

2019

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route / State Route

LEGEND

- PERMIT BOUNDARY
- LANDFILL FOOTPRINT
- ONE MILE RADIUS
- SURFACE WATER BODY OR OTHER WATER
- 8501 — WATER WELL
- WATER WELL ID GRID
- 65-12-2 — WATER WELL GRID NUMBER

NOTE:

1. TOPOGRAPHIC BASE MAP IS US TOPO 7.5 MINUTE QUADRANGLE HEDWIG VILLAGE, TEX 2019 DOWNLOADED FROM USGS WEBSITE ON APRIL 9, 2019.
2. WATER WELLS IDENTIFIED FROM ONLINE STATE RECORDS. REFER TO PART III, ATTACHMENT E, APPENDIX E1 FOR WATER WELL INFORMATION.
3. THERE ARE ___ SPRINGS LOCATED WITHIN ONE MILE OF THE PERMIT BOUNDARY.

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WATER WELL LOCATION MAP

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DSN. ESF	DATE : 01/2021	DRAWING	III-4A-6
DWN. SRC	SCALE : GRAPHIC		
CHK. JMS	DWG : III-4A-6_MileWaterWells.dwg		

J:\101\24\102\ATT E\III-4A-6_MileWaterWells.dwg Layout: layout 1 User: SCundiff