SITE INVESTIGATION REPORT AND PROPOSED REMEDIATION PLAN

Castex Development, LLC v. Anadarko Petroleum Corporation, et al.
31st Judicial District Court, Docket No. C-0502-20
Sections 13 and 39, Township 10 South, Range 03 West and
Sections 17 and 18, Township 10 South, Range 02 West
West Mermentau Oil and Gas Field
Jefferson Davis Parish, Louisiana
LDENR OC Legacy Project No. 031-027
August 05, 2025

Prepared for

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August 05, 2025

Hydro-Environmental Technology, Inc. (HET) is submitting this Site Investigation Report and Proposed Remediation Plan (Plan), on behalf of BP America Production Company (bp), to the Louisiana Department of Natural Resources Office of Conservation (LDENR) and to the 31st Judicial District Court for the Parish of Jefferson Davis, State of Louisiana (Court) pursuant to a Limited Admission filed on behalf of bp on August 05, 2025 (Attachment 1). The purpose of the Limited Admission is, in accordance with La. R.S. 30:29 ("Act 312"), to establish the Most Feasible Plan for the evaluation, or if necessary, remediation of environmental damage, if any, as defined by Act 312 within the scope of the Limited Admission Area as defined in the Limited Admission in accordance with Act 312 and applicable regulations. The Plan was prepared to evaluate whether environmental damage as defined by Act 312 exists and, if necessary, remediate the contamination that resulted in the environmental damage, if any, within the Limited Admission Area defined herein in accordance with the requirements of the applicable rules and regulations of the LDENR and/or the Louisiana Department of Environmental Quality (LDEQ) as applicable through the LDENR. Where applicable or relied upon, rules and regulations of the LDEQ as part of the overall framework of LDENR's Statewide Order 29-B are cited in the Plan. This Plan was prepared in adherence to HET's strict quality assurance/quality control procedures to ensure that the Plan meets the highest standards in terms of the methods used to obtain the information presented.

The Plan is based on field data collected and information received from the client, other parties associated with the client and other third parties during the period of October 27, 2020 to August 05, 2025. All conclusions and recommendations are based on available information cited herein and should be reviewed within this context. Should conditions at the site in question change, or additional information become available, especially with regard to prior site conditions, it may be necessary to modify these conclusions and recommendations accordingly in the future. The contents of this Plan are proprietary, and text, illustrations, and/or any other parts of this Plan may not be reproduced without the express written permission of HET.

A reasonable effort was made by bp's counsel to obtain a complete list of parties. A list of all parties to whom the Plan is being provided, their addresses, and other contact information is attached as Attachment 2. A commissioner's conference has not been held. Should you have any questions or need further information, please feel free to contact us.

Sincerely,

HYDRO-ENVIRONMENTAL TECHNOLOGY, INC.
Project #1009.A75

Matthew L. Greene (CPSS #495789)
Environmental Scientist

Craig E. Cormier, P.G. (LA #356)
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Stewart L. Stover, Jr., P.G. (LA#440)
Director

MLG/CEC/BTP/SLS/eop

EXECUTIVE SUMMARY

Site Status

This Plan is being submitted in connection with a Limited Admission made on behalf of bp in the matter styled *Castex Development, LLC v. Anadarko Petroleum Corporation, et al., 31st Judicial District Court, Docket No. C-0502-20, Parish of Jefferson Davis, State of Louisiana*. The case is currently set for trial in February 2026. The Limited Admission pertains to environmental damage, if any, to the soil and discontinuous, shallow water bearing zones arising from the operation of LDENR Serial No. 76146 (Johnson & Boudreaux SWD No. 001) and associated facilities located within the Limited Admission Area (LAA) depicted in Figure 5 and further defined below. The Castex property (Property) was observed during the course of the investigation as agricultural fields, grassland, and densely vegetated and forested acreage with areas of standing water.

History

The Property was subject to exploration and production in the West Mermentau Oil and Gas Field beginning in 1935, with production now ceased. There is one (1) producing (Status 10) well on the Property. The Plaintiff filed suit in 2020 against BP America Production Company (bp) as successor to Midwest and/or Amoco and others alleging environmental damage on the Property and sought restoration costs based on data collected by their consultants, including ICON Environmental Services, Inc. (ICON). Hydro-Environmental Technology, Inc. (HET) subsequently conducted an additional investigation.

On August 05, 2025, bp entered a limited admission of responsibility to evaluate whether environmental damage (as defined by Act 312) exists and, if necessary, remediate environmental damage, if any, resulting from the operation of the LDENR Serial No. 76164 and its now closed production facilities within the LAA as illustrated on Figure 5 and further defined below. Pursuant to the Order entered by the Court on August 05, 2025, HET, on behalf of bp, is submitting this Plan for (1) the evaluation of constituents in the soil and discontinuous shallow water bearing zones resulting from the operation of LDENR Serial No. 76164 and associated facilities within the LAA and (2) the presentation of evaluation and remedial options for constituents in the soil and shallow water bearing zones associated within the LAA that meet applicable regulatory standards and that serve the best interest of the intended utilization, functionality, and aesthetics of the Property. The Plan is being submitted in accordance with the requirements of the applicable rules and regulations of the LDENR Office of Conservation.

Reason for Assessment

ICON, on behalf of the landowners, conducted an investigation of the property between 2021 and 2024 and presented the results in the Expert Report and Restoration Plan for the Landowners dated October 18, 2024. HET conducted further assessment of the site beginning in April and May of 2025 to accurately determine the environmental conditions and conduct further evaluation to establish appropriate regulatory status of the Property. The purpose of the Limited Admission and this Plan is to assist the LDENR with its function of assessing the existence or not of environmental damage related to LDENR Serial No. 76164 and its now closed production facilities within the LAA; to acknowledge regulatory responsibility for the evaluation and/or remediation of such environmental damage, if it is found to exist; and thereby, to assist the LDENR to ensure that the health, safety, and welfare of the people of the State of Louisiana are protected as established in La. R.S. 30:29.

Site Characteristics

The Property is in a rural portion of Jefferson Davis Parish and is surrounded by wooded, agricultural, and/or undeveloped properties. Additionally, rural residential properties are located southeast of the Property, which also borders the Mermentau River. During the course of the investigations conducted to date, the Property was observed as agricultural fields, grassland, and densely vegetated and forested acreage with areas of standing water. Furthermore, portions of the southern half of the Property have been designated by the U.S. Fish and Wildlife Services (FWS) as freshwater forested/shrub wetland, with a small portion of pipeline right-of-way designated as freshwater emergent wetland. The Property is currently utilized for recreational (hunting) and agricultural (rice/crawfish) purposes. Additionally, the Property has been subject to historical oilfield exploration and production activities, as well as a nonhazardous oilfield waste (NOW) disposal facility operated by Castex Systems, Inc. in the 1980s as further discussed below.

From information obtained from the Environmental Regulatory Code (LAC 33.IX.1123), the site is located within the Upper Grand River and Lower Flat River subsegment from the headwaters to the Intracoastal Waterway (Subsegment 120107) within the Terrebonne Management Basin. Surface water bodies, including the tributaries and drainage canals, within this subsegment are not utilized as sources of drinking water. Salinity values for these surface water bodies for this subsegment are listed as 250 milligrams per liter (mg/L) for chlorides, seventy-five (75) for sulfates, and 500 mg/L for total dissolved solids (TDS).

Release Source

The LAA is identified in Figure 5 and pertains to the soil and groundwater samples collected in and adjacent to the former pit and tank battery associated with historical operations of LDENR Serial No. 76164. Based on GIS mapping of the boring locations, the LAA corresponds to the sample locations listed below.

- **LAA (LDENR Serial No. 76164):** Soil and/or groundwater samples collected from ICON borings HA-1, HA-2, HA-3, CD-04, and CD-05, as well as soil samples collected by HET borings SB-1-SB-4, HA-2R, CD-05R, and DB-01.

The source of constituents associated with the LAA appears to be historical operations of the former pit and tank battery at LDENR Serial No. 76164 that were closed by operators subsequent to Midwest and Amoco after 1984. Data demonstrate that the source soils (i.e., constituent concentrations) have been vertically and horizontally delineated to Statewide Order 29-B, Chapter 3 and RECAP screening standards, are confined to the surficial confining unit at depths less than eighty (80) feet BLS, and neither extends to the Chicot aquifer, nor stands to affect it in the future. No ongoing sources have been identified.

Soil Type

According to the United States Department of Agriculture (USDA) Soil Survey of Jefferson Davis Parish (2003 and updated via the online database), soil types for the Property consist of the Acadia silt loam (AcB), Barbary mucky clay (BBA), Basile and Casilla silt loams (BEA), Crowley-Vidrine silt loams (CrA, CrB), Midland silt loam (MdA), and Mowata-Vidrine silt loams (MwA). These soil types are gently sloping to level, poorly to moderately well drained, and found either in terraces or ridges of the Gulf Coast Prairies or in swamps. The USDA database also identifies natural pH values for soils on the Property ranging between 4.5 and 8.4 Standard Units (SU). In addition, USDA data indicates that the natural salinity (i.e., EC) values for soil types on the Property range upward of two (2) mmhos/cm.

Maximum Concentrations (Soil)

Surface concentrations of EC, SAR, and/or ESP were evaluated within the root zone as established by on-site work and research performed by Matthew Greene with HET. Subsurface concentrations of EC were evaluated for reference purposes in accordance with LAC 43:XIX.313D to assess whether the chloride parameters at depth might affect the overall conditions of the Property, while considering the protection of the shallow water bearing zones.

Laboratory analytical results from the HET and ICON investigations within the LAA reported that all concentrations are below the regulatory/agronomic standards, with the concentrations reported in surface samples collected from boring HA-2, not confirmed in the resampling data from boring HA-2R. Additionally, limited concentrations of ESP and SAR were reported above the respective Statewide Order 29-B standards, with a maximum surface concentration of ESP at 25.5 percent in borings HA-2 and HA-3 and of SAR at 19.5 percent in boring HA-2, both at a depth between land surface and two (2) feet BLS. However, ESP and SAR concentrations did not appear to affect the surface vegetation within the LAA, wherein no areas of distressed vegetation were observed and are typically only evaluated within the effective root zone (Appendix H).

Laboratory analytical results reported subsurface concentrations of EC above the Statewide Order 29-B standard of four (4) mmhos/cm at depths upward of seventy-four (74) feet BLS in borings CD-5/5R and fifty-eight (58) feet in boring CD-4R in a localized area in the vicinity of the former operations associated with LDENR Serial No. 76164. However, the depth of the EC concentrations significantly decreases within a short lateral distance from these operations, as evidenced in boring DB-01, with EC concentrations above Statewide Order 29-B standards at depths less than ten (10) feet BLS and with no elevated concentrations above background tolerances or Statewide Order 29-B, Chapter 3, standards reported in soil samples collected from borings CD-10/10R and CD-12/12R. Furthermore, the concentrations of EC have been vertically and horizontally delineated, are confined to the surficial confining unit, and do not extend to usable portions of the Chicot aquifer. Finally, SPLP results demonstrate that the reported EC concentrations are below the threshold to result in cross-media transfer, even without application of the default dilution and attention factor (DAF).

With regard to metals, all reported concentrations were determined to be below the Statewide Order 29-B, Chapter 3 standards, with the exception of arsenic concentrations in select soil samples at depth collected during installation of borings CD-16 and CD-18 outside of the LAA. These reported arsenic concentrations are at a distance from the LAA, were not confirmed in the split sample analyses, do not correlate with other constituents typically associated with oilfield activities, and are within natural tolerances and/or background standards established for the State under RECAP. Additionally, arsenic has been demonstrated to be naturally occurring in soils throughout Louisiana according to a study performed by Ori, et al. (1993). Concentrations of total barium, chromium, and/or lead were also reported above RECAP screening standards in soil samples collected from HA-2/2R and HA-10. These metal concentrations were determined to meet applicable RECAP screening standards based on a combination of SPLP analyses and reproduction sample results considering the reproduction sample results and the updated barium screening standard of 1,600 parts per million (ppm). Note that the elevated concentrations of metals reported by ICON in boring HA-2 were not confirmed in split samples collected during ICON's investigation or by HET during resampling efforts.

With regard to hydrocarbons, all concentrations of hydrocarbons were reported below the respective RECAP screening standards for the aliphatic and aromatic hydrocarbon fractions, with the exception of the split sample result from soil samples collected by ERM at a depth between two (2) and four (4) feet BLS in boring HA-2 only. However, the confirmation samples collected by HET confirm the full profile of hydrocarbons from within the former pit at the boring HA-2 location to report concentrations below screening standards. The concentrations of TPH reported by ICON were not confirmed in the fraction analyses as required by RECAP.

Based on the tiered approach that considers concentrations in order from Statewide Order 29-B, Chapter 3, and RECAP, all constituent concentrations in the soil associated with the LAA have been demonstrated to meet applicable screening standards in accordance with Statewide Order 29-B, Chapter 3 and RECAP considering further analyses and/or SPLP results. However, as a conservative measure, HET has elected to further evaluate concentrations of total barium and Aliphatic C12 - C16 in the risk assessment in Section 6.0 below despite these concentrations determined to be below screening standards in split samples and/or resampling events.

Maximum Concentrations (Groundwater)

Groundwater samples were collected by ICON at various depths within the "A-Zone", which ICON defined as depths less than fifty (50) feet BLS and the "B-Zone", which ICON identified as existing between depths of fifty (50) and ninety-five (95) feet BLS. The Chicot aquifer has not been encountered or logged during installation of the borings to date, and shallow water bearing silts, as encountered in borings CD-10 and CD-12, are within the overall surficial confining zone. The deeper wells installed at depths greater than ninety-five (95) feet BLS in the CD-5 and CD-19 locations are in the transition zone within the surficial confining zone, instead of the Chicot aquifer itself.

Laboratory analytical results from groundwater samples collected within the surficial confining unit (i.e., “A-Zone” and “B-Zone”) reported chloride concentrations above the EPA Secondary Drinking Water Standard of 250 ppm in samples collected from select nested monitor wells CD-4, CD-5, CD-17, CD-18, CD-19, with results from groundwater samples collected from CD-19 in the “A-Zone” and CD-15 in the “B-Zone” reporting the highest concentrations of chloride at 1,140 ppm (screened interval of 10-20’) and 12,900 ppm (screened interval of 65-70’), respectively. The concentrations are localized as evidenced by the fact that soil and groundwater samples collected from nested monitor wells CD-10 and CD-12 reported chloride concentrations below the EPA Secondary Drinking Water Standard at similar depths and at a short distance from historical operations. Additionally, concentrations of TDS were also reported above the EPA Secondary Drinking Water Standard of 500 ppm in the same select nested wells as chlorides plus CD-8, CD-9, CD-13, and CD-16, often with corresponding low levels of chlorides. The chloride and/or TDS concentrations were limited to wells installed at depth of or less than eighty (80) feet BLS and decrease significantly with depth from the base of the ICON designated “B-Zone” to the transition zone wells installed at depths of or greater than ninety-five (95) feet BLS, as also evidenced in the soil data and lithologic observations of an increasingly dense clay with depth. Sample data demonstrates that soils at that depth are within background tolerances.

With regard to metal concentrations, arsenic, barium, iron, and manganese concentrations were detected above the conservative RECAP screening standards and/or EPA Drinking Water Standards. The dissolved analyses demonstrated that the reported total chromium and lead concentrations were, in fact, below the conservative screening standards. Concentrations of arsenic, iron, and manganese were reported in a vast majority of sample results, including those sample results that did not report concentrations of compounds typically evaluated as part of oilfield assessment, thus demonstrating that these constituents are associated with known water quality issues within the water bearing zones.

Finally, laboratory analytical results reported all concentrations of the respective hydrocarbon fractions (i.e., Aliphatic and Aromatic ranges) as below laboratory detection limits or the conservative RECAP screening standards. The concentrations of total petroleum hydrocarbons (diesel and oil range organics) were not confirmed in the fraction analyses and are, therefore, superseded by the fraction analyses in accordance with RECAP, Appendix D. Additionally, only one (1) groundwater sample, collected from monitor well CD-5B, reported a benzene concentration above the RECAP screening standard.

Based on the information above, the concentrations of chlorides, TDS, benzene, and metals (arsenic and barium) in the groundwater are further evaluated in a risk assessment. Radiological parameters are also evaluated below in a typical risk assessment methodology; however, the concentrations of Radium 226 and Radium 228 will be evaluated by others. Furthermore, the elevated concentrations are subject to groundwater monitoring activities as proposed below as part of the Most Feasible Plan (MFP).

Free Product Conditions

No phase separated hydrocarbons or surface water sheens were identified during the investigations conducted by HET and ICON. Furthermore, the pressurized gas identified by ICON purportedly associated with the blowout of the Bruce No. 2 well (LDENR Serial No. 206253) during initial sampling of monitor well CD-5B had a microbial plot location, suggesting a mixed origin at this location as discussed below. However, HET did not observe pressurized gas during installation and grouting of a reproduction boring at boring CD-5R or during water level measurements from the nested wells at CD-5 in May of 2025.

Potential Receptors

In Jefferson Davis Parish, the Chicot aquifer and the Mermentau River are utilized as sources of groundwater regionally. Particularly, the Mermentau River serves as a source of irrigation water for agricultural purposes on the Property. The thickness of the surficial confining zone in this portion of Jefferson Davis Parish has been mapped by the USGS as between eighty (80) and 120 feet BLS (Sargent, 2004). Furthermore, lithologic descriptions from soil cores collected on the Property demonstrate that the thickness of the surficial confining zone is greater than ninety-six (96) feet BLS, which is the deepest boring logged. Finally, review of the LDENR Groundwater Resources Division well registration data files determined that shallow water bearing zones within the surficial confining unit were not utilized as a source of drinking water and that potable water was obtained from the upper sand unit of the Chicot aquifer at depths greater than 124 feet in this portion of Jefferson Davis Parish.

Problem Evaluation

In connection with the litigation, ICON has proposed a restoration plan that includes the restoration of soil by excavation to background standards for constituents of concern at a cost from $10,120,813 for a purported regulatory plan as proposed in the June 23, 2025, rebuttal report to $16,765,641 for a background plan as proposed in the October 18, 2024, Expert Report. In addition, ICON presented a plan for restoration of the shallow aquifer to purported background concentrations via pump and treat with either off-site disposal or on-site injection at a cost from $51,176,011 to $255,498,395, respectively. Finally, ICON offered a program to vent gas from the Chicot aquifer associated with the blowout of the Bruce No. 2 well (LDENR Serial No. 206253) to be $552,420, none of which should apply to the LAA. Based on a review of the Plaintiff's costs, HET estimates that the portion of ICON's proposed soil remediation pertaining to the LAA to be $1,676,564, as well as the costs associated with ICON's proposed groundwater remediation areas designated as Plumes 2 and 4. The ICON plan proposes no evaluation or remediation of the Chicot aquifer which is consistent with data showing there is no impact to the Chicot aquifer as a result of historical operations associated with bp. The ICON plan is unnecessary and not feasible, particularly in its determination of appropriate standards that are protective of human health and the environment and required to protect the further reasonably intended uses of the Property.

The data demonstrates that no soil restoration is warranted within the LAA because measured exceedances for 29-B constituents consist exclusively of EC levels at depth that are associated with unused and non-usable discontinuous groundwater, and modestly elevated sodium levels within the root zone have shown no effect on vegetation within the LAA. However, should the area within the LAA be re-incorporated into agricultural use, ordinary cultivation accompanied with limited surface amendments could be possibly added to the vicinity of boring HA-2/2R area while working with the farmer to recontour the land for rice production as a conservative measure.

Furthermore, bp recommends that the MFP adopt Monitored Natural Attenuation (MNA) to evaluate and/or remediate the shallow, discontinuous groundwater zones within the LAA in consideration of the proposed RECAP standards. While ICON has offered a proposed concept for remediation of groundwater in these zones, consideration of that option shows it to be demonstrably infeasible as it assumes an ability to pump and dispose of groundwater in areas and zones that are not saturated, which site data shows to be impossible. Even if such a remedy were physically possible, it would condemn the use of the Property for nearly thirty (30) years.

Bp proposes that the LDENR adopt an MFP to evaluate and confirm that soil and groundwater conditions documented for the property do not impair the reasonably intended use of the Property and thus, do not constitute contamination, potential contamination, or environmental damage within the meaning of La. R.S. 30:29 and Statewide Order 29-B. The cost to conduct the conditional soil restoration activities within the LAA, as well as implement a monitored natural attenuation program of groundwater monitoring for a period of one (1) year, is estimated to be $233,701.60. The Plan submitted by bp complies with all of the provisions of Statewide Order 29-B and is fully protective of human health, the environment, and any reasonably intended use of this Property without limitations or encumbrances.

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1.0: INTRODUCTION

Hydro-Environmental Technology, Inc. (HET) conducted a hydrogeologic and environmental assessment of the Castex Development, LLC property (the "Property") and requests that the Louisiana Department of Energy and Natural Resources, Office of Conservation (LDENR) adopt this Plan as the Most Feasible Plan (MFP) for the evaluation and, if necessary, remediation of the constituents in the soil and shallow, discontinuous groundwater zones associated with the Limited Admission Area (LAA) in compliance with the rules of the LDENR. The Plan was prepared in connection with a Limited Admission made by BP America Production Company (bp) in the case entitled *Castex Development, LLC v. Anadarko Petroleum Corporation, et al., 31st Judicial District Court for the Parish of Jefferson Davis, State of Louisiana, Docket No. C-0502-20*). The Plan includes an evaluation of all data generated during separate assessments conducted by multiple consultants, including HET, on behalf of bp and ICON Environmental Services, Inc. (ICON), as representatives of the Plaintiff.

This Plan includes information provided by the following experts: 1) Stewart "Smokey" L. Stover, Jr., Director with HET, 2) Brent T. Pooler, Principal Risk Analyst/Hydrogeologist with HET, 3) Craig E. Cormier, Principal Environmental Scientist with HET, 4) Matthew L. Greene, Environmental Scientist with HET, 5) Dr. Karen Cejas, Ph.D. with Environmental Resource Management Southwest, Inc. (ERM), 6) Dr. B.H. Kueper, Ph.D. with B. Kueper & Associates, Ltd., and 7) Dr. P. Robinan Gentry, Ph.D., with Ramboll Americas Engineering Solutions, Inc. (Ramboll). More detailed information on the qualifications of these experts is outlined in Section 1.3 below, with the résumés included in Appendix A.

The work conducted by HET to date has included oversight of field activities performed by consultants on behalf of the Plaintiff and the completion of independent assessments of portions of the Property to further evaluate and confirm constituent concentrations to make an independent determination as to the environmental conditions of the Property. In addition, HET reviewed and included here within relevant environmental assessment data, as appropriate, from nearby properties, addressed in the *Shirlene Britt, et al., v. Riceland Petroleum Company, et al. (31st Judicial District Court for the Parish of Jefferson Davis, Docket No. C-397-14*, LDENR Conservation Order Nos. 031-012-001 and 031-012-002) ("Britt Properties") property as described in more detail below.

The investigation conducted by HET was performed in accordance with applicable and appropriate standards and regulations, including Statewide Order 29-B per the LDENR regulations (LAC 43:XIX) and

the Risk Evaluation/Corrective Action Program (RECAP), as promulgated by the Louisiana Department of Environmental Quality (LDEQ) under the most recent guidance document dated October 20, 2003 (LAC 33:1 Chapter 13). The application of RECAP standards was done after comparison of constituent concentrations to the Statewide Order 29-B, Chapter 3 pit closure standards (LAC 43:XIX.313.C) as part of the overall regulatory framework established by the LDENR Office of Conservation, Environmental Division for the evaluation of sites pursuant to Statewide Order 29-B under LAC 43:XIX.313.D and 43:XIX.319, the second amended memorandum of understanding between the LDENR and the LDEQ dated February 23, 2023, and the provisions of Act 312 which include the use of all appropriate regulations. Furthermore, data presented in this Plan, as well as information from other consultants, have been submitted to the LDENR Office of Conservation under Office of Conservation Legacy Project No. 031-027 per the requirements outlined in Act 312 for the evaluation of oilfield sites pursuant to Statewide Order 29-B in the State of Louisiana.

The Plan presented below is protective of human health and the environment under a non-industrial exposure scenario. Upon completion of the proposed work, remnant constituent concentrations, if any, will not pose limitations or encumbrances on any reasonably intended use of the property. The incorporation of regulatory standards was part of the overall assessment conducted to ensure that the Property could be used for its intended purposes.

1.1: Site Description

The Property, as described in the petition and the Jefferson Davis Parish Assessor's office, occupies an approximate 1,130 acre tract that is located along Louisiana Highway 1126, southeast of Jennings, Louisiana and just west of the town of Mermentau, Louisiana. The Property is geographically located in Sections 13 and 39, Township 10 South, Range 03 West; and Sections 17 and 18, Township 10 South, Range 02 West in Jefferson Davis Parish, Louisiana. Figure 1 contains a site location map. Figure 2 contains a 1954 (Limited Revision 1964) historical topographic location map of the Property.

The Property is located in the West Mermentau Oil and Gas Field in a rural portion of Jefferson Davis Parish and is surrounded by wooded, agricultural, and/or undeveloped properties. Additionally, rural residential properties are located southeast of the Property, which also borders the Mermentau River. During the course of the investigations conducted to date, the Property was observed as agricultural fields,

grassland, and densely vegetated and forested acreage with areas of standing water. Furthermore, portions of the southern half of the Property have been designated by the U.S. Fish and Wildlife Services (FWS) as freshwater forested/shrub wetland, with a small portion of pipeline right-of-way designated as freshwater emergent wetland. The Property is currently utilized for recreational (hunting) and agricultural (rice/crawfish) purposes. Additionally, the Property has been subject to historical oilfield exploration and production activities, as well as a nonhazardous oilfield waste (NOW) disposal facility operated by Castex Systems, Inc. in the 1980s as further discussed below.

No areas of stained surfaces or areas of distressed vegetation were observed during the course of the investigation of the areas formerly operated by bp predecessors. To the contrary, healthy agricultural fields, grassland, and dense vegetation were observed throughout the Property. The Property appears to be in good condition and may be utilized for its reasonably intended purposes. Figure 3 contains a 2024 aerial photograph of the Property. Figure 4 illustrates the extent of wetlands as obtained from the FWS. Appendix G contains historical aerial photographs of the Property as a whole, as well as zoomed-in historical areas of the Property in the vicinity of the LAA. Appendix H contains site photographs.

1.2: Litigation Status and Limited Admission Area

This Plan is being submitted in connection with a Limited Admission made on behalf of bp on August 05, 2025. The case is currently set for a two-week jury trial set to commence in February 2026. Bp's Limited Admission applies to LDENR Serial No. 76164 and its now closed production facilities, as illustrated on Figure 5 and further defined below.

This Plan presents the results of the investigations performed on the Property to date, with a focus on the results within and adjacent to the LAA. The samples collected and evaluated to date associated with the LDENR Serial No. 76164 and the LAA include ICON borings HA-1, HA-2, HA-3, CD-04, and CD-05; ICON monitor wells CD-4A, CD-4B, CD-5A, CD-5B, CD-5C, and CD-5D; and HET borings SB-1, SB-2, SB-3, SB-4, DB-1, HA-2R, and CD-05R, as illustrated in Figure 6.

1.3: Qualifications of Experts

The group of experts that jointly prepared this Plan has had numerous plans and reports submitted and approved by regulatory agencies, including the LDENR and LDEQ. Copies of the résumés of the key personnel involved in preparation of this plan are included in Appendix A.

Stewart “Smokey” L. Stover, Jr. with HET holds both Bachelor of Science and Master of Science degrees in Geology and has thirty-five (35) years of experience as a Hydrogeologist. Mr. Stover has been an expert witness in litigation involved in, but not limited to, environmental site assessment, remediation, landfill assessment and design, hazardous waste, surface water impacts, and groundwater supplies and currently conducts project oversight for HET in the states of Louisiana, Mississippi, Alabama, Texas, Wyoming, and Colorado. He also holds several professional licenses in the field of Geology in the states of Alabama, Arkansas, Mississippi, Tennessee, Texas, and Louisiana.

Brent T. Pooler with HET holds a Bachelor of Science in Geology, with a concentration in environmental geology from Louisiana State University (LSU) and has nearly twenty-nine (29) years of experience in conducting hydrogeologic investigations and implementation of soil and groundwater restoration plans. Additionally, Mr. Pooler has over twenty-six (26) years of experience in conducting risk assessments in the states of Louisiana and Texas and has been qualified as an expert in the fields of geology, hydrogeology, remediation, and implementation of RECAP and risk assessments. Mr. Pooler holds professional licenses in the field of Geology in both Louisiana and Texas.

Mr. Craig E. Cormier with HET holds a Bachelor of Science in Environmental Science, with a minor in Chemistry from McNeese State University (McNeese) and has over twenty-eight (28) years of experience in the design, implementation, and management of numerous remediation projects and oilfield pit closures under Statewide Order 29-B and RECAP, including soil remediation, surface soil restoration, and decommissioning. Mr. Cormier’s experience also includes environmental assessment; remediation; decommissioning; soil, groundwater, and surface water sampling; and/or Naturally Occurring Radioactive Materials (NORM) surveying as part of numerous environmental evaluations/assessments of oilfields in Louisiana, Texas, Colorado, Utah, Wyoming, and North Dakota. He has also owned and operated a rice and crawfish farm of eighty (80) acres in size for fifteen (15) years.

Matthew L. Greene with HET holds a Bachelor of Science in Environmental Science, with a concentration in soil and water conservation from the University of Louisiana at Lafayette (ULL) and has

over seven (7) years of experience in conducting root zone investigations at HET, which have been approved by the LDENR as part of overall site assessment work conducted by HET. In addition, Mr. Greene previously worked with Mr. Arville Touchet for over two (2) years doing much of the same before joining HET. Mr. Greene holds a national professional license in the field of Soil Science.

Dr. Kueper is an expert hydrogeologist, with expertise in the area of soil and groundwater contamination, groundwater hydraulics, and subsurface remediation. He received his Ph.D. in hydrogeology from the University of Waterloo in 1989 and joined the faculty at Queen's University in 1990. Dr. Kueper's research is focused on the behavior and remediation of soil and groundwater contaminants in unconsolidated deposits, such as clays, silts, and sands, as well as fractured rock. His research has included performing field experiments, laboratory experiments, and numerical simulation studies related to the behavior and remediation of contaminants. Dr. Kueper is a former Associate Editor for the Journal of Ground Water, the Journal of Contaminant Hydrology, and the Canadian Geotechnical Journal. He has provided professional short courses and training seminars on the topics of soil and groundwater contamination, groundwater hydraulics, and subsurface remediation to various regulatory agencies. Dr. Kueper is the 2019 recipient of the prestigious NGWA M. King Hubbert award for major contribution to the groundwater industry.

Robinan Gentry, PhD, DABT, and a Principal with Ramboll Americas Engineering Solutions, Inc. (Ramboll), has over thirty-five (35) years of experience in toxicological issues relevant in the determination of the potential safety or risk associated with exposure to chemicals in consumer products, pharmaceuticals, or the environment. Over her career, she has been a principal investigator or contributing author for numerous safety and risk assessments for both government and industry. The purpose for a number of these assessments has been to incorporate both standard and innovative quantitative approaches in the determination of acceptable levels of exposure of humans to chemicals in the environment, in pharmaceuticals, and in consumer products. She is a published author in quantitative risk assessment and the development of Physiologically Based Pharmacokinetic (PBPK) models, and their application into both the cancer and non-cancer risk assessment process. She has also been involved in projects using quantitative methods to investigate human variability by age and gender and the potential impact of this variation on risk assessment. Her recent work includes projects that are aimed at understanding the mode of action of adverse effects in animals and the implications to human health, as

well as the development of innovative approaches that rely upon in vitro data and incorporation of these data into the risk assessment paradigm. Dr. Genty has also been qualified as an expert in the field of toxicology and offered testimony at trial.

Dr. Karen Cejas is an environmental toxicologist and ecological risk assessor. She has a Bachelor of Science degree in zoology from Louisiana State University and a Ph.D. from Louisiana State University Department of Biological Sciences, with a Ph.D. minor from the Department of Environmental Sciences. She has fifteen (15) years of experience in aquatic and terrestrial ecotoxicology, ecological risk assessment, natural resource damage assessments, and environmental site investigation involving a wide range of constituents, including metals, hydrocarbons, polychlorinated biphenyls (PCBs), and dioxin/furans.

1.4: Operational History

According to the LDENR database, approximately fifty-five (55) wells were drilled between 1935 and 2012 as part of the overall exploration of the West Mermentau Oil and Gas Field. The petition lists twenty-four (24) wells drilled on the Property. Of the wells listed in the petition, Midwest and/or Amoco, as predecessors of bp, drilled and/or operated LDENR Serial Nos. 76164, 82022, 82706, and 139607. However, this Plan concentrates on the environmental data associated with LDENR Serial No. 76164 as being within the LAA. Additional information regarding operational history and production will be evaluated by others. Figure 7 contains a 1970 aerial photograph illustrating the approximate locations of wells drilled on the Property.

Text Table 1 below contains a list of the wells on the Property that were drilled or operated by bp predecessors Midwest and Amoco, as well as the current status, spud date (defined as the date of commencement of drilling activities), date of plugging and abandonment, and last operator of record, as obtained from the LDENR SONRIS online database for reference purposes.

Text Table 1
Operational History
Castex Development, LLC Property
West Mermentau Oil and Gas Field

LDENR Serial Number	Well Location	Well Name	Well No.	Current Status	Spud Date	P&A Date	Last Operator or Record
Midwest Oil Corporation and Amoco Production Company Associated Wells							
76164	Limited Admission Area	Johnson Boudreaux SWD	001	30	8/7/1959	1/24/1986	The Stone Petroleum Corp. [1]
82022 (dual with 139607)	Other Areas	Johnson-Boudreaux	001	30	11/5/1960	11/14/1991	The Stone Petroleum Corp.
82706	Other Areas	Johnson & Boudreaux	002	28	4/23/1961	05/11/1961	Midwest Oil Corp.
139607 (dual with 82022)	Other Areas	Johnson-Boudreaux	1-D	30	11/5/1960	11/14/1991	The Stone Petroleum Corp.

Spud - date that the well was drilled
28 - unable to locate
30 - plugged and abandoned

Separately, HET reviewed files associated with the operation and closure of the nonhazardous oilfield waste (NOW) disposal facility operated by Castex Systems, Inc. between 1982 and 1989. The facility encompassed approximately twenty (20) acres along the northern portion of the Property and expanded on the historical operational footprint associated with LDENR Serial No. 34959, including expansion of the former pit and addition of other waste management units (WMUs). Castex Systems, Inc. also re-entered LDENR Serial No. 34959 in 1982, which had been previously plugged by Delta in 1968, for the use as a commercial saltwater disposal (SWD) well. The former NOW disposal facility is located approximately 1,800 feet northeast of the LAA. The facility was abandoned in 1989 after a catastrophic fire and the apparent failure of the produced water storage tank battery. The U.S. Environmental Protection Agency (EPA) Region 6 directed the closure of the facility, which included removal and closure of the WMUs and plugging and abandonment of the SWD, in the late 1990s, in accordance with appropriate and applicable regulatory standards under Statewide Order 29-B. Groundwater remediation was evaluated as a remedial option by the EPA but was not selected or conducted. The EPA reports recognized the low hydraulic conductivity of the limited silt zones within the surficial confining unit, the fact that the shallow water bearing zones are not used regionally as a source of drinking (domestic or irrigation), and the absence

[1] While Text Table 1 above lists the last operator of record, the operational history associated with LDENR Serial No. 76164 is as follows: General Crude Oil Company (8/3/1959); Midwest Oil Corp. (3/3/1961); Amoco Production Company (8/6/1974); Petroleum Well Services, Inc. (7/19/1984); and Stone Petroleum (1/24/1986).

of the threat to the Chicot aquifer particularly once the source (i.e., former WMUs) had been removed. The closure operations were completed by 2002.

1.5: Review of Previous Investigations

The LAA is a portion of the larger Property comprising approximately 1,130 total acres. Environmental media in the form of soil and groundwater on the Property have been sampled in a series of efforts by ICON, ERM, and HET. The following discussion provides an overview of sampling across the Property, including the LAA. Copies of the reports prepared by other parties not included here within may be provided separately by counsel or at the request of the LDENR.

ICON performed an assessment of the Property on behalf of the Plaintiff as part of the litigation and presented its conclusions in the Expert Report and Restoration Plan for the Landowners dated October 18, 2024. A copy of the report prepared by ICON is attached as Appendix I for reference. The investigation conducted by ICON included installation via direct push technology or hand auger and sampling of a series of borings and monitor wells between June 2021 and August 2024. Additionally, ICON collected naturally occurring radioactive materials (NORM) samples based on the results of a radiological survey in June 2022. HET and/or ERM conducted oversight and collected split samples as volume allowed during ICON's investigation. HET reviewed all available data to determine the environmental conditions, regulatory status, and natural tolerances, including sample results from split samples collected by HET and/or ERM. A review of the data is presented below in Section 5.0. Appendix J contains HET's field notes generated during all investigations of the Property to date. Additionally, Mr. Charles R. Norman issued an Engineering and Operations Report dated November 04, 2024.

Figure 8 depicts the locations of all borings and monitor wells installed by ICON as part of its assessment of the Property. Tables 1 to 4 contain analytical summaries of soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in the LAA and in other areas of the Property. Table 5 contains an analytical summary of radiological parameters from soil samples collected in other areas of the Property. Tables 6 to 17 contain analytical summaries of groundwater samples in the "A-Zone", "B-Zone", and transition zone in the LAA and in other areas of the Property. Tables 18 and 19 contain analytical summaries of natural gases in the LAA and in other areas of the Property, respectively. Tables 20 and 21 contain geotechnical summaries within the LAA and other areas of the Property, respectively. Tables 22

and 23 contain summaries of x-ray diffraction and bulk mineralogy results within the LAA and other areas of the Property, respectively. Each of the above referenced tables in Appendix C summarizes data from all parties, including split sample results, for those borings and monitor wells located in the vicinity of those wells operated by Midwest and Amoco, as discussed in Sections 1.4 and 5.0. Appendix D contains a copy of the boring logs. Appendix E contains a copy of the laboratory analytical reports from samples collected by ICON since the issuance of its report and samples collected by HET and ERM. Note that the tables contained in Appendix K summarize all data obtained to date, including investigations conducted of the Property by HET, ERM, and ICON.

1.5.1: Review of Plaintiff's Investigation

Based on a review of the ICON report (Appendix I), HET offers the following limited comments on the evaluation and conclusions made by ICON as it pertains to the LAA and HET's further evaluation below.

- The vertical extent of EC concentrations has been defined as further discussed below to a depth less than eighty (80) feet below land surface (BLS). Particularly, ICON installed the screened interval of monitor well CD-5C at a depth between ninety (90) and ninety-five (95) feet below land surface in an alternative clay and silt zone above the Chicot aquifer. However, ICON's boring log indicates that the formation collapsed to a depth of seventy (78) feet BLS during well construction. Therefore, the chloride concentrations reported for monitor well CD-5C (90-95') are not representative of groundwater conditions. Moreover, ICON was unable to collect lithologic information or groundwater samples from the nested monitor well CD-5D (95-110') as it was dry.
- The ICON calculated background levels do not meet the requirements of RECAP, Section 2.13. Specifically, the use of a limited dataset that, according to RECAP, Section 2.13, results in *"[a]n insufficient number of background samples [that] will result in the need for further background characterization".* Furthermore, RECAP, Section 2.13 states that site-specific background data is only to be used where there is an absence of *"Department-derived, State-specific, background calculations"* such as arsenic. Finally, RECAP, Section 2.13, states that *"[r]egional or local background data from published sources ... shall not be used in a quantitative manner to evaluate site-specific background concentrations",* which is

contrary to ICON's reliance on the USGS data to calculate purported site-specific background standards for chlorides in the shallow water bearing zones and Chicot aquifer. Interestingly, for soil background, ICON includes data from soil samples collected from HA-1 (CD-5) within the LAA in its background dataset despite being located beneath a former tank battery associated with LDENR Serial No. 76164, which is subject to ICON's proposed soil remediation.

- ICON fails to conduct the necessary analytical testing to confirm and fully evaluate constituent concentrations in accordance with the regulations. ICON fails to include appropriate analytical testing to confirm and fully evaluate constituent concentrations, such as TPH, that include non-target analytes and natural compounds. For instance, ICON did not elect to request analyses of hydrocarbon fractions in accordance with RECAP, Appendix D, Table D-1 or Synthetic Precipitation Leachate Procedure (SPLP) in accordance with RECAP, Appendix H, and the provisions of US EPA Soil Screening Guidance Technical Background Document (EPA 1996). ICON's plan does not account for natural tolerances of constituent concentrations, including arsenic, as documented in the regional study performed by Ori, et al. (1993), and EC based on mapping conducted by the USDA. Finally, ICON appears to rely on total metal concentrations in the groundwater instead of dissolved analyses in accordance with regulatory guidance.
- ICON fails to consider or conduct the necessary pilot or feasibility testing to support the proposed long-term groundwater recovery system. For instance, ICON's plan fails to consider the laterally discontinuous nature of the depositional environment as evidenced by the lithologic cross sections and water levels to determine the long-term yield of the shallow water bearing zone in support of the proposed groundwater treatment system. Finally, ICON fails to properly establish that the groundwater recovery system would, in fact, remediate both the water bearing zones and unsaturated confining clays deeper than twenty (20) feet BLS. Instead, the Plaintiff's plan relies upon idealized models.

1.6: Defense Investigations

HET and ERM, as part of litigation, each conducted independent investigations on behalf of select Defendants. The investigation conducted by ERM included the installation of a confirmatory boring in the vicinity of LDENR Serial No. 28396, the results of which are summarized in the tables included in Appendix K. Separately, ERM conducted an ecological risk assessment, a copy of which is included in Appendix L. Finally, Drs. John Frazier and Charles Wilson conducted a Naturally Occurring Radioactive Materials (NORM) survey. Figure 9 illustrates the location of the boring installed by ERM.

Between April 14 and May 15, 2025, HET conducted an independent investigation of the Property. The investigation conducted by HET included the installation of a series of confirmatory and/or delineation borings, deep lithological borings, slug testing, and surface water elevation surveys. In addition, Mr. Matthew L. Greene of HET performed an effective root zone determination of the Property, as discussed below in Section 4.0. Figure 10 illustrates the locations of borings installed by HET. Appendix D contains a copy of the boring logs for borings installed by HET.

The results of the separate investigations conducted by HET and ERM, as well as data generated during the course of the investigation performed by ICON, are incorporated into the overall evaluation of the Property conditions as described in more detail below. ICON, as representative of the Plaintiff in this litigation, observed all field work conducted by HET and ERM and collected split samples for select analyses. All data were reviewed by HET in its evaluation of the regulatory status.

Tables 1 to 4 contain analytical summaries of soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in the LAA and in other areas of the Property. Table 5 contains an analytical summary of radiological parameters from soil samples collected in other areas of the Property. Tables 6 to 17 contain analytical summaries of groundwater samples in the “A-Zone”, “B-Zone”, and transition zone in the LAA and in other areas of the Property . Tables 18 and 19 contain analytical summaries of natural gases in the LAA and in other areas of the Property . Tables 20 and 21 contain geotechnical summaries within the LAA and other areas of the Property. Tables 22 and 23 contain summaries of x-ray diffraction and bulk mineralogy results within the LAA and other areas of the Property. Each of the above referenced tables in Appendix C summarizes data from all parties, including split sample results, for those borings and monitor wells located in the vicinity of those wells operated by Midwest and Amoco, as discussed in Sections 1.4 and 5.0. Appendix D contains a copy of the boring logs. Appendix E contains a copy of the laboratory

analytical reports from samples collected by ICON since the issuance of its report and samples collected by HET and ERM. Note that the tables contained in Appendix K summarize all data obtained to date, including investigations conducted of the Property by HET, ERM, and ICON.

1.7: Review of Britt Investigation

As part of the evaluation of the Property, HET reviewed the investigations conducted in connection with the legacy matter (*Shirlene Britt, et al., v. Riceland Petroleum Company, et al., 31st Judicial District Court, Parish of Jefferson Davis, Docket No. C-397-14*) on the nearby Britt, Doherty, former Walker, Morgan, Hollier, Theriot, and Miller properties (Britt properties) in the South Jennings Oil and Gas Field, located approximately one (1) mile west of the Property. Given the proximity of the Britt properties to each other, the methods of remediation (i.e., pit closure), as well as the applicable regulatory standards and classification of the shallow water bearing zones as GW_{3NDW}, the Britt properties were evaluated as they pertain to the assessment conducted on the Property. This is one (1) example of numerous projects in which the LDENR has applied regulatory standards as part of the overall evaluation of environmental conditions and the need, if any, for soil and/or groundwater remediation. Figure 11 illustrates the location of the Britt properties in relation to the Property.

The Britt properties have been subject to separate investigations conducted by ICON, on behalf of the Britt Plaintiff and HET, on behalf of the Britt Defendants, in the now-settled above-captioned lawsuit. HET conducted assessment and remedial activities on portions of Britt properties based on established regulatory standards as part of the overall response to Conservation Order Nos. ENV 031-012-001 and 031-012-002. Results of the assessment activities conducted by ICON and HET, along with a description of the remedial activities conducted by HET, were summarized and submitted by HET in a series of reports, including, but not limited to, the following: 1) Site Assessment Report dated November 15, 2017; 2) Groundwater Monitoring and Delineation Assessment Report dated October 01, 2020; 3) Groundwater Monitoring and Pit Closure Report dated July 11, 2022; 4) Petition for Site Closure and Semi-Annual Groundwater Monitoring Report dated March 06, 2023; and 5) Petition for Site Closure Monitor Well Plugging and Abandonment Report dated February 28, 2024.

The LDENR approved HET's overall assessment of soil and groundwater conditions and granted closure status [No Further Action At This Time (NFA-ATT)] considering the application of Statewide Order 29-B and/or RECAP standards in a letter dated January 17, 2025.

1.8: Introduction to the Plan

As discussed and defined below, this Plan presents a comprehensive review of all data associated with the LAA to establish the MFP to protect the health, safety, and welfare of the people of the State of Louisiana as established in La. R.S. 30:29. The Plan serves in the best interest of the utilization, functionality, and aesthetics of the Property, consistent in function with native and undisturbed areas of the Property and surrounding areas. The data discussed below demonstrates that all source areas in the LAA have been appropriately characterized and the site is in declining conditions (i.e., the constituent mass is not increasing, the source of the release has been mitigated, and the area of constituent concentrations above the screening standard is not expanding).

As to the LAA, bp proposes no further action with regard to soil, with a contingent plan to conduct ordinary cultivation accompanied application of limited surface amendments to possibly be added to the vicinity of boring HA-2/2R area while working with the farmer to recontour the land for rice production as a conservative measure. With regard to groundwater, bp proposes Monitored Natural Attenuation (MNA) in consideration of the RECAP standards as calculated in Section 6.3 below.

Statewide Order 29-B, Chapter 6 (Section 611.F.1) provides for the submission of a plan that complies with all of the provisions of Statewide Order 29-B, Chapter 3, exclusive of Sections 313.D and 319. Bp's plan for soil addresses all exceedances of Section 313 and demonstrates that soil conditions are in accordance with Statewide Order 29-B, Chapter 3 standards as part of the overall MNA plan. Bp's proposal with regard to groundwater contemplates MNA, which bp submits is fully compliant with Statewide Order 29-B, Chapters 3 and 6.[2] Should the department wish to evaluate an alternative soil remediation plan, Appendix U contains a hypothetical soil excavation and/or soil mixing plan to address concentrations of EC below the root zone and above the first encountered shallow water bearing zone designated by ICON

[2] Section 309 of 29-B provides that a groundwater monitoring program can be a fully compliant plan. Prior LDENR practice has involved presentation by relevant parties, and evaluation by the LDENR, of active groundwater remediation options targeting background or other acceptable criteria. As set forth in the analysis of BKA in Appendix M, the option of active groundwater remediation (pump and treat) was evaluated, including use of the ICON proposed groundwater remediation plan and its functional and cost estimates (Appendix I). That option was deemed unreliable and infeasible. It was considered and is noted here for LDENR reference. Such a plan is not adopted, endorsed, or proposed by bp.

at the “A-Zone”. The alternate plan to address soil by excavation and/or mixing and blending is not endorsed by the authors or suggested to be the most feasible plan, warranted, or necessary based on the evaluation of data below and the protection of human health, the environment, and the uses of the Property.

Additionally, should the LDENR wish to evaluate a hypothetical plan using an alternative remedial approach to address groundwater conditions, Appendix I contains a groundwater pump and treat plan for Plumes 2 and 4 as prepared by ICON that includes the LAA and a broader surrounding area that is exaggerated and not feasible, as explained in more detail below and in the report prepared by Dr. Kueper contained in Appendix M. ICON’s proposed plan would install 349 extraction wells on the Property to extract more than two (2) billion gallons of groundwater, approximately half of which would be disposed, over the course of 29.9 years. This alternate groundwater plan is not required by Statewide Order 29-B and is being submitted for the LDENR’s review only to meet any arguable technical requirements for filing under the procedures of the LDENR. Such a plan is not necessary based on the nature and extent of conditions at the LAA. The alternate plan to address groundwater is not endorsed by the authors or suggested to be the most feasible plan, or a feasible option as the plan is completely unfeasible, impracticable, would result in more harm than good for the property, and would render the property unusable during implementation.

2.0: GEOLOGICAL SETTING

The Property is located in the West Mermentau Oil and Gas Field, approximately two (2) miles southeast of Jennings, Louisiana and west of the town of Mermentau in a rural portion of Jefferson Davis Parish. The depositional environment of the Property was influenced by Pleistocene fluvial deltaic processes and resulting deposits associated with the Paleo Red River. The Property consists of prairie pastures which are utilized for agricultural purposes and densely wooded forested acreage, portions of which that have been determined as emergent wetlands by the USFWS. Additionally, the Property borders the Mermentau River.

The Geologic Map of Louisiana, Crowley Quadrangle Map (2003) indicates that the near surface in the vicinity of the Property is mapped as the Beaumont Alloformation (Figure 12). This formation is comprised of Coastal Plain deposits of late to middle Pleistocene Age, with deposits in topographically lower areas of the Property consisting of Holocene Undifferentiated Alluvium. The Beaumont Alloformation (Beaumont) is associated with the deposits of the Paleo-Red River Deltaic Plain. The Beaumont deposits consist of light gray to light brown clays, sandy clays, silts, sands, and some gravel along alluvial valleys. The fine-grained units (clays) form a surficial confining layer for this portion of Jefferson Davis Parish that tends to retard downward vertical migration of substances toward the underground source of drinking water, which is obtained from the coarser grained deposits (sands) of the Chicot aquifer in Southwest Louisiana.

2.1: Topography and Drainage

Based on the United States Geological Survey (USGS) topographic map of the West Mermentau Oil and Gas Field, surface elevations range from approximately five (5) to more than fifteen (15) feet above sea level. As expected, based on field observations, the USGS depicts much of the southern half of the Property as mainly wooded areas that hold water. Natural ground elevations for the Property, as determined by Southeast Engineers & Land Surveyors (Southeast) at the request of HET, ranged from approximately two (2) feet to just below fourteen (14) feet above mean sea level. Figure 13 contains a LIDAR map illustrating the changes in elevation across the Property.

The Soil Survey of Jefferson Davis Parish (2003 and updated via the online database) published by the United States Department of Agriculture (USDA) designates the surface soils within the boundaries

of the Property as the Acadia silt loam, Barbary mucky clay, Basile and Casilla silt loams, Crowley-Vidrine silt loams, Midland silt loam, and Mowata-Vidrine silt loams, as further described below:

Acadia silt loam (AcB): These very gently sloping, somewhat poorly drained soils are located on side slopes along drainageways on terraces of Gulf Coast Prairies. Very slow permeability rates.

Barbary mucky clay (BBA): These level, very poorly drained soils are located in swamps, are ponded most of the time, and are frequently flooded. Very slow permeability rates.

Basile and Casilla silt loams (BEA): These level and gently sloping, poorly and well drained soils are located on narrow flood plains. Slow to moderate permeability rates.

Crowley-Vidrine silt loams (CrA, CrB): These level and gently sloping, somewhat poorly and moderately well drained soils are located on broad convex ridges on terraces of the Gulf Coast Prairies. Very slow and slow permeability rates.

Midland silt loam (MdA): These level, poorly drained soils are located on broad flats and in slightly concave areas on terraces of the Gulf Coast Prairies. Very slow permeability rates.

Mowata-Vidrine silt loams (MwA): These level, poorly and moderately well drained soils are located on broad flats on terraces of the Gulf Coast Prairies. Very slow and slow permeability rates.

The USDA also tabulated natural conditions of several soil parameters, including pH and EC, based on mapping conducted of soils in the State and within Jefferson Davis Parish itself. The USDA database identifies natural pH values for soils on the Property ranging between 4.5 and 8.4 Standard Units (SU). In addition, USDA data indicates that the natural salinity (i.e., EC) values for soil types on the Property range upward of two (2) mmhos/cm, contrary to ICON's calculated background EC concentration of 0.849 mmhos/cm. Figure 14 illustrates the soil types on the Property as defined by the USDA.

Based on information obtained from the Louisiana Administrative Code on Environmental Quality (LAC 33.IX.1123), the Property is located primarily within the Mermentau River subsegment from the headwaters to Lake Arthur (Subsegment 050401), within the Mermentau River Management Basin. A small section of the northern portion of the Property is located within the Bayou Nezpique subsegment from the headwaters to Mermentau River (Subsegment 050301), also within the Mermentau River Management Basin. Surface water bodies, including the tributaries and drainage canals, within these subsegments are not utilized as sources of drinking water. Salinity values for these surface water bodies for these subsegments are tabulated as ninety (90) milligrams per liter (mg/L) for chlorides, thirty (30) mg/L for sulfates, and 260 mg/L for total dissolved solids (TDS). Figure 15 illustrates the extent of the regional subsegments, including subsegments 050401 and 050301, within which the Property is situated.

2.2: Depositional Environment

Depositional environments of Quaternary sediments control the geologic framework of near surface and subsurface deposits underlying this portion of Jefferson Davis Parish. These deltaic and fluvial depositional patterns produce a variety of lithologies deposited as the result of stream energy in various environments. The energy of the Paleo-Red River distributary system and the energy of associated deltaic plain were the main controlling factors influencing the depositional environment and drainage patterns (Fisk, 1952; Jones, et. al., 1956; Saucier, 1977; Saucier, 1994). Varying relict depositional sequences of channel courses, ranging from natural levees to backswamps, occur within these meander belts across this area. Surface and near surface faulting in the vicinity of the Property will also control the extent and distribution of sediments (Milner and Fisher, 2009).

2.3: Regional Hydrogeology

According to the LDEQ Aquifer Recharge Potential Map, the Property is in an area that is considered as having a low to no recharge potential for major Louisiana freshwater aquifers. A confining clay unit occurs at the surface and forms the surficial confining unit of the Chicot aquifer beneath the Property and this portion of Jefferson Davis Parish. The Geologic Map of Louisiana (1984) shows the Property as the Quaternary Prairie Terrace Formation, consisting of light gray to light brown clay, sandy clay, silt, sand, and some gravel. The Property is also mapped as Alluvium on the eastern portion along the Mermentau River, consisting of gray to brownish gray clay and silty clay, with some sand and gravel locally.

Two (2) major aquifer systems capable of supplying usable, sufficient quantities of groundwater underlie the Property and the surrounding areas within Southwest Louisiana, including Jefferson Davis Parish. These aquifers are known as the Chicot aquifer system and the deeper Evangeline aquifer system. The Chicot aquifer system in the majority of Jefferson Davis Parish is divided into two (2) units, the upper sand and the lower sand units, which are separated by a confining clay found between 400 and 800 feet BLS. The clay layer may not be present in northern portions of the Parish, in which case the upper and lower sands are referred to as the Chicot aquifer system undifferentiated sands.

The Chicot aquifer system, typically encountered at depths ranging from eighty (80) to 120 feet BLS in this portion of Jefferson Davis Parish, is composed of clay, silt, coarse sand, and gravel deposited during the Pleistocene epoch (Sargent, 2004). This unit is composed of several confined and subdivided sand units named for the depth in which the layer is encountered separated by laterally discontinuous clay

confining units. Correlation of the Chicot aquifer moving from east to west to the vicinity of the Property indicates that this portion of Jefferson Davis is a hinge point for the separation of the massive aquifer to individual units separated by massive confining (clay) units. Localized water bearing units within the overall confining zone of the Chicot aquifer system are classified as the shallow sands, if encountered, which are often not in communication with the upper sands of the Chicot. Recharge for this aquifer typically occurs from infiltration of precipitation in the northern portions of the aquifer in parts of Beauregard, Allen, Evangeline, Rapides, and Vernon Parishes, as well as from vertical leakage and lateral flow from other aquifers.

The Evangeline aquifer system, typically encountered at a depth of 1,600 feet BLS in this region of Jefferson Davis Parish, is moderately well to well sorted and consists of fine sand near the upper portion of the aquifer grading to coarse sand and gravel in the lower portions. This unit is generally discontinuous and confined by silt and clay layers of Pliocene age. Recharge of this aquifer occurs in the northern portion of the aquifer in Vernon, Rapides, and Avoyelles Parishes. The aerial extent of fresh water within the Evangeline aquifer system in Jefferson Davis Parish is limited to portions along the northern border of the Parish.

2.3.1: Aquifer Utilization

A review of the LDENR Groundwater Resources Division water well registration database indicated that a total of 204 water wells have been installed within a one (1) mile radius of the Property. Of the wells that have been installed, fifty-seven (57) are listed as plugged and abandoned. The uses of the active registered water wells include commercial public supply, domestic, industrial, industrial petroleum refining, irrigation, monitor, and oil/gas well rig supply. Additionally, two (2) wells installed within the upper sand unit of the Chicot Aquifer at depths of 150 and 165 feet BLS have no listed use. Figure 16 depicts the locations of registered water wells within a one (1) mile radius of the Property.

The active monitor wells were installed at depths ranging between nine (9) and eighty (80) feet BLS within the surficial confining unit of the Chicot aquifer system. Note that one (1) monitor well installed at a depth of thirty (30) feet BLS has no listed aquifer name. The remaining active wells, including commercial public supply, domestic, industrial, industrial petroleum refining,

irrigation, and oil/gas well rig supply, are all installed in the upper sand unit of the Chicot aquifer at depths ranging from 124 to 258 feet BLS, with the exception of two (2) domestic wells (053-6425Z and 053-6551Z) installed at unknown depths. Water Well 053-6425Z was installed nearly a mile west-northwest of the Property as a backup to Water Well 053-6429Z which was installed in the upper sand unit of the Chicot aquifer at a depth of 135 feet BLS. Water Well 053-6551Z was installed 0.7 of a mile southwest of the Property as a domestic well, approximately fifty (50) feet from another domestic well with the same owner, being Water Well 053-6529Z which was installed in the upper sand unit of the Chicot aquifer at a depth of 125 feet BLS. A review of the database determined that shallow water bearing zones within the surficial confining unit were not utilized as a source of drinking water and that potable water was obtained from the upper sand unit of the Chicot aquifer at depths greater than 124 feet in this portion of Jefferson Davis Parish. Appendix F contains a list of wells registered within a one (1) mile radius of the Property.

2.3.2: USGS Regional Water Quality Information

Regional water quality data received from the USGS was reviewed with regard to the Property and surrounding areas. Laboratory data obtained from USGS drinking water quality sample results reported chloride concentrations ranging from 32 mg/L to 290 mg/L within the Chicot aquifer in Jefferson Davis Parish. Additionally, sample results from USGS wells in Acadia Parish reported chloride concentrations ranging from 16 mg/L to 141 mg/L within the Chicot aquifer system. A survey of shallow water-bearing zones documented chloride concentrations ranging from 120 mg/L to 180 mg/L. Figure 17 illustrates the locations of regional water wells and the associated sample results. Appendix N contains a copy of the USGS sample results.

2.3.3: Drinking Water Supply

Municipal water supply does not appear to be available for the Property. From information received, it appears that agricultural supply is obtained from an irrigation ditch located along Castex Landing Road which bisects the Property. Additionally, municipal water supplies for the town of Mermentau are obtained from the upper sand unit of the Chicot aquifer at depths greater than 150 feet BLS. Laboratory data obtained from the most recent published drinking water quality sample

results in April of 2024 from the town of Mermentau reported chloride concentrations ranging from ninety-three (93) to ninety-seven (97) mg/L. The presence of surface water from the irrigation ditch and drinking water from the upper sands of the Chicot aquifer of such quality questions the need to restore or use the shallow silts that have been demonstrated to be unusable and not classified as a potential source of drinking water on the Property. Appendix F contains a copy of the Louisiana Department of Health Intracoastal Water System West sample results.

2.4: Surficial Confining Unit Water Bearing Zones

The surficial confining unit is composed of deposits that contain mostly clays and silty clays that form an aquitard over the Chicot aquifer system. Selective silts containing some fine-grained sand deposits occur locally to form water bearing zones, which are discontinuous in nature and occur at various depths within this overall confining unit. Regional depositional patterns will control the extent, thickness, and distribution of these water bearing units. The thickness of the surficial confining zone in this portion of Jefferson Davis Parish has been mapped by the USGS as between eighty (80) and 120 feet BLS (Sargent, 2004). Furthermore, lithologic descriptions from soil cores collected on the Property demonstrate that the thickness of the surficial confining zone is greater than ninety-six (96) feet BLS, which is the deepest boring logged. These laterally discontinuous shallow water bearing zones have been demonstrated to yield an insufficient amount of water to serve as a source of drinking water on the Property as discussed further below.

2.5: Site Hydrogeology

The near surface hydrogeologic and depositional environments were determined from borings installed at the Property by HET and ICON to a maximum depth of ninety-six (96) feet BLS. Observations and lithologic interpretation from borings installed indicate that the hydrogeology is dominated by low energy deposits that are predominantly clay and silt. This surficial confining unit contains some discontinuous silt and sand content with varying thicknesses, with the average calculated as less than ten (10) feet. Lithologic observations indicate that these permeable zones are underlain by confining clays on the Property. Underlying the confining unit is the upper sand unit of the Chicot aquifer, which was not encountered in ICON's or HET's investigation. Core samples collected for geotechnical analyses from within the clay unit

indicate hydraulic permeability rates that range from 3.94 x 10^{-8} cm/sec (CD-12R, 29-30') to 6.12 x 10^{-8} cm/sec (DB-01, 58-60'). Historical geotechnical data included in the EPA investigation and closure of the Castex Systems, Inc. non-hazardous oilfield waste (NOW) disposal facility included geotechnical analyses that reported similar permeability rates. By way of comparison, pit liner requirements established in Statewide Order 29-B in 1986 provided for natural clay liners with hydraulic conductivity of 1 x 10^{-7} cm/sec.

Additionally, HET requested that survey data be collected to determine the depths of nearby surface water bodies, including various ditches, the irrigation canal, and the Mermentau River. This determination is important from a risk-based perspective to determine whether there is a potential for the shallow water bearing zones to discharge to the nearest down-gradient surface water body in order to calculate the dilution and attenuation factor (DAF) in accordance with RECAP. Based on the results of the survey and the water level measurements as discussed below in Section 3.4, the shallow water bearing zones are not in direct hydraulic communication with surface water bodies or usable portions of the underlying Chicot aquifer, and the shallow water bearing zones are incapable of discharge to the Mermentau River. Figures 18 and 19 contain the lines of section and the lithologic cross sections A-A' and B-B' that illustrate the near surface hydrogeology at the Property, respectively. Appendix D contains a copy of the geological boring logs prepared by HET.

3.0: INVESTIGATION DESCRIPTION

Between April 14 and May 08, 2025, HET conducted a hydrogeologic and environmental assessment of the Property. All sampling and testing were performed in accordance with Statewide Order 29-B and where appropriate, RECAP. The investigation performed by HET included the installation of a series of borings for the collection of subsurface soil samples on the Property. ICON, as representatives of the Plaintiff, observed all field work and collected split samples for select analyses during HET's investigation of the Property.

All drilling conducted by HET was done in accordance with the LDENR regulations pertaining to drilling practices, including the Guidance Manual for Environmental Boreholes and Monitoring Systems dated November 2021. HET (LDENR WWC-416) and its contractor, Walker Hill Environmental, Inc. (WHE) (LDENR WWC-574) are licensed water well contractors in the State of Louisiana. All samples submitted for laboratory analyses were analyzed in accordance with applicable regulatory requirements, including, where applicable, the latest revision of LDENR laboratory procedures manual titled "Laboratory Procedures for Analysis of Exploration and Production Waste." All laboratory analyses were performed by an LDEQ LELAP-accredited laboratory holding current accreditation for each parameter analyzed and test method used. Copies of the laboratory accreditations are identified in the accompanying reports and are available for review upon request. Appendix E contains a copy of the laboratory analytical reports.

3.1: Boring Installation

HET installed ten (10) borings as part of the overall evaluation of the Property, five (5) of which were installed as reproduction borings for further evaluation and/or confirmation sampling of previously installed ICON borings. Figure 10 illustrates the locations of borings installed by HET.

The borings were installed to evaluate site conditions, with respect to historical oilfield exploration and production related activities, based on a review of previous assessments, historical aerial photography, and regulatory research to assess areas of potential concern, to further evaluate/confirm the information presented by ICON during its investigation of the Property, to obtain accurate lithologic descriptions of the soils, to horizontally and/or vertically delineate the constituents of concern, to determine the applicable standards to be applied, and/or to determine the need for remediation, if any. During each boring installation, appropriate field screening, lithologic descriptions of the geological setting, and the collection

of soil samples for subcontracted laboratory analyses were conducted, as appropriate. The complete geological boring logs with photoionization detector (PID) and EC meter readings for borings are contained as part of the geological boring logs contained in Appendix D.

The borings were installed by either direct push or sonic drilling technology. Borings installed by direct push technology utilized either a 2.25- or 3.25-inch outer diameter dual core with interior sample core barrel with dedicated acetate liner for each sample interval, with access to each location provided by a track mounted Geoprobe drill rig. Alternatively, select deeper borings were drilled using Sonic drilling technology, which uses a combination of high frequency resonant vibrations and water to drill to the desired depths with interior sample core barrel. The borehole annulus was grouted to land surface utilizing a cement/bentonite slurry. All core barrels, bits, and sampling equipment utilized in the boring installation were properly decontaminated and cleaned prior to each drilling activity.

3.2: Soil Sample Collection

Continuous soil samples were obtained from the sample core during each boring installation via dedicated acetate liner or sleeve. Each core was observed in the field for lithologic description of the geological setting and field screening purposes for the collection of soil for subcontracted laboratory analyses, as appropriate. In addition, new, disposable nitrile gloves were utilized during sample collection. The complete geological boring logs with photoionization detector (PID) and/or EC meter readings are contained in Appendix D.

Representative soil samples were obtained from the core and retained for subcontracted laboratory analyses on two (2) foot intervals at select depths based on field observations and/or previously detected concentrations of constituents of concern. All samples were properly containerized, labeled, chilled, and transported under chain-of-custody records to Waypoint Analytical, Inc. in Marrero, Louisiana or Burns Cooley Dennis, Inc. in Ridgeland, Mississippi, for the discrete analyses of the parameters listed below. Appropriate detection limits were obtained by laboratory personnel on all parameters on the following page for application to LDENR Statewide Order 29-B or RECAP, as appropriate.

1. LDENR Statewide Order 29-B parameters (EC/SAR/ESP/CEC, True Total Barium, and pH)

2. total chlorides and sulfates by EPA SW-846 Method 9056 and 29-B (Saturated Paste)

3. synthetic precipitation leachate procedure (SPLP) by Extraction Method 1312

4. metals by EPA SW-846 Method 6010D/7471A

5. alkalinity by 29-B (Saturated Paste)

6. percent moisture by SW-DRYWT

7. hydrocarbon fractions (volatile petroleum or extractable petroleum hydrocarbon ranges) in accordance with RECAP, Appendix D, Table D-1 by either the Massachusetts or TX 1006 Method

8. polycyclic aromatic hydrocarbons (PAH) by EPA SW-846 Method 8270C or EPA 3546 Method 8270D

9. bulk mineralogy by Semi Quantitative X-ray diffraction (XRD) and Energy Dispersive X-Ray Spectrometry (EDX) by Core Mineralogy, Inc.

10. select geotechnical parameters (Atterberg Limits, consolidation, dry unit weight, grain size, moisture content, organic matter, particle size analysis, and USCS)

Quality Assurance/Quality Control (QA/QC) methods were conducted in accordance with RECAP, Section 2.4. Field duplicate or split samples as well matrix spike and matrix spike duplicate (MS/MSD) on a batch sample by the laboratory were collected for every twenty (20) samples and submitted for laboratory analysis for all parameters analyzed. Trip and field blanks were collected per day and analyzed for volatile parameters only. Finally, new acetate lines or sleeves were utilized for sample collection.

Tables 1 to 4 contain analytical summaries of soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in the LAA and in other areas of the Property. Tables 20 and 21 contain geotechnical summaries within the LAA and other areas of the Property, respectively. Tables 22 and 23 contain summaries of x-ray diffraction and bulk mineralogy results within the LAA and other areas of the Property, respectively. Each of the above referenced tables in Appendix C summarizes data from all parties, including split sample results, for those borings and monitor wells located in the vicinity of those wells operated by Midwest and Amoco, as discussed in Sections 1.2 and 5.0. Appendix E contains a copy of the laboratory analytical reports from samples collected by ICON since the issuance of its report that have been received to date and samples collected by HET and/or ERM. Note that the tables contained in Appendix K summarize all data obtained to date, including investigations conducted by HET, ERM, and ICON.

3.3: Water Level Measurements

At the request of HET, the elevations of the tops of casings of select monitor wells installed by ICON in the vicinity of historical operations by Midwest and Amoco were determined by Southeast, a registered land surveyor, utilizing a global positioning device and adjusted to MSL based on the National Geodetic Vertical Datum (NGVD). Latitude and longitude of the borings and wells were determined to the 100th of a second during the survey.

Water level measurements of ICON monitor wells were taken on multiple occasions, most recently of the select number of monitor wells by HET on May 08, 2025. These water levels were adjusted for effective freshwater head to account for density variations given the salinity ranges in the groundwater data obtained across the Property. Based on the most recent water level measurements, groundwater in the ICON designated “A-Zone” appeared to be moving in an overall southeast direction, while groundwater in the ICON designated "B-Zone” appeared to be moving in an overall western direction. Figures 20 and 21 contain potentiometric surface maps for water level measurements taken on May 08, 2025, from the ICON designated “A-Zone” and “B-Zone”, respectively.

Note that a difference in water levels within wells does not necessarily indicate flow. In this location, the potentiometric surfaces for both groundwater zones exhibited abnormally steep gradients across a relatively short distance within zones that are purported to be the same unit, which are likely not representative of actual groundwater flow within the surficial confining unit and likely instead a function of the laterally discontinuous water bearing zones. This is also evidenced by the varying screened intervals of monitor wells installed by ICON to date and the fact that several wells (CD-1B, CD-3B, CD-5B, CD-5C, CD-6C, CD-7A, CD-8B, CD-10B, CD-10C (not sampled), CD-10D, CD-11B, CD-13C, CD-15C, CD-17A, CD-17B, and CD-18A) were observed as dry or dried during sampling as depicted in Figure O-1 in Appendix O.

3.4: Aquifer Characteristics

HET reviewed and re-evaluated aquifer test data collected by ICON on the Property to aid in the determination of a groundwater classification and overall sustainability and yield of the shallow water bearing zones designated by ICON as the “A” and “B” zones. This included slug tests conducted by ICON of monitor wells CD-2A (33-43’), CD-3A (27-42’), CD-4A (27-42’), and CD-10A (30-40’) in June of 2022,

and CD-1C (48-58') and CD-2B (58-68') in July of 2024. Furthermore, ICON performed low flow pumping tests on wells CD-2B, CD-6B, and CD-9B in June of 2022. Separately, HET conducted a slug test of ICON monitor well CD-5B in April of 2025. Figure 8 depicts the locations of all monitor wells installed by ICON as part of its investigation of the Property. Appendix O contains HET's evaluations of the slug test data collected by ICON and by HET.

Slug tests performed by ICON were conducted by introducing a measured volume of water into each well casing adding volume, displacing the water (falling head). HET performed the aquifer tests utilizing a solid stainless-steel slug to displace the water in each well. The slug tests were performed by quickly submerging the stainless-steel slug in the well casing, adding volume, and displacing the water in the well (falling head). Once the water level stabilized, the slug was quickly removed, displacing the water in the well again (rising head) by removing the volume. The water level changes for each test performed by HET and ICON of the slug in (falling head) and slug out (rising head) data were recorded utilizing a submersible data logger which collected data. ERM and/or HET were on-site to observe the slug or pump tests conducted by ICON, and ICON, in turn, observed the slug test performed by HET.

HET evaluated the data by determining hydraulic conductivity (K) values by the Bouwer and Rice method utilizing spreadsheets developed by the USGS with the guidelines in RECAP. The yield was evaluated following the equation presented in Appendix F, Figure 3 of the LDEQ October 20, 2003, RECAP Document. To note, RECAP Appendix F states, *"When averaging a number of hydraulic conductivity results from a site, the geometric mean shall be used."* In addition, HET re-evaluated the slug test data presented by ICON in its report to account for actual thicknesses of the water bearing zones and establishing well-specific K rates instead of averaging as done by ICON. Note that the K ranges calculated based on the graphs contained in Appendix H of the ICON report do not match the values mentioned in the text, the tabulated values listed in Table 6, or the values listed in support of the proposed groundwater remediation calculations presented in Appendix H of the ICON report.

ICON performed slug tests of a total of four (4) shallow monitor wells installed within the ICON designated "A-Zone" at depths generally less than fifty (50) feet BLS, including monitor wells CD-2A (33-43'), CD-3A (24-42'), CD-4A (27-42'), and CD-10A (30-40'). ICON reported that the K values ranged between 0.3731 feet per day (ft/day) and 0.2105 ft/day, with the geomean of the hydraulic conductivity being 0.3009 ft/day in Table 6 of its report. However, the individual values for the tests do not match the

evaluation sheets in Appendix H or the text of ICON's report. Based on HET's evaluation of the data from the slug tests performed by ICON, K values for ICON monitor wells actually ranged between 0.21 ft/day in monitor well CD-10A (30-40') and 0.31 ft/day in monitor well CD-2A (33-43'), with the geomean of the hydraulic conductivities being 0.26 ft/day. Based on review of field observations, notes, boring logs, and depth to water (DTW) measurements, confining head (hc) values for those wells subject to slug testing range between 8.38 and 15.77 feet, with saturated thicknesses (b) ranging from 6.5 feet to thirteen (13) feet. Using this data, estimated yield for the shallow water bearing zones ranges between 150 gallons per day (gpd) and 199 gpd. Using the geomean of the K, hc, and b values results in an estimated yield of 164 gallons per day (gpd). ICON did not provide a yield for the "A-Zone" in their report.

With regard to the remaining monitor wells subject to slug testing and screened within the ICON designated "B-Zone", ICON reported the K values for ICON monitor wells CD-1C (48-58') and CD-2B as 0.3581 ft/day and 0.1919 ft/day respectively. Additionally, low flow pumping test data for ICON monitor wells CD-2B (58-68'), CD-6B (56-66'), and CD-9B (58-68') were evaluated using the half ellipsoid and/or radial flow formulas as presented in the publication "*Determining Hydraulic Conductivity Using Pumping Data from Low-Flow Sampling,"* (GROUND WATER March-April 2009, pages 271-276). K values from the pumping data were 0.4113 ft/day (CD-2B), 0.0914 ft/day (CD-6B), and 1.1504 ft/day (CD-9B). The geomean of ICON's K values for the "B-Zone" is 0.3123 ft/day as presented in Table 6 of ICON's Report. Again, the K values presented by ICON in Table 6 of its report do not match the data presented in Appendix H or the text of the report. Based on HET's evaluation of the data, the K values ranged from 0.09 ft/day to 1.15 ft/day. Based on review of field observations and notes, boring logs, and depth to water (DTW) measurements, the confining head (hc) values for the slug tested wells ranged from 5.83 feet to 35.44 feet, with saturated thicknesses (b) ranging from two (2) feet to eleven (11) feet. Using the geomean of the K, hc, and b values results in a yield for the "B-Zone" of 229 gpd. Similarly to the "A-Zone", ICON did not provide a yield calculation for the "B-Zone" in their report.

Based on a review of the aquifer test data obtained from the Property, it is not practicable or feasible for the shallow water bearing zones within the Chicot Aquifer System Surficial Confining Unit (112CHCTC) to serve as sources of drinking water and the yield is unsustainable for the remediation via pump and treat system as proposed by ICON. The classification under RECAP confirms this finding as these zones are classified as GW_{3NDW} in accordance with RECAP, Section 2.10. The conclusion is based on the following:

1) well yield information from both the slug tests and low-flow pumping tests, as well as observations of wells either as dry or drying during sampling, demonstrates that the shallow water bearing zone is incapable of sustaining a yield of more than 800 gallons per day; 2) the shallow water bearing zones are currently not being utilized as a source of drinking water and are not in direct hydraulic communication with the deeper drinking water zones of the Chicot Aquifer; 3) surface water bodies in this region of Jefferson Davis Parish are not utilized as sources of drinking water; and 4) the discontinuous shallow water bearing zones are not in direct hydraulic communication with and are incapable of discharge to regional surface water bodies.

The low yields of the shallow water bearing zones and groundwater classification of GW_{3NDW} on the Property are consistent with that established by HET and approved by the LDENR during the regional investigation of the Britt properties. Furthermore, the low yield combined with monitor wells that were observed as dry or dried during sampling activities performed by ICON draws questions as to the feasibility of the proposed groundwater remediation via pump and treat as discussed further in Section 8.0 below. Note that the following monitor wells were observed as dry or dried during sampling as depicted in Figure O-1 in Appendix O: CD-1B, CD-3B, CD-5B, CD-5C, CD-6C, CD-7A, CD-8B, CD-10B, CD-10C (not sampled), CD-10D, CD-11B, CD-13C, CD-15C, CD-17A, CD-17B, and CD-18A.

4.0: ROOT ZONE INVESTIGATION

Between April 24, 2025 and May 15, 2025, Matthew L. Greene, with assistance from HET personnel, performed a root zone investigation of portions of the Property. The investigation consisted of a visual site inspection; identification of site-specific plant species; characterization of soil types across portions of the Property; exposure of roots of select plant species by way of shovel; and evaluation of rooting depths. The investigation was conducted to determine the effective root zone depth of the representative tree, agricultural, and herbaceous vegetation to support assessment activities conducted on the Property.

During the investigation, traverses were made across portions of the Property to note vegetative transitions within the areas investigated. Upon documentation of the tree vegetation, nine (9) trees were analyzed by probing and measuring to the top of the dominant roots extending from the base of the trees, mainly below the ground surface in areas with minimal amount of historic disturbance to obtain an undisturbed result. In addition, soil horizons and feeder roots were exposed and reviewed near each select tree by excavating inspection trenches via shovel with average dimensions of eighteen (18) inches long, eighteen (18) inches wide, and twenty (20) inches deep, or via the hand auger method to approximately seventeen (17) to thirty-two (32) inches deep. Upon documentation of the agricultural, herbaceous, and shrub vegetation, four (4) rice stands, four (4) herbaceous stands, and one (1) shrub were analyzed during the investigation by excavating four (4) core profiles and five (5) inspection trenches via shovel to expose soil horizons and rooting depths, again in areas with minimal amount of historic disturbance to obtain an undisturbed result. An evaluation of near surface soils, vegetation, and root mass abundance was conducted for the core profiles, inspection trenches, and hand augers to determine the site-specific effective root zone. Figure 22 depicts the root zone investigation locations.

4.1: Soil Classification

The soil at each investigation location was evaluated to determine specific soil properties relative to the soil classification system. Specific soil properties evaluated included, but were not limited to, the depth of each horizon, horizon classification, matrix color, and redoximorphic concentration or depletions (if applicable) with associated abundances and color contrasts, texture, concretions, and structure. In addition to these soil properties, the N-value, a measure of the soil firmness of each horizon, was determined by the "Squeeze Test" method, as necessary. Other soil properties that would impede root elongation or deter plant growth were also documented, including hydric soil, non-hydric soil, restrictive layers, disturbed soil horizons, buried horizons, etc. Upon review of all soil properties, the soil at each inspection location was classified under the USDA soil taxonomy system and correlated to the correct soil series name.

Based on soil properties and mapping data, the area investigated consisted of several soil types, including, but not limited to, Acadia silt loam, Crowley silt loam, Mowata silt loam, and Vidrine silt loam. The Acadia series is classified as fine, smectitic, thermic Aquic Paleudalfs; the Crowley series is classified as fine, smectitic, thermic Typic Albaqualfs the Mowata series is classified as fine, smectitic, thermic Typic Glossaqualfs; and the Vidrine series is classified as fine, smectitic, thermic Aquic Glossudalfs by the USDA. These soils, along with elevation and hydrology, are directly related to the current plant species growing throughout the area investigated.

4.2: Vegetation Identification

The vegetation throughout portions of the Property was documented on HET Field Note Sheets, as well as HET Root Zone Data Forms, as applicable, using the species' common name at the time of the investigation. Scientific nomenclature and species-specific information for the vegetation observed was obtained upon completion of all field activities. The wooded areas within the area investigated predominantly consisted of bottomland hardwood tree vegetation, including, but not limited to, Oak species (*Quercus spp.*), Hackberry (*Celtis occidentalis*), American Elm (*Ulmus americana*), Sweet-Gum (*Liquidambar styracifula*), and Green Ash (*Fraxinus pennsylvanica*) with an occasional Chinese Tallow (*Triadica sebifera*) and Southern Bald Cypress (*Taxodium distichum*). These areas also contained Loblolly Pine (Pinus taeda) in select areas, Dwarf Palmetto (*Sabal minor*), Yaupon (Ilex vomitoria), Green Briar

(*Smilax spp*.), Peppervine (*Ampelopsis arborea*), Poison Ivy (*Toxicodendron radicans*), and Sedge (Carex *spp*.). Portions of the agricultural areas were utilized for rice (*Oryza sativa*) production (currently young in age), with other portions left as set-aside containing herbaceous vegetation. The remaining areas, outside of the agricultural areas, within the area investigated predominantly consisted of herbaceous vegetation, including, but not limited to, Annual Ragweed (*Ambrosia artemisiifolia*), Annual Marsh-Elder (*Iva annua*), Bermuda grass (*Cynodon dactylon*), Broom Sedge (*Carex tribuloides*), Brazilian Vervain (*Verbena incompta*), Crane's Bill (*Geranium sp.*), Green Flat Sedge (*Cyperus virens*), Johnson Grass (*Sorghum halepense*), Perennial Rye Grass (*Lolium perenne*), Rough Bent Grass (*Agrostis scabra*), Virginia Buttonweed (*Didodia virginiana*), and Yellow Bristle Grass (*Setaria pumila*). The purpose of this investigation was to establish the site-specific effective root zone for the dominant species within the area investigated as possible restoration activities would target these select species. The investigation further confirmed that typical and expected trees, crops, and other vegetation were naturally abundant and unimpaired.

4.3: Root Zone Interpretation

Rooting depths of different vegetative species vary due to several factors (soil type, hydrology, prior land usage, etc.); therefore, a site-specific root zone investigation is needed to determine the species' effective root zone. The effective root zone of a plant is the area within the soil that is essential for plant growth and maturation process. This area is not representative of the plant's deepest roots, rather, it is the location where the vast majority, approximately eighty (80) percent, of the roots reside. The effective root zone is imperative for the completion of the plant's life cycle as it is the area within the soil where the majority of the water from the soil water solution is extracted by the plant and the area where the most available nutrients reside. The maximum root depth of a plant may be below the effective root zone. However, the maximum depth is not the area in which the plant takes up the vast majority of its nutrients, as noted above. The intent of this evaluation is to describe the root zone that is essential for plant growth, completion of the life cycle, and maturation process (i.e., effective root zone) and determine the need for potential remedial and/or restoration activities, if deemed appropriate, which are typically targeted to this distinct zone.

Tree root zones are determined by noting the depths and distributions of dominant and feeder roots extending from the base of the tree. Initially, the tree is examined for characteristics, including, but not limited to, overall health, leaf structure, branching tendencies, trunk stature, and measurement of the diameter at breast height (dbh). Dominant rooting systems are located and followed away from the bole (trunk) of the tree using a steel probe to intersect the tops of the roots. Small pin flags or stakes are staged on top of the roots, allowing for measurements and sketches of the rooting system to occur. The deepest portion of each dominant root is measured to the top of the root below land surface, as well as the distance away from the bole of the tree. Additional measurements, including depth BLS at random distances away from the bole and the total length observed for the root, are documented. Feeder roots are also analyzed and/or exposed via shovel or hand auger during the investigation. The effective root zone of a tree species considers the depth BLS where the vast majority of the roots reside based on site-specific field observations.

Herbaceous and shrub root zones are described by noting and distinguishing the root mass abundances. The zones can be broken down into several different categories (abundant, many, common, sparse, very sparse, etc.), depending on the site location, vegetative species, and soil type. In areas where the root densities across the soil profile were high with thick root mat, the root mass abundance was considered “abundant.” Areas where the root densities begin to decrease, yet still contain a considerable number of roots, were considered “many.” When densities decreased with a dotted distribution of roots across the soil profile, the root mass abundance was considered “common.” When the root densities across the soil profile were low and/or very low, the area was considered “sparse” and/or “very sparse.” The effective root zone of a plant species takes into account areas that are documented as “abundant”, “many”, and “common” root mass abundances. This area is essential for the completion of a plant’s life cycle. Site-specific root zones are described in the Root Zone Results section of this report.

4.4: Root Zone Results

The results of this investigation are concluded based on current site conditions. Tree location 1 (T-01) consisted of a Water Oak (*Quercus nigra*) that is located on the north-central portion of the Property, west of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location T-01 was made up of Crowley silt loam. The bole of T-01 measured a dbh of 14.5 inches. Fifteen

(15) dominant roots were discovered during the investigation, with overall lengths ranging from thirty-six (36) to 102 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and twelve (12) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately 11.5 inches BLS. Based on field documented data obtained, the effective root zone for T-01 was determined to be approximately zero (0) to twelve (12) inches BLS. Appendix P contains soil descriptions, photographs of the soil horizons, and photographs of the roots for root zone locations.

Tree location 2 (T-02) consisted of a Water Oak (*Quercus nigra*) that is located on the north-central portion of the Property, northwest of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location T-02 was made up of Crowley silt loam. The bole of T-02 measured a dbh of 6.5 inches. Twelve (12) dominant roots were discovered during the investigation, with overall lengths ranging from nine (9) to sixty-one (61) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and ten (10) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately ten (10) inches BLS. Based on field documented data obtained, the effective root zone for T-02 was determined to be approximately zero (0) to ten (10) inches BLS.

Tree location 3 (T-03) consisted of a Willow Oak (*Quercus phellos*) that is located on the eastern portion of the Property, northeast of the Johnson & Boudreaux No. 002 (LDENR Serial No. 82706) well pad area. The soil profile at location T-03 was made up of Acadia silt loam. The bole of T-03 measured a dbh of 11.5 inches. Fourteen (14) dominant roots were discovered during the investigation, with overall lengths ranging from thirty-one (31) to sixty-five (65) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and thirteen (13) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately fourteen (14) inches BLS. Based on field documented data obtained, the effective root zone for T-03 was determined to be approximately zero (0) to thirteen (13) inches BLS.

Tree location 4 (T-04) consisted of a Swamp Chestnut Oak (*Quercus michauxii*) that is located on the eastern portion of the Property, northeast of the Johnson & Boudreaux No. 002 (LDENR Serial No. 82706) well pad area. The soil profile at location T-04 was made up of Acadia silt loam. The bole of T-04 measured a dbh of 13.2 inches. Seventeen (17) dominant roots were discovered during the investigation,

with overall lengths ranging from thirty-five (35) to 116 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and fourteen (14) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately twelve (12) inches BLS. Based on field documented data obtained, the effective root zone for T-04 was determined to be approximately zero (0) to fourteen (14) inches BLS.

Tree location 5 (T-05) consisted of an American Elm (*Ulmus americana*) that is located on the northeast portion of the Property, northwest of the Johnson-Boudreaux No. 001 (LDENR Serial No. 82022) well pad area. The soil profile at location T-05 was made up of Mowata silt loam. The bole of T-05 measured a dbh of 12.3 inches. Fourteen (14) dominant roots were discovered during the investigation, with overall lengths ranging from twelve (12) to 142 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and nine (9) inches BLS, with the top of the deepest point of two (2) dominant roots noted at approximately 6.5 inches BLS. Based on field documented data obtained, the effective root zone for T-05 was determined to be approximately zero (0) to nine (9) inches BLS.

Tree location 6 (T-06) consisted of a Sweet-Gum (*Liquidambar styraciflua*) that is located on the northeast portion of the Property, southeast of the Johnson-Boudreaux No. 001 (LDENR Serial No. 82022) well pad area. The soil profile at location T-06 was made up of Mowata silt loam. The bole of T-06 measured a dbh of 10.8 inches. Fourteen (14) dominant roots were discovered during the investigation, with overall lengths ranging from thirty (30) to ninety (90) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and eight (8) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately 7.5 inches BLS. Based on field documented data obtained, the effective root zone for T-06 was determined to be approximately zero (0) to eight (8) inches BLS.

Tree location 7 (T-07) consisted of a Water Oak (*Quercus nigra*) that is located on the northeast portion of the Property, southeast of the Johnson-Boudreaux No. 001 (LDENR Serial No. 82022) well pad area. The soil profile at location T-07 was made up of Mowata silt loam. The bole of T-07 measured a dbh of 8.8 inches. Fifteen (15) dominant roots were discovered during the investigation, with overall lengths ranging from thirty-six (36) to 200 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and twelve (12) inches BLS, with the top of the deepest

point of one (1) dominant root noted at approximately 4.5 inches BLS. Based on field documented data obtained, the effective root zone for T-07 was determined to be approximately zero (0) to twelve (12) inches BLS.

Tree location 8 (T-08) consisted of a Loblolly Pine (*Pinus taeda*) that is located on the eastern portion of the Property, west of the Johnson & Boudreaux No. 002 (LDENR Serial No. 82706) well pad area. The soil profile at location T-08 was made up of Crowley silt loam. The bole of T-08 measured a dbh of 10.5 inches. Fifteen (15) dominant roots were discovered during the investigation, with overall lengths ranging from twenty-four (24) to eighty-eight (88) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and thirteen (13) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately twelve (12) inches BLS. Numerous attempts were made to determine the depth of the tap root; however, extensive digging and damage would have to occur directly underneath the tree to determine the actual depth. After extensive probing, a measurement was made at eighteen (18) inches away from the bole of the tree and extending down thirty (30) inches on an angle. The tap root was then calculated to be approximately twenty-four (24) inches BLS. Based on field documented data obtained, the effective root zone for T-08 was determined to be approximately zero (0) to thirteen (13) inches BLS.

Tree location 9 (T-09) consisted of a Water Oak (*Quercus nigra*) that is located on the north-central portion of the Property, southwest of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location T-09 was made up of Crowley silt loam. The bole of T-09 measured a dbh of 7.3 inches. Fifteen (15) dominant roots were discovered during the investigation, with overall lengths ranging from twenty-four (24) to seventy (70) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and thirteen (13) inches BLS, with the top of the deepest point of one (1) dominant root noted at approximately 13.5 inches BLS. Based on field documented data obtained, the effective root zone for T-07 was determined to be approximately zero (0) to thirteen (13) inches BLS.

Shrub location 1 (S-01) consisted of a Dwarf Palmetto (*Sabal minor*) that is located on the northeast portion of the Property, southeast of the Johnson-Boudreaux No. 001 (LDENR Serial No. 82022) well pad area. The soil profile at location S-01 was made up of Mowata silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to two (2) inches, many from two (2) to eight (8) inches, and

common from eight (8) to twelve (12) inches BLS. Below twelve (12) inches, the root distribution decreases with sparse from twelve (12) to sixteen (16) and very sparse to none from sixteen (16) to twenty-one (21) inches BLS. Based on field documented data obtained, the effective root zone for S-01 was determined to be approximately zero (0) to twelve (12) inches BLS.

Rice location 1 (R-01) consisted of Cultivated Rice (*Oryza sativa*) that is located on the north-central portion of the Property, west of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location R-01 was made up of Crowley silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to two (2) inches, many from two (2) to 4.5 inches, and common from 4.5 to six (6) inches BLS. Below six (6) inches, the root distribution decreases with very sparse from six (6) to nine (9) and none from nine (9) to sixteen (16) inches BLS. Based on field documented data obtained, the effective root zone for R-01 was determined to be approximately zero (0) to six (6) inches BLS.

Rice location 2 (R-02) consisted of Cultivated Rice (*Oryza sativa*) that is located on the north-central portion of the Property, west of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location R-02 was made up of Crowley silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to one (1) inch, many from one (1) to three (3) inches, and common from three (3) to five (5) inches BLS. Below five (5) inches, the root distribution decreases with sparse from five (5) to nine (9) and none from nine (9) to sixteen (16) inches BLS. Based on field documented data obtained, the effective root zone for R-02 was determined to be approximately zero (0) to five (5) inches BLS.

Rice location 3 (R-03) consisted of Cultivated Rice (*Oryza sativa*) that is located on the north-central portion of the Property, west of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location R-03 was made up of Crowley silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to two (2) inches, many from two (2) to four (4) inches, and common from four (4) to six (6) inches BLS. Below six (6) inches, the root distribution decreases with sparse from six (6) to ten (10) and none from ten (10) to eighteen (18) inches BLS. Based on field documented data obtained, the effective root zone for R-03 was determined to be approximately zero (0) to six (6) inches BLS.

Rice location 4 (R-04) consisted of Cultivated Rice (*Oryza sativa*) that is located on the northern portion of the Property, northwest of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location R-04 was made up of Crowley silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to 1.5 inches, many from 1.5 to three (3) inches, and common from three (3) to five (5) inches BLS. Below five (5) inches, the root distribution decreases with sparse from five (5) to eight (8) and very sparse to none from eight (8) to fifteen (15) inches BLS. Based on field documented data obtained, the effective root zone for R-04 was determined to be approximately zero (0) to five (5) inches BLS.

Herbaceous location 1 (H-01) consisted of Broom Sedge (*Carex tribuloides*), Annual Marsh-Elder (*Iva annua*), and Annual Ragweed (*Ambrosia artemisiifolia*) that are located on the north-central portion of the Property, southwest of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location H-01 was made up of Crowley silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to two (2) inches, many from two (2) to four (4) inches, and common from four (4) to seven (7) inches BLS. Below seven (7) inches, the root distribution decreases with sparse from seven (7) to fourteen (14), very sparse from fourteen (14) to eighteen (18), and none from eighteen (18) to twenty-four (24) inches BLS. Based on field documented data obtained, the effective root zone for H-01 was determined to be approximately zero (0) to seven (7) inches BLS.

Herbaceous location 2 (H-02) consisted of Annual Ragweed (*Ambrosia artemisiifolia*), Crane's Bill (*Geranium sp.*), Brazilian Vervain (*Verbena incompta*), and Yellow Bristle Grass (*Setaria pumila*) that are located on the north-central portion of the Property, southwest of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location H-02 was made up of Vidrine silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to one (1) inch, many from one (1) to three (3) inches, and common from three (3) to seven (7) inches BLS. Below seven (7) inches, the root distribution decreases with sparse from seven (7) to twelve (12), very sparse from twelve (12) to sixteen (16), and none from sixteen (16) to twenty-four (24) inches BLS. Based on field documented data obtained, the effective root zone for H-02 was determined to be approximately zero (0) to seven (7) inches BLS.

Herbaceous location 3 (H-03) consisted of Johnson Grass (*Sorghum halepense*), Crane's Bill (*Geranium sp.*), Bermuda grass (*Cynodon dactylon*), Brazilian Vervain (*Verbena incompta*), and Virginia Buttonweed (*Didodia virginiana*) that are located on the north-central portion of the Property, west of the

Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location H-03 was made up of Crowley silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to two (2) inches, many from two (2) to four (4) inches, and common from four (4) to seven (7) inches BLS. Below seven (7) inches, the root distribution decreases with sparse from seven (7) to seventeen (17), very sparse from seventeen (17) to thirty-two (32), and none from thirty-two (32) to thirty-six (36) inches BLS. Based on field documented data obtained, the effective root zone for H-03 was determined to be approximately zero (0) to seven (7) inches BLS.

Herbaceous location 4 (H-04) consisted of Perennial Rye Grass (*Lolium perenne*), Rough Bent Grass (*Agrostis scabra*), Green Flat Sedge (*Cyperus virens*), Brazilian Vervain (*Verbena incompta*), and Broom Sedge (*Carex tribuloides*) that are located on the north-central portion of the Property, south of the Johnson Boudreaux No. 001 (LDENR Serial No. 76164) well pad area. The soil profile at location H-04 was made up of Vidrine silt loam. As shown in the photographs, the root distribution was abundant from zero (0) to two (2) inches, many from two (2) to four (4) inches, and common from four (4) to six (6) inches BLS. Below six (6) inches, the root distribution decreases with sparse from six (6) to twelve (12), very sparse from twelve (12) to seventeen (17), and none from seventeen (17) to twenty-four (24) inches BLS. Based on field documented data obtained, the effective root zone for H-04 was determined to be approximately zero (0) to six (6) inches BLS. To note, herbaceous locations H-01, H-02, and H-03 were plowed following the investigation, in addition to select fallow agricultural fields located near the former well pads.

Findings during the root zone investigation within the dominant vegetative communities exhibited shallow distributions of roots as summarized in Text Table 2 on the following page. Effective root zones for the trees investigated ranged from zero (0) to fourteen (14) inches BLS, the shrub ranged from zero (0) to twelve (12) inches BLS, rice stands ranged from zero (0) to six (6) inches BLS, and herbaceous stands ranged from zero (0) to seven (7) inches BLS. The vast majority of the roots found during the investigation were above twelve (12) inches below land surface. The vegetation observed on the tract appeared to be in very good condition, with excellent growth and reproduction observed. The effective root zones noted above should be taken into account during potential restoration planning, if any.

Text Table 2
Effective Root Zone (ERZ) of Select Species

Location ID	Common Name	Effective Root Zone (Inches)
T-01	Water Oak	0-12
T-02	Water Oak	0-10
T-03	Willow Oak	0-13
T-04	Swamp Chestnut Oak	0-14
T-05	American Elm	0-9
T-06	Sweet Gum	0-8
T-07	Water Oak	0-12
T-08	Loblolly Pine	0-13
T-09	Water Oak	0-13
S-01	Dwarf Palmetto	0-12
R-01	Rice	0-6
R-02	Rice	0-5
R-03	Rice	0-6
R-04	Rice	0-5
H-01	Broom Sedge, Annual Marsh-Elder, Annual Ragweed	0-7
H-02	Annual Ragweed, Crane's Bill, Brazilian Vervain, Yellow Bristle Grass	0-7
H-03	Johnson Grass, Bermuda Grass, Brazilian Vervain, Crane's Bill, Virginia Buttonweed	0-7
H-04	Perennial Rye Grass, Rough Bent Grass, Green Flat Sedge, Brazilian Vervain, Broom Sedge	0-6

5.0: RESULTS OF THE INVESTIGATIONS

Based on a review of data generated during the investigations performed to date, the following results of the investigations are presented. All information obtained to date was considered in the evaluation of the data, including split sample results from the various consultants, as well as the overall geological settings of the Property. If additional data is collected, the following evaluation of data is subject to change. Tables 1 to 4 contain analytical summaries of soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in and adjacent to the LAA and in areas of the Property not associated with the LAA by all sampling parties. Table 5 contains a soil analytical summary of radiological parameters. Tables 6 to 15 contain analytical summaries of groundwater samples in the “A-Zone”, “B-Zone”, and transition zone in and adjacent to the LAA and in areas of the Property not associated with the LAA by all sampling parties. Table 16 contains a groundwater analytical summary of dissolved gases and isotopic parameters. Table 17 contains a soil analytical summary of geotechnical parameters. Table 18 contains a summary of x-ray diffraction or bulk mineralogy results. Appendix Q contains soil and groundwater concentration maps that depict an initial screening of concentrations relative to Statewide Order 29-B and RECAP based on the data tabulated in the above referenced summary tables with regard to samples collected in and adjacent to the LAA.

This report presents the results of data collected within or in the immediate proximity of the LAA, as defined above in Section 1.2. Based on GIS mapping of the boring locations as it relates to this operational area, HET focused its review of data on soil and/or groundwater samples collected from ICON during installation of ICON borings HA-1 to HA-3, CD-4, and CD-5, as well as the associated cluster wells installed at these locations (Figure 8) and the soil samples collected by HET during the installation of HET borings DB-1, CD-5R, SB-1 to SB-4, and HA-2R (Figure 10). Figure 6 illustrates the locations of all borings and monitor wells installed by all parties, including HET and ICON, during the litigation assessments conducted within the LAA to date. In addition, Figure 23 illustrates the locations of all borings and monitor wells installed by all parties, including HET and ICON, during the litigation assessments conducted in the vicinity of operations conducted by Midwest and/or Amoco to date.

5.1: Evaluation Under Statewide Order 29-B

As mentioned above, the investigation conducted by HET was performed in accordance with applicable and appropriate regulations under the framework established under Statewide Order 29-B per the LDENR regulations (LAC 43:XIX) which incorporate the Risk Evaluation/Corrective Action Program (RECAP), as promulgated by the LDEQ under the most recent guidance document dated October 20, 2003 (LAC 33:1 Chapter 13). The incorporation of regulatory standards was part of the overall assessment conducted to review natural tolerances and ensure that the Property could be used for its reasonably intended purposes, consistent with accepted standards of environmental site assessment and corrective action evaluation. Data were initially evaluated by comparison with Section 313 of Statewide Order 29-B as a conservative reference and as per LDENR policy. This information is provided for agency reference, with the following considerations upon review of the data set as a whole:

1. Surface concentrations of EC, SAR, and/or ESP considering upland criteria for the areas investigated were evaluated in accordance with Statewide Order 29-B, with SAR and ESP applied within the effective root zone in support of vegetative growth, as established by the work performed by Mr. Greene. Subsurface concentrations of EC were also evaluated in accordance with LAC 43:XIX.313 to demonstrate that chloride parameters assessed do not affect the overall conditions of the Property and are protective of subsurface water bearing zones as discussed further below.

2. Metal concentrations, with the exception of True Total Barium, were evaluated on a wet weight basis in accordance with the LDENR memorandum dated November 20, 2007, and in accordance with the October 20, 2003, RECAP guidance document. Any metal results that were reported on a dry weight basis were converted to a wet weight basis as part of HET's analysis for comparison to the regulatory standards.

3. Oil and grease concentrations as per the method in Statewide Order 29-B, as well as TPH by EPA SW-846 Method 8015B, may include non-target analytes, including a broad range of oils and minerals found in plant matter and other substances that do not pose a risk to human health. Additional analyses of the hydrocarbon fractions are more indicative of potential impact, noting that RECAP, Appendix D, requires the use of the hydrocarbon fraction analysis and further states that the hydrocarbon fraction analyses supersede the results of the total analyses, especially when the data differ.

4. Finally, concentrations of pH less than the Statewide Order 29-B standard of six (6) standard units were consistent with natural tolerances for soil types determined by the USDA above in Section 2.1.

5.2: Evaluation Under RECAP

The utilization and application of RECAP standards were done after comparison of constituent concentrations to the Statewide Order 29-B, Chapter 3 pit closure standards (LAC 43:XIX.313.C) as part of the overall regulatory framework established by the LDENR Office of Conservation, Environmental Division for the evaluation of sites under Statewide Order 29-B as described above. The LDEQ RECAP document, under the most recently promulgated guidance document dated October 20, 2003, defines preliminary acceptable levels of compounds (screening standards) and site-specific standards to aid in determining more site-specific levels (management options), as appropriate, for potential constituents of concern (COC) in soil and groundwater in Louisiana. These standards, adopted by regulation, incorporate generally accepted standards for environmental evaluation and remediation. Each of the three (3) higher tiers of RECAP under Management Options 1 (MO-1), 2, (MO-2), and 3 (MO-3) requires additional and more rigorous assessment data than the previous tier to establish more site-specific standards and includes conservative assumptions to ensure that the goal of protection of human health and the environment is met. RECAP evaluates sites either under a non-industrial (residential) or industrial (commercial) exposure scenario, depending on the use of the Property. Application of the industrial standards, if met, requires the filing of a conveyance notification to limit the use of the Property for commercial/industrial purposes only.

The LDEQ promulgated RECAP to develop conservative risk-based standards to establish clear and consistent guidelines across media-based program lines, properly evaluate risk to human health and the environment, and to determine whether remediation is warranted. The first tier is the Screening Option, which establishes screening standards to quickly and effectively determine whether additional assessment would be warranted as an overly conservative assessment. An exceedance of a screening standard does not mean that a threat to human health or the environment necessarily exists, and the screening standards are not intended to serve as the target remedial goals. The screening standard is determined by selecting the lowest of two (2) general exposure criteria, those being the protection of human health (Soil_SSni or Soil_SSi, depending on the use of the Property) and the protection of groundwater (Soil_SSgw). The screening option (SO) takes into consideration overly conservative certain assumptions and exposure criteria that are not met at the Property. First, the screening standards assume protection of a drinking water aquifer defined by RECAP in Section 2.10 as GW_1. Secondly, the screening standards assume a Hazard Index of 0.1 to account for potential additive health effects, when, in fact, the protection of a Hazard

Index of 1.0 is appropriate under the higher tiers of RECAP. This basically equates to the assumption of ten (10) COCs targeting each organ which is not realized on the Property.

Furthermore, RECAP evaluates the non-traditional parameter of chlorides under Appendix D with the following considerations: 1) applicable or relevant and appropriate requirements, 2) protection of resource aesthetics, 3) environmental fate and transport pathways, 4) protection of vegetation, and 5) background conditions. Additional guidance published by LDEQ and approved on other sites by both agencies established methods to consider chloride concentrations in a typical risk assessment methodology as sodium chloride concentrations do not pose a threat to human health. Both sets of regulations, as promulgated by the LDENR and LDEQ, as well as natural conditions, are taken into consideration by HET to evaluate site conditions.

The agriculturally derived standards of EC, SAR, and ESP are typically evaluated within the root zone for the ability to support vegetation growth, and restoration/analyses of ESP and SAR concentrations below the root zone are not appropriate. Additional evaluation of the root zone and the effect of chloride related parameters on vegetation was conducted by Mr. Matthew L. Greene with HET as documented in Section 4.0 above.

Subsurface concentrations of chloride are evaluated for protection of the Point of Exposure (POE), as defined by RECAP, either being the protection of groundwater or the nearest surface water body capable of receiving discharge after consideration of the additional risk assessment methodology promulgated under RECAP. Samples collected beneath the effective root zone during the course of the investigations were analyzed for total chlorides and electrical conductivity (EC), as well as SPLP analyses, to evaluate the potential for cross media transfer (soil to groundwater). Chloride, EC, and sodium concentrations are evaluated for the protection of the shallow water bearing zones by comparing constituent concentrations to the standard determined by conservatively multiplying the EPA secondary drinking water standard of 250 milligrams per liter (mg/L) for chlorides and sixty (60) mg/L for sodium by a default DAF of twenty (20) in accordance with RECAP. As a result, the concentrations of chloride-related parameters in the soil demonstrate that the subsurface concentrations of chloride and sodium are below the threshold considered to result in cross media transfer (soil to groundwater), particularly since the source has been mitigated and the concentrations are in declining conditions as defined by RECAP. Note that the SPLP analysis is considered the preferred method to evaluate the potential for cross media transfer by the regulatory

agencies, including LDENR and LDEQ, as compared to the Leachate Chloride parameter per the Statewide Order 29-B analysis.

5.3: Review of Soil Data associated with the Limited Admission Area

Based on the regulatory framework established above by the LDENR under Statewide Order 29-B, HET has evaluated all data associated with the LAA defined above. The following is a tiered evaluation under Statewide Order 29-B, Chapter 3 and then RECAP as a screening tool to determine the need for further evaluation under a higher tier of RECAP as part of the overall framework established by the LDENR. Laboratory analytical results demonstrate that constituent concentrations have been vertically and horizontally delineated and meet the applicable standards in accordance with Statewide Order 29-B, Chapter 3 pit closure standards and/or RECAP standards as discussed below. Appendix Q contains soil concentration maps exhibiting concentrations of constituents of concern reported above Statewide Order 29-B and/or RECAP screening standards.

With regard to surface concentrations of EC, all concentrations are below the regulatory/agronomic standards, with the concentrations reported in surface samples collected from boring HA-2 not confirmed in the resampling data from boring HA-2R. Additionally, limited concentrations of ESP and SAR were reported above the respective Statewide Order 29-B standards, with maximum surface concentrations of ESP at twenty-five (25.5) percent (%) in borings HA-2 and HA-3 and of SAR at 19.5 in boring HA-2, both at a depth between land surface and two (2) feet BLS. However, ESP and SAR concentrations did not appear to affect the surface vegetation at the LAA, wherein no areas of distressed vegetation were observed and are typically only evaluated within the effective root zone.

Laboratory analytical results reported subsurface concentrations of EC above the Statewide Order 29-B standard of four (4) mmhos/cm at depths upward of seventy-four (74) feet BLS in borings CD-5/5R and fifty-eight (58) feet in boring CD-4R in a localized area in the vicinity of the former operations associated with LDENR Serial No. 76164. However, the depth of the EC concentrations significantly decreases within a short lateral distance from these operations as evidenced in boring DB-01, with EC concentrations above Statewide Order 29-B standards at depths less than ten (10) feet BLS and with no elevated concentrations above background tolerances and/or Statewide Order 29-B, Chapter 3 standards reported in soil samples collected from borings CD-10/10R and CD-12/12R. Furthermore, the concentrations of EC have been

vertically and horizontally delineated, are confined to the surficial confining unit, and do not extend to usable portions of the Chicot aquifer. Finally, SPLP results demonstrate that the reported EC concentrations are below the threshold to result in cross-media transfer, even without application of the default dilution and attention factor (DAF).

As an initial evaluation, all reported metal concentrations were determined to be below the Statewide Order 29-B, Chapter 3 standards within the LAA. Note that arsenic concentrations were reported above the Statewide Order 29-B standard of ten (10) mg/Kg in areas of the Property not included within the LAA, however, the reported arsenic concentrations are at a distance from the LAA were not confirmed in the split sample analyses, do not correlate with other constituents typically associated with oilfield activities, and are within natural tolerances and/or background standards established for the State under RECAP. Additionally, arsenic has been demonstrated to be naturally occurring in soils throughout Louisiana according to a study performed by Ori, et al. (1993). Total arsenic concentrations for soils of the coastal prairies at depths from zero (0) to seventy-two (72) centimeters (cm) below surface ranged from 4.5 to 46.5 mg/Kg, with a mean arsenic concentration of 18.3 mg/Kg. Concentrations of total barium, chromium, and/or lead were reported above RECAP screening standards in soil samples collected from HA-2/2R. These metal concentrations were determined to meet applicable RECAP screening standards based on a combination of SPLP analyses and reproduction sample results considering the reproduction sample results and the updated barium screening standard of 1,600 parts per million (ppm). Note that the elevated concentrations of metals reported by ICON in boring HA-2 were not confirmed in split samples collected during ICON's investigation or by HET during resampling efforts.

HET calculated updated RECAP screening and MO-1 standards for barium using the most recent oral reference dose (RFD_o) published by the EPA in the IRIS database to present the most current risk assessment data. The RFD_o of 0.07 mg/kg/day obtained from EPA's HEAST database and utilized by the LDEQ in calculations presented in the RECAP 2003 document is no longer supported by the EPA, which currently considers the RFD_o of 0.2 mg/kg/day obtained from the EPA's IRIS database. Using the updated RFD_o and default non-industrial exposure parameters generates an updated non-industrial barium screening standard of 1,600 mg/kg and an updated MO-1 standard of 16,000 mg/kg. The resulting barium RECAP standard of 16,000 mg/kg represents the most current toxicity reference values, done in accordance with RECAP, Appendix H and accepted by the LDEQ based on the most recent data published

by the EPA. Finally, the reported concentrations of barium have been determined to be associated with barium sulfate (Barite) via XRD analyses, which would not be a constituent of concern under RECAP due to its chemical properties. Appendix T contains a copy of the calculations.

With regard to hydrocarbons, all concentrations of hydrocarbons were reported below the respective RECAP screening standards for the aliphatic and aromatic hydrocarbon fractions, with the exception of the split sample result from soil samples collected by ERM at a depth between two (2) and four (4) feet BLS in boring HA-2 only. However, the confirmation samples collected by HET confirm the full profile of hydrocarbons from within the former pit at the boring HA-2 location to report concentrations below screening standards. The concentrations of TPH reported by ICON were not confirmed in the fraction analyses as required by RECAP.

Based on the tiered approach that considers concentrations in order from Statewide Order 29-B, Chapter 3, and RECAP, all constituent concentrations in the soil in the LAA have been demonstrated to meet applicable screening standards in accordance with Statewide Order 29-B, Chapter 3 and RECAP considering further analyses and/or SPLP results. However, as a conservate measure, HET has elected to further evaluate concentrations of total barium and Aliphatic C_{12} - C_{16} in the risk assessment in Section 6.0 below despite these concentrations determined to be below screening standards in split samples and/or resampling events.

5.4: Review of Groundwater Data

As described above, the Limited Admission considers groundwater conditions associated with the LAA as determined from groundwater samples collected from the monitor wells installed by ICON. Based on the data obtained to date, all constituent concentrations in the soil and groundwater have been delineated. Appendix Q contains groundwater concentration maps exhibiting concentrations of constituents of concern reported above EPA secondary or primary drinking water and/or RECAP screening standards.

Groundwater samples were collected by ICON at various depths within the “A-Zone”, which ICON defined as depths less than fifty (50) feet BLS and the “B-Zone”, which ICON identified as between depths of fifty (50) and ninety-five (95) feet BLS. The Chicot aquifer has not been encountered or logged during installation of the borings to date, and shallow water bearing silts, as encountered in borings CD-10 and CD-12, are within the overall surficial confining zone. The deeper wells installed at depths greater than

ninety-five (95) feet BLS in the CD-5 and CD-19 locations are in the transition zone within the surficial confining zone instead of the Chicot aquifer itself. Note that these deeper wells within the transition zone have only been sampled once and groundwater sample results discussed below could be due to well conditions shortly after installation.

Laboratory analytical results from groundwater samples collected within the surficial confining unit (i.e., “A-Zone” and “B-Zone”) reported chloride concentrations above the EPA Secondary Drinking Water Standard of 250 ppm in samples collected from select nested monitor wells CD-4, CD-5, CD-17, CD-18, CD-19, with results from groundwater samples collected from CD-19 in the “A-Zone” and CD-15 in the “B-Zone” reporting the highest concentrations of chloride at 1,140 ppm (screened interval of 10-20’) and 12,900 ppm (screened interval of 65-70’), respectively. The concentrations are localized as evidenced by the fact that soil and groundwater samples collected from nested monitor wells CD-10 and CD-12 reported chloride concentrations below the EPA Secondary Drinking Water Standard at similar depths and at a short distance from historical operations. Additionally, concentrations of TDS were also reported above the EPA Secondary Drinking Water Standard of 500 ppm in the same select nested wells as chlorides plus CD-8, CD-9, CD-13, and CD-16, often with corresponding low levels of chlorides. The chloride and/or TDS concentrations were limited to wells installed at depth of or less than eighty (80) feet BLS and decrease significantly with depth from the base of the ICON designated “B-Zone” to the transition zone wells installed at depths of or greater than ninety-five (95) feet BLS, as also evidenced in the soil data and lithologic observations of an increasingly dense clay with depth. Note that comparison of these constituent concentrations to drinking water standards is inappropriate as these shallow water bearing silts regionally have been classified by the State as non-drinking due to limited yield and based on regional assessments as discussed above.

With regard to metal concentrations, arsenic, barium, iron, and manganese concentrations were detected above the conservative RECAP screening standards and/or EPA Drinking Water Standards. Note that it is more representative to evaluate metal concentrations on a dissolved basis in the evaluation of data; however, HET includes a comparison to the maximum concentrations as a conservative measure. As such, the dissolved analyses demonstrated that the reported total chromium and lead concentrations were, in fact, below the conservative screening standards. Concentrations of arsenic, iron, and manganese were reported in a vast majority of sample results, including those sample results that did not report

concentrations of compounds typically evaluated as part of oilfield assessment, thus demonstrating that these constituents are associated with known water quality issues within the water bearing zones. This is supported by regional publications, including the United States Geological Society (USGS) Water Resources of Jefferson Davis Parish, Louisiana Fact Sheet 2014-3074 dated 2014 (*Lindaman, M.A., and White, V.E., 2021, Water resources of Jefferson Davis Parish, Louisiana: U.S. Geological Survey Fact Sheet* 2014-3074*, 6 p.*) and the LDNR General Water Quality Summary, Louisiana Groundwater-Alluvial Aquifer Systems (2010). However, the concentrations of arsenic are further evaluated in a risk assessment below as part of HET's conservative evaluation.

Finally, laboratory analytical results reported all concentrations of the respective hydrocarbon fractions (i.e., Aliphatic and Aromatic ranges) as below laboratory detection limits or the conservative RECAP screening standards. The concentrations of total petroleum hydrocarbons (diesel and oil range organics) were not confirmed in the fraction analyses and are therefore, superseded by the fraction analyses in accordance with RECAP, Appendix D. Additionally, only one (1) groundwater sample, collected from monitor well CD-5B, reported a benzene concentration above the RECAP screening standard. Note that ICON did not elect to use any groundwater data obtained from its monitor wells to calculate background, having instead relied on regional USGS data which did not analyze for total petroleum hydrocarbons. However, concentrations of total petroleum hydrocarbons are often reported even in ICON's background data at other sites.

Based on the information above, the concentrations of chlorides, TDS, benzene, and metals (arsenic and barium) in the groundwater are further evaluated in a risk assessment. Radiological parameters are also evaluated below in a typical risk assessment methodology below. Additionally, Drs. Wilson and Frazier evaluated the groundwater samples collected from the subject Property and concluded that the ratios of concentrations of Radium 226 and Radium 228 in the groundwater are consistent with natural ratios and do not indicate the presence of produced water or oilfield NORM. Appendix R contains a copy of the Expert Report authored by Drs. Wilson and Frazier.

5.5: Review of Pressurized Data and Observations

ICON observed pressurized gas during installation, sampling, or collection of water level measurements in select boring locations during the course of its assessment. ICON verbally informed the LDENR of the observed pressurized gas locations on March 08, 2022. As a result, the LDENR issued a notice to the Louisiana Licensed Water Well, Geotechnical Borehole, and Groundwater Monitoring Well Drillers of the possible presence of natural gas in the upper Chicot aquifer, near Mermentau, in correspondence dated April 14, 2022.

On May 13, 2022, ICON collected gas samples from monitor wells CD-2A, CD-5B, and CD-6C. HET was on-site to observe field activities and collect split samples. All three (3) samples were submitted to Isotech Laboratories in Champaign, IL, for isotopic analyses. Based on the results, all three (3) samples appear to be thermogenic in origin, however, sample CD-5B located in the vicinity of historical operations by Midwest and/or Amoco had a microbial plot location, suggesting a mixed origin at this location. Figure 24 (Whiticar, et al, 1986) and Figure 25 (Bernard, et al, 1977) illustrate these gas plots.

ICON opined that presence of pressurized gas within select areas within the “B-Zone” was a result of upward migration from accumulated gas pockets that may be confined to the east of a ridge purportedly within the Chicot aquifer. Furthermore, ICON and Charles Norman associated the pressurized gas with the blowout of the Bruce No. 2 well (LDENR Serial No. 206253). Note that HET did not observe pressurized gas during installation and grouting of a reproduction boring at boring CD-5R or during water level measurements from the nested wells at CD-5 in May of 2025.

6.0: RISK ASSESSMENT DOCUMENTATION

The risk assessment below is intended to define human health risk standards for media encountered during the investigation of the Property to determine the need for further evaluation and/or remediation, as necessary and appropriate. The evaluation also serves to better define the need for remediation to ensure that the Property could be used for its reasonably intended purposes and is safe for human health and the environment. All information obtained to date was considered in the evaluation of the data, noting that HET's assessment data is considered more reliable where confirmatory sampling has been conducted and differences in the data exist. The risk assessment is incorporated into the assessment in accordance with the overall framework of Statewide Order 29-B to determine a feasible plan for the Property. Robinan Gentry, PhD also evaluated the human health risks, which can be found in Appendix S.

6.1: Site Usage and Ranking

The Property is located in the West Mermentau Oil and Gas Field in a rural portion of Jefferson Davis Parish and is primarily used for agricultural purposes in the form of rice production. Additionally, the Property has been subject to historical oil and gas exploration and production activities, as well as nonhazardous oilfield waste (NOW) disposal facility operated by Castex Systems, Inc. between 1982 and 1989.

The surficial water bearing zones are not utilized as sources of drinking water, the shallow water bearing zones are not in direct hydraulic communication with surface water bodies or usable portions of the underlying aquifer, and the constituent concentrations meet the proposed RECAP standards outlined below. Therefore, considering all current and future receptors and exposure pathways, the site demonstrates no long-term threat to human health, safety, or the sensitive environmental receptors and a site ranking of 4 (RECAP Section 2.2) has been applied to the site.

For risk assessment purposes, the Property is considered as non-industrial for all areas investigated. This is considered a highly conservative approach given the fact that the non-industrial assessment scenario assumes exposure to site conditions at a much more prolonged rate. HET does not propose any limitations or encumbrances on the use of the Property that a change in the exposure scenario would require (i.e., conveyance notice).

6.2: Appendix H Criteria

The detection of potential constituents of concern above the conservative RECAP screening standards is typically evaluated further under RECAP MO-1 or higher, as appropriate. The elevated constituent concentrations are limited in extent, and the source areas are considered to be below half an acre in size. Moreover, the concentrations detected in the soil have been demonstrated to be below the threshold considered to result in cross media transfer (soil to groundwater) and would not be considered an ongoing source under RECAP. Therefore, this evaluation was conducted in accordance with RECAP, Management Option 1 (MO-1) per the criteria listed in RECAP, Section 4.1.1.

6.3: Soil and Groundwater Classification

This risk assessment conservatively considers a non-industrial scenario for the Property. Therefore, the soil designation for the protection of human health for non-industrial land use ($Soil_{ni}$) would apply to the site.

There are no water wells within a one (1) mile radius of the site that are screened within the shallow water bearing zone and utilized for domestic or public supply purposes. Furthermore, aquifer testing and field observations demonstrate that the shallow water bearing unit is incapable of sustaining a sufficient yield to be considered a potential source of drinking water. Therefore, a groundwater classification of GW_{3NDW} and thus, a soil protective of groundwater that prevents the leaching of unacceptable concentrations from soil to groundwater of $Soil_{GW3NDW}$ would apply to the site.

6.4: Additive Health Effects

The MO-1 and MO-2 RECAP standards (RS) for carcinogenic constituents were calculated using a target risk level of 10^{-6}, and the MO-1 RS for non-carcinogenic constituents were calculated using a Hazard Index of 1.0. In accordance with the guidelines set forth in RECAP, Section G5.0, it is not necessary to modify the MO-1 RS for carcinogens to account for additivity. However, non-carcinogenic COCs must be modified for multiple exposures to the same critical health effect or apportioned to ensure that the Hazard Index of 1.0 is not exceeded for each target organ/system. Of the RECAP standards that must be adjusted for additive health effects, $Soil_{ni}$ applies to the Property under a conservative assessment.

The target organ/system for each non-carcinogenic potential constituent of concern at the site was determined from RECAP Table G-1, and each non-carcinogenic compound was grouped for the effect

elicited on each target organ/system for the constituent concentrations of total barium and Aliphatic C_{12} - C_{16}. Of the two (2) methods to account for additivity, this Hazard Index approach employed by HET is much more site specific and realistic instead of the simple division method. Based on the target organs for barium (potential kidney effects) and Aliphatic C_{12} - C_{16} (potential liver and hematological system effects), adjustment for additive health effects is not necessary.

6.5: Soil and Groundwater RECAP Standards Calculations

The soil and groundwater RECAP standards established as part of this risk assessment evaluate the potential for non-industrial exposure and protection of groundwater considering the classification of the shallow water bearing zones in accordance with the guidelines set forth in RECAP. Based on a review of the data obtained to date, the extent of groundwater concentrations has been vertically delineated to RECAP screening standards, EPA primary or drinking water standards, and/or natural conditions associated with the aquifer.

The risk assessment considers the use of the property as non-industrial for all areas investigated as a conservative approach given that 1) the non-industrial assessment scenario assumes exposure frequency to site conditions at a much more prolonged rate and 2) HET does not propose any limitations or encumbrances on the use of the property. The MO-1 standards were from Tables 3 and 4 of the October 20, 2003, RECAP document. The input parameters conservatively listed below include a DAF of 220 assuming an average thickness of the shallow water bearing zones of between five (5) and ten (10) feet and a downgradient distance from the point of compliance (POC) to point of exposure (POE) of greater than 2,000 feet as there are no down-gradient surface water bodies capable of receiving discharge from the shallow water bearing zone in the vicinity of the Property. The RECAP standards per RECAP are included in Appendix T. Text Tables 3 and 4 on the following page contain the calculated soil and groundwater RECAP standards applied to the areas of investigation (AOIs).

Text Table 3
Soil RECAP Standards
LAA

Compound	$Soil_{ni}$ [1]	$Soil_{GW3NDW}$ [1]	DAF	Applied LRS	Max Concentration [3]
Barium	16,000	N/A [2]	N/A	16,000	3,768
Aliphatics C_{12}- C_{16}	3,700	10,000	N/A	3,700	527

1 - RECAP, Appendix H, Table 2 MO-1 Standard or calculated standard (i.e., barium)
2 - SPLP data eliminates that soil protective of groundwater standard.
3 - Maximum Soil Concentration (All Results)
LRS - Limiting RECAP Standard (lowest value)
Note: Concentrations listed in mg/Kg

Text Table 4
Groundwater RECAP Standards
LAA

Compound	GW_{3NDW} [1]	DAF	Solubility	LRS	Maximum Concentration [2]
chlorides	90 [3]	220	N/A	19,800	12,900
chlorides	250 [4]	220	N/A	55,000	12,900
TDS	260 [3]	220	N/A	78,000	26,500
TDS	500 [4]	220	N/A	110,000	26,500
benzene	0.013	220	N/A	2.86	0.015
arsenic	0.05	220	N/A	11	0.0304
barium	45	220	N/A	9,900	32.7
combined radium 226 & 228	5 [4]	220	N/A	1,100	48.8

1 - RECAP, Table 3 MO-1 Standard
2 - Maximum groundwater concentration (All Results)
3 - Surface Water Criteria (LDEQ Subsegment 050401)
4 – EPA Primary Drinking Water Standard
N/A - Not Applicable
LRS - Limiting RECAP Standard (lowest value)
Concentrations reported in mg/L (ppm)

7.0: SUMMARY OF FINDINGS TO BE ADDRESSED BY A PLAN

The investigations performed to date have appropriately characterized the environmental conditions of the Property and definitively determined the horizontal and vertical extents of constituent concentrations above the Statewide Order 29-B and RECAP standards. The data generated to date are more than sufficient to determine the most feasible plan for evaluation and remediation of the areas investigated that were subject to the LAA. Furthermore, the evaluations of all data generated to date by HET and Drs. Cejas, Kueper, Gentry, Wilson, and Frazier have confirmed that all constituent concentrations meet appropriate human health and ecological risk assessment standards. Additionally, no toxicological risk to human health or any adverse impact on ecosystem function exists with respect to the LAA.

The following sections of this document reflect the consideration of the necessity of remediation, or lack thereof, proposed for the former operational area within the LAA. This document then presents and considers potential remedial options and recommends the most feasible plan for remediation, if necessary. Appendix U contains references in support of the conclusions and findings of this report.

8.0: MOST FEASIBLE PLAN

Before deciding whether remedial options should be considered, Louisiana Revised Statute 30:29 provides for creation, when necessary, of the most feasible plan for evaluation to determine the necessity and scope of remediation. As documented in the foregoing discussion, constituent concentrations have been fully evaluated within and adjacent to the LAA. As a result, the extent of metal and hydrocarbon-related exceedances of Statewide Order 29-B parameters has been appropriately characterized, and the horizontal and vertical extents have been delineated to the applicable standards presented above in Section 6.0 above in support of the risk assessment.

With respect to the soil associated with the LAA, HET proposes no further action in accordance with LDENR policy and in support of the Property being used for its intended purposes with a contingent plan to add surface amendments in the vicinity of soil boring HA-2/HA-2R should this AOI be re-incorporated into agricultural use while working with the farmer to recontour the land for rice production as a conservative measure. The options listed below were considered in the process of determination of the most feasible plan.

8.1: Source Removal

Excavation of soil was considered in part or as a whole to address constituent concentrations identified during the course of the investigations. HET considered excavation, with the scope of costs outlined in Appendix U, as well as evaluated in the excavation plan as proposed by plaintiff to determine the best course of action for the site. Evaluation of the constituent concentrations does not demonstrate a need for removal of environmental media as constituent concentrations meet the appropriate and applicable standards, there are no limitations to the potential uses of the Property, and are not a threat to human health or the environment.

Excavation as the remediation option is typically a last resort by the EPA as it causes the most disruption on-site, requires the use of landfill space, and results in damaging another property that would be necessary to be used as backfill material. This option was not selected due to its large, wasteful, and invasive scope and costs in addition to the fact that the concentrations detected in the soil do not affect the overall use of the property and concentrations meet applicable human health and ecologic risk assessment standards.

8.2: Surface Amendments

The application of surface amendments to the former operational areas within the LAA was also evaluated to address constituent concentrations identified during the investigations. A review of the site conditions and constituent concentrations demonstrates that there may be a potential benefit from surface amendments in the event that the former operational areas in the vicinity of boring HA-2/2R, within the LAA, currently utilized for equipment staging are returned to farmland. As such, this plan would consider the application of surface amendments to treat surface soils as part of site closure activities.

This option would allow for the consideration of all appropriate regulatory standards as part of the overall framework of Statewide Order 29-B and allow for the former operational areas within the LAA to be used as farmland. As a result, surface amendments are considered a feasible option. The soil subject to amendments would be limited to elevated ESP and SAR concentrations in the LAA within the effective root zone as described above in Section 4.0. The cost for surface amendments would be approximately $63,316.90.

Based on a review of the data, this option was not selected as bp is not aware of any plans to return the areas within the LAA to farmland at this time.

8.3: No Further Action

As part of this Limited Admission, no further action is considered the most feasible plan for soil remediation as the Property is being used for its intended purposes. The extent of the concentrations that exceed the Statewide Order 29-B standards within the LAA are limited to salt related parameters and did not appear to affect the surface vegetation, wherein no areas of distressed vegetation were observed. Furthermore, the results are in declining conditions, all concentrations meet applicable comparative standards that both allow for vegetative growth and protection of groundwater, and the risk assessment confirms that active remediation is not necessary or warranted. No further action is the recommended option for the site with the contingent plan for application of surface amendments should the LAA be reincorporated into agricultural use as described in Section 8.2.

8.4: Soil Remedy Selection

Based on the alternatives considered above, no further action is the most efficient and feasible plan for the site. This option supports the conclusion that concentrations meet applicable human health and ecologic risk assessment standards and support the current uses for the Property. Should the use of the Property within the LAA be returned to farmland, the application of surface amendments could be appropriate at that time.

8.5: Groundwater Remedy Selection

Groundwater MNA has been determined to be the most feasible plan for the site. This is based on the facts that 1) the shallow water bearing zones are not in direct hydraulic communication with the nearby surface water bodies; 2) the shallow water bearing zones have been determined as non-drinking (i.e., GW_3); 3) constituent concentrations in the soil have been determined to meet applicable Statewide Order 29-B standards and are below the threshold considered to result in cross-media transfer; and 4) groundwater constituent concentrations meet the proposed RECAP standards as calculated above. Furthermore, information evaluated by Dr. Kueper concludes that conditions support natural attenuation without the need for pump and treat and that MNA would achieve the same goal in a reasonable timeframe. Therefore, HET proposes to install a groundwater monitoring network and conduct groundwater monitoring on a quarterly basis for a period of one (1) year as depicted on Figure 26. Appendix M contains additional expert analysis from Dr. Kueper.

9.0: FINAL RECOMMENDATION, TIMEFRAME, AND ESTIMATED COSTS

The most feasible plan to address soil conditions for compliance with applicable regulatory standards at the Property is no further action based on the fact that all constituent concentrations meet the applicable human health and ecological risk assessment standards, and concentrations are not affecting the surface vegetation, wherein no areas of distressed vegetation were observed.

With regard to groundwater, bp proposes Monitored Natural Attenuation (MNA), as evaluated by Dr. Kueper and with consideration of the RECAP standards as calculated in Section 6.5. This plan is based on the results of the investigations to date and the fact that constituent concentrations in the soil have been fully delineated horizontally and vertically within the bounds of the Property. The Plan proposed by bp contemplates installation of five (5) monitor wells as part of the groundwater monitoring network for quarterly sampling for a period of one (1) year. Should additional monitoring or evaluation of groundwater conditions be warranted or directed by the LDENR based on site-specific conditions, bp can undertake the additional field work as summarized below and itemized in the cost estimates contained in Appendix U.

Should the areas within the LAA be targeted for a return to farmland use, the application of surface amendments would be appropriate. If desired by the landowner or directed by the LDENR, bp could undertake the surface amendment work as summarized in the itemized cost estimates contained in Appendix U. This plan does not change the conclusions of the risk assessment as concentrations have been demonstrated to be in declining conditions in accordance with RECAP and meet applicable human health and ecological risk standards.

HET estimates that it can begin implementing the work called for in this Plan within ninety (90) days of adoption of the Most Feasible Plan. HET further estimates that the length of time to complete the groundwater monitoring program conducted on a quarterly basis to be a total of one (1) year upon completion of permitting and regulatory agencies' approval. A written report will be formulated and submitted to the LDENR within ninety (90) days of completing the groundwater monitoring program. The report will include complete documentation of the groundwater monitoring activities, current site conditions, laboratory analyses, and chain-of-custody records, as well as conclusions. The report will be structured to include a summary of all field activities and will include all documentation necessary to petition the LDENR for site closure as appropriate based on a review of the data. Text Table 5 on the following page contains

a list of itemized costs associated with surface soil amendments and groundwater monitoring. Appendix U contains a copy of the estimates prepared/obtained by HET.

Text Table 5
Costs for Groundwater Monitoring
Castex Development, LLC Property
West Mermentau Oil and Gas Field

Proposed Remediation Option	Proposed Cost Estimates
Groundwater Monitoring Network Well Installation (including Plugging and Abandonment upon completion)	$127,291.50
Groundwater Monitoring on a quarterly basis for a period of one (1) year	$36,913.20
HET Safety Management, Project Management, and Reporting Requirements	$6,180.00
Total Estimated Cost	$170,384.70

* Costs for each additional year of monitoring would be approximately $43,093.20, including reporting.

Text Table 6
Contingent Costs for Soil Amendments
Castex Development, LLC Property
West Mermentau Oil and Gas Field

Proposed Remediation Option	Proposed Cost Estimates
Application of Surface Amendments should the LAA be reincorporated into agricultural use	$63,316.90
Total Estimated Contingent Cost	$63,316.90

ATTORNEY CERTIFICATION

I, George Arceneaux III, have reviewed the information submitted herewith and hereby attest that to the best of my knowledge, information and belief it is true and correct and is based on scientific data that has been obtained in a manner compliant with all applicable regulations.

George Arceneaux III (La. Bar No. 17442)

APPENDICES