SITE INVESTIGATION REPORT AND PROPOSED REMEDIATION PLAN

August Levert, Jr., Family, LLC, et al. v. BP America Production Company
18th Judicial District Court, Division "A", Docket No. 078953
North Half of Fractional Section 15, Township 10 South, Range 11 East
Grand River Oil and Gas Field
Iberville Parish, Louisiana
LDNR OC Legacy Project No. 018-028
November 03, 2022

Prepared for

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SITE INVESTIGATION REPORT AND PROPOSED REMEDIATION PLAN

November 03, 2022

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 (LDNR) and to the 18th Judicial District Court for the Parish of Iberville, State of Louisiana (Court) pursuant to a Limited Admission filed on behalf of BP on October 26, 2022 (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 media within the scope of the Limited Admission Areas as defined in the Limited Admission in accordance with Act 312 and applicable regulations. The Plan was prepared by HET to evaluate or remediate environmental damage within the Limited Admission Areas defined herein in accordance with the requirements of the applicable rules and regulations of the LDNR and/or the Louisiana Department of Environmental Quality (LDEQ) as applicable through the LDNR. Where applicable or relied upon, rules and regulations of the LDEQ as part of the overall framework of LDNR'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 December 20, 2013 to November 03, 2022. 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.
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EXECUTIVE SUMMARY

Site Status

This Plan is being submitted in connection with a Limited Admission made on behalf of BP in the matter styled *August J. Levert, Jr., Family, LLC, et al., v. BP America Production Company, Docket No. 78953, Div. A, 18th JDC, Parish of Iberville, State of Louisiana*. The case is currently set for trial in June 2023. The Limited Admission pertains to the soils found beneath three (3) former pit locations within two (2) of the Limited Admission Areas (LAAs), as well as groundwater found in the discontinuous, shallow water bearing zones, as illustrated on Figure 6 and further defined below. The August Levert, Jr. Family, LLC et al. property (Property) is currently open water and undeveloped predominantly bottomland hardwood forest wetlands and capable of being utilized for only recreational or silviculture purposes.

History

The Property was subject to exploration and production in the Grand River Oil and Gas Field beginning in 1967, with production now ceased. The Plaintiffs filed suit in 2019 against BP America Production Company (BP) 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 October 21, 2022, BP entered a limited admission of liability for the environmental damage, as defined by La. R.S. 30:29, within LAAs 1, 2, and 3 as illustrated on Figure 6 and further defined below. Pursuant to the Order entered by the Court, on November 03, 2022, HET, on behalf of BP, is submitting this Plan for the remediation of the contamination that resulted in the environmental damage in LAAs 1, 2, and 3 to applicable regulatory standards. The Plan also serves in the best interest of the utilization, functionality, and aesthetics of the Property.

Reason for Assessment

ICON, on behalf of the landowners, conducted an investigation of the property between 2019 and 2022 and presented the results in the Expert Report and Restoration Plan for the Landowners dated July 29, 2022. HET conducted further assessment of the site beginning in June of 2022 to accurately determine the environmental conditions and conduct a more detailed evaluation to establish appropriate regulatory status of the site. HET is submitting this Plan to assist the LDNR with establishing the Most Feasible Plan (MFP) to protect the health, safety, and welfare of the people of the State of Louisiana as established in La. R.S. 30:29.

Site Characteristics

The Property is in a remote portion of Iberville Parish and accessible by boat only. The areas investigated were observed to be open water and undeveloped predominantly bottomland hardwood forest wetlands, as determined by CK Associates, LLC. The site has been observed as flooded numerous times during the investigations of the Property and the neighboring Iberville Parish School Board (IPSB) property. A series of barge canals have been dug to grant access to those historical exploration and production sites, with the spoil generated during the construction of the canals serving as limited and isolated elevated areas, some of which were formerly utilized for oilfield facilities. Portions of the Property outside of the canals have been designated by the U.S. Fish and Wildlife

Service (FWS) as freshwater forested/shrub wetland, because the area is characterized by woody vegetation that is six (6) meters tall or taller and is flooded for brief to extended periods of time.

The Property is located approximately nine (9) miles southwest of Plaquemine, Louisiana, in a low-lying portion of the Atchafalaya Basin, within the Deltaic Plain. Major surface water features are in the vicinity of the Property, including Willow Lake to the north and west, Sullivan Lake to the west, and the Upper Grand River to the east of the Property. The site is heavily wooded and surrounded by surface water bodies, borrow canals, and levees utilized for water drainage control and river channels, including the Upper Grand River, that comprise a portion of the major drainage basin in this area.

The LAAs that are the subject of this Plan are identified in Figure 6 and relate exclusively to the groundwater found in the discontinuous, shallow water bearing zones and the soils found beneath three (3) former pit locations within the operational areas associated with BP. Based on GIS mapping of the boring locations, the LAAs associated with former operational areas associated with BP correspond to the following sample locations.

- **LAA1 (Former Tank Battery Area Storage Facility Code 921900):** Groundwater at ICON monitor well LT-1.
- **LAA2 (LDNR Serial Nos. 121454 and 120453):** Soil and groundwater at ICON borings HA-1 and LT-2; ICON monitor well LT-2; and HET borings HA-1R and SB-17 to SB-24.
- **LAA3 (LDNR Serial No. 123040):** Soil and/or groundwater at ICON borings HA-2 and LT-3; ICON monitor well LT-3; and HET borings SB-01 to SB-16.

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

No ongoing sources have been identified, and the historic release source(s) are assumed for the purposes of this report to be associated with the exploration and/or production operations conducted within the LAAs, except for LAA1, where a source appears to have been the currently closed pit formerly located on the IPSB property. The source associated with LAAs 2 and 3 appear to be historical operations of the separate three (3) former oilfield pits. Data demonstrate that the source soils (i.e., constituent concentrations) do not extend outside of the bounds of the pit levees and appear to be limited and isolated in extent. Furthermore, the horizontal and vertical extents of constituent concentrations have been fully delineated horizontally and vertically to Statewide Order 29-B, Chapter 3 and RECAP screening standards in each of the three (3) LAAs.

Soil Type

According to the United States Department of Agriculture (USDA) Soil Survey of Iberville Parish (June 1977), soil types for the Property consist of the Fausse Association, now referred to as the Dowling Association on the USDA online database, and surface water bodies. Based on the root zone investigation by Matthew Greene with HET, however, soil types on the Property include the Barbary muck and Fausse clay with areas of dredged soil. Both soil types are very poorly drained and very slowly permeable soils found in low backswamp areas. The Fausse series is formed in clayey alluvium, while the Barbary series is formed in thin muck over clayey alluvium. Natural pH values for soils at the Property are listed as ranging from 6.1 to 8.4 for the Barbary muck and 5.6 to 8.4 for the Fausse soils.

Maximum Concentrations (Soil)

Surface concentrations of EC, SAR, and/or ESP were evaluated within the root zone as established by the work performed by Matthew Greene with HET. Subsurface concentrations of EC were evaluated for reference purposes only 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. Note that the salt-related constituents of EC, SAR, and/or ESP in this submerged wetland area are not subject to criteria under LAC 43:XIX.313 and were compared to the elevated wetland criteria for reference purposes only.

Laboratory analytical results from the HET and ICON investigations within the LAAs reported concentrations of EC and ESP as below the respective Statewide Order 29-B standards for elevated wetland settings (utilized in this submerged wetland area for reference and comparative purposes only). Soil samples reported a concentration of SAR in ICON soil borings HA-1 (14.8 at a depths of two (2) to four (4) feet BLS) in the split sample results, which is above the Statewide Order 29-B standard of fourteen (14) for elevated wetlands. The concentrations reported in HA-1 in LAA1 were not confirmed in the ICON split sample result or the HET soil boring HA-1R, installed as a reproduction of ICON soil boring HA-1. The SAR concentrations in HA-1 are in compliance with Statewide Order 29-B, do not relate to the effective root zone for the property, and have not impacted the actual vegetation, which is healthy and robust across the site, including within former operational areas/LAA's.

The concentrations of metals were evaluated on an "as received" or wet weight basis, with the exception of True Total Barium, in accordance with both Statewide Order 29-B and RECAP regarding exposure concentrations and risk-based RECAP standards. A majority of the concentrations detected within the LAAs are reported below the Statewide Order 29-B standards, with the exception of select concentrations of arsenic, True Total Barium, cadmium, chromium, lead, and zinc in HET soil borings SB-03, SB-04, or SB-12 at depths between zero (0) and four (4) feet BLS. The maximum concentration of arsenic was reported as 47.3 mg/Kg. The maximum concentration of True Total Barium was reported as 439,000 mg/Kg. The maximum concentration of lead was reported as 818 mg/Kg. The maximum concentration of cadmium was reported as 9.96 mg/Kg. The maximum concentration of chromium was reported as 517 mg/Kg. Finally, the

maximum concentration of zinc was reported as 1,606 mg/Kg. Furthermore, the maximum concentration of total barium was reported as 5,120 mg/Kg in ICON boring HA-2 at the zero (0) to two (2) foot interval. The majority of the reported metal concentrations were determined to be below the RECAP screening standards, with all but arsenic and lead being below the RECAP Management Option-1 (MO-1) standards.

With regard to hydrocarbons, a majority of the oil and grease concentrations detected within the LAAs are reported below the Statewide Order 29-B standard, with the exception of samples collected from ICON borings HA-1 and HA-2 and from HET borings SB-10, SB-11, and SB-17 to SB-20, with a maximum concentration of 12.4 percent reported in ICON boring HA-2 at the zero (0) to two (2) foot sample interval.

Limited concentrations of total petroleum hydrocarbons (TPH) were detected by ICON in borings HA-1, HA-2, and HA-3 and HET in borings SB-03, SB-04, SB-09 to SB-12, and SB-17. HET conducted additional analyses of hydrocarbon concentrations in accordance with RECAP, Appendix D. The assessment conducted by HET included the analyses of volatile and extractable range petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAH), which are more representative of site conditions in a human health risk assessment than the total petroleum hydrocarbons (diesel and oil range organics). In accordance with RECAP, the hydrocarbon fractions supersede the TPH values and are more representative of site conditions. Laboratory analytical results for hydrocarbon analyses reported all concentrations of volatile and extractable range hydrocarbon fractions (aliphatic and aromatic compounds) and PAH as below the conservative RECAP screening standards, with the exception of select extractable range hydrocarbon fractions and/or PAH indicator compounds in ICON boring HA-1 and HET borings SB-04 and SB-20. The maximum concentration of Aromatics C12-16 was reported as 208 mg/Kg in HET boring SB-04 at the zero (0) to two (2) foot sample interval. The maximum concentration of Aromatics C16-21 was reported as 168 mg/Kg in HET boring SB-20 at the zero (0) to two (2) foot sample interval. The maximum concentration of Aromatics C21-35 was reported as 875 mg/Kg in ICON boring HA-1 at the zero (0) to two (2) foot sample interval. The maximum concentration of the PAH indicator compound 2-methylnaphthalene was reported as 4.01 mg/Kg in HET boring SB-04 at the zero (0) to two (2) foot sample interval. Each of the reported concentrations, however, was below the respective RECAP MO-1 standards as evaluated below.

Based on laboratory analytical data from soil samples collected during both the HET and ICON investigations, the vertical and horizontal extents of evaluated constituent concentrations have been fully defined to Statewide Order 29-B and RECAP screening standards as evaluated below. The elevated concentrations are subject to pit closure activities as proposed below as part of the Most Feasible Plan (MFP).

Maximum Concentrations (Groundwater)

Laboratory analytical results from groundwater samples collected from temporary monitor wells installed within the first encountered groundwater zone across the site reported concentrations of chlorides, TDS, hydrocarbon related parameters, and/or select metals (arsenic, barium, chromium, iron, lead, manganese, and selenium) above the comparative RECAP screening or EPA drinking water standards. These standards were evaluated for comparison purposes as a conservative evaluation because these standards assume a classification of the shallow water bearing zone as drinking water, which does not apply to the shallow, discontinuous zones encountered beneath the property. Furthermore, the elevated constituent concentrations are mainly chloride-related, with no source soils identified on the Property as defined by RECAP. Note that laboratory analyses of SPLP demonstrate that the remnant constituent concentrations in the soil are below the threshold considered to result in cross-media transport and limited to depths less than four (4) feet BLS. Therefore, there does not appear to be ongoing sources, and the LAAs are in declining conditions as defined by RECAP.

Elevated chloride and TDS concentrations above background tolerances range upward of 12,400 ppm and 24,900 ppm, respectively, in groundwater samples collected from ICON temporary monitor well LT-1 (11-16') in LAA1. Hydrocarbon concentrations reported in total petroleum hydrocarbons were not confirmed in the fraction and indicator compound analyses in the groundwater, with reported concentrations as below laboratory detection limits and RECAP screening standards. Finally, combined radium 226 and 228 concentrations that Dr. Frazier determined not to be associated with oilfield NORM were reported in groundwater samples collected from LT-1 in LAA1 only.

With regard to metal concentrations, arsenic, barium, chromium, lead, and selenium concentrations were reported above the conservative RECAP screening standards. HET considered the maximum concentration of all constituents in the groundwater for further evaluation under RECAP despite the fact that dissolved metal analyses are typically more representative of actual conditions, especially given the temporary nature of the monitor wells installed as part of the investigations conducted to date. Furthermore, the reported concentrations of arsenic, iron, and manganese were reported in a vast majority of sample results, including those without chlorides or other compounds typically evaluated as part of oilfield assessment, thus demonstrating that these constituents are consistent with natural conditions rather than oilfield sources.

Therefore, elevated concentrations of chloride and TDS upward of 12,400 ppm and 24,900 ppm, respectively, as well as arsenic upward of 0.301 ppm, barium upward of 5.02 ppm, chromium upward of 0.274 ppm, lead upward of 0.0195 ppm, and selenium upward of 0.0796 ppm above the respective RECAP screening standards of 0.010 ppm, 2.0 ppm, 0.10 ppm, 0.015 ppm, and 0.05 ppm were conservatively further evaluated in a risk assessment. Furthermore, the elevated concentrations are subject to groundwater monitoring activities as proposed below as part of the MFP.

Free Product Conditions

No phase separated hydrocarbons or surface water sheens were identified during the investigations conducted by HET and ICON.

Potential Receptors

In Iberville Parish, the MRVA, locally known as the Plaquemine aquifer, can be utilized as a source of groundwater regionally in developed areas of the Parish. The MRVA in this area contains groundwater water quality that is poor and contains large concentrations of iron, magnesium, and calcium. In and around the vicinity of the site, no wells are screened in the MRVA. Review of electric log data indicates that the MRVA occurs at a depth greater than 100 feet BLS in and around the Property. Therefore, no impacts to groundwater resources have been identified. Furthermore, a review of the LDNR Groundwater Resources Division well registration data files indicated that no water wells have been installed within a one (1) mile radius of the Property and that the shallow water bearing zones encountered at depths less than twenty (20) feet BLS were not utilized as a source of drinking water.

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 and restoration of groundwater in the shallow aquifer to either background groundwater concentrations or to surface water quality criteria. The costs associated with the ICON proposed plan are estimated to range from $26,234,901.00 to $37,081,357.00. 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.

BP proposes a comprehensive plan for remediation of soils at the three (3) historical pit locations within LAAs 2 and 3. Furthermore, the plan recommends Monitored Natural Attenuation (MNA) for groundwater in consideration of the RECAP standards. The groundwater within LAA1 is being evaluated as part of the chloride plume associated with the adjacent IPSB property currently being evaluated under direction of the Department under LDNR Conservation Order Nos. 018-024-001, 018-024-003, and 018-024-004. The proposed plan is a conservative option in accordance with department policy to physically close the pits in accordance with Statewide Order 29-B, Chapter 3 pit closure standards without exception based on the reasons stated below. As a result, costs to conduct the proposed closure activities of the former three (3) pits in LAAs 2 and 3, as well as groundwater monitoring for a period of one (1) year post-closure, are estimated to be $1,171,399.80.

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No.

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1.0: INTRODUCTION

Hydro-Environmental Technology, Inc. (HET) has conducted a thorough environmental assessment of the August Levert, Jr., et al. (August Levert) property (the "Property) and submits this Plan as the Most Feasible Plan for the remediation of the Limited Admission Areas (LAAs) in compliance with the rules of the Louisiana Department of Natural Resources , Office of Conservation (LDNR). The Plan was prepared in connection with a Limited Admission made by BP America Production Company (BP) in the case entitled *August Levert, Jr., et al., v. BP America Production Company, 18th Judicial District Court for the Parish of Iberville, Docket No. 78953, Division "A"*. 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 Plaintiffs.

This Plan includes information provided by the following experts: 1) Stewart "Smokey" L. Stover, Jr., Principal Hydrogeologist with HET, 2) Brent T. Pooler, Principal Risk Analyst and Senior Hydrogeologist with HET, 3) Matthew L. Greene, Environmental Scientist with HET, 4) Wade L. Bryant with CK Associates, LLC (CK Associates), 5) Dr. Helen Connelly, Ph.D. with Environmental Resource Management (ERM), 6) Dr. B.H. Kueper, Ph.D. and 7) Dr. Michael West, Ph.D. with B. Kueper & Associates, Ltd., and 8) Dr. John Frazier, Ph.D., an independent Health Physics Consultant. More detailed information on the qualifications of these experts is outlined in Section 1.3 below, with the resumes included in Appendix A.

The work conducted by HET to date has included oversight of field activities performed by consultants on behalf of the Plaintiffs and the completion of an independent assessment or 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 the western adjacent property, referred to as the *State of Louisiana and the Iberville Parish School Board v. BP America Production Company, et al. (IPSB) (18th Judicial District Court, Division "A", Docket No. 72605, LDNR Legacy Project No. 018-024)* property as described in more detail below.

The investigation conducted by HET was performed in accordance with applicable and appropriate regulations, including Statewide Order 29-B per the LDNR 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 LDNR Office of Conservation, Environmental Division for the evaluation of oilfield sites under Statewide Order 29-B pursuant to LAC 43:XIX.313.D and 43:XIX.319, the memorandum of understanding between the LDNR and the LDEQ dated February 2011, and the provisions of Act 312 which incorporate the use of all appropriate regulations. Furthermore, data presented in this Plan, as well as information from other consultants, have been submitted to LDNR under Office of Conservation Legacy Project No. 018-028 per the requirements outlined in Act 312 for the evaluation of oilfield sites 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 the reasonably intended future 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 is in a remote section of Iberville Parish that is accessible by boat only, typically docking at Jack Miller's Landing located at the terminus of Belleview Drive, west of Plaquemine, Louisiana. The entrance to the Property is located approximately 1.9 miles south of the landing along Grand River/Intracoastal Waterway and thence approximately 0.8 of a mile west of the Intracoastal Waterway along oilfield access canals. The Property encompasses an irregular section that is geographically located in the North-Half of Fractional Section 15, Township 10 South, Range 11 East in Iberville Parish, Louisiana. Note that there is a discrepancy in the topographic section lines and the Iberville Parish Tax Assessor property lines. As a result, HET relied upon the Iberville Parish Tax Assessor information to depict the property boundary. Figure 1 contains a topographic map of the Property. Figure 2 contains a 1953 historic topographic map of the same.

The Property consists of a series of predominantly bottomland hardwood forest wetlands, as determined by CK Associates, LLC (Appendix I), with the natural state waterways of Willow Lake located along the western portion of the Property. Barge canals have been dredged to grant access to those historical exploration and production sites, with the spoil generated during the construction of the canals serving as limited and isolated elevated areas, some of which were formerly utilized for oilfield facilities. In addition to the wetland delineation of the Property, a separate root zone study was performed by Matthew Greene with HET. Furthermore, portions of the Property outside of the canals have been designated by the U.S. Fish and Wildlife Service (FWS) as freshwater forested/shrub wetland since the area is characterized by woody vegetation that is six (6) meters tall or taller and is flooded for brief to extended periods of time. The site is currently utilized for recreational camping, fishing, and hunting only due to the remote nature of the site, the dense vegetation, and the lack of access. Finally, the site and surrounding areas, other than isolated sections of spoil banks, have been observed as flooded numerous times during HET's investigations, spanning from the first quarter of 2016 to the second quarter of 2021. Figure 3 contains a 2020 aerial photograph of the site. Figure 4 illustrates the extent of wetland as obtained from the FWS. Figure 5 depicts the results of the wetland delineation performed by CK Associates.

No areas of stained surfaces or distressed vegetation were observed during the investigation. To the contrary, healthy wetland vegetation was observed throughout the Property, with former operational areas currently consisting of heavily overgrown vegetation. The site appeared to be in good condition and utilized for its intended purposes. Appendix G contains photographs of the site.

1.2: Litigation Status and Limited Admission Areas

This Plan is submitted in connection with a Limited Admission made on behalf of BP on October 26, 2022. The case is currently set for trial in June 2023. BP's Limited Admission applies to soil associated with three (3) former pit locations in LAAs 2 and 3. With respect to groundwater, the Limited Admission pertains to the discontinuous, shallow water bearing zones found at LAA1 that are associated with the emanating plume from the adjacent IPSB property, as well as the groundwater in the discontinuous, shallow water bearing zones found beneath the former pit locations at LAAs 2 and 3, as illustrated on Figure 6 and further defined below. Data obtained to date pertaining to the Property and the adjacent IPSB property

demonstrate clearly that groundwater conditions at each of the LAAs are distinct and unrelated to each other.

This Plan presents the results of the investigations performed on the Property to date, with a focus on the results pertaining to the operational areas associated with BP as defined below. The following LAAs, as they pertain to the select oil and gas well locations as depicted on Figure 7 and samples collected to date as illustrated in Figure 8, are defined in the text table below:

Limited Admission Areas and Associated Sample Locations
August Levert Property
Grand River Oil and Gas Field

Area	Associated Operational Area	Media	Associated Borings and/or Monitor Wells
1	Former Tank Battery Storage Facility Code 921900	Groundwater	ICON monitor well LT-1
2	LDNR Serial Nos. 121454, 120453	Soil, Groundwater	ICON borings HA-1 and LT-2; ICON monitor well LT-2; and HET borings HA-1R and SB-17 to SB-24
3	LDNR Serial No. 123040	Soil, Groundwater	ICON borings HA-2 and LT-3; ICON monitor well LT-3; and HET borings SB-01 to SB-16

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 LDNR and LDEQ. Copies of the resumes 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 over twenty-five (26) years of experience in conducting hydrogeologic investigations and implementation of soil and groundwater restoration plans. Additionally, Mr. Pooler has over twenty-four (25) 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.

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 LDNR 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.

Wade Bryant is a Senior Environmental Scientist with CK's Ecological Team and comes to CK after twenty-five (25) years of federal service. Mr. Bryant was a Senior Ecologist with the U.S. Geological Survey for twenty-two (22) years and worked for the U.S. Fish and Wildlife Service Division of Environmental Contaminants and the Division of Refuges. Mr. Bryant spent four (4) years as a science advisor to the

Federal On-Scene Coordinator for the Deepwater Horizon Oil Spill. Prior to 2010, Mr. Bryant led integrated assessments of stream ecosystem health for a national-scale federal program. These assessments included the evaluation of effects of alterations in hydrology and stream habitat, nutrient enrichment, pesticides, heavy metals, and PAHs on the stream biota. Mr. Bryant has expertise in the design and implementation of aquatic monitoring programs, wetland ecology, ecological risk assessment, and statistical analysis/modeling. Mr. Bryant has extensive experience providing technical support to federal agencies, including U.S. Coast Guard, NOAA Office of Response and Restoration, Bureau of Safety and Environmental Enforcement, USFWS Endangered Species Program, Department of Interior Section 106 Compliance Office, and the Department of Justice.

Dr. Helen Connelly is a toxicologist and ecological and human health risk assessor. Dr. Connelly has a Bachelor of Science degree in geology from Louisiana State University and a Ph.D. from Louisiana State University School of Veterinary Medicine, Department of Physiology, Pharmacology and Toxicology. Dr. Connelly is an adjunct professor at Louisiana State University in the Department of Environmental Science. Dr. Connelly has taught graduate and undergraduate classes in environmental science, environmental sampling, conservation biology, ecology, biology, and ERA at Louisiana State University and Baton Rouge Community College. She has been a mentor for many students receiving their graduate degrees in natural sciences over the years. For almost twenty (20) years, she has been involved with research and investigation of the effects of oil and gas production and exploration on aquatic and terrestrial life in Louisiana wetlands, lakes, bayous, estuaries, and other water bodies. Dr. Connelly is a member of the Society of Environmental Toxicology and Chemistry (SETAC) and the Baton Rouge Geological Society. Dr. Connelly began working for the LDEQ in 1991 in the Inactive and Abandoned Sites Division and it was at LDEQ that she became interested in ERA. After obtaining her Ph.D. in 1997, she worked as an environmental consultant first for Michael Pisani and Associates and then ERM, while also teaching concurrently. Dr. Connelly's research investigations have been a part of her consulting work and have been focused on ERA of the effects of organic and inorganic compounds, including metals and hydrocarbons associated with oil and gas production and exploration, on vegetation and wildlife.

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.

Dr. Michael West has a Bachelor of Science in Civil Engineering (environmental option) and Ph.D. in contaminant hydrology from Queen's University at Kingston, Ontario, Canada. Dr. West is an hydrogeologist with B. Kueper & Associates, Ltd., where his work focuses on site characterization, source zone delineation, development of geology models, analytical modeling, numerical modeling, and the analysis and design of groundwater remediation systems. Dr. West has twenty-four (24) years of experience in the field of contaminant hydrology and subsurface remediation.

Dr. John Frazier is an expert in health physics - the scientific discipline of measuring radiation and protecting people from the harmful effects caused by high doses of radiation. His academic degrees include a B.A. in physics, M.S. in physics, and Ph.D. in physics (with emphasis in health physics and radiation protection). Dr. Frazier has over forty-five (45) years of professional experience in health physics, primarily in the areas of environmental dose assessments, external and internal radiation dosimetry, environmental sampling and analysis, and radiation detection and measurement. Dr. Frazier has earned Comprehensive Certification by the American Board of Health Physics (ABHP) and is the past president and a Diplomate of the American Academy of Health Physics. The term "Certified Health Physicist" is a certification mark that may only be used by individuals who have received Comprehensive Certification by the ABHP. Certification in health physics by the ABHP is the same as professional certification by other recognized professional organizations, such as certification in diagnostic radiological physics by the American Board of Radiology. He is an elected member of the National Council on Radiation Protection and Measurements

(NCRP) and a Fellow and a past president of the Health Physics Society and has extensive experience performing radiological characterization surveys of property, assessing external and internal radiation doses from natural and man-made radiation sources, and reviewing/assessing operational data generated by facilities that are licensed to possess and use radioactive materials and other radiation sources. Over the past nineteen (19) years, Dr. Frazier has performed numerous radiological assessments of soil and groundwater on properties for oilfield NORM and has evaluated current and past radiation exposure conditions on properties impacted by oilfield NORM. Finally, Dr. Frazier has been qualified by numerous courts as an expert in health physics.

1.4: Exploration History

According to the LDNR database, five (5) wells were drilled on the Property as part of the overall exploration of the Grand River Oil and Gas Field. Midwest Oil Corporation and Amoco Production Company, predecessors to BP, operated wells between 1967 and 1985, being the Schwing-Levert #001 (LDNR Serial No. 120453), the Schwing-Levert #001-D (LDNR Serial No. 121454), and the Schwing-Levert #002 (LDNR Serial No. 123040). The Schwing-Levert Well Sites and the Tank Battery were plugged, abandoned, and decommissioned by 1997. Note that the Tank Battery was decommissioned through the LDNR Orphan Fund program.

Figure 7 contains a 1968 aerial photograph illustrating the approximate locations of wells drilled on the Property. Text Table 1 on the following page contains a list of the wells included in the LAAs, as well as the current status, spud date (defined as the date of commencement of drilling activities), date of plugging and abandonment, if applicable, and last operator of record, as obtained from the LDNR SONRIS online database for reference purposes.

Text Table 1
Exploration and Production History
August Levert Property
Grand River Oil and Gas Field

LDNR Serial Number	Limited Admission Area	Well Name	Well No.	Current Status	Spud Date	P&A Date	Last Operator or Record
Former Tank Battery Area	LAA1	Storage Facility Code 921900	N/A	N/A	N/A	N/A	Sun Resources, Inc.
120453	LAA2	Schwing-Levert	001	30	07/16/1967	08/06/1996	Sun Resources, Inc.
121454	LAA2	Schwing-Levert	001-D	30	07/16/1967	08/06/1996	Sun Resources, Inc.
223315	N/A	Schwing-Levert	001	30	12/10/1999	05/03/2001	Tellus Operating Group, LLC
228188	N/A	Schwing-Levert	001	29	06/02/2003	08/23/2003	LLOG Exploration Company, LLC
123040	LAA3	Schwing-Levert	002	30	01/17/1968	02/21/1997	Sun Resources, Inc.

Spud - date that the well was drilled
N/A - Not Applicable
29 - dry and plugged
30 - plugged and abandoned

1.5: Review of Previous Investigations

The LAAs are a portion of the larger Property comprising approximately fifty-seven (57) total acres. Environmental media in the form of soil and groundwater on the Property have been sampled in a series of efforts by ICON and HET. The following discussion provides an overview of sampling across the Property, including the LAAs. In addition, ICON and HET have performed certain sampling on the IPSB property, immediately adjacent to the Property. Copies of the reports prepared by other parties not included here within may be provided separately by counsel or at the request of the LDNR.

ICON performed an assessment of the Property on behalf of the Plaintiffs as part of the litigation and presented its conclusions in the Expert Report and Restoration Plan for the Landowners dated July 29, 2022. A copy of the report prepared by ICON is attached as Appendix J for reference. The investigation conducted by ICON included the installation of a series of conductivity probes, soil borings, and monitor wells between August 2019 and June 2022. HET conducted oversight and collected split samples as volume allowed during ICON's investigation. HET has reviewed all available data to determine the

regulatory status and natural conditions of the site, including sample results from split samples collected by HET. A review of the data is presented below in Section 3.0. Appendix R contains HET's field notes generated during all investigations of the Property to date. Additionally, Dr. William J. Rogers and Charles R. Norman issued separate reports regarding toxicology and oilfield engineering and operations, respectively.

Figure 9 depicts the locations of borings and monitor wells installed by ICON as part of its overall assessment of the Property. Tables 1 to 6 contain analytical summaries for soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling parties. Tables 7 to 14 contain analytical summaries for groundwater samples collected in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling parties. Table 15 contains a summary of x-ray diffraction or bulk mineralogy results. Each of the above referenced tables summarizes data from all parties, including split sample results. Appendix D contains a copy of the boring logs for soil borings installed by ICON and observed by HET.

1.6: BP Investigations

Between June 14 and July 29, 2022, HET conducted an additional independent investigation of the Property. All sampling and testing were performed in accordance Statewide Order 29-B, and where appropriate RECAP. The investigation conducted by HET included the installation of a series of pit characterization and delineation borings within the LAAs. ICON, as representatives of the Plaintiffs, conducted oversight of all sampling activities and collected split samples for select analyses. The results of the investigation conducted by HET, as well as data generated during the investigation performed by ICON, are incorporated into the overall evaluation of site conditions as described in more detail below.

Figure 10 illustrates the locations of borings installed by HET within the LAAs. Tables 1 to 6 contain analytical summaries for soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling parties. Tables 7 to 14 contain analytical summaries for groundwater samples collected in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling

parties. Table 15 contains a summary of x-ray diffraction or bulk mineralogy results. Each of the above referenced tables summarizes data from all parties, including split sample results. Appendix D contains a copy of the boring logs for soil borings installed by HET.

1.7: Review of IPSB Investigation

As part of the evaluation of the Property, HET reviewed the investigations and remedial activities conducted on the adjacent IPSB property to the west, which is set within the same geological setting and overall depositional environment as the subject property. Given the proximity of the sites to each other, the methods of remediation (i.e., pit closure), as well as the applicable regulatory standards, including groundwater classification as GW_3, as established on the IPSB property, would also pertain to the subject property.

The IPSB property has been subject to separate investigations conducted by ICON, on behalf the plaintiffs, and HET, on behalf of the defendants, in the settled lawsuit styled *State of Louisiana and the Iberville Parish School Board v. BP America Production Company, et al.* (18th Judicial District Court for the Parish of Iberville, Docket No. 72,605, Division "A"). HET, on behalf of BP, W&T Offshore, Inc., and Houston Oil & Gas, conducted additional investigative activities to further evaluate the environmental conditions upon settlement under direction of the LDNR as part of the overall response to Conservation Order Nos. 018-024-001, 018-024-003, and 018-024-004. Results of the IPSB property assessment activities conducted by HET and ICON, as well as Dr. Frazier, Mr. Arville Touchet, and Dr. Holloway, were summarized and submitted by HET in a Site Assessment Report dated October 13, 2017, in a Delineation Assessment Report dated March 07, 2022, and in a Pit Closure Report dated September 08, 2022. The LDNR has approved the HET reports. Copies of the reports prepared by HET or other parties may be provided separately by counsel or at the request of the LDNR.

In September and October of 2021, HET conducted decommissioning, remediation, and pit closure activities for seven (7) areas near historical oil and gas exploration and production areas on portions of the IPSB property. The closure activities were conducted to address elevated constituent concentrations and/or to conduct pit closure activities in an effort to reach confirmed closure status for six (6) unregistered, historical oilfield pits and one (1) former tank battery.

Two (2) of the remediated areas were located on the eastern edge of the IPSB property, adjacent to the subject property and ICON soil borings LT-1 and HA-4. As further discussed below in Section 5.3, elevated concentrations of salt parameters were reported in the soil and groundwater within the water bearing zone only at ICON soil boring/monitor well LT-1. Based on a review of the historical aerial photography and the results of the IPSB and August Levert investigations, the elevated concentrations reported in ICON soil boring and monitor well LT-1 appear to be the result of COCs associated with the plume identified in association with the historical operations located on the IPSB property and the subject property. Appendix K contains reports and associated correspondence generated during the assessment and pit closure activities conducted at the IPSB property.

1.8: Introduction to the Plan

As discussed and defined below, this Plan presents a comprehensive review of all data associated with the LAAs to establish the most feasible plan 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 LAAs 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).

In LAAs 2 and 3, BP proposes to conduct source soil removal to meet LDNR policy with regard to physical closure of three (3) pits and to meet applicable human health and ecologic risk assessment standards, as further discussed below in Section 7.0. With regard to groundwater, BP proposes Monitored Natural Attenuation (MNA) in LAAs 1, 2, and 3 in consideration of the RECAP standards as calculated in Section 5.3 below.

Statewide Order 29-B, Chapter 6 (Section 611.F.1) provides for the submission of a plan that complies with all the provisions of Statewide Order 29-B, exclusive of Sections 313.D and 319. BP's plan for soils addresses all exceedances of Section 313 and will restore soil conditions in accordance with

Statewide Order 29-B, Chapter 3 standards. BP's proposal with regard to groundwater contemplates MNA, which BP submits is fully compliant with Statewide Order 29-B, Chapters 3 and 6.[1]

Should the LDNR wish to evaluate a hypothetical plan for active remediation to address groundwater conditions, Appendix J contains a groundwater pump and treat plan as prepared by ICON that is considered by BP as not feasible, as explained in more detail in the report prepared by Dr. Kueper contained in Appendix L. This alternate groundwater plan is not required by Statewide Order 29-B and is being submitted for the LDNR's review only to meet any arguable technical requirements for filing under the procedures of the LDNR. Such a plan is not necessary based on the nature and extent of conditions at the sites. The alternate plan to address groundwater is not endorsed by the authors or suggested in any fashion 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. Moreover, it should be noted that the emanating groundwater plume from the adjacent IPSB property is being addressed at the direction of the LDNR per separate Conservation Order Nos. 018-024-001, 018-024-003, and 018-024-004 as discussed above in Section 1.7.

[1] Section 309 of 29-B provides that a groundwater monitoring program can be a fully compliant plan. Prior LDNR practice has involved presentation by relevant parties, and evaluation by the LDNR, of active groundwater remediation options targeting background or other acceptable criteria. As set forth in the analysis of BKA in Appendix L, 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 J). That option was deemed unreliable and infeasible. It was considered and is noted here for LDNR reference and as a matter of due diligence. Such a plan is not adopted, endorsed, or proposed by BP.

2.0: GEOLOGICAL SETTING

The Property investigated is located approximately nine (9) miles southwest of Plaquemine, Louisiana, in a low-lying portion of the Atchafalaya Basin, within the Deltaic Plain. Major surface water features are in the vicinity of the property, including Willow Lake to the north and west, Sullivan Lake to the west, and the Upper Grand River to the east of the property. The site is heavily wooded and surrounded by surface water bodies, borrow canals, and levees utilized for water drainage control and river channels, including the Upper Grand River, that comprise a portion of the major drainage basin in this area.

2.1: Topography and Drainage

The Geologic Map of Louisiana, Baton Rouge Quadrangle Map (2000), indicates that surface topography at the Property is controlled by distributary complexes of the Atchafalaya River (Figure 11). These Holocene cyclic deltaic deposits consist of primarily backswamp deposits that collectively formed the varying topography across the site. Based on the USGS topographic map of the Grand River Oil and Gas Field, surface elevations range from sea level to just above sea level along the areas outside of the drainage basin. As expected, based on the field observations, the USGS depicts this property as a swamp. Figure 12 contains a LIDAR map of the property illustrating the changes in elevation across the investigation area.

According to the United States Department of Agriculture (USDA) Soil Survey of Iberville Parish (June 1977), soil types for the Property consist of the Fausse Association, now referred to as the Dowling Association on the USDA online database, and surface water bodies. Based on the root zone investigation performed by Matthew Greene with HET, however, soil types on the property include the Barbary muck and Fausse clay with areas of dredged spoil, as further discussed below in Section 4.1. Both soil types are very poorly drained and very slowly permeable soils found in low backswamp areas. The Fausse series is formed in clayey alluvium, while the Barbary series is formed in thin muck over clayey alluvium. Natural pH values for soils at the Property are listed as ranging from 6.1 to 8.4 for the Barbary muck and 5.6 to 8.4 for the Fausse soils. Figure 13 illustrates the soil types on the properties as defined by the USDA.

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). Figure 14 illustrates the extent of the regional subsegments, including subsegment 120107, in which the site is situated.

2.2: Depositional Environment

Depositional environments of Holocene sediments control the geologic framework of near surface and subsurface deposits underlying this portion of Iberville 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 Mississippi 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; and Saucier, 1977). Varying relict depositional sequences of channel courses occur within these meander belts across this area. The depositional environment at the site consists of predominantly backswamp and natural levee deposits, which consist mainly of clay. These overbank deposits formed the confining unit overlying the sands of the Mississippi River alluvial aquifer.

2.3: Regional Hydrogeology

According to the LDEQ Aquifer Recharge Potential Map (Baton Rouge Quadrangle), the Property is in an area that does not recharge major Louisiana freshwater aquifers. A confining clay unit with some silts and sands occurs at the surface and forms the surficial confining unit of the Mississippi River alluvial aquifer (MRVA), which underlies the property and surrounding areas within Iberville Parish. The Geologic Map of Louisiana (1984) shows the site as within the Deltaic Plain, consisting of alluvium sediments derived from Red or Mississippi River deposits.

In Iberville Parish, the MRVA, locally known as the Plaquemine aquifer, can be utilized as a source of groundwater. Groundwater public supplies are limited in this area, and surface water is utilized for the majority of water needs, such as industrial and power generation. The MRVA in this area contains groundwater water quality that is poor and contains large concentrations of iron, magnesium, and calcium. Recharge to this aquifer is accomplished directly by infiltration of rainfall over the river valleys and upward vertical movement from underlying aquifers. In and around the vicinity of the site, no wells are screened in the MRVA. Review of electric log data indicates that the MRVA occurs at a depth greater than 100 feet BLS in and around the Property. Review of electric log data from 1953 to 1954 in the area also indicates that the base of the fresh water occurs at depths ranging from 275 to 305 feet BLS. Regional studies by Whiteman (1972) confirm these findings and indicate that the base of freshwater could be as shallow as 210 feet BLS.

2.3.1: Aquifer Utilization and Potential Receptors

Except for monitor wells installed as part of the HET investigation on the neighboring IPSB property, a review of available databases indicates that no water wells are registered with the state of Louisiana or have been drilled within a one (1) mile radius of the property and that the shallow water bearing zones within the surficial confining unit are not utilized as a source of drinking water. Figure 15 illustrates the locations (or lack thereof) of registered water wells within a one (1) mile radius of the site.

2.4: Surficial Confining Unit Water Bearing Zones

The surficial confining unit is composed of deposits that contain mostly clay and organics with some silty clays, that form an aquitard over the Mississippi River alluvial aquifer. Selective silts occur locally to form water bearing units, which are discontinuous and occur at various depths within this confining unit and produce very little to no groundwater. Regional depositional patterns will control the extent, thickness, and distribution of these water bearing units.

2.5: Site Hydrogeology

The near surface hydrogeologic and depositional environments at the site were determined from borings and monitor wells installed at the site by HET and ICON to a maximum depth of twenty-eight (28) feet BLS. Observations and lithologic interpretation from borings installed at the site indicate that the site hydrogeology is dominated by low energy backswamp and lacustrine deposits that are predominantly clay. Discontinuous silt lenses of varying thicknesses with low moisture content are present at the site and typically occur at depths greater than ten (10) feet BLS. Underlying the confining unit are the sands of the MRVA, which were not encountered during ICON's or HET's investigation. Figure 16 contains lithologic cross section A-A' depicting the near surface hydrogeology at the August Levert and IPSB properties. Appendix D contains a copy of geologic boring logs generated during HET's and ICON's investigations.

2.6: Aquifer Characteristics

The groundwater classification of GW_{3NDW} was established and approved by the LDNR during the investigation of the IPSB property. Appendix K contains the reports generated for the adjacent IPSB property. The lithology and groundwater yields observed on both the Property and the IPSB property are identical. Note that the groundwater classification is not in dispute as ICON incorporated the yield data from the adjacent IPSB property in its Expert Report for this case, thus adopting the conclusion that yield from the shallow water bearing zone ranged from 108 gallons per day (gpd) to 281 gpd, resulting in a RECAP groundwater classification of GW3A: *"Groundwater within an aquifer that is sufficiently permeable to transmit water to a well at a maximum sustainable yield of less than 800 gpd."* Similarly, HET has incorporated the information from aquifer testing on the IPSB property that was conducted on October 13, 2015. During the previous aquifer evaluation, HET conducted aquifer tests (slug tests) of four (4) of the monitor wells installed by HET (MW1, MW4, MW5, and MW6) on the neighboring IPSB property. The slug tests were conducted by introducing a solid stainless-steel slug into the well and then recording the changes in water level through time using a submersible data level logger, with the data retrieved from the logger upon the completion of each test.

Data gathered in the field was then evaluated following the methods recommended in Table F-2 in the LDEQ RECAP document. For slug tests conducted of unconfined or leaky aquifers, the LDEQ

recommends utilizing the Bouwer and Rice (1976) method to estimate the hydraulic conductivity of the aquifer penetrated by the monitor well. Based on the site lithology identified during the installation of soil borings by HET, the shallow water bearing zone was determined to consist of a leaky aquifer. Excel spreadsheets developed by the United States Geological Survey (USGS) for these aquifer test methods were utilized in the data evaluation. Appendix K contains the above referenced aquifer test data for slug tests performed by HET as part of the 2017 Assessment Report of the IPSB property.

The average hydraulic conductivity (K) determined from slug tests from the four (4) HET monitor wells tested reported a value of 0.245 feet/day, with K values ranging from 0.013 feet/day (MW4) to 0.890 feet/day (MW6). The estimated well yield for the shallow water bearing zone was calculated following the equation presented in Appendix G, Figure 3 of the LDEQ October 20, 2003, RECAP Document. The estimated well yields for the shallow water bearing zone averaged thirty-one (31) gallons per day (gpd), assuming an average thickness of the saturated zone of around two (2) feet.

Based on a review of the data obtained from aquifer testing of the shallow water bearing zone, the first shallow water bearing zone beneath the Property would be 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 sampling activities demonstrates that the shallow silts zone is incapable of yielding 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 hydraulically connected to the deeper drinking water zones of the regional Plaquemine aquifer; and 3) surface water bodies in this region of Iberville Parish are not utilized as sources of drinking water. The groundwater classification of GW_{3NDW} at the IPSB property was evaluated in HET's Site Assessment Report dated October 13, 2017, and subsequently approved by the LDNR in correspondence dated March 15, 2018.

3.0: INVESTIGATION DESCRIPTION

Between June 14 and September 27, 2022, HET conducted an additional assessment of the Property. All sampling and testing were performed in accordance Statewide Order 29-B, and where appropriate RECAP. The investigation performed by HET included the installation of a series of pit characterization and delineation borings for the collection of soil within the LAAs. ICON, as representatives of the Plaintiffs, observed all field work and collected split samples during HET's investigation of the Property.

All drilling conducted by HET was done in accordance with the Louisiana Department of Transportation and Development (LADOTD)/LDEQ regulations regarding soil boring installation. HET (WWC-416) is a licensed water well contractor in the State of Louisiana. All samples submitted for laboratory analysis were analyzed in accordance with applicable regulatory requirements including, where applicable, the latest revision of DNR laboratory procedures manual titled "Laboratory Procedures for Analysis of Exploration and Production Waste." All laboratory analyses were performed by a DEQ 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: Soil Boring Installation

HET installed twenty-six (26) soil borings, including reproduction borings, on site as part of the evaluation of the former pit locations within the LAAs on the Property. Figure 10 illustrates the locations of soil 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 to assess areas of potential concern, to further evaluate/confirm the information presented by ICON during its investigation of the site, to horizontally and/or vertically delineate the constituents of concern, and/or to determine the appropriate regulatory status under Statewide Order 29-B and RECAP. 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. The complete geologic logs with photoionization

detector (PID) and electrical conductivity (EC) meter readings for borings and monitor wells installed, as well as the geophysical logs, are contained in Appendix D.

The borings were installed by either direct push or hand auger technology. Borings installed via direct push 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 marsh master mounted Geoprobe drill rig. All core barrels, bits, and sampling equipment utilized in the boring installation were properly decontaminated and cleaned prior to each drilling activity. In addition, new, disposable nitrile gloves were utilized during sample collection.

3.2: Soil Sample Collection

Continuous soil samples were obtained from a direct push core during the installation of borings via direct push core barrel with dedicated, interior liners for each interval sampled. A representative sample was obtained from the soil core on two (2) foot intervals for lithologic description and screened in the field by head space analysis using an Ion Science® PID. In addition, each interval was screened in the field for chloride concentrations by a field EC meter. The complete geologic boring logs with PID and EC readings for all borings and monitor wells are contained in Appendix D.

Soil samples were retained for laboratory analyses on two (2) foot intervals at the total depth (TD) of the boring, at a depth in which the soil/water interface was encountered, and/or at a depth in which field observations indicated the potential presence of constituents of concern from land surface to fifteen (15) feet BLS and from fifteen (15) feet BLS to the total depth of the borehole. All soil samples were properly containerized, labeled, chilled, and transported under chain-of-custody records to Waypoint Analytical, Inc. in Marrero, Louisiana; SGS North America, Inc. in Scott, Louisiana; and Core Minerology, Inc. in Broussard, Louisiana, for the select composite or discrete analyses of the parameters listed below. Appropriate detection limits were obtained by laboratory personnel on all parameters for application to LDNR Statewide Order 29-B or RECAP, as appropriate.

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

2. cation exchange capacity (CEC) by Environmental Protection Agency (EPA) SW-846 Method 9081

3. total chlorides and sulfates by EPA SW-846 Method 9056A

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

5. metals by EPA SW-846 Method 6010B/7471B/7196A

6. alkalinity (Saturate Paste) 29-B meq/L

7. percent moisture by Method 5240G

8. 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

9. polynuclear aromatic hydrocarbons (PAH) by EPA SW-846 Method 8260

10. benzene, toluene, ethylbenzene, and xylene (BTEX) by EPA SW-846 Method 8270

11. bulk mineralogy by x-ray diffraction

Tables 1 to 6 contain analytical summaries for soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling parties. Table 15 contains a summary of x-ray diffraction or bulk mineralogy results. Appendix D contains a copy of geologic boring logs for boreholes installed by HET during this investigation. Appendix E contains a copy of laboratory analytical results from soil samples collected.

3.3: Water Level Measurements

Neither HET nor ICON installed permanent monitor wells on the Property, having instead relied upon potentiometric surface data generated during the groundwater sampling and monitoring of the adjacent IPSB property to the west. This information is pertinent to the overall evaluation of the August Levert property given the close proximity of the areas of investigation on both properties.

The elevations of the tops of casings of each monitor well installed on the IPSB property were determined by a registered land surveyor upon completion and monitor well constructions 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 all monitor wells installed at the neighboring IPSB property by HET were taken on October 13, 2015; December 02, 2020; and July 28, 2022. Based on water level measurements, the overall flow direction on October 13, 2015 and on December 02, 2020, appeared to be moving away from the canals in a classic disconnected losing stream scenario. Based on water level measurements on July 28, 2022, however, the overall flow direction appeared to be moving in a western direction.

Based on the water level measurements and the resulting groundwater flow directions, the flow direction overall appeared to be moving away from the canals in a classic disconnected losing stream scenario. Furthermore, based on the site lithology and survey of the bottom elevations of the canals, the canals and waterways in this area are incapable of receiving discharge from the shallow water bearing silts encountered beneath the areas of investigation. Figures 17, 18, and 19 contain potentiometric surface maps for water level measurements taken on October 13, 2015; December 02, 2020; and July 28, 2022, respectively. Appendix F contains a copy of the surveys conducted by M.P. Mayeux Surveying and Boundary Consulting, LLC.

4.0: ROOT ZONE INVESTIGATION

Between August 16, 2022 and August 18, 2022, Matthew 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 vegetation to support assessment activities conducted on the Property. This study incorporates, as appropriate, the data generated during the root zone investigation conducted on the neighboring IPSB property. Results of the neighboring root zone investigation can be found in the Expert Report Iberville Parish School Board dated May 06, 2016, prepared by Holloway Environmental Services, Inc. and Blue Frog Environmental, Soils and Wetland Services, L.L.C., and detailed below. Matthew

Greene with HET contributed to the field work and data retrieval conducted during the IPSB root zone investigation.

During the investigation, traverses were made across portions of the site property to note vegetative transitions within the area of investigation. Upon documentation of the tree vegetation, five (5) 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 were exposed and reviewed near each select tree. An evaluation of near surface soils, vegetation, and root mass abundance was conducted extending away from the base of the trees to determine the site-specific effective root zone. Figure 20 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 of investigation consisted of two (2) soil types, including Barbary muck and Fausse clay with areas of dredged spoil. The Barbary series is classified as very-fine, smectitic, nonacid, hyperthermic Typic Hydraquents, and the Fausse series is classified as very-fine, smectitic, nonacid, hyperthermic Typic Vertic Endoaquepts by the USDA. The Barbary series was noted on the portions of the property located east of Willow Lake, with the Fausse series noted west of

Willow Lake. These soils, along with elevation, are directly related to the current plant species growing throughout the investigated area.

4.2: Vegetation Identification

The vegetation throughout the site 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 area investigated predominantly consisted of tree vegetation, with select species noted in select areas. Areas east of Willow Lake, containing the Barbary muck, mainly consisted of Southern Bald Cypress (*Taxodium distichum*) and Water Tupelo (*Nyssa aquatica*) with occasional Chinese Tallow (*Triadica sebifera*), Red Maple (*Acer rubrum*), and Swamp Privet (*Forestiera acuminata*). These areas also contained Lizard's Tail (*Saururus cernuus*), Savannah-Panic Grass (*Phanopyrum gymnocarpon*), and Water-Spangles (*Salvinia minima*). Areas west of Willow Lake, containing the Fausse clay, mainly consisted of American Elm (*Ulmus americana*), Chinese Tallow (*Triadica sebifera*), Green Ash (*Fraxinus pennsylvanica*), Texas Red Oak or Nuttall Oak (*Quercus texana*), Overcup Oak (*Quercus lyrate*), Southern Bald Cypress (*Taxodium distichum*), Sugarberry (*Celtis laevigata*), Swamp Privet (*Forestiera acuminata*), Water Hickory or Bitter Pecan (*Carya aquatica)*, an occasional Water Tupelo (*Nyssa aquatica*), and some Savannah-Panic Grass (*Phanopyrum gymnocarpon*). The vegetation and soil on this portion of the property were consistent with the areas investigated during the root zone investigation of the neighboring IPSB property. Areas of the property containing dredged spoil consisted of American Elm (*Ulmus americana*), American Sycamore (*Platanus occidentalis*), Ash-Leaf Maple or Boxelder (*Acer negundo*), Black Willow (*Salix nigra*), Chinese Tallow (*Triadica sebifera*), Dogwood (*Cornus drummondii*), Green Ash (*Fraxinus pennsylvanica*), Texas Red Oak or Nuttall Oak (*Quercus texana*), Overcup Oak (*Quercus lyrate*), Southern Bald Cypress (*Taxodium distichum*), Sugarberry (*Celtis laevigata*), Swamp Privet (*Forestiera acuminata*), and Water Oak (*Quercus nigra*). These areas also contained Downy Goldenrod (*Solidago puberula*), Dwarf Palmetto (*Sabal minor*), Eastern Marsh Fern (*Thelypteris palustris*), Green Briar (*Smilax spp.*), Peppervine (*Ampelopsis arborea*), Poison Ivy (*Toxicodendron radicans*), Sedge (Carex *spp.*), and Thistle (*Cirsium spp.*). All areas of the site property exhibited Trumpet-Creeper (*Campsis*

radicans) within select trees. The purpose of this investigation was to establish the site-specific effective root zone for the dominant species as possible restoration activities would target these select species.

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 majority of its nutrients, as noted above. The intentions of this evaluation are to describe the root zone that is essential for plant growth, completion of the life cycle, and maturation process (i.e., effective root zone) as remedial and/or restoration activities typically target this distinct zone, if deemed appropriate.

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 top 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 below land surface at random distances away from the bole and the total length observed for the root, are documented. The deepest root encountered for each tree is exposed via shovel for additional analysis, if applicable. Feeder roots are also analyzed and/or exposed via shovel during the investigation. The effective root zone of a tree species

considers the depth below land surface where the vast majority of the roots reside based on site-specific field observations. 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 Green Ash (*Fraxinus pennsylvanica*) that is located on the western portion of the property. The soil profile at location T-01 was made up of Fausse clay. The bole of T-01 measured a dbh of 12.25 inches. Ten (10) dominant roots were discovered during the investigation, with overall lengths ranging from twenty-five (25) to 137 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and seven (7) inches BLS, with the top of the deepest point of two (2) roots noted at approximately nine (9) inches BLS. Based on field documented data obtained, the effective root zone for T-01 was determined to be approximately zero (0) to seven (7) inches BLS. Appendix M 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 Texas Red Oak or Nuttall Oak (*Quercus texana*) that is located on the western portion of the property. The soil profile at location T-02 was made up of Fausse clay. The bole of T-02 measured a dbh of 8.28 inches. Nine (9) dominant roots were discovered during the investigation, with overall lengths ranging from thirty-two (32) to 160 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and six (6) inches BLS, with the bottom of the deepest point of one (1) root noted at approximately 6.75 inches BLS. Based on field documented data obtained, the effective root zone for T-02 was determined to be approximately zero (0) to six (6) inches BLS.

Tree location 3 (T-03) consisted of a Water Tupelo (*Nyssa aquatica*) that is located on the eastern portion of the property. The soil profile at location T-03 was made up of Barbary muck. The bole of T-03 measured a dbh of fourteen (14) inches. Fifteen (15) dominant roots were discovered during the investigation, with overall lengths ranging from twenty-five (25) to sixty-two (62) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and eighteen (18) inches BLS, with the top of the deepest point of one (1) root noted at approximately nineteen

(19) inches BLS. Based on field documented data obtained, the effective root zone for T-03 was determined to be approximately zero (0) to eighteen (18) inches BLS.

Tree location 4 (T-04) consisted of a Southern Bald Cypress (*Taxodium distichum*) that is located on the eastern portion of the property. The soil profile at location T-04 was made up of Barbary muck. The bole of T-04 measured a dbh of twenty-one (21) inches. Eleven (11) dominant roots were discovered during the investigation, with overall lengths ranging from twenty-eight (28) to 219 inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and twenty-four (24) inches BLS, with the top of the deepest points of two (2) roots noted at approximately twenty-six (26) inches BLS. Based on field documented data obtained, the effective root zone for T-04 was determined to be approximately zero (0) to twenty-four (24) inches BLS.

Tree location 5 (T-05) consisted of a Water Tupelo (*Nyssa aquatica*) that is located on the eastern portion of the property. The soil profile at location T-05 was made up of Barbary muck. The bole of T-05 measured a dbh of 16.23 inches. Fifteen (15) dominant roots were discovered during the investigation, with overall lengths ranging from twenty-two (22) to fifty-nine (59) inches away from the tree. Extensive review of the root system indicates that the majority of the roots reside between zero (0) and twenty-four (24) inches BLS, with the top of the deepest point of one (1) root noted at approximately twenty-eight (28) inches BLS. Based on field documented data obtained, the effective root zone for T-05 was determined to be approximately zero (0) to twenty-four (24) inches BLS.

In addition to the five (5) trees evaluated during this investigation, twelve (12) trees were reviewed during the root zone investigation of the IPSB property. As indicated above, the vegetation and soil on the western portion of the property (west of Willow Lake) were consistent, with the areas investigated during the root zone investigation of the neighboring IPSB property. The results of the current investigation and the IPSB investigation are listed in Text Table 2 on the following page.

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

Location ID	Common Name	Effective Root Zone (Inches)
August Levert, Jr., et al. Property		
T-01	Green Ash	0-7
T-02	Texas Red Oak (Nuttall Oak)	0-6
T-03	Water Tupelo	0-18
T-04	Southern Bald-Cypress	0-24
T-05	Water Tupelo	0-24
IPSB Property		
T-01	Green Ash	0-14
T-02	American Elm	0-6
T-03	Red Maple	0-7
T-04	Texas Red Oak (Nuttall Oak)	0-9
T-05	Sugarberry	0-7
T-06	Texas Red Oak (Nuttall Oak) (blow-down)	0-9
T-07	Southern Bald-Cypress	0-11
T-08	Texas Red Oak (Nuttall Oak)	0-7
T-09	American Elm	0-6
T-10	Red Maple	0-5
T-11	Sugarberry	0-6
T-12	Green Ash	0-9

Findings during the root zone investigations within the vegetative communities exhibited shallow distributions of roots. Effective root zones for the trees investigated on the western portion of the property (west of Willow Lake) and the IPSB property ranged from zero (0) to fourteen (14) inches below land surface, with the trees on the eastern portion of the property (east of Willow Lake) ranging from zero (0) to twenty-four (24) inches below land surface. The vast majority of the roots found during the investigation were above fourteen (14) inches below land surface. The vegetation observed on the tracts appeared to be in very good condition, with excellent growth observed. In the unlikely event that any restoration is deemed necessary with regard to salinity, effective root zones of zero (0) to fourteen (14) inches for trees west of Willow Lake and zero (0) to twenty-four (24) inches for trees east of Willow Lake should be taken into account during any potential restoration planning.

5.0: RESULTS OF INVESTIGATION

Based on a review of data generated during the investigations performed to date associated with the LAAs, 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 parties, as well as the overall geological settings of the properties. If additional data is collected, the following evaluation of data is subject to change. Tables 1 to 6 contain analytical summaries for soil samples analyzed for Statewide Order 29-B and/or RECAP parameters in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling parties. Tables 7 to 14 contain analytical summaries for groundwater samples collected in Limited Admission Areas 1, 2, and 3 and in areas of the property not included within the LAAs by all sampling parties. Table 15 contains a summary of x-ray diffraction or bulk mineralogy results. Appendix H 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 the immediate vicinity of the oil and gas wells described above in Section 1.4.

This report presents the results of the investigations performed on the Property to date, with a focus on the results pertaining to the LAAs. The following LAAs, as they pertain to the select oil and gas well locations as depicted on Figure 7 and samples collected to date as illustrated in Figure 8, are defined in the text table below:

Limited Admission Areas and Associated Sample Locations
August Levert Property
Grand River Oil and Gas Field

Area	Associated Operational Area	Media	Associated Borings and/or Monitor Wells
1	Former Tank Battery Storage Facility Code 921900	Groundwater	ICON monitor well LT-1
2	LDNR Serial Nos. 121454, 120453	Soil, Groundwater	ICON borings HA-1 and LT-2; ICON monitor well LT-2; and HET borings HA-1R and SB-17 to SB-24
3	LDNR Serial No. 123040	Soil, Groundwater	ICON borings HA-2 and LT-3; ICON monitor well LT-3; and HET borings SB-01 to SB-16

5.1: Regulatory Framework 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 LDNR regulations (LAC 43:XIX) which incorporates 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). Site data were initially evaluated by comparison with Section 313 of Statewide Order 29-B as a conservative reference and as per LDNR 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 were evaluated at all depths with a focus within the root zone as established by the work performed by Matthew Greene with HET. Subsurface concentrations of EC were evaluated in accordance with LAC 43:XIX.313D to demonstrate that chloride parameters assessed at the site do not affect the overall conditions of the properties and are protective of subsurface water bearing zones as discussed further below. Note that the salt-related constituents of EC, SAR, and/ESP in submerged wetland areas are not subject to criteria under LAC 43:XIX.313 and were compared to the elevated wetland criteria for reference purposes only.

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

3. Oil and grease concentrations were evaluated in conjunction with the RECAP hydrocarbon fraction analyses as the Statewide Order 29-B analyses for oil and grease, 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. The hydrocarbon fraction results are more indicative of potential impact. Appendix D of RECAP 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.

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 LDNR Office of Conservation, Environmental Division for the evaluation of oilfield sites under Statewide Order 29-B pursuant to LAC 43:XIX.313.D and 43:XIX.319, the memorandum of understanding between the LDNR and the LDEQ dated February 2011, and the provisions of Act 312 which incorporate the use of all appropriate regulations. 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. 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 uses 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 established the RECAP screening standards to quickly and effectively determine whether additional assessment would be warranted as an overly conservative assessment. 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 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 additive health effects, when, in fact, the protection of a Hazard Index of 1.0 is more appropriate under the higher tier of RECAP. This basically equates the assumption of ten (10) COCs at each LAA which is not realized on the Property. Note that the EPA continues to update the exposure criteria for various constituents of concern. Therefore, HET has incorporated the updated RECAP standards for total barium, which results in a screening standard of 1,600 mg/Kg and a Management Option 1 standard of 16,000 mg/Kg, in the evaluation and delineation of the constituent concentrations.

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 LDNR and LDEQ, are taken into consideration by HET to evaluate site conditions.

The agriculturally derived guidelines for EC, SAR, and ESP are typically evaluated within the root zone for the ability to support vegetation growth. Additional evaluation of the root zone and the effect of chloride-related parameters on vegetation was conducted by Matthew Greene with HET as documented above, which determined that the effective root zone does not extend past twenty-four (24) inches.

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. As a result, samples collected beneath the effective root zone during the course of the investigations were analyzed for total chlorides and electrical conductivity, as well as SPLP analyses, to evaluate the potential for cross media transfer (soil to groundwater). 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 site concentrations are in declining conditions. Therefore, the 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 dilution and attenuation factor (DAF) of twenty (20) in accordance with RECAP.

With regard to hydrocarbons, HET conducted additional analyses of hydrocarbon concentrations for select concentrations of TPH in accordance with RECAP, Appendix D. The assessment conducted by HET included the analyses of volatile and extractable range petroleum hydrocarbons and the indicator compounds of benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAH), which are more representative of site conditions in a human health risk assessment than the total petroleum hydrocarbons (diesel and oil range organics), as necessary and appropriate based on a review of the initial results of the hydrocarbon fractions and/or field screening. In accordance with RECAP, the hydrocarbon fractions supersede the TPH values and are more representative of site conditions.

5.2: Review of Soil Data Within the Limited Admission Areas

Based on the regulatory framework established above by the LDNR under Statewide Order 29-B, HET has evaluated the data obtained from the LAAs defined above. The proceeding sections contain the tiered evaluation under Statewide Order 29-B and then RECAP as a screening tool to determine the need for further evaluation under a higher tier of RECAP. Based on the laboratory analytical results, all reported constituent concentrations have been fully delineated vertically and horizontally to both Statewide Order 29-B, Chapter 3 standards and the RECAP screening standards as defined above. Laboratory analytical results demonstrate that constituent concentrations have been fully delineated vertically and horizontally to the Statewide Order 29-B, Chapter 3 pit closure standards and RECAP screening standards as discussed below. Appendix H contains soil concentration maps exhibiting concentrations of constituents of concern reported above Statewide Order 29-B and/or RECAP screening standards.

5.2.1: Review of Soil Data in Limited Admission Area 1 (Former Tank Battery Area)

Laboratory analytical results reported all concentrations below the Statewide Order 29-B, RECAP screening standards, and/or statewide background concentrations, except for EC in one (1) soil sample from ICON soil boring LT-1 installed along the western edge of the Property in the vicinity of the former central facility (i.e., tank battery area) that historically straddled the IPSB and August Levert property boundary. The EC concentration was reported at a depth of twelve (12) to fourteen (14) feet BLS within the water bearing zone, which is a result of a groundwater plume emanating from the currently closed pit formerly on the IPSB property, as previously discussed above in Section 1.7.

As a result, the media subject to the Limited Admission in LAA1 is limited to groundwater as the soil concentrations either meet applicable regulatory standards or result from groundwater conditions in this area of the Property. Additional information as to groundwater concentrations and regulatory status is contained below in Section 5.3.

5.2.2: Review of Soil Data in Limited Admission Area 2 (LDNR Serial Nos. 120453 and 121454)

The investigation conducted by ICON in the vicinity of LDNR Serial Nos. 120453 and 121454 was limited to two (2) soil borings (HA-1 and LT-2), the latter of which was converted into a temporary monitor well. ICON soil boring HA-1 reported elevated concentrations of SAR and oil and grease above the Statewide Order 29-B standards of fourteen (14) and one (1) percent (%), respectively.

HET performed additional sampling to further assess and define the hydrocarbon concentrations through the installation of borings SB-17 to SB-20 and HA-1R within the former pit borings SB-20 to SB-24 for horizontal delineation purposes. Elevated concentrations of oil and grease were reported above the Statewide Order 29-B standard of one (1) percent in samples collected from HET soil borings SB-17 to SB-20 at the zero (0) to two (2) foot sample interval. HET notes that the lone SAR concentration in this LAA was reported at a depth of two (2) to four (4) feet BLS and was not confirmed in HET soil boring HA-1R, installed as a reproduction of ICON soil boring HA-1. Thus, not only does Section 313 provide no regulatory standard for salt parameters at this location, but salt does not appear to be a constituent of concern by any measure.

HET further evaluated constituent concentrations in accordance with RECAP. As an initial evaluation on a wet-weight basis, all reported metal concentrations were determined to be below the RECAP screening standards, with the exception of barium in HET soil boring SB-21 at a depth of zero (0) to two (2) feet BLS. The reported concentration, however, is below the updated RECAP screening standard of 1,600 mg/Kg, the MO-1 standard of 5,500 mg/Kg, and the soil protective of groundwater standard of 2,000 mg/Kg.

Laboratory analytical results for hydrocarbon analyses reported all concentrations of volatile and extractable range hydrocarbon fractions (aliphatic and aromatic compounds) and PAH as below the conservative RECAP screening standards, with the exception of select extractable range hydrocarbon fractions in samples collected from ICON boring HA-1 and HET boring SB-20, both collocated within the bounds of the former pit. Elevated concentrations of Aromatics C16-21 and Aromatics C21-C35 were reported in ICON boring HA-1 at the zero (0) to two (2) foot sample intervals. Additionally, laboratory analytical results reported elevated concentrations of Aromatics

C12-C16 and Aromatics C16-21 in HET boring SB-20 at the zero (0) to two (2) foot sample interval. All of the reported concentrations, however, meet the RECAP MO-1 standards considering the conservative additive health calculations for potentially combined effects of barium and hydrocarbon fractions on the kidney. This was determined by the hazard quotient calculations considering a division of the maximum concentration by the RECAP MO-1 standard to ensure that the Hazard Index was below or equivalent to 1.0 [barium (936/5,500) + Aromatics C16-21 (168/1,500) + Aromatics C21-35 (875/1,800) = 0.9] in accordance with RECAP.

Based on the tiered approach that considers concentrations in order from Statewide Order 29-B and RECAP, all constituent concentrations in the soil at LAA1 have been demonstrated to meet applicable standards. Furthermore, the constituent concentrations have been fully delineated vertically and horizontally to Statewide Order 29-B, Chapter 3 and RECAP screening standards which demonstrate that those exceedances are limited to the former pit. However, HET recommends excavation and offsite disposal of oil and grease concentrations within the former pit boundaries as part of physical pit closure in accordance with LDNR policy, as illustrated in Figure 21 and as discussed below in Section 7.2.

5.2.3: Review of Soil Data in Limited Admission Area 3 (LDNR Serial No. 123040)

The investigation conducted by ICON in the vicinity of LDNR Serial No. 123040 was limited to two (2) soil borings (HA-2 and LT-3) within the western former pit in LAA3. ICON soil boring HA-2 reported elevated concentrations of arsenic, True Total Barium, lead, zinc, and oil and grease above the respective Statewide Order 29-B standards. ICON did not collect samples from the eastern former pit. As a result, HET performed additional sampling of both former pits to characterize, further evaluate, and define the constituent concentrations.

5.2.3.1: Western Former Pit in Limited Admission Area 3

Regarding the western pit that was also subject to ICON's previous investigation, HET installed borings SB-09 to SB-12 within the former pit and borings SB-13 to SB-16 on the outside perimeter of the former pit on natural ground surface for horizontal delineation

purposes. Elevated concentrations of oil and grease were reported above the Statewide Order 29-B standard of one (1) percent in samples collected from HET soil borings SB-10 and SB-11 at the two (2) to four (4) foot sample interval. Additionally, all soil samples reported concentrations for metals below the Statewide Order 29-B regulations, with the exception of two (2) exceedances each of arsenic, lead, cadmium, and zinc, as well as six (6) exceedances of True Total Barium. The maximum concentrations of arsenic, lead, cadmium, True Total Barium, and zinc were each reported in HET boring SB-12 at the two (2) to four (4) foot interval.

HET further evaluated constituent concentrations in accordance with RECAP. As an initial evaluation of metals on a wet-weight basis, elevated concentrations of arsenic, barium, cadmium, chromium, and lead were detected at concentrations above RECAP screening standards but below the respective MO-1 standards, with the exception of arsenic and lead. A determination of the MO-1 standards considered the additive health effects for the potential combined effects of barium and cadmium on the kidney noting that all hydrocarbon fraction concentrations were below the laboratory detection limits as discussed below. This was determined by the hazard quotient calculations considering a division of the maximum concentration by the RECAP MO-1 standard to ensure that the Hazard Index was below or equivalent to 1.0 [barium (2,156/5,500) + Cadmium (9.96/39) = 0.7] in accordance with RECAP.

Additionally, HET also evaluated the total barium concentrations in HET soil borings SB-11 and SB-12 by analyzing for x-ray diffraction (bulk mineralogy), the results of which confirmed that barium on-site is in the form of barium sulfate and would not be considered a constituent of concern under RECAP due to its chemical properties. Furthermore, the EPA has concluded that barium sulfate is essentially non-toxic to humans and the environment. Finally, SPLP analyses of the arsenic, barium, chromium, and lead determined that the concentrations were below the threshold to result in cross media transfer considering the groundwater classification of GW3, thus eliminating the respective soil protective of groundwater standards from consideration.

HET further evaluated the oil and grease and TPH concentrations via the analyses of the hydrocarbon fractions. Laboratory analytical results for hydrocarbon analyses reported all concentrations of volatile and extractable range hydrocarbon fractions (aliphatic and aromatic compounds) as below the conservative RECAP screening standards.

Based on the tiered approach that considers concentrations in order from Statewide Order 29-B and RECAP, all constituent concentrations in the soil at Limited Admission Area 2 have been demonstrated to meet applicable standards, with the exception of concentrations of arsenic and lead within the former pit area. Furthermore, the constituent concentrations have been fully delineated vertically and horizontally to Statewide Order 29-B, Chapter 3 and RECAP screening standards which demonstrates that those exceedances are limited to the former pit. Therefore, HET recommends the excavation and offsite disposal of all soils within the former pit boundaries as part of physical pit closure, as illustrated in Figure 21 and as discussed below in Section 7.2.

5.2.3.2: Eastern Former Pit in Limited Admission Area 3

Regarding the eastern pit that was not subject to ICON's previous investigation, HET installed borings SB-01 to SB-04 within the former pit and borings SB-05 to SB-07 on the levees of the former pit, as well as borings SB-08 and SB-25 to SB-27, on the outside perimeter of the former pit on natural ground surface for horizontal delineation purposes. All soil samples reported concentrations for metals and hydrocarbons below the Statewide Order 29-B regulations, except for one (1) exceedance of arsenic, one (1) exceedance of chromium, and eight (8) exceedances of True Total Barium.

HET further evaluated constituent concentrations in accordance with RECAP. As an initial evaluation of metals on a wet-weight basis, elevated concentrations of arsenic, barium, chromium, and lead were detected at concentrations above RECAP screening standards but below the respective MO-1 standards. Based on a review of the potential

for additive health effects, none of the constituents were determined to elicit the same critical effect or have the same target organ/system.

HET also evaluated the total barium concentrations in HET soil borings SB-03 and SB-04 by analyzing for x-ray diffraction (bulk mineralogy), the results of which confirmed that barium on-site is in the form of barium sulfate and would not be considered a constituent of concern under RECAP due to its chemical properties. Furthermore, the EPA has concluded that barium sulfate is essentially non-toxic to humans and the environment. Finally, SPLP analyses of the arsenic, barium, chromium, and lead determined that the concentrations were below the threshold to result in cross media transfer, thus eliminating the respective soil protective of groundwater standards from consideration.

Laboratory analytical results for hydrocarbon analyses reported all concentrations of volatile and extractable range hydrocarbon fractions (aliphatic and aromatic compounds) and PAH as below the conservative RECAP screening standards, except for select extractable range hydrocarbon fractions and PAH indicator compounds in HET boring SB-04, located within the bounds of the historic pit location. Elevated concentrations of Aromatics C12-16, along with the indicator compound 2-methylnapththalene, were reported above their respective RECAP screening standards in HET boring SB-04 at the zero (0) to two (2) foot sample interval. Both reported concentrations, however, were below the respective RECAP MO-1 standards.

Based on the tiered approach that considers concentrations in order from Statewide Order 29-B and RECAP, all constituent concentrations in the soil at Limited Admission Area 3 have been demonstrated to meet applicable standards. Furthermore, the constituent concentrations have been both fully delineated vertically and horizontally to Statewide Order 29-B, Chapter 3 and RECAP screening standards which demonstrates that those exceedances are limited to the former pit. However, as a conservative measure, HET recommends the excavation and offsite disposal of soils within the former pit boundaries as part of physical pit closure in accordance with LDNR policy, as illustrated in Figure 21 and as discussed below in Section 7.2.

5.3: Groundwater Investigation Results

As described above, the Limited Admission considers groundwater conditions in each of the three (3) LAAs as determined from groundwater samples collected from the temporary monitor wells installed by ICON. In addition, the groundwater sampling data from the adjacent IPSB property were also reviewed to overall determine groundwater flow directions and groundwater concentrations pertaining to LAA1. Based on the data obtained to date, the groundwater concentrations detected in each of the three (3) LAAs appear to be distinct and separate from each other. In addition, all constituent concentrations in the soil and groundwater have been delineated. Note that ICON did not install a temporary monitor well at the LT-6 location based on the lack of a groundwater zone encountered. Appendix H 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 collected from temporary monitor wells installed as part of the ICON investigation from within the first encountered water bearing zone across the site reported concentrations of chlorides, TDS, hydrocarbon related parameters, and/or select metals (arsenic, barium, chromium, iron, lead, manganese, and selenium) above the comparative RECAP screening or EPA drinking water standards. Note that the comparison of these concentrations to drinking water standards is inappropriate as the shallow water bearing silts on the property and regionally have been classified as non-drinking based on the considerations evaluated above. Additionally, concentrations of radiological parameters are within natural ranges, as determined by Dr. John Frazier. A copy of Dr. Frazier's report is contained in Appendix O.

Elevated concentrations of chloride-related parameters were reported in ICON monitor wells LT-1 (LAA1), LT-2 (LAA2), and LT-3 (LAA3), located on the property within the discontinuous water bearing zones in the former operational areas. Laboratory analytical results reported maximum chloride and TDS concentrations in monitor well LT-1 (11-16'). Note that groundwater conditions in LAA1 are associated with historical operations on the IPSB property and are more likely than not emanating from the previously identified plume being evaluated under LDNR Legacy Project No. 018-024 under direction of the LDNR. Furthermore, no source soils have been identified on the Property and a review of EC concentrations in the soil are below Statewide Order 29-B standards in the vicinity of ICON monitor wells LT-2 and LT-3. While

chloride concentrations in the groundwater were reported above background, the shallow water bearing zone is considered unusable for any purpose based on its groundwater classification and the lack of water wells installed in the shallow water bearing zone within a mile of the site.

Elevated hydrocarbon concentrations above RECAP screening standards for total petroleum hydrocarbons (diesel and oil range constituents) were reported in multiple ICON monitor wells. However, the concentrations of TPH reported in the ICON data set were not confirmed in the hydrocarbon fraction data, with all ranges reporting concentrations below RECAP screening standards. Note that the fraction data supersedes the TPH data in accordance with RECAP, Appendix D, and all hydrocarbon fraction results, including the indicator compounds of BTEX, reported concentrations below laboratory detection limits and/or RECAP screening standards.

With regard to metal concentrations, arsenic, barium, chromium, lead, and selenium concentrations were reported above the conservative RECAP screening standards. Also, in the evaluation of data, it is more representative to evaluate metal concentrations on a dissolved basis, however, HET evaluated the data on the maximum concentrations as a conservative measure. Furthermore, the reported concentrations of arsenic, iron, and manganese were reported in a vast majority of sample results, including those without compounds typically evaluated as part of oilfield assessment, thus demonstrating that these constituents are associated with known water quality issues. However, the concentrations of arsenic are further evaluated in a risk assessment below as part of HET's conservative analysis.

Based on the information above, the concentrations of chlorides, TDS, and metals (arsenic, barium, chromium, lead, and selenium) in the groundwater are further evaluated in a risk assessment. 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 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. Furthermore, the shallow water bearing zones are not a source of drinking water. Thus, 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.

This risk evaluation was conducted in accordance with RECAP, Management Option 1 (MO-1) per the criteria listed in RECAP, Section 4.1.1. The Management Option 1 (MO-1) standards were selected

from Tables 2 and 3 of the October 20, 2003, RECAP document (Appendix H). The input parameters conservatively listed below include a dilution and attenuation factor (DAF) of 440 assuming a thickness of the shallow water bearing zones of less than five (5) 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 site. Text Table 3 below contains the applied soil and groundwater RECAP standards. Appendix Q contains a copy of RECAP standards.

Text Table 3
Groundwater RECAP Standards

Compound	GW_{3NDW} [1]	DAF	Solubility	LRS	Maximum Concentration [2]
Salinity Parameters					
chlorides	250 [3]	440	N/A	110,000	12,400
TDS	500 [3]	440	N/A	220,000	24,900
Metal Parameters					
arsenic	0.010	440	N/A	4.4	0.301
barium	45	440	N/A	19,800	5.02
chromium	960	440	N/A	422,400	0.274
lead	0.05	440	N/A	22	0.0195
selenium	0.05	440	N/A	22	0.0796

1 - RECAP, Table 3 MO-1 Standard
2 - Maximum groundwater concentration between ICON and HET data
3 - Surface Water Criteria (LDEQ Subsegment 120107)
N/A - Not Applicable
LRS - Limiting RECAP Standard (lowest value)
Concentrations reported in mg/L

Based on a review of the data obtained to date, the extent of groundwater concentrations has been delineated to RECAP screening standards, EPA primary or drinking water standards, and/or natural conditions associated with the aquifer as established in background locations, including ICON monitor wells LT-8 and LT-9. The data evaluated in support of this conclusion includes both laboratory analytical results, the results of the GEM survey performed by ICON, and the discontinuous nature of the shallow water bearing zone as evidenced by the lack of encountered water bearing zone during the installation of temporary monitor well MW6 by ICON. Finally, the western extent of groundwater constituent concentrations was evaluated through the assessment conducted of the adjacent IPSB property.

5.4: Ecological Risk Assessment Report

Dr. Connelly performed an ecological risk assessment of the August Levert property as part of the overall evaluation of environmental conditions. Dr. Connelly's assessment considers the site setting, as well as the pending proposed pit closure activities. Appendix N contains a copy of the ecological risk assessment.

6.0: 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 remediation of the areas investigated that were subject to historical oilfield exploration and production activities by predecessors of BP. Furthermore, the evaluations of all data generated to date by HET and Drs. Bryant, Connolly, and Frazier have confirmed that all constituent concentrations meet appropriate human health and ecological risk assessment standards in consideration of the proposed pit closure activities as defined below. Upon completion of the physical pit closure activities, no toxicological risk to human health or any adverse impact on ecosystem function will exist within the LAAs.

The following sections of this document reflect the consideration of the necessity and content of remediation proposed for the three (3) former oilfield pits located in LAAs 2 and 3. This document then presents and considers potential remedial options and recommends the most feasible plan for remediation. Appendix S contains references in support of the conclusions and findings of this report.

7.0: 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 the LAAs. As a result, the extents of metal and hydrocarbon-related exceedances of Statewide Order 29-B parameters have been appropriately characterized and the horizontal and vertical extents have been delineated to the applicable standards included in Section 5.0 above in support of the risk assessment.

With respect to the soil within the bounds of the three (3) former historical pit locations in LAAs 2 and 3, HET proposes to conduct pit closure activities in accordance with LDNR policy and in support of the Property being used for its intended purposes. The scope of work includes physical pit closure by excavation and off-site disposal within the former pits (Figure 21). The options listed below were considered in the process of determination of the most feasible plan.

Note that excavation of subsurface concentrations of EC along the northwest corner of the Property, near the former central facility and tank battery area that largely was situated on the IPSB property, as proposed by Plaintiffs, was not considered feasible or necessary. The concentrations are associated with the off-site soil sources currently under LDNR direction (IPSB, Conservation Order Nos. 18-024-001, 18-024-002, 18-024-003, and 18-024-004) and do not pose limitations to the potential uses of the Property and are not a threat to human health or the environment.

7.1: Pit Closure with Source Removal

Excavation of soil was considered in part or as a whole to address constituent concentrations identified during the course of the investigations. A review of the site conditions and constituent concentrations demonstrates that physical pit closure of the three (3) former pits located in LAAs 2 and 3 is warranted based on LDNR policy. Furthermore, excavation to the proposed regulatory evaluation is protective of human health and the environment and supports any proposed intended use of the Property.

Excavation as the remediation option is typically a last resort by the EPA as it both 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. The former pits subject to closure within LAAs 2 and 3 are small in size and relatively easily addressed under a pit closure scenario. Furthermore, the difference in scope and costs between excavation with and without exception under Statewide Order 29-B is relatively limited given the sizes of the pits.

Based on a review of the data, this option was selected as the most feasible plan to meet LDNR policy with regard to physical closure of pits and to meet applicable human health and ecologic risk assessment standards upon completion of physical pit closure.

7.2: Pit Closure Without Source Removal

Pit excavation through a combination of excavation and off-site disposal and/or soil mixing and blending as part of the physical closure of the levees was also evaluated to address constituent concentrations identified during the investigations. A review of the site conditions and constituent concentrations demonstrates a need for physical pit closure of the three (3) former pits located in LAAs 2 and 3 based on LDNR policy. As such, this plan would consider on-site mixing and blending of levee and pit soils as part of the overall physical pit 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 physical closure of the pit by largely considering soil mixing and blending in lieu of off-site disposal. As a result, soil mixing and blending is considered a feasible option. The soil subject to disposal would be limited to elevated oil and grease concentrations in LAA2 within the top two (2) feet only before physical closure of the pits by pushing in the levees and contouring to natural grade elevations. This option would also allow for less disruption in depth of the area after dewatering the former pits.

Based on a review of the data, this option was not selected as the extent of constituent concentrations is limited and the difference in scope between mixing and blending and excavation is minimal given time considerations.

7.3: Passive Closure, i.e. No Further Action

Given LDNR policy that passive pit closure requires that constituent concentrations meet the conservative Statewide Order 29-B, Chapter 3 pit closure standards, this option was not considered as a viable remediation alternative.

7.4: Soil Remedy Selection

Based on the alternatives considered above, physical pit closure with source removal is the most efficient and feasible plan for the site. This option supports that concentrations will meet applicable human health and ecologic risk assessment standards upon completion of physical pit closure. The physical pit closure would return the former pits in the LAA to natural grade elevations and support any intended uses for the Property. The proposed pit closure activities include removal of the source soils to depths between two (2) and four (4) feet BLS and contouring the levees to meet natural grade. The total proposed excavation and off-site disposal are estimated to remove approximately 657 cubic yards, as depicted on Figure 21.

7.5: 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 by consultants for both the Plaintiffs and BP 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 active groundwater remediation 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 22. Appendix L contains additional expert analysis from Dr. Kueper.

8.0: FINAL RECOMMENDATION, TIMEFRAME, AND ESTIMATED COSTS

The most feasible plan to address soil conditions for compliance with applicable regulatory standards is source removal followed by physical pit closures. This Plan will remove all constituent concentrations that exceed the Statewide Order 29-B, Chapter 3, pit closure standards and can be accomplished within a relatively brief period.

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 5.3. This plan is based on the results of the investigations to date, including that performed of the adjacent IPSB property since 2013 and the fact that constituent concentrations in the soil have been fully delineated horizontally and vertically within the bounds of the three (3) historical pits in LAAs 2 and 3. The Plan proposed by BP contemplates installation of eight (8) 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 LDNR based on site specific conditions, BP can undertake the additional field work as summarized below and itemized in the cost estimates contained in Appendix P.

HET plans to evaluate the vegetative regrowth during groundwater monitoring events. This would ensure seeding of the former pits to facilitate vegetation recovery after closure. 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. Furthermore, the monitoring plan would not change the recommended options for remediation.

HET estimates that the length of time to complete soil remedial activities, as necessary and appropriate, including completion of 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 LDNR upon completion of soil remedial activities and again upon completion of the groundwater monitoring program. The report will include complete documentation of the soil remedial 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 LDNR for site closure. Text Table 4 on the following page

contains a list of itemized costs associated with soil remediation, pit closure activities, and groundwater monitoring. Appendix P contains a copy of the estimates prepared/obtained by HET .

Text Table 4
Itemized Costs for Soil Remediation, Pit Closure Activities, and Groundwater Monitoring
August Levert Property
Grand River Oil and Gas Field Oil and Gas Field

Proposed Remediation Option	Proposed Cost Estimates
Excavation and off-site disposal of all pits associated with LAAs 2 and 3	$891,059.80
Mitigation Banking	$20,000.00
Installation of Permanent Monitor Wells as part of the Groundwater Monitoring Network	$66,680.00
Groundwater Monitoring on a quarterly basis for a period of one (1) year	$144,300.00
HET Safety Management, Project Management, and Reporting Requirements	$49,360.00
Total Estimated Cost	$1,171,399.80

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