Appendix T
Hypothetical 29-B Plan
Pursuant to LAC 43:XIX.611.F.1

ERM's proposed most feasible plan (MFP) is located in the main body of this document and complies with the Louisiana Department of Environmental Quality's Risk Evaluation/Corrective Action Program (RECAP), the State's risk-based protocol for environmental evaluation and remediation, Statewide Order 29-B (29-B), and the Louisiana Department of Natural Resources (LDNR)'s interpretation of Order 29-B, utilizing recognized exceptions approved and accepted by LDNR in developing evaluation and remediation plans for exploration and production sites (e.g., MFPs issued by LDNR in the Tensas Poppadoc, Savoie, Moore, Sweet Lake, Vermillion Parish School Board, Hero Lands, LA Wetlands, Jeanerette Lumber, and Neumin Production matters). See Appendix U, December 12, 2018, Memorandum from John W. Adams to Richard P. Ieyoub.

As required by LAC 43:XIX.611.F.1, this Appendix presents a hypothetical remediation plan to address both soil and groundwater that complies with all the provisions of Order 29-B, exclusive of Subchapter 319, and is submitted solely in fulfillment of that requirement. Unlike its soil standards, 29-B contains no groundwater standards. Therefore, this Hypothetical 29-B Plan includes a theoretical cost estimate, if RECAP were ignored, to attempt to remediate soil and/or groundwater at the Chevron Limited Admission Areas (Areas 2, 4, 5, 6, and 8), to comply with the technical requirements of LAC 43:XIX.611.F.1. ERM does not support nor endorse such remediation as an alternative approach to RECAP and such an approach would be inconsistent with most feasible plans developed by LDNR at other sites. The cost estimate associated with this appendix represents the unnecessary, worst-case, unreliable and least feasible cost. Actual costs would be truncated if this approach were attempted because any attempt to operate a shallow groundwater pumping system would likely fail and implementation of the soil remedy would be infeasible.

Statewide Order 29-B standards apply to soil and do not apply to groundwater. RECAP provides the specific relevant and applicable regulatory standards that address protection of the environment, public health, safety and welfare as required for a most feasible plan under La. R.S. 30:29 ("Act 312"). The RECAP regulation has therefore been applied to E&P sites subject to LDNR review and Most Feasible Plan (MFP) approval or development. The implementation of this Hypothetical 29-B Plan would be excessive, wasteful, unnecessary, technically impracticable, infeasible, potentially harmful, economically unsound, unreasonable, and would result in significantly more damage than benefit to the property at issue. This Hypothetical 29-B Plan is therefore a hypothetical plan, which would be impractical or impossible to implement. Therefore, ERM does not support nor endorse the adoption of this plan as the most feasible plan for this site for the following reasons:

- It is unnecessary given the current condition of the Property, which meets RECAP standards and United States Environmental Protection Agency (USEPA) human health and ecological standards and continues to be used for its highest and best use;
- It is technically impracticable because it would result in significantly more damage than benefit to the environment and public health;
- It would necessarily disrupt current and future agricultural and recreational activities on the Property;
- It would ignore LDNR's adoption of RECAP as an applicable regulatory standard in the 2011 LDNR/LDEQ Memorandum of Understanding (MOU) and in multiple MFPs including 29-B exceptions issued to reviewing courts based on evidence presented at Act 312 hearings (see Appendix U); and,
- It is not the most feasible plan to protect the health, safety and welfare of the people of Louisiana.

ERM's MFP includes the application of appropriate and recognized exceptions and alternate soil standards allowed under Section 319 of the 29-B regulations and the 2011 MOU to support the application of RECAP and soil standards that are based on current and anticipated future land use. These exceptions have been adopted and applied by this Department on a consistent basis. The MFP issued by LDNR in the H.C. Drew Estate v. Neumin matter states that "[u]se of LDEQ's RECAP, at least in part, to demonstrate compliance with Section 319.A has been proposed by responsible parties, considered and ultimately accepted by LDNR on case-by-case basis for over 20 years beginning October 2001 with Guillory Landfarm Facility Closure, Site Code 0103, located in Eunice, Louisiana". ERM requests that its plan that applies RECAP and multiple lines of scientific evidence be adopted as the most feasible plan for this Property. The use of RECAP to determine whether and to what extent soil and groundwater should be remediated has consistently been recognized by LDNR as an appropriate exception to 29-B. Therefore, the application of RECAP to the soil and groundwater in this case is appropriate for the following reasons:

- The 2003 RECAP regulation provides the comprehensive risk-based program necessary for fully evaluating this complex, multi-media site. The United States Environmental Protection Agency (USEPA), Louisiana, and other state risk-based standards have been developed and refined after the 1986 amendment to Order 29-B; therefore, they provide standards that appropriately supplement 29-B standards;

- The February 2011 MOU between the LDNR and the LDEQ recognizes the application of RECAP, a risk-based approach to assessing the need for remediation as compared to the 1986 Statewide Order 29-B pit closure standards, which are not risk-based and do not include numeric groundwater standards. Furthermore, the MOU states that all site evaluation, remediation plans, or final results submitted pursuant to RECAP Management Option 3 (MO-3) assessments, or addressing air, surface water, water bottoms (sediments), or non-29-B parameters shall be forwarded to LDEQ for review and comment;

- RECAP has been consistently applied in previous MFPs issued by LDNR under Act 312. The June 29, 2022 MFP issued by LDNR in the H.C. Drew Estate vs. Neumin Production Company matter (Appendix U) states that "LDEQ's RECAP procedures have been recognized as containing groundwater evaluation and/or remediation standards applicable to E&P sites, and RECAP has been used as the principal regulatory standard for groundwater evaluation and/or remediation in every Act 312 [case] where groundwater has been an issue." Previous MFPs issued by LDNR have also routinely applied RECAP and additional lines of scientific evidence to soil for salt parameters below the effective root zone, and for non 29-B parameters; and

- The extensive, site-specific Human Health and Ecological Risk Assessments performed by Chevron's experts in this case demonstrate that the site poses no unacceptable risk to human health and the environment. As outlined in the LDEQ RECAP preamble, risk to human health and the environment is the primary consideration when remedial decisions are made. The full RECAP Risk Assessment and Ecological Assessment findings fully support an MFP with exceptions to Statewide Order 29-B (i.e., use of the rigorous and widely accepted RECAP standards to address the requirement for protection of public health and the environment).

This Hypothetical 29-B Plan is not appropriate and should be rejected by LDNR because, as identified in the US National Contingency Plan (NCP), the ultimate selection of a remedy by the agency is dependent upon five primary balancing criteria including (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. Rigid application of Order 29-B (i.e.,

implementation of this Hypothetical 29-B Plan), is not consistent with these criteria. If two remedies are equally feasible, reliable, and provide the same level of protection, then the most cost-effective remedy should be selected. Both the capital and long-term operational and maintenance costs for the remedial period must be considered. The most expensive remedy is not always the most feasible or best approach.

This Hypothetical 29-B Plan should be rejected for the following additional reasons:

- The shallow water bearing zone that is encountered at a depth of between approximately 20 and 62 feet below the ground surface, where present, is a Class 3 aquifer as defined by RECAP. This zone has a very low hydraulic conductivity (average of approximately 1 foot per day) and consequently a very low yield (398 gallons per day [gpd]). The low hydraulic conductivity in this zone demonstrates not only that it is unsuited as a source of usable water, but also that it would be infeasible to treat through a long-term, large-scale pumping remedy.

- The shallow water-bearing zone is highly variable laterally, which would further impede the ability to recover groundwater in several areas on the Property. This is demonstrated by the very low yield in wells across the Property, as demonstrated by monitoring wells that purged dry or exhibited low yield during sampling (e.g., H-25, H-26, H-27, MW-7, MW-9, MW-9D, and MW-11) and/or demonstrated low yield in slug test analysis. Water-bearing silt stringers were not encountered at the anticipated depth in multiple boring locations, and the shallow water-bearing zone was not encountered at all in some locations [e.g., H-11].

- The shallow water-bearing zone has naturally poor, non-potable water quality, with chloride, sulfate, iron, and manganese concentrations exceeding the EPA Secondary Maximum Contaminant Levels (SMCLs). An attempt to reduce constituents to background levels will likely not achieve any benefit; further, the remedy would not make the water potable or desirable to drink because chloride, sulfate, iron, and manganese would naturally remain above SMCLs.

- The only Class 1 aquifer, the Chicot Aquifer, underlying the property occurs at depths below approximately 120 to 200 feet, and has historically been utilized as a source of water for rig supply, domestic, and irrigation purposes in water wells within a one-mile radius of the property. The public water supply in the area is provided by the Jefferson Davis Water and Sewer Commission #1, which has water lines along Highway 14 which bisects the Property.

- A remedy of the magnitude required to attempt to fully comply with Order 29-B is technically impracticable (not able to achieve end goals in a reasonable time frame) for both soil and groundwater.

- Implementation of this Hypothetical 29-B Plan would destroy portions of a thriving ecosystem and historical (and potentially future) agricultural area in the effort to attain groundwater and/or soil concentrations that would provide no environmental benefit.

- The Hypothetical 29-B Plan remedy would consume valuable and limited disposal capacity at commercial disposal facilities, with no benefit.

- The Hypothetical 29-B Plan remedy would result in an increased risk of environmental damage from transportation and disposal of site residues.

- The implementation of this Hypothetical 29-B Plan would do nothing to change the current or reasonably anticipated future use of the property and would, in fact, impede operations for the duration of the remedy.

- The risks posed by implementation of a massive Hypothetical 29-B Plan are significant and must be considered. They include destruction of a healthy ecosystem as a result of installation and operation of a groundwater remediation system and/or extensive dig and haul soil remediation, and potential for subsidence due to the extraction of large volumes of shallow groundwater.

- Pits closed prior to January 20, 1986 are not considered existing pits subject to Order 29-B standards. Thus, implementation of this Hypothetical 29-B Plan is not appropriate.

- Although long-term industrial operations, as expected, have left an industrial footprint on the Property, that footprint has not affected the past, current, or reasonably anticipated future highest and best use of the Property, and does not pose an unacceptable risk to human health or the environment.

For these reasons, ERM neither seeks nor supports the implementation of this Hypothetical 29-B Plan. ERM recommends the adoption of its proposed remediation plan that applies RECAP (as provided for in the 2011 Memorandum of Understanding between LDNR and LDEQ) and additional scientific evidence to meet the requirements of a feasible plan.

The Hypothetical 29-B Plan is based on the following scope and general assumptions.

- Salt parameters in soil are agronomic standards under 29-B. While they only apply to the effective root zone (See July 19, 2000 LDNR Decision on MAR Services Site Remediation [Exhibit 1]), which is up to approximately 10 inches on the Property per Dr. Luther Holloway and Mr. Patrick Ritchie's site-specific root zone study, this hypothetical remedy is based on removal of soil with salt concentrations above the 29-B standard at all depths above the water-bearing zone. The 29-B regulations include a provision that allows the use of higher limits for salt parameters if "the operator can show that higher limits for EC, SAR, and ESP can be justified for future land use". Application of 29-B standards only to the effective root zone should be granted by LDNR per this provision without requiring an exception to 29-B. However, this Hypothetical Plan has been prepared with the overly conservative assumption that exceedances of 29-B salt parameters may be addressed through remediation at all depths.

- Exceedances of 29-B salt parameters were detected in various samples within Chevron Areas 2, 4, and 5 below the effective root zone. Exceedances of other 29-B standards were not detected in the Chevron limited admission areas. Therefore, this Hypothetical Plan for soil includes a massive excavation to address only 29-B salt parameters below the effective root zone, which would provide no benefit to the current or anticipated future use of the Property.

- The maximum excavation depth on the Property would be limited to the depth of the top of the shallow water-bearing zone, which is variable across the Property. This zone is present at a depth of between approximately 20 and 62 feet below the ground surface, and in some locations is not present. Due to the highly variable nature of the shallow water-bearing zone, this Hypothetical Plan assumes that the maximum excavation depth is 32 feet (the approximate average top of the shallow water-bearing zone). It is assumed that any salt impacts below that depth would be remediated by the hypothetical groundwater remedy.

- Excavation of soil, especially to greater depths, requires assessment of soil conditions and may result in the requirement for slope stabilization (such as benching, sloping, or other measures). Although soils removed for slope stability can be managed on site as clean fill, it requires the aerial extent of the excavation to expand dramatically in all directions. This would cause unnecessary destruction to the established healthy ecosystem, and would further impede current and future uses of the property. This Hypothetical Plan assumes that the benching/sloping would be performed at a 1:1 slope, though this could vary depending on soil types encountered. The actual sloping would be no less than 1:1 and could be significantly more, resulting in even more over-excavation.

- Implementation of the Hypothetical Plan for soil would likely require additional hydrogeological, geotechnical, and chemical evaluation to refine the excavation areas, depths, and engineering. The hypothetical soil excavation areas based on the currently available data are shown on Figures T-1 through T-3.

- Evaluation and remediation will address groundwater where concentrations indicate any increase in concentrations over background. This is based on the assumption that Statewide Order 29-B requires that groundwater be remediated to background conditions, regardless of risk or lack of risk posed by the conditions, which is contrary to EPA and state risk-based regulations and guidance.

- In accordance with USEPA guidance, background threshold values (BTVs) can be calculated to establish a site-specific background concentration for comparison with site data. The ProUCL software tool is recommended by LDEQ for statistical analysis in support of RECAP, and was used to develop potential BTVs for chlorides in groundwater based on data from monitoring wells located in background areas of the Property (Areas 1 and 9). A 95% upper simultaneous limit (USL) of 687 mg/L was selected as the most appropriate BTV based on the distribution of the background chlorides dataset. This background concentration is over 2.5 times higher than the EPA SMCL of 250 mg/L and remediation to this target concentration would not result in potable groundwater. The extent of this area was estimated based on available data and is shown on Figure T-4. The ProUCL input/output tables are presented in Exhibit 2.

- This Hypothetical 29-B Plan for groundwater relies on an estimated capture zone for each recovery well based on *U.S. EPA., 1987, Guidelines for delineation of wellhead protection area, EPA 440/6-87-010, Washington, D.C., Office of Groundwater Protection*, along with various other assumptions outlined in Tables T-1 and T-2. These assumptions would be further evaluated after the *Initial Remediation Well Installation, Pump Test, and Pilot Evaluation* component of the remedy within each remediation area. It is anticipated that this initial step in the remedy would demonstrate that the implementation of the full Hypothetical 29-B Plan would be impractical or impossible.

The following steps would be implemented as part of this Hypothetical 29-B Plan:

- Submit a plan to LDNR Office of Conservation (OOC) for assessment and design activities;
- Perform assessment and design activities;
- Submit a detailed implementation plan to LDNR OOC for soil remediation activities;
- Implement soil remediation activities, if practical and feasible;
- Perform *Initial Remediation Well Installation, Pump Test, and Pilot Evaluation* in each remediation area to obtain data needed to design a groundwater pumping system, if practical and feasible;
- Perform design activities for groundwater pumping;
- Submit a detailed implementation plan to LDNR OOC for remediation activities;
- Install saltwater disposal well (SWD) for on-site disposal of extracted groundwater;

- Install groundwater extraction wells; and,
- Install groundwater recovery system and operate for a period of up to approximately 19 years.

It has been assumed that the groundwater pumping remedy in the hypothetical plan will continue for a period of up to approximately 19 years. The time to implement the hypothetical plan, along with the number of recovery wells needed, cannot be determined until pump tests and pilot testing is completed. The cost estimates assume the number of recovery wells based on estimated capture zones calculated from EPA wellhead protection equations and the total estimated impacted area. In reality, the ability to implement groundwater pumping from numerous wells would likely be impeded by recovery wells pumping dry over time due to very low yield in some portions of the highly variable and discontinuous shallow water-bearing zone.

In addition, the soil and groundwater remedy will cause the disruption, or complete shutdown, of current and anticipated future uses of the property, including recreational (e.g., hunting) and potential agricultural activities across portions of the Property. The costs of this business interruption may be significant and have not been included in the estimate.

The details of this hypothetical plan and estimated implementation cost are included in Tables T-1 through T-4.

The hypothetical schedule for implementing this Hypothetical 29-B Plan would be generally as follows:

- Implement soil assessment, geotechnical assessment and engineering design activities. Soil assessment and design would require approximately 6-9 months to complete;
- Soil remediation would require approximately 7-9 months to implement;
- Implement groundwater assessment activities within 60 days of LDNR approval of the plan. Groundwater assessment activities (pilot testing) would require approximately 3 months to complete;
- Groundwater treatment system design and installation would require approximately 6 months to complete; and,
- The groundwater extraction and disposal would be performed for up to approximately 19 years.

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Associate

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Partner

Property

Chevron Limited Admission Areas

Area 2

Hypothetical Soil Remediation Area

ERM Soil Sample Location

ICON Soil Sample Location

Figure T-1

Hypothetical Soil Remediation Areas – Area 2

Henning Management, L.L.C. v.
Chevron U.S.A. Inc., et al.
Hayes Oil & Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Notes:
BCY - Bulk Cubic Yards
2019 aerial via USGS Earth Explorer.

Environmental Resources Management
www.erm.com

Source: ESRI - ArcGIS Online; NAD 1983 UTM Zone 15N

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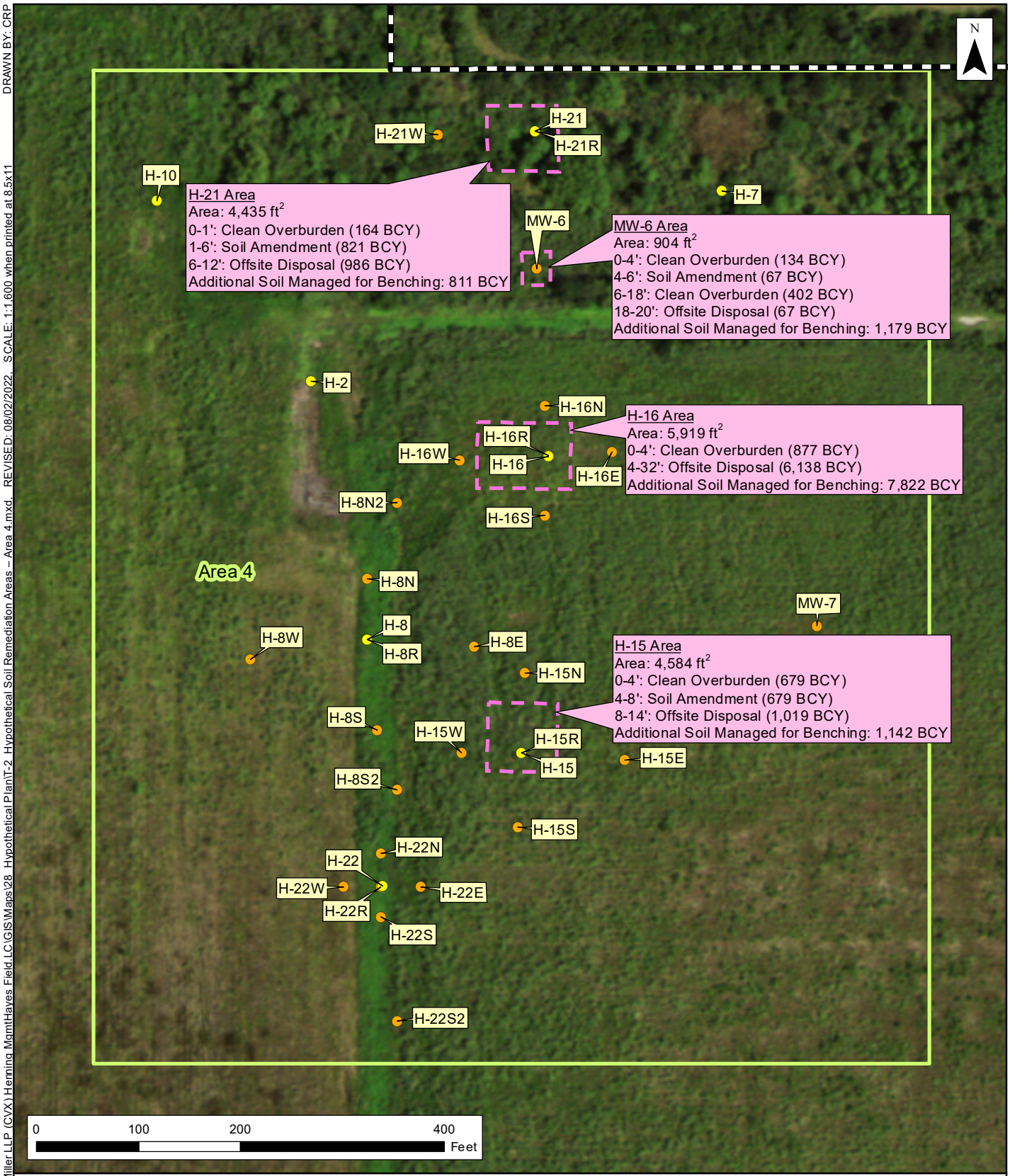

Property

Chevron Limited Admission Areas

- Area 4
- Hypothetical Soil Remediation Area
- ERM Soil Sample Location
- ICON Soil Sample Location

Notes:
BCY - Bulk Cubic Yards
2019 aerial via USGS Earth Explorer.
H-15 Area, H-16 Area, and H-21 Area based on aerial extent of historical E&P features.

Figure T-2
Hypothetical Soil Remediation Areas – Area 4
Henning Management, L.L.C. v.
Chevron U.S.A. Inc., et al.
Hayes Oil & Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Environmental Resources Management
www.erm.com

Source: ESRI - ArcGIS Online; NAD 1983 UTM Zone 15N

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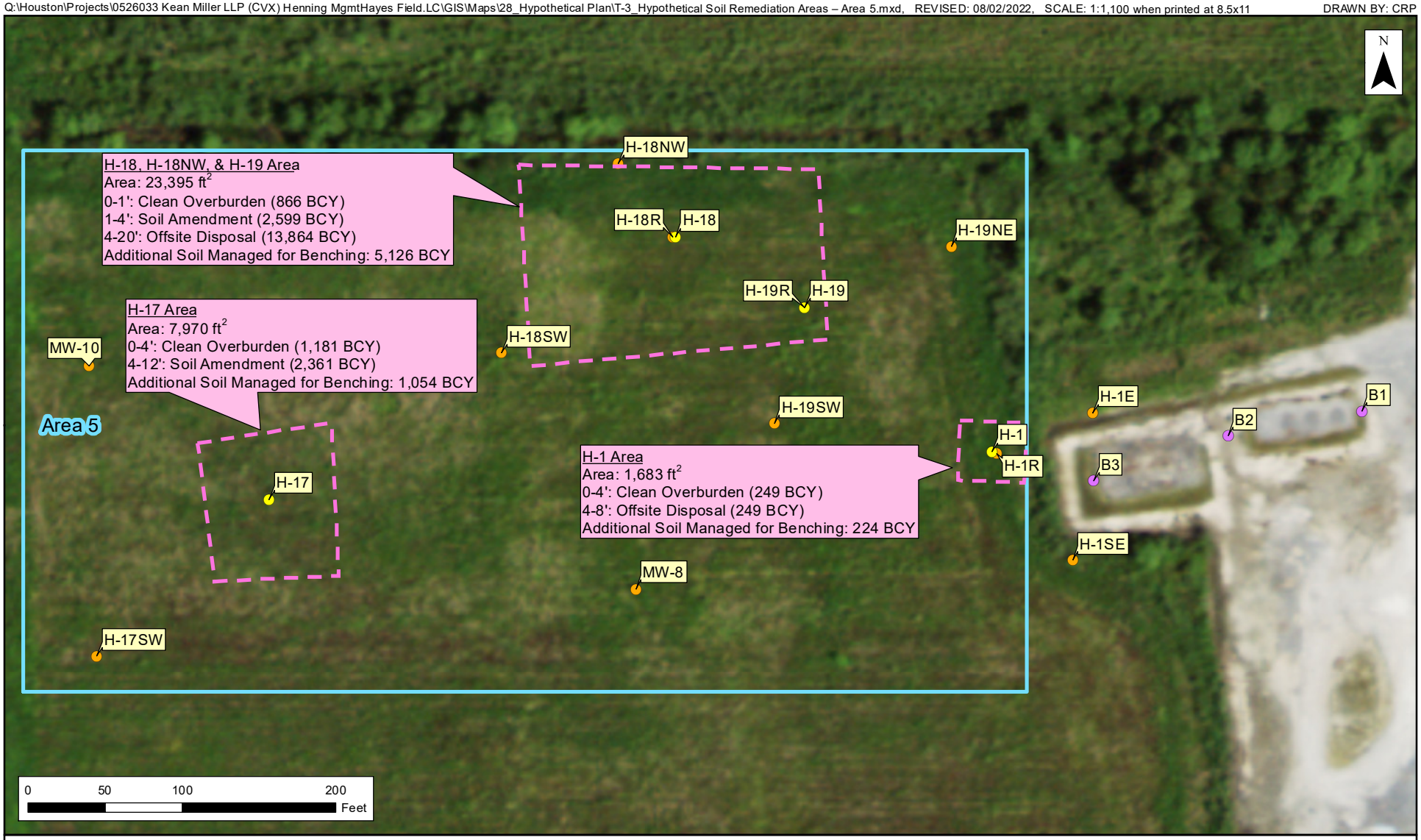

Property

Chevron Limited Admission Areas

Area 5

Hypothetical Soil Remediation Area

ERM Soil Sample Location

ICON Soil Sample Location

HLP Soil Sample Location

Notes:
BCY - Bulk Cubic Yards
2019 aerial via USGS Earth Explorer.
H-17 Area and H-18, H-18NW, & H-19 Area based on aerial extent of historical E&P features.

Figure T-3
Hypothetical Soil Remediation Areas – Area 5
Henning Management, L.L.C. v.
Chevron U.S.A. Inc., et al.
Hayes Oil & Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Environmental Resources Management
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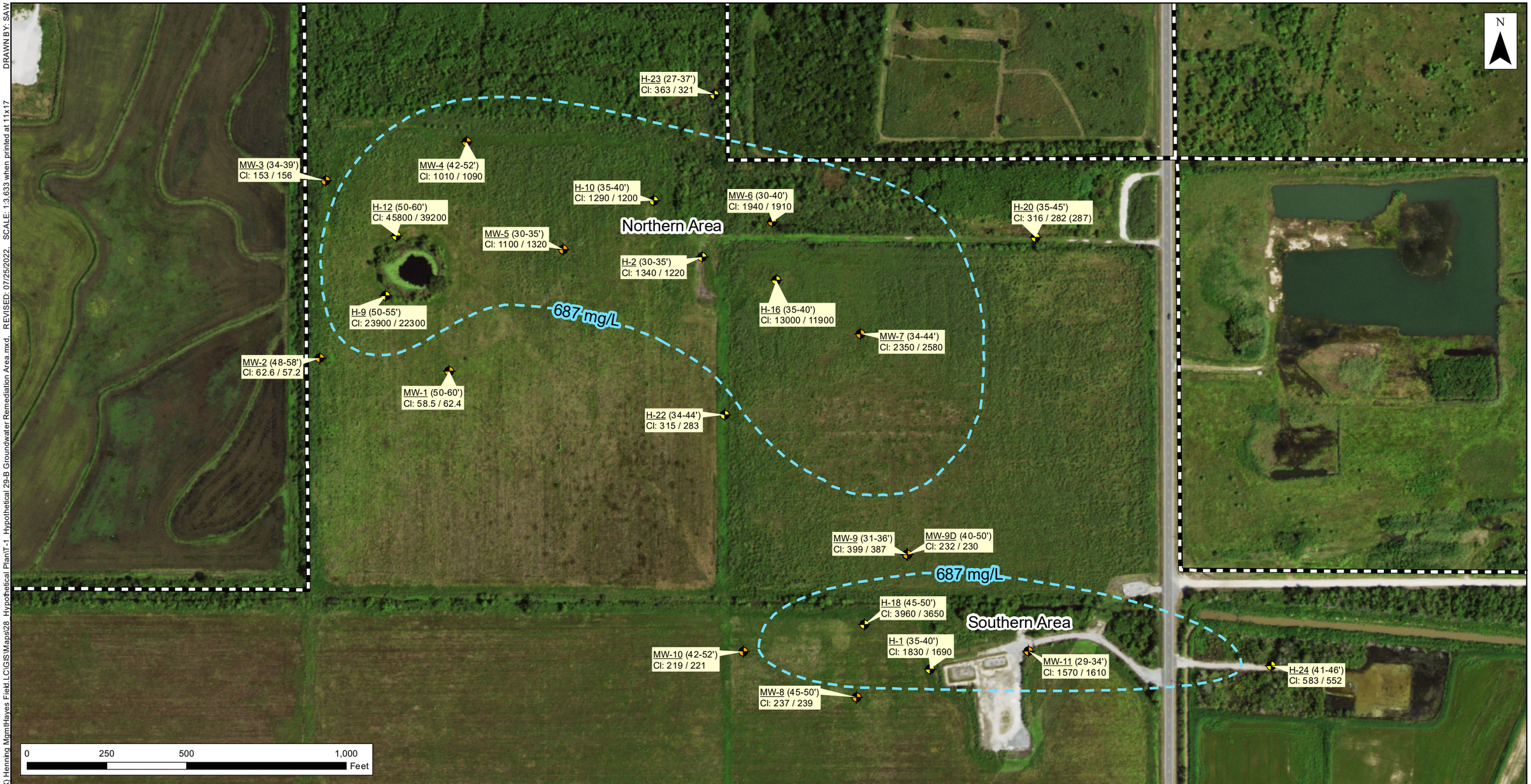
ERM

Source: Esri - ArcGIS Online; NAD 1983 UTM Zone 15N



Property
ERM Monitoring Well
ICON Monitoring Well
Estimated 687 mg/L Chloride Concentration

Well ID (Screened Interval)
Parameter: ERM Result / ICON Result

Notes:
Concentrations reported as mg/l.
2019 Aerial via Earth Explorer

Figure T-4
Hypothetical 29-B Groundwater Remediation Area
Henning Management, L.L.C. v.
Chevron U.S.A. Inc., et al.
Hayes Oil & Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Environmental Resources Management
www.erm.com

Source: Esri - ArcGIS Online; NAD 1983 UTM Zone 15N

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Table T-1
Groundwater Remediation: Northern Area - Target Chloride 687 mg/L (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Volume Calculations	Unit	Value	Basis
Impacted Thickness (b)	feet	4.1	Average shallow water-bearing zone thickness in northern area
Porosity (n)	unitless	0.3	Assumed
Area of Plume (A)	square feet	1,548,510	Area of extrapolated (estimated) 687 mg/L contour
Pore Volume	cubic feet	1,881,440	Calculated: Pore Volume = b * n * A
Pore Volume	gal	14,074,147	Calculated: Unit conversion
Retardation Factor (Rf)	unitless	1	Constant value for chloride
Target Concentration (C_f)	mg/L	687	Calculated 95% USL for background wells (Area 1 and Area 9)
Initial Concentration (C_o)	mg/L	5239	Average of ICON and ERM Splits for wells in northern area
Number Pore Volumes	unitless	2.03	Calculated: Number Pore Volumes = -Rf * ln(C_f/C_o)
Recovery Volume	gallons	28,592,356	Calculated: Recovery Volume = Pore Volume * Number Pore Volumes
Recovery Well Calculations			
Aquifer Pumping Rate	gallons per minute	0.282	Geometric mean of well yield for slug tested wells in northern area (H-9, H-20, MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-9, and MW-9D)
Aquifer Pumping Rate (Q)	ft^3/day	54.22	Calculated: Unit conversion
Time (t)	days	3,650	Assume 10 years
Estimated Radius (r)	feet	228	Calculated: $r = \sqrt{\frac{Qt}{\pi bn}}$ (EPA, 1987)
Estimated Capture Zone Area	square feet	162,870	Calculated
Estimated Number of Recovery Wells	unitless	10	Calculated: Area of Plume / Estimated Capture Zone Area
Time Calculations			
Groundwater Recovery Rate	gallons per day	4,056	Calculated: Pumping Rate * Number of Wells
Recovery System Operation Time	years	19.3	Calculated: Recovery Volume / Recovery Rate
Other Assumptions			
Well Depth	feet	45	Approximate average bottom of shallow water-bearing zone in northern area
Well Diameter	inch	4	Assumed

Initial RW Installation, Pump Test, and Pilot Evaluation	Unit Cost	Units	Quantity	Cost	Cost Basis
Drill Rig Mobilization/Demobilization	$1,500	unit	1	$1,500	7/14/2022 Walker Hill Estimate
Sonic Drill Rig and Crew (one four-inch well and one two-inch well)	$6,500	day	2	$13,000	7/14/2022 Walker Hill Estimate
Four-inch PVC Well Materials	$20	foot	45	$900	7/14/2022 Walker Hill Estimate
Two-inch PVC Well Materials	$16	foot	45	$720	7/14/2022 Walker Hill Estimate
Drill Crew Per Diem	$525	day	2	$1,050	7/14/2022 Walker Hill Estimate
Above-grade Surface Completions	$750	unit	2	$1,500	7/14/2022 Walker Hill Estimate
1/2 HP 5 GPM Well Pump and Control Box	$2,000	unit	1	$2,000	ERM Estimate
Temporary Electrical Hookup	$40	feet	350	$14,000	ERM Estimate
ERM Oversight, Development, and Equipment	$1,500	day	2	$3,000	ERM Estimate
ERM Labor for 24-Hour Pump Test	$5,000	day	1	$5,000	ERM Estimate
Data Loggers for Pump Test	$2,000	unit	2	$4,000	ERM Estimate
55-Gallon Drums for Purge Water and Soil IDW	$80	unit	18	$1,440	ERM Estimate, Walker Hill estimate (10 drums for well install, 8 drums for pump test)
Purge Water and Soil IDW Drum Disposal	$237	unit	18	$4,266	Aaron Oil invoice
Data Evaluation and Reporting	$10,000	unit	1	$10,000	ERM Estimate
Initial RW Installation, Pump Test, and Pilot Evaluation Subtotal				*$62,376*	

Table T-1
Groundwater Remediation: Northern Area - Target Chloride 687 mg/L (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Additional RW Installation	Unit Cost	Units	Quantity	Cost	Cost Basis
Drill Rig Mobilization/Demobilization	$1,500	unit	1	$1,500	7/14/2022 Walker Hill Estimate
Sonic Drill Rig and Crew (9 four-inch wells)	$6,500	day	4	$26,000	7/14/2022 Walker Hill Estimate
Four-inch PVC Well Materials	$20	foot	405	$8,100	7/14/2022 Walker Hill Estimate
Drill Crew Per Diem	$525	day	4	$2,100	7/14/2022 Walker Hill Estimate
Above-grade Surface Completions	$750	unit	9	$6,750	7/14/2022 Walker Hill Estimate
55-Gallon Drums for Soil IDW	$80	unit	25	$2,000	ERM Estimate, Walker Hill estimate
Soil IDW Drum Disposal	$237	unit	25	$5,925	Aaron Oil invoice
1/2 HP 5 GPM Well Pump and Control Box	$2,000	unit	9	$18,000	ERM Estimate
Electrical Hookup	$40	feet	2,500	$100,000	ERM Estimate
ERM Oversight, Development, and Equipment	$1,500	day	5	$7,500	ERM Estimate
Additional RW Installation Subtotal				*$177,875*	

On-site Disposal Capital Costs	Unit Cost	Units	Quantity	Cost	Cost Basis
Disposal Well	-	unit	-	-	Cost estimate for disposal well and associated equipment included on Table T-3
Three-inch Flowline at 4,500 Linear Feet to Connect to SWD	$30	feet	4,500	$135,000	ERM Estimate, Peak Energy (assume 10 wells at an average distance of 266' spacing and 1,800' of collector to disposal well)
On-site Disposal Capital Costs Subtotal				*$135,000*	

Recovery Operation and Maintenance	Unit Cost	Units	Quantity	Quarterly or Annual	Cost	Cost Basis
Energy Consumption (Recovery Pumps)	$0.0775	kWh	8,057	78	$48,703	https://www.electricitylocal.com/
Personnel (O&M)	$75	hr	156	78	$912,600	ERM Estimate - Assumes 12 hours per week
Project Management	$120	hr	20	78	$187,200	ERM Estimate - Assumes 20 hours per quarter
Miscellaneous Equipment	$2,000	year	1	19.3	$38,600	ERM Estimate
Pump Replacement	$4,000	year	1	19.3	$77,200	ERM Estimate - Assumes replacing 2 pumps per year
Annual Sampling	$3,000	year	1	19.3	$57,900	ERM Estimate - Performed in conjunction with a quarterly inspection
Recovery Operation and Maintenance Subtotal					*$1,322,203*	

Project Management and Reporting	Unit Cost	Units	Quantity	Years	Cost	Cost Basis
Project Management	$5,000	year	1	19.3	$96,500	ERM Estimate
Data Evaluation and Reporting	$15,000	year	1	19.3	$289,500	ERM Estimate
Project Management and Reporting Subtotal					*$386,000*	

Total Cost - 19.3 Years of Operation **$2,083,454**

Table T-2
Groundwater Remediation: Southern Area - Target Chloride 687 mg/L (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Volume Calculations	Unit	Value	Basis
Impacted Thickness (b)	feet	2.5	Average shallow water-bearing zone thickness in southern area
Porosity (n)	unitless	0.3	Assumed
Area of Plume (A)	square feet	435,544	Area of extrapolated (estimated) 687 mg/L contour
Pore Volume	cubic feet	320,125	Calculated: Pore Volume = b * n * A
Pore Volume	gal	2,394,700	Calculated: Unit conversion
Retardation Factor (Rf)	unitless	1	Constant value for chloride
Target Concentration (C_f)	mg/L	687	Calculated 95% USL for background wells (Area 1 and Area 9)
Initial Concentration (C_o)	mg/L	1100	Average of ICON and ERM Splits for wells in southern area
Number Pore Volumes	unitless	0.47	Calculated: Number Pore Volumes = -Rf * ln(C_f/C_o)
Recovery Volume	gallons	1,127,260	Calculated: Recovery Volume = Pore Volume * Number Pore Volumes
Recovery Well Calculations			
Aquifer Pumping Rate	gallons per minute	0.258	Geometric mean of well yield for slug tested wells in southern area (H-18, MW-8, MW-9, MW-9D, MW-10, and MW-11)
Aquifer Pumping Rate (Q)	ft^3/day	49.74	Calculated: Unit conversion
Time (t)	days	3,650	Assume 10 years
Estimated Radius (r)	feet	280	Calculated: $r = \sqrt{\frac{Qt}{\pi bn}}$ (EPA, 1987)
Estimated Capture Zone Area	square feet	247,009	Calculated
Estimated Number of Recovery Wells	unitless	2	Calculated: Area of Plume / Estimated Capture Zone Area
Time Calculations			
Groundwater Recovery Rate	gallons per day	744	Calculated: Pumping Rate * Number of Wells
Recovery System Operation Time	years	4.1	Calculated: Recovery Volume / Recovery Rate
Other Assumptions			
Well Depth	feet	45	Approximate average bottom of shallow water-bearing zone in southern area
Well Diameter	inch	4	Assumed

Initial RW Installation, Pump Test, and Pilot Evaluation	Unit Cost	Units	Quantity	Cost	Cost Basis
Drill Rig Mobilization/Demobilization	$1,500	unit	1	$1,500	7/14/2022 Walker Hill Estimate
Sonic Drill Rig and Crew (one four-inch well and one two-inch well)	$6,500	day	2	$13,000	7/14/2022 Walker Hill Estimate
Four-inch PVC Well Materials	$20	foot	45	$900	7/14/2022 Walker Hill Estimate
Two-inch PVC Well Materials	$16	foot	45	$720	7/14/2022 Walker Hill Estimate
Drill Crew Per Diem	$525	day	2	$1,050	7/14/2022 Walker Hill Estimate
Above-grade Surface Completions	$750	unit	2	$1,500	7/14/2022 Walker Hill Estimate
1/2 HP 5 GPM Well Pump and Control Box	$2,000	unit	1	$2,000	ERM Estimate
Temporary Electrical Hookup	$40	feet	350	$14,000	ERM Estimate
ERM Oversight, Development, and Equipment	$1,500	day	2	$3,000	ERM Estimate
ERM Labor for 24-Hour Pump Test	$5,000	day	1	$5,000	ERM Estimate
Data Loggers for Pump Test	$2,000	unit	2	$4,000	ERM Estimate
55-Gallon Drums for Purge Water and Soil IDW	$80	unit	18	$1,440	ERM Estimate, Walker Hill estimate (10 drums for well install, 8 drums for pump test)
Purge Water and Soil IDW Drum Disposal	$237	unit	18	$4,266	Aaron Oil invoice
Data Evaluation and Reporting	$10,000	unit	1	$10,000	ERM Estimate
Initial RW Installation, Pump Test, and Pilot Evaluation Subtotal				*$62,376*	

Table T-2
Groundwater Remediation: Southern Area - Target Chloride 687 mg/L (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Additional RW Installation	Unit Cost	Units	Quantity	Cost	Cost Basis
Drill Rig Mobilization/Demobilization	$1,200	unit	1	$1,200	08/26/2020 Walker Hill Estimate
Hollow Stem Auger Rig and Crew (1 four-inch well)	$3,500	day	1	$3,500	08/26/2020 Walker Hill Estimate
Four-inch PVC Well Materials	$20	foot	45	$900	08/26/2020 Walker Hill Estimate
Drill Crew Per Diem	$525	day	1	$525	08/26/2020 Walker Hill Estimate
Above-grade Surface Completions	$750	unit	1	$750	08/26/2020 Walker Hill Estimate
55-Gallon Drums for Soil IDW	$80	unit	5	$400	ERM Estimate, Walker Hill estimate
Soil IDW Drum Disposal	$237	unit	5	$1,185	Aaron Oil invoice
1/2 HP 5 GPM Well Pump and Control Box	$2,000	unit	1	$2,000	ERM Estimate
Electrical Hookup	$40	feet	200	$8,000	ERM Estimate
ERM Oversight, Development, and Equipment	$1,500	day	2	$3,000	ERM Estimate
Additional RW Installation Subtotal				*$21,460*	

On-site Disposal Capital Costs	Unit Cost	Units	Quantity	Cost	Cost Basis
Disposal Well	-	unit	-	-	Cost estimate for disposal well and associated equipment included on Table T-3
Three-inch Flowline at 1,200 Linear Feet to Connect to SWD	$30	feet	1,200	$36,000	ERM Estimate, Peak Energy (assume 2 wells at an average distance of 280' spacing and 600' to connect to northern area)
On-site Disposal Capital Costs Subtotal				*$36,000*	

Recovery Operation and Maintenance	Unit Cost	Units	Quantity	Quarterly or Annual	Cost	Cost Basis
Energy Consumption (Recovery Pumps)	$0.0775	kWh	1,611	17	$2,123	https://www.electricitylocal.com/
Personnel (O&M)	$75	hr	26	17	$33,150	ERM Estimate - Assumes 2 additional hours per week in conjunction with northern area
Project Management	$120	hr	0	17	$0	ERM Estimate - Assumes performed in conjunction with northern area.
Miscellaneous Equipment	$2,000	year	1	4	$8,000	ERM Estimate
Pump Replacement	$1,000	year	1	4	$4,000	ERM Estimate - Assumes replacing one pump every other year
Annual Sampling	$300	year	1	4	$1,200	ERM Estimate - Assumes performed in conjunction with northern area.
Recovery Operation and Maintenance Subtotal					*$48,473*	

Project Management and Reporting	Unit Cost	Units	Quantity	Years	Cost	Cost Basis
Project Management	$0	year	1	4	$0	ERM Estimate - Assumes performed in conjunction with northern area
Data Evaluation and Reporting	$2,000	year	1	4	$8,000	ERM Estimate - Assumes performed in conjunction with northern area
Project Management and Reporting Subtotal					*$8,000*	

Total Cost - 4.1 Years of Operation **$176,309**

Table T-3
Groundwater Remediation: SWD Capital Costs and Operation and Maintenance (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

On-site Disposal Capital Costs	Unit Cost	Units	Quantity	Cost	Cost Basis
Disposal Well	$600,000	unit	1	$600,000	ERM Estimate, Peak Energy, scaled from 3000' injection depth to 1500' injection depth
Flowline	$30	feet	0	$0	Included in cost estimates for Northern and Southern areas
10,000 Gallon Storage Tanks	$10,000	unit	2	$20,000	ERM Estimate, Peak Energy
Pumps, Piping, and Electrical	$100,000	unit	1	$100,000	ERM Estimate, Peak Energy
On-site Disposal Capital Costs Subtotal				*$720,000*	

On-site Disposal Operation and Maintenance (Annual)	Unit Cost	Units	Quantity	Years	Cost	Cost Basis
Energy Consumption and Maintenace (Disposal Well)	$0.0775	kWh	122,640	19.3	$183,439	https://www.electricitylocal.com/ (70 hp, 4.8 hours/day, 365 days/year)
SWD Maintenance	$1,000	year	1	19.3	$19,300	ERM Estimate
Pumps, Piping, and Electrical Replacement	$10,000	year	1	19.3	$193,000	ERM Estimate, Peak Energy
Chemical Treatment (Biocide)	$10,000	year	1	19.3	$193,000	ERM Estimate, Peak Energy
Acid Wash SWD ($100,000 every five years)	$20,000	year	1	19.3	$386,000	ERM Estimate, Peak Energy, Northstar
On-site Disposal Operation and Maintenance (Annual) Subtotal					*$974,739*	

Total Cost - 19.3 Years of Operation **$1,694,739**

Table T-4
Soil Remediation Cost Estimate (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

Soil Excavation Area	Area (ft^2)	Depth (ft)	Thickness (ft)	Volume (ft^3)	Volume (BCY)	Type
Area 2						
H-9 & H-12 Area	10,136	0-2'	2	20,272	751	Clean Overburden
		2-6'	4	40,544	1,502	Soil Amendment
Area 4						
H-21 Area	4,435	0-1'	1	4,435	164	Clean Overburden
		1-6'	5	22,175	821	Soil Amendment
		6-12'	6	26,610	986	Offsite Disposal
MW-6 Area	904	0-4'	4	3,616	134	Clean Overburden
		4-6'	2	1,808	67	Soil Amendment
		6-18'	12	10,848	402	Clean Overburden
		18-20'	2	1,808	67	Offsite Disposal
H-16 Area	5,919	0-4'	4	23,676	877	Clean Overburden
		4-32'	28	165,732	6,138	Offsite Disposal
H-15 Area	4,584	0-4'	4	18,336	679	Clean Overburden
		4-8'	4	18,336	679	Soil Amendment
		8-14'	6	27,504	1,019	Offsite Disposal
Area 5						
H-1 Area	1,683	0-4'	4	6,732	249	Clean Overburden
		4-8'	4	6,732	249	Offsite Disposal
H-17 Area	7,970	0-4'	4	31,880	1,181	Clean Overburden
		4-12'	8	63,760	2,361	Soil Amendment
H-18, H-18NW, & H-19 Area	23,395	0-1'	1	23,395	866	Clean Overburden
		1-4'	3	70,185	2,599	Soil Amendment
		4-20'	16	374,320	13,864	Offsite Disposal

Additional Soil Managed in Excavation Benching (Areas Calculated in ArcGIS)	Area (ft^2)	Depth (ft)	Thickness (ft)	Volume (ft^3)	Volume (BCY)	Type
H-9 & H-12 Area	4,031	0-6'	6	12,093	448	Clean Overburden
H-21 Area	3,649	0-12'	12	21,894	811	Clean Overburden
MW-6 Area	3,184	0-20'	20	31,840	1,179	Clean Overburden
H-16 Area	13,200	0-32'	32	211,200	7,822	Clean Overburden
H-15 Area	4,404	0-14'	14	30,828	1,142	Clean Overburden
H-1 Area	1,514	0-8'	8	6,056	224	Clean Overburden
H-17 Area	4,745	0-12'	12	28,470	1,054	Clean Overburden
H-18, H-18NW, & H-19 Area	13,839	0-20'	20	138,390	5,126	Clean Overburden

Scope Assumptions	Quantity	Units	Basis
Maximum Depth of Excavation	32	ft	Approximate average top of shallow water-bearing zone
Excavation Benching Slope	1:1	ratio	ERM estimate - actual slope may vary based on soil type
Volume of Material to Excavate (Clean Overburden)	23,110	BCY	Calculation - Sum of volumes described above
Volume of Material to Excavate (Soil Amendment)	8,030	BCY	Calculation - Sum of volumes described above
Volume of Material to Excavate (Offsite Disposal)	22,322	BCY	Calculation - Sum of volumes described above
Volume of Backfill Required	26,787	LCY	Conversion - Volume of material for offsite disposal times 1.2 (BCY to LCY)

Table T-4
Soil Remediation Cost Estimate (Hypothetical 29-B Plan)

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.
Hayes Oil and Gas Field
Calcasieu and Jefferson Davis Parishes, Louisiana

	Unit Cost	Units	Quantity	Cost	Cost Basis
Project Initiation and Planning					
Contractor Pre-job Deliverables/Site Visit/Sub-Surface Clearance Activities	$7,500	lump	1	$7,500	ERM Estimate
ERM Oversight (Contractor Site Visit and Sub-Surface Clearance Activities)	$2,200	day	3	$6,600	ERM Estimate
Geotechnical Assessment, Engineering, Detailed Work Plan	$75,000	lump	1	$75,000	ERM Estimate
Project Initiation/Planning Subtotal				*$89,100*	
Excavation, Amendment, Transportation, and Disposal					
Contractor Labor	$565,920	lump	1	$565,920	Diversified 8/3/22 Quote
Equipment (Excavators, Dozers, Track Trucks, Service Trucks, Side by Side, ATV)	$600,120	lump	1	$600,120	Diversified 8/3/22 Quote
Per Diem (Meals/Lodging)	$117,390	lump	1	$117,390	Diversified 8/3/22 Quote
Diesel	$87,750	lump	1	$87,750	Diversified 8/3/22 Quote
Mob/Demob Heavy Equipment	$6,000	lump	1	$6,000	Diversified 8/3/22 Quote
Amendments	$10,000	lump	1	$10,000	Diversified 8/3/22 Quote
Clean Fill Material	$428,624	lump	1	$428,624	Diversified 8/3/22 Quote
Trucking of Impacted Soils to Disposal	$1,054,000	lump	1	$1,054,000	Diversified 8/3/22 Quote
Disposal of Impacted Material (WM-Carlyss)	$2,701,083	lump	1	$2,701,083	Diversified 8/3/22 Quote
ERM Contractor Oversight (Labor and Expenses)	$2,200	day	210	$462,000	ERM Estimate and Diversified 8/3/2022 Quote
ERM Labor and Expenses - Sampling (Assume one 29-B composite per excavation)	$2,200	day	5	$11,000	ERM Estimate
Sampling and Analytical	$450	sample	8	$3,600	ERM Estimate
Excavation, Amendment, Transportation, and Disposal Subtotal				*$6,047,487*	
Closure Report and Project Management					
Closure Report Preparation and Submittal	$25,000	lump	1	$25,000	ERM Estimate
Project Management	$9,600	month	7	$67,200	ERM Estimate
Closure Reporting Subtotal				*$92,200*	
			Total	**$6,228,787**	

Note: Assumes disposal at Waste Management in Carlyss, LA (Chevron approved landfill). Disposal at Waste Management Reliable Landfill in Livonia would reduce estimated cost approximately $1,696,548 (Diversified 8/3/22 Quote).

Exhibit 1

State of Louisiana

M.J."MIKE" FOSTER, JR.
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF CONSERVATION

JACK C. CALDWELL
SECRETARY

PHILIP N. ASPRODITES
COMMISSIONER OF CONSERVATION

July 19,2000

Ian A. Webster
Project Navigator, Ltd.
2600 East Nutwood Avenue
Suite 830
Fullerton, California 92831

Re: MAR Services Site Remediation Project Slide Presentation (May 3, 2000)
Phase II: Soils Management Proposed Remedy
Mar Services, St. Landry Parish, Louisiana

Dear Mr. Webster:

The Office of Conservation, Injection and Mining Division (IMD) has reviewed the proposed Phase II soils remedy outline for the referenced site contained in the handouts submitted in your presentation on May 3, 2000. Based on the material presented during your presentation in addition to subsequent discussions regarding the same, IMD staff considers the items listed below to represent the most significant aspects of the proposal.

- All metal (barium, zinc) and hydrocarbon (oil & grease) impacted soils, regardless of depth, shall be treated on-site or excavated for off-site disposal for compliance with closure criteria as established in Statewide Order No. 29-B, Section 129.M.7.e.ii.
- All salt impacted areas shall be treated to a depth of three (3) feet to meet closure criteria of 29-B, Section 129.M.7.e.ii.
- All remediated areas shall be graded and vegetated for adequate surface water management.
- New up-gradient and down-gradient groundwater monitoring wells shall be installed.
- All new and existing groundwater monitoring wells shall be maintained and sampled (monitored).

IMD has no objection to this conceptional approach toward closure certification for the referenced site as relates to previous nonhazardous oilfield waste (NOW) commercial facility operations. However, salt impacted soils below three (3) feet and any groundwater concerns are considered to be associated with onsite production waste activities occurring prior to commercial facility operations. Future activities to address groundwater at the MAR site shall be referred to Office of Conservation's Engineering Division.

Therefore, Office of Conservation authorization to conduct Phase II activities shall be contingent upon submission of a written plan for closure certification in accordance with Statewide Order No. 29-B, Section 129.M.7.e. Such plan must be submitted for review and approval before any Phase II soil remediation activities may be initiated. The plan must also address the question of salt wicking upon completion of Phase II activities.

You may contact Mr. Pierre H. Catrou or Mr. Gary Snellgrove at 225/342-5515, if you have any questions about this letter.

Yours truly,

Philip N. Asprodites
Commissioner of Conservation

By: Carroll D. Wascom
Carroll D. Wascom, Director
Injection & Mining Division

DW:PHC:gs

CC: John Aldridge, Office of Conservation, Engineering Division
Earl Moran, ExxonMobil
Nick Longo, Unocal

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Exhibit 2

Exhibit 2

Table 1

Groundwater Chlorides BTV Input

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.

Hayes Oil and Gas Field

Calcasieu and Jefferson Davis Parishes, Louisiana

Boring (a)	Depth	Date	Consultant	Chlorides (mg/L)
H-25	38-48	4/20/2021	ERM	372
H-25	38-48	4/20/2021	ICON	347
H-26	45-50	4/20/2021	ICON	250
H-27	46-51	4/20/2021	ERM	496
H-27	46-51	4/20/2021	ICON	466
H-32A	20-30	8/23/2021	ERM	312
H-32A	20-30	8/23/2021	ICON	213
H-32B	40-50	8/23/2021	ERM	254
H-32B	40-50	8/23/2021	ICON	157
H-33	20-30	8/23/2021	ERM	629
H-33	20-30	8/23/2021	ICON	496
H-34	18-28	8/23/2021	ERM	472
H-34	18-28	8/23/2021	ICON	359

Notes:

(a) Samples collected from monitor wells located in Areas 1 and 9 were considered representative of background.

Exhibit 2

Table 2

Groundwater Chlorides BTV Output

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.

Hayes Oil and Gas Field

Calcasieu and Jefferson Davis Parishes, Louisiana

Background Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	ProUCL 5.16/10/2022 3:09:00 PM
From File	GW Cl Background Stats\GW Cl Areas 1 & 9 Input.xlsx
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
New or Future K Observations	1
Number of Bootstrap Operations	2000

GW Cl

General Statistics

Total Number of Observations	13	Number of Distinct Observations	12
Minimum	157	First Quartile	254
Second Largest	496	Median	359
Maximum	629	Third Quartile	472
Mean	371	SD	135.5
Coefficient of Variation	0.365	Skewness	0.223
Mean of logged Data	5.848	SD of logged Data	0.396

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.671	d2max (for USL)	2.331

Normal GOF Test

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with	95% Coverage	**732.9**	90% Percentile (z)	544.7
	95% UPL (t)	621.6	95% Percentile (z)	593.9
	95% USL	**686.8**	99% Percentile (z)	686.2

Gamma GOF Test

A-D Test Statistic	0.246	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.237	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.538	k star (bias corrected MLE)	5.85
Theta hat (MLE)	49.22	Theta star (bias corrected MLE)	63.42
nu hat (MLE)	196	nu star (bias corrected)	152.1
MLE Mean (bias corrected)	371	MLE Sd (bias corrected)	153.4

Exhibit 2

Table 2

Groundwater Chlorides BTV Output

Henning Management, L.L.C. v. Chevron U.S.A. Inc., et al.

Hayes Oil and Gas Field

Calcasieu and Jefferson Davis Parishes, Louisiana

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	672.4	90% Percentile	576.1
95% Hawkins Wixley (HW) Approx. Gamma UPL	682.4	95% Percentile	653.9
95% WH Approx. Gamma UTL with 95% Coverage	859.2	99% Percentile	817.2
95% HW Approx. Gamma UTL with 95% Coverage	886.1		
95% WH USL	778.1	95% HW USL	796.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.157	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	997.8	90% Percentile (z)	575.7
95% UPL (t)	720.9	95% Percentile (z)	664.8
95% USL	872	99% Percentile (z)	870.6

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	13	95% UTL with 95% Coverage	629
Approx, f used to compute achieved CC	0.684	Approximate Actual Confidence Coefficient achieved by UTL	0.487
		Approximate Sample Size needed to achieve specified CC	59
95% Percentile Bootstrap UTL with 95% Coverage	629	95% BCA Bootstrap UTL with 95% Coverage	629
95% UPL	629	90% Percentile	496
90% Chebyshev UPL	792.9	95% Percentile	549.2
95% Chebyshev UPL	983.9	99% Percentile	613
95% USL	629		

Note: The use of USL tends to yield a conservative estimate of BTV, especially when the sample size starts exceeding 20. Therefore, one may use USL to estimate a BTV only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.

The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.