

CenterPoint Energy Houston Electric

**Clute Substation Project
Brazoria County, Texas**

Alternatives Analysis

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June 2022



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Acronyms and Abbreviations

404(b)(1) guidelines	<i>Guidelines for Preparation of Analysis of Section 404 Permit Applications Pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act (40 Code of Federal Regulations § 230)</i>
CEHE	CenterPoint Energy Houston Electric
CR	County Road
DOW	The DOW Chemical Company
DOW SR	DOW Stratton Ridge chemical facility
EOID	TxNDD element occurrence ID
FCU	functional capacity unit
FEMA	Federal Emergency Management Agency
FM	Farm-to-Market Road
HBMA	Halls Bayou Mitigation Area
kV	kilovolt
MW	megawatt
PEM	palustrine emergent wetland
PFO1	palustrine forested wetland, deciduous
PRM	permittee-responsible mitigation
Project	CEHE's proposed 63.6-acre substation facility
TxNDD	Texas Natural Diversity Database

Section 1

Introduction

1.1 Introduction

An integral part of the U.S. Army Corps of Engineers' Section 404 permitting process is the analysis of project alternatives. A key provision of the *Guidelines for Preparation of Analysis of Section 404 Permit Applications Pursuant to the Section 404(b)(1) Guidelines of the Clean Water Act* (40 Code of Federal Regulations § 230), hereinafter referred to as the 404(b)(1) guidelines, is the “practicable alternative test.”

The practicable alternative test requires that “no discharge of fill material shall be permitted if there is a practicable alternative to the proposed fill which would have a less adverse impact on the aquatic ecosystem.” When the basic purpose of the proposed project is not water dependent, the applicant must clearly demonstrate that there are no alternatives available that would avoid impacts on aquatic resources. For an alternative to be considered “practicable,” the land must be available for use, the alternative must meet the purpose of the project, and the alternative must be feasible after taking into consideration cost, existing technology, and logistics. Practicability, or screening, criteria used in this evaluation of alternatives are discussed in Section 2.1 and listed in Table 1.

CenterPoint Energy Houston Electric (CEHE) proposes to develop an 83.4-acre parcel into a substation facility that will significantly upgrade 138 kilovolt (kV) and 345 kV electric power delivery systems to improve reliability and resiliency in the Freeport, Texas region. Freeport features a robust and growing petrochemical industry complex critical to Texas' economy. DOW Chemical Company (DOW), Freeport LNG, and Enterprise Chemical Transport are key stakeholders within the industrial complex, and new projects totaling 237.5 megawatts (MW) of additional load demand on the system are planned or proposed in the near future. The new Clute 138/345 kV substation complex is essential in supporting these projects, maintaining reliable electric transmission and distribution service to the Freeport industrial complex and growing residential community, and improving system resiliency. In addition, the substation project will provide capacity to accommodate renewable energy generation additions to the system, of which there are hundreds of MW in the planning and construction phases southwest of the Houston metropolitan area.

The proposed 138/345 kV substation complex (Project) will impact 21.8 acres of waters of the U.S. The alternative analysis contained herein reviews CEHE's Preferred Alternative, the No Action Alternative, offsite alternatives, and onsite alternatives. CEHE worked diligently to assess several alternatives in an effort to identify the least environmentally damaging practicable alternative and minimize impacts to waters of the U.S. as much as possible.

1.2 Purpose and Need

CEHE maintains two high-voltage 345 kV transmission circuits and two 138 kV circuits in the Angleton-Freeport corridor that runs northwest to southeast along Farm-to-Market (FM) 523

through the DOW Stratton Ridge chemical facility (DOW SR). These electric transmission lines provide most of the power to southern Brazoria County, DOW SR, Freeport LNG, and other existing industrial facilities in the area.

The primary purpose of the Project is to construct a new substation facility along these existing transmission lines that will provide radial 138 kV service to DOW to improve reliability, support future expansion at DOW SR, and support 237.5 MW of new load from projects currently under development, which CEHE is required to serve. DOW recently approached CEHE with an urgent request for a new 138 kV substation to improve DOW's electric service reliability and to support future industrial expansion at the existing DOW SR facility. The Project will also maintain high-voltage 345 kV grid reliability in southern Brazoria County.

In addition to known load growth projects planned for implementation in the near future, industrial activities and population will continue to grow in southern Brazoria County through 2030, with an expected increase in population of 20 percent between 2020 and 2030 (HGAC 2018). CEHE's Engineering and Planning groups have also determined that additional 138 kV and 345 kV substation capacity is needed as additional industrial customers begin operations. The increase in capacity from the proposed substation facility will meet DOW's request for additional capacity, support additional industrial customers as identified by CEHE, and support growing industrial business and population in Brazoria County. Additionally, the Project will increase the resiliency of the power grid in southern Brazoria County to allow it to have a better chance to withstand catastrophic weather events (e.g., hurricanes) as well as add reliability in day-to-day operations.

Finally, several renewable energy generation projects and battery storage projects have recently been completed, are under construction, or are planned in Brazoria County and nearby counties southwest of Houston. This substation project will provide capacity to accommodate these recently completed and future generation additions.

The proposed Project is not water dependent.

Section 2

Alternatives Analysis

The proposed general location for the Project was selected because it represents the most technologically and logistically feasible, and economically viable option for meeting the Project's stated purpose and need. Within this general location, CEHE identified several parcels that may fit the needs of the Project, then screened these parcels to determine which would be practicable alternatives.

CEHE then evaluated the practicable alternatives to determine whether any may have substantial environmental or other advantages compared to the proposed Project and evaluated potential onsite layouts to determine whether environmental impacts could be avoided or minimized. In Sections 2.2 through 2.4 below, CEHE evaluates the No Action Alternative, Project site alternatives, and onsite layout alternatives, which inform the reasonable and practicable avoidance, minimization, and mitigation measures discussed in Section 3.

2.1 Evaluation of Considered Alternatives for Practicability

The 404(b)(1) guidelines consider an alternative to be practicable “if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” The screening criteria used to assess the practicability of identified alternatives and the screening criteria definitions are outlined in **Table 1**. Each of the identified alternatives were evaluated using the screening criteria and the results are provided in **Table 2**. The alternative sites considered are shown on **Figures 1 and 2** in **Appendix A**.

Table 1. Screening Criteria for Evaluation of Alternatives

Criterion	Definition	Basis for Criterion
Project Size	Meets the size required for the Project. Alternative sites must be at least 35 acres in size.	Alternative sites must be large enough to accommodate a substation facility that can provide 138 kV to DOW and 345 kV grid reliability to southern Brazoria County.
Parcel Availability	The parcel is available for purchase.	Project site alternatives must be available for purchase.
Minimal Encumbrances	Alternative sites must have fewer than two encumbrances that could hinder construction of the substation facility. Examples include airstrips, conservation easements, salt agreements, multiple landowners, distance from current infrastructure, and pipelines.	Alternatives sites must have minimal encumbrances to minimize complications, costs, and delays to the construction of the substation facility such that the Project may be operational by May 2023.

DOW = Dow Chemical Company; kV = kilovolt

Table 2. Summary Table for Site Screening Selection Criteria

Site Screening Selection Criteria	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8 ^a
Size	Yes	Yes	Yes	No	No	No	Yes	Yes
Availability	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Minimal Encumbrances	Yes	No	Yes	No	No	No	Yes	Yes
Practicable Site	Yes	No	Yes	No	No	No	No	Yes

^a Alternative 8 is the Preferred Alternative site.

Alternative 1 is 38.9 acres and is located in southern Brazoria County approximately 0.5 mile north of the intersection of FM 523 and County Road (CR) 223. Alternative 1 is located approximately 2.4 miles northwest of DOW SR and abuts the existing transmission line corridor that connects to DOW SR. Alternative 1 is available for purchase and has minimal encumbrances for construction of the substations and connecting electric transmission lines. This alternative meets the selection

criteria to be considered a practicable alternative and is carried forward for additional evaluation in Section 2.3.

Alternative 2 is 39 acres and is located in southern Brazoria County. It is bordered to the south by FM 223 and is approximately 1.2 miles west of the intersection of FM 523 and CR 223. Alternative 2 is located approximately 2.4 miles northwest of DOW SR and approximately 0.8 mile west of the electric transmission line corridor that connects to DOW SR. Alternative 2 is available for purchase; however, there is a private airstrip located on the property just to the east of Alternative 2, which is considered an encumbrance that would require avoidance. Because Alternative 2 abuts a property with a private airstrip, Alternative 2 is not considered a practicable alternative and is not carried forward for additional evaluation.

Alternative 3 is 48.2 acres and is located in southern Brazoria County. It is bordered by FM 2004 to the west and is approximately 0.6 mile northeast of the intersection of FM 2004 and CR 223. Alternative 3 is located approximately 1.1 miles west of the existing electric transmission line corridor that connects to DOW SR and approximately 3.3 miles northwest of DOW SR. Alternative 3 is available for purchase. This alternative meets the selection criteria to be considered a practicable alternative and is carried forward for additional evaluation in Section 2.3.

Alternative 4 is 6.7 acres and located in southern Brazoria County. It is bordered by Stratton Ridge Road to the northwest and is located approximately 0.3 mile southwest of the intersection of FM 523 and Stratton Ridge Road. Alternative 4 is located on a tract of land within DOW SR and abuts the right-of-way for the main electric transmission line. Alternative 4 is available for purchase but is owned by multiple landowners and is covered by a salt agreement, which restricts sub-surface development. Because Alternative 4 does not meet the size requirements and does not have minimal encumbrances, Alternative 4 is not considered a practicable alternative and is not carried forward for additional evaluation.

Alternative 5 is 8 acres and located in southern Brazoria County. It is bordered by a dirt road to the southeast and is located approximately 0.4 mile southwest of the intersection of FM 523 and Stratton Ridge Road. Alternative 5 is located on a tract of land within DOW SR and approximately 0.1 mile southwest of the main electric transmission corridor. Alternative 5 is available for purchase but is owned by multiple landowners and is covered by a salt agreement, which restricts sub-surface development. Because Alternative 5 does not meet the size requirements and does not have minimal encumbrances, Alternative 5 is not considered a practicable alternative and is not carried forward for additional evaluation.

Alternative 6 is 21 acres and located in southern Brazoria County. It is bordered by FM 523 to the southwest and is located directly across from the intersection of Stratton Ridge Road and FM 523. Alternative 6 is located northeast of DOW SR, across FM 523, and is approximately 0.3 mile northeast of the main electric transmission corridor. Alternative 6 is available for purchase but is owned by multiple landowners and is covered by a salt agreement, which restricts sub-surface development. Because Alternative 6 does not meet the size requirements and does not have minimal encumbrances, Alternative 6 is not considered a practicable alternative and is not carried forward for additional evaluation.

Alternative 7 is 53.1 acres and located in southern Brazoria County. It is bordered by FM 523 to the southwest, Moller Road to the north, and Stratton Ridge Road to the east. Alternative 7 is located 0.1 mile east of the main electric transmission corridor and is across FM 523 from DOW SR. Alternative 7 is not available for purchase. Alternative 7 meets the size and minimum encumbrance criteria, but the alternative site is not available for purchase; therefore, Alternative 7 is not considered a practicable alternative and is not carried forward for additional evaluation.

Alternative 8 (CEHE's Preferred Alternative) is 83.4 acres and located in southern Brazoria County. Alternative 8 is bordered by FM 523 to the east and is located approximately 0.5 mile southeast of the intersection of FM 523 and Hoskins Mound Road. Alternative 8 abuts the main electric transmission corridor and is approximately 0.5 mile southeast of DOW SR. Alternative 8 is owned by DOW and is available to CEHE for construction of the substations. It also meets the size and minimum encumbrance criteria; therefore, Alternative 8 meets the selection criteria to be considered a practicable alternative and is carried forward for additional evaluation in Section 2.3.

Alternatives 1, 3, and 8 meet all screening criteria and are considered practicable alternatives. These three alternatives are further evaluated in Section 2.3. Alternatives 2, 4, 5, 6, and 7 do not meet the screening criteria and are, therefore, not considered further in this analysis.

2.2 No Action Alternative

Under the No Action Alternative, the Project would not be constructed. If the Project is not constructed, the land would remain in its current state and there would be no adverse environmental impacts. However, the No Action Alternative would not satisfy the purpose of the Project or meet the stated needs to provide reliable 138 kV and 345 kV capacity to DOW, support additional industrial customers as identified by CEHE, support growing industrial business and population in Brazoria County, and provide capacity to accommodate recently completed and future renewable energy generation projects.

The demand for electricity would continue to grow as the population increases, DOW and other industrial businesses expand, and more renewable energy projects are proposed. As such, other transmission lines and/or substations would likely be developed to satisfy demand, which could have fewer or more environmental impacts than the proposed Project. Therefore, CEHE does not consider the No Action Alternative to be a practicable alternative.

2.3 Evaluation of Site Alternatives

This section further assesses the alternatives determined to be practicable as noted in **Table 2** and discussed in Section 2.1. The results of this detailed assessment of practicable alternatives are shown in **Table 3**. These practicable alternatives include Alternative 1, Alternative 3, and Alternative 8 (Preferred Alternative).

Table 3. Evaluation of Practicable Alternatives

Evaluation Parameter	Alternative 1	Alternative 3	Alternative 8 (Preferred Alternative)
Total Area (acres)	38.9	48.2	83.4
Market Availability	Potentially available	Potentially available	Owned by DOW; available
Public Land (acres)	0	0	0
Shortest distance to access road (miles)	0	0	0
Shortest distance to existing infrastructure (miles)	0	1.1	0
Detailed Wetland Evaluation (acres)			
Field Delineated Wetlands ^a	33.1	48.2	32.0
Delineated Wetlands in FEMA 100-year Floodplain (acres)	33.1	48.2	32.0
FEMA 100-year Floodplain (acres)	38.9	48.2	83.4
TXNDD EOID	Bald Eagle (EOID 4018)	Bald Eagle (EOID 4018)	Bald Eagle (EOID 4018)

^a Field delineated by Environmental Resources Management and Cardno in [2021 and 2018, respectively].

EOID = element occurrence identifier; FEMA = Federal Emergency Management Agency; TxNDD = Texas Natural Diversity Database

Database Sources Reviewed: FEMA 100-Year Floodplain; TxNDD EOID Data Request; USGS Protected Area Database Search.

2.3.1 Alternative 1

Alternative 1 is a 38.9-acre site located near the intersection of FM 523 and CR 223 in southern Brazoria County, Texas (**Appendix A, Figure 3**). The site may be available for purchase and is situated between the existing CEHE electric transmission corridor and FM 523, with access to FM 523. In 2021, Environmental Resources Management, Inc. ecologists mapped 33.1 acres of palustrine, emergent (PEM) wetlands, all of which are located within the mapped Federal Emergency Management Agency (FEMA) 100-year floodplain. The Texas Natural Diversity Database (TxNDD) depicts a Bald Eagle element occurrence ID (EOID) across the entire site.

2.3.2 Alternative 3

Alternative 3 is a 48.2-acre site located north of the intersection of FM 2004 and CR 223 in southern Brazoria County, Texas (**Appendix A, Figure 4**). The site may be available for purchase and has access to FM 2004. The shortest distance to CEHE existing infrastructure is 1.1 miles east of the site. In 2021, Environmental Resources Management, Inc. ecologists mapped 48.2 acres of PEM wetlands, all of which are located within the mapped FEMA 100-year floodplain. TxNDD depicts a Bald Eagle EOID in the southeastern corner of the site.

2.3.3 Alternative 8 (Preferred Alternative)

Alternative 8 (Preferred Alternative) is an 83.4-acre site located near the intersection of FM 523 and CR 227 in southern Brazoria County, Texas (**Appendix A, Figure 5**). The site is currently owned by DOW, who is requesting the additional electric infrastructure and will allow CEHE to construct the substations on this property. The site has access to FM 523. The existing CEHE transmission corridor bisects the western portion of the site. In 2018, Cardno ecologists mapped approximately 21.8 acres of PEM and 10.3 acres of palustrine, deciduous forested (PFO1) wetlands, all of which are located within the mapped FEMA 100-year floodplain. TxNDD depicts a Bald Eagle EOID across the entire site. Alternative 8 is the Preferred Alternative for the reasons discussed in Section 2.3.4 below.

2.3.4 Site Alternative Conclusion

Of the three alternatives evaluated in detail, Alternative 3 would have the greatest impact on wetlands, as the entire site was found to be PEM wetland. Alternative 3 would potentially impact more wetlands than were identified on site because the distance of Alternative 3 to the existing CEHE electric transmission corridor would require over 1 mile of new right-of-way to be cleared for a connecting electric transmission line. Because Alternative 3 would require over 1 mile of new electric transmission line, CEHE would have to apply for a Certificate of Convenience and Necessity through the Public Utilities Commission of Texas, which would require additional time for approval. Therefore, this alternative would not meet the required schedule for the Project.

Due to the size of the site for Alternative 1 (38.9 acres), wetland impacts would be greater than Alternative 8 as most of the site would need to be developed to meet the purpose and need of the Project. Alternative 8 has a similar amount of wetland acreage within the site boundary to Alternative 1, but because the Alternative 8 site is larger, CEHE has greater flexibility in design of the substations and electric transmission connection lines to minimize impacts to wetlands. While the Bald Eagle EOID covers more of the Alternative 1 and Alternative 8 sites than Alternative 3, Cardno ecologists did not detect any Bald Eagles or Bald Eagle nests during the field survey for Alternative 8. Because Bald Eagles have not been identified at the Alternative 8 site and additional habitat is available in the surrounding area, impacts from Alternative 8 would not likely adversely affect Bald Eagles. The Alternative 8 site is owned by DOW and DOW would grant CEHE surface rights to build, manage, and maintain the substation facility and associated infrastructure.

For the reasons noted above, Alternative 8 is the least environmentally damaging practicable alternative, having accounted for cost, existing technology, and logistics of developing the substations and connecting electric transmission lines in southern Brazoria County.

2.4 Evaluation of Onsite Alternatives

This section reviews the various onsite alternatives considered for the Preferred Alternative (i.e., Alternative 8). Onsite alternatives were evaluated based on environmental impact avoidance, minimization, and mitigation.

2.4.1 Site Layout 1

Site Layout 1 would include two substations—one 138 kV and one 345 kV—floodplain mitigation basins, and electric transmission line connectors with permanent workspaces around the transmission poles (**Appendix A, Figure 6**). This layout would result in the permanent loss of 9.91 acres of PEM wetlands and 7.69 acres of PFO1 wetlands, permanent conversion of 1.04 acres of PFO1 wetlands to PEM wetlands, and temporary impacts to 3.22 acres of PEM wetlands. While Site Layout 1 avoids some wetlands, this layout does not minimize permanent impacts on waters of the U.S. Therefore, Site Layout 1 would be more environmentally damaging and mitigation costs would make this alternative economically unviable.

2.4.2 Site Layout 2 (Preferred Alternative)

CEHE developed Site Layout 2 to maximize avoidance and minimization of wetland impacts while still meeting the purpose of the Project in a practicable manner (**Appendix A, Figure 7**). Site Layout 2 will result in the permanent loss of 9.19 acres of PEM wetlands and 6.81 acres of PFO1 wetlands, permanent conversion of 1.93 acres of PFO1 wetlands to PEM wetlands, and temporary impacts to 3.94 acres of PEM wetlands. Compared to Site Layout 1, this layout will avoid and minimize impacts to the greatest extent practicable by eliminating permanent workspaces around the transmission poles; the workspaces would be temporary during construction only, then allowed to revegetate to natural conditions. Site Layout 2 is the least environmentally damaging practicable alternative.

Section 3

Avoidance, Minimization, and Mitigation

3.1 Avoidance and Minimization

Based on the foregoing analysis, Site Layout 2 will result in the least permanent impacts on waters of the U.S. by avoiding and minimizing development in wetlands to the extent practicable, while still meeting the purpose and need of the Project. CEHE will minimize impacts on wetlands by minimizing the Project size within the 83.4-acre Preferred Alternative site boundary—the overall Project size will be 63.6 acres within the larger 83.4-acre site. CEHE designed Site Layout 2 (Preferred Alternative) to be the optimal layout and best use of space within the Project area and avoid permanent impacts to 0.72 acre of PEM wetlands and 0.88 acre of PFO1 wetlands compared to Site Layout 1. Because CEHE reduced the overall Project size, Site Layout 2 will avoid 1.54 acres of PFO1 wetlands, and 8.64 acres of PEM wetlands of the total 32.04 acres of wetlands delineated within the 83.4-acre site. Site Layout 2 will avoid and minimize wetland impacts as much as possible and is the least environmentally damaging practicable alternative.

3.2 Mitigation

While CEHE is proposing to avoid and minimize impacts to the extent practicable, the Preferred Alternative will result in some unavoidable impacts. These impacts will be mitigated by purchasing functional capacity units (FCUs; i.e., credits) through the Danza Del Rio Mitigation

Bank (owned/operated by Delta Land Services, LLC), to offset permanent impacts to and conversion of PFO1 wetlands within the Project area. Permanent impacts to PEM wetlands will be mitigated by purchasing FCUs through the Delta Land Services, LLC planned Halls Bayou Mitigation Area (HBMA). If PEM credits from HBMA are not available upon the issuance of this Permit, a permittee responsible mitigation (PRM) plan will be developed within the HBMA to sufficiently offset PEM impacts within the Project area.

Section 4

Literature Cited

HGAC (Houston-Galveston Area Council). 2018. 2018 H-GAC Regional Growth Forecast. Available online: [https://www. https://datalab.h-gac.com/rgf2018/](https://www.datalab.h-gac.com/rgf2018/). Accessed April 2022.

Appendix A

Figures

Figure 1: Alternative Site Locations – Topographic Map

Figure 2: Alternative Site Locations – Aerial Map

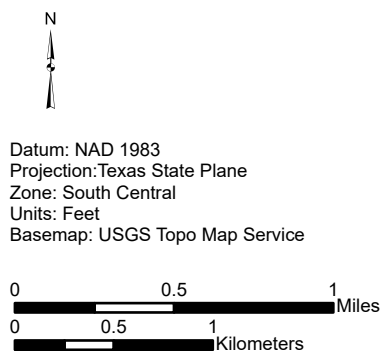
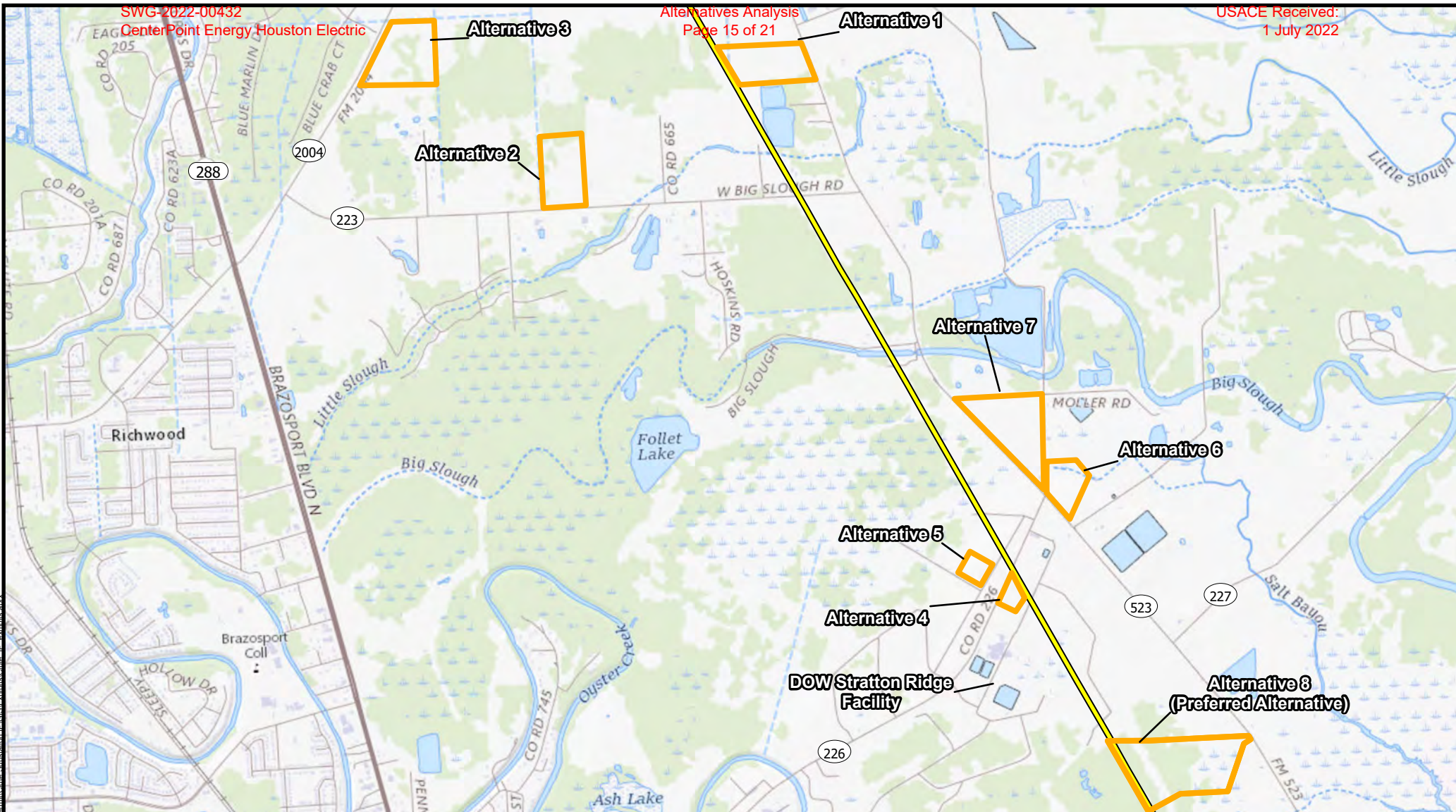
Figure 3: Alternative 1 – Site Analysis

Figure 4: Alternative 3 – Site Analysis

Figure 5: Preferred Alternative – Site Analysis

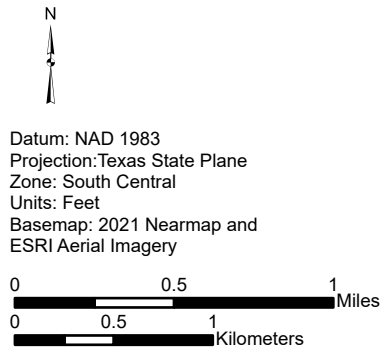
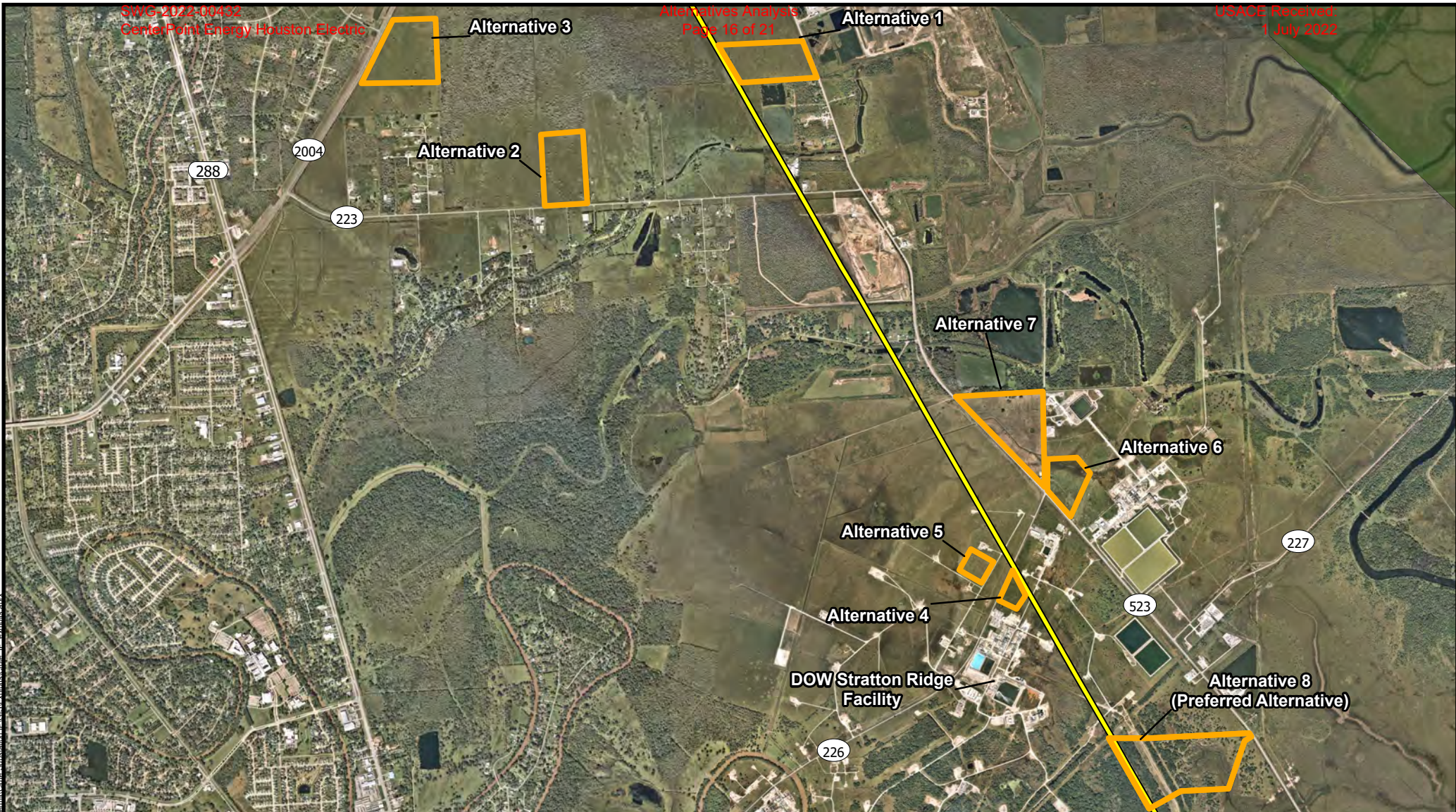
Figure 6: Site Layout 1

Figure 7: Site Layout 2 (Preferred Alternative)



- Alternative Site
- Existing CEHE Transmission Line

 BGE, Inc. 10777 Westheimer, Suite 400, Houston TX 77042 Tel: 281-558-8700 Fax: 281-558-9701	
Figure 1 Alternative Site Locations - Topographic Map Alternatives Analysis Clute Substation Project CenterPoint Energy Houston Electric Brazoria County, Texas	
Prepared By: BGE	Scale: 1:38,196
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- Alternative Site
- Existing CEHE Transmission Line

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Figure 2
Alternative Site Locations - Aerial Map
Alternatives Analysis
Clute Substation Project
CenterPoint Energy Houston Electric
Brazoria County, Texas

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Scale: 1:38,196

Job No.: 10230-00

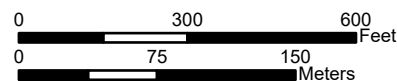
Date: June 2022



Alternative 1
Location



Datum: NAD 1983
Projection: Texas State Plane
Zone: South Central
Units: Feet
Basemap: 2021 Nearmap
Aerial Imagery



Alternative Site Boundary (38.9 acres)



TXNDD EOID 4018 (Bald Eagle Nest Territory)



PEM Wetland



Existing CEHE Transmission Line Corridor

*Entire Figure is located in the mapped FEMA 100-Year Floodplain.



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Figure 3
Alternative 1 - Site Analysis
Alternatives Analysis
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Brazoria County, Texas

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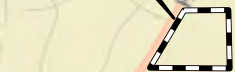
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Alternative 3
Location



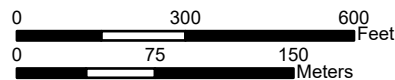
2004

223

W Big Slough



Datum: NAD 1983
Projection: Texas State Plane
Zone: South Central
Units: Feet
Basemap: 2021 Nearmap
Aerial Imagery



Alternative Site Boundary (48.2
acres)



TXNDD EOID 4018 (Bald Eagle
Nest Territory)



PEM Wetland

*Entire Figure is located in the mapped
FEMA 100-Year Floodplain.



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Figure 4
Alternative 3 - Site Analysis
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Job No.: 10230-00

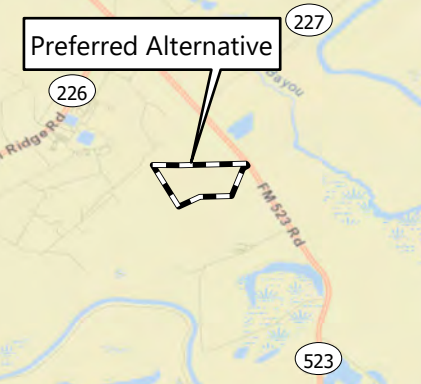
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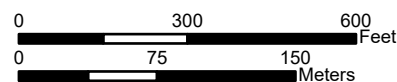
Preferred Alternative

227

226



Datum: NAD 1983
Projection: Texas State Plane
Zone: South Central
Units: Feet
Basemap: 2021 Nearmap
Aerial Imagery



Preferred Alternative Site
Boundary (83.4 acres)



TXNDD EOID 4018 (Bald Eagle
Nest Territory)



PFO Wetland



PEM Wetland



Existing CEHE Transmission Line

*Entire Figure is located in the mapped
FEMA 100-Year Floodplain.



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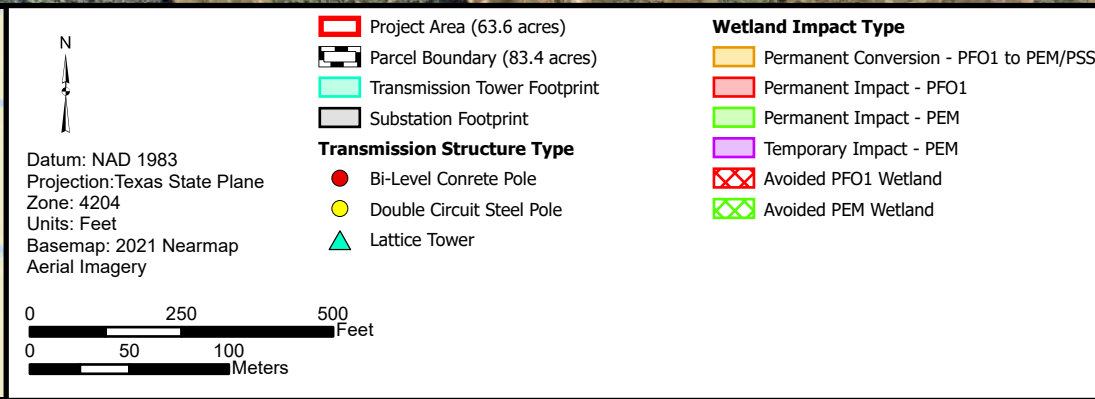
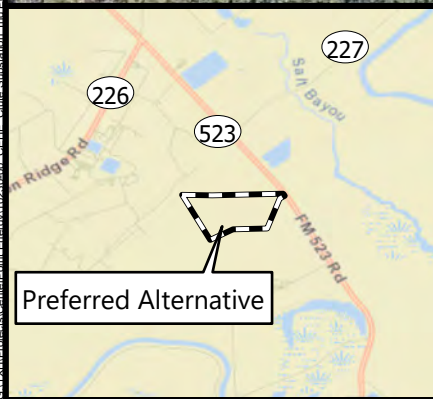
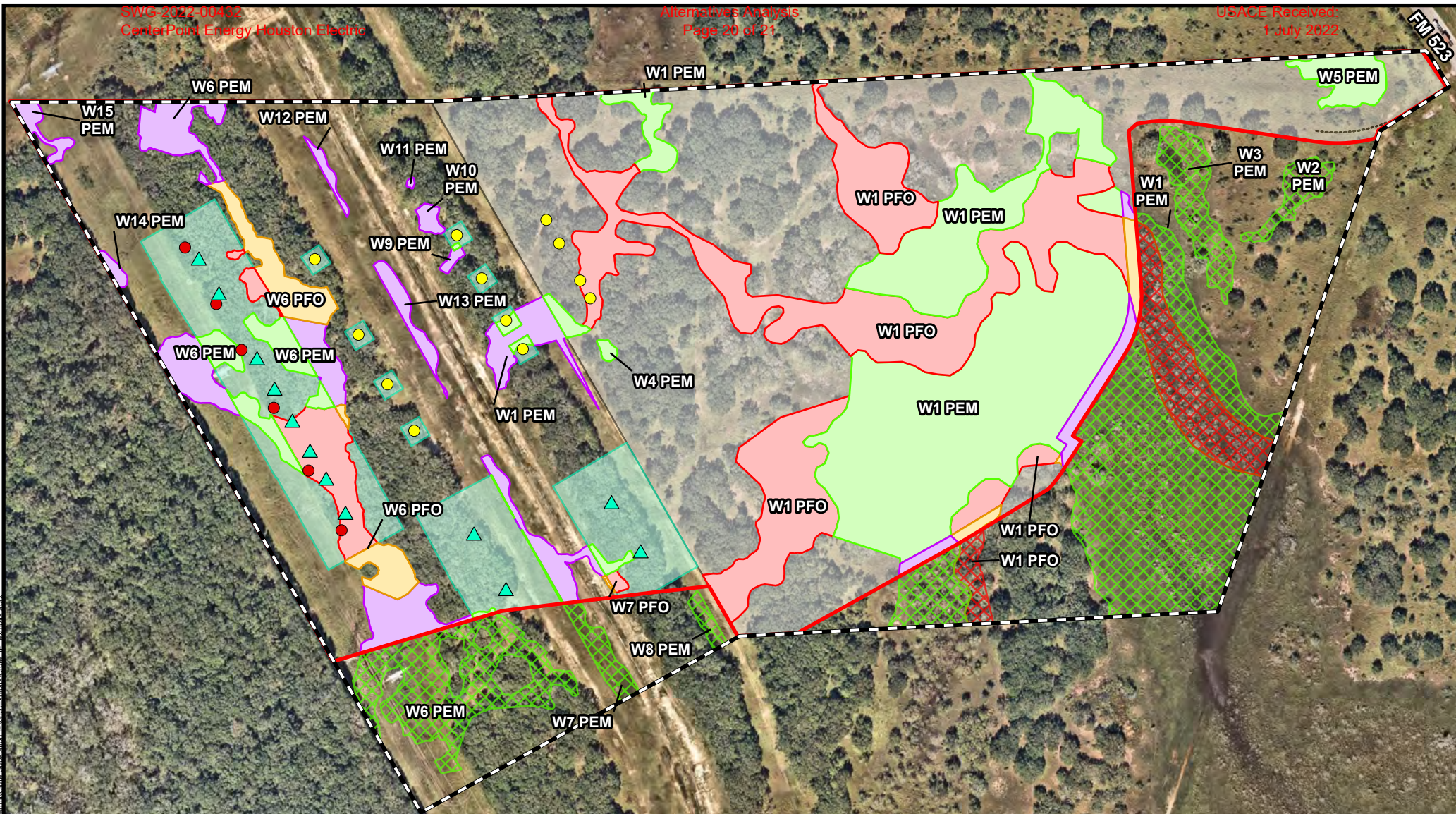
Figure 5
Preferred Alternative - Site Analysis
Alternatives Analysis
Clute Substation Project
CenterPoint Energy Houston Electric
Brazoria County, Texas

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Job No.: 10230-00

Scale: 1:4,101

Date: June 2022



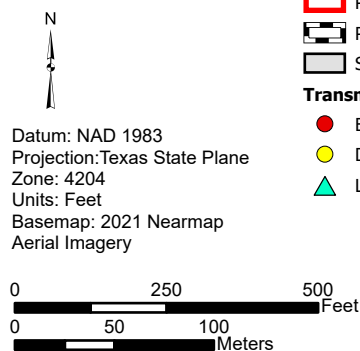
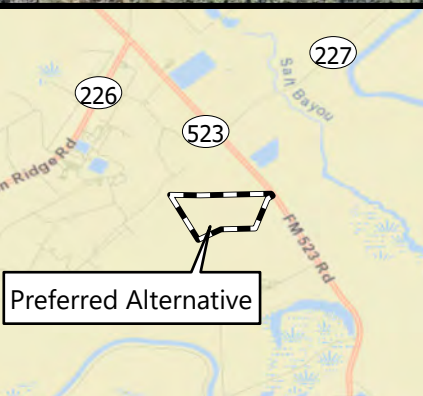
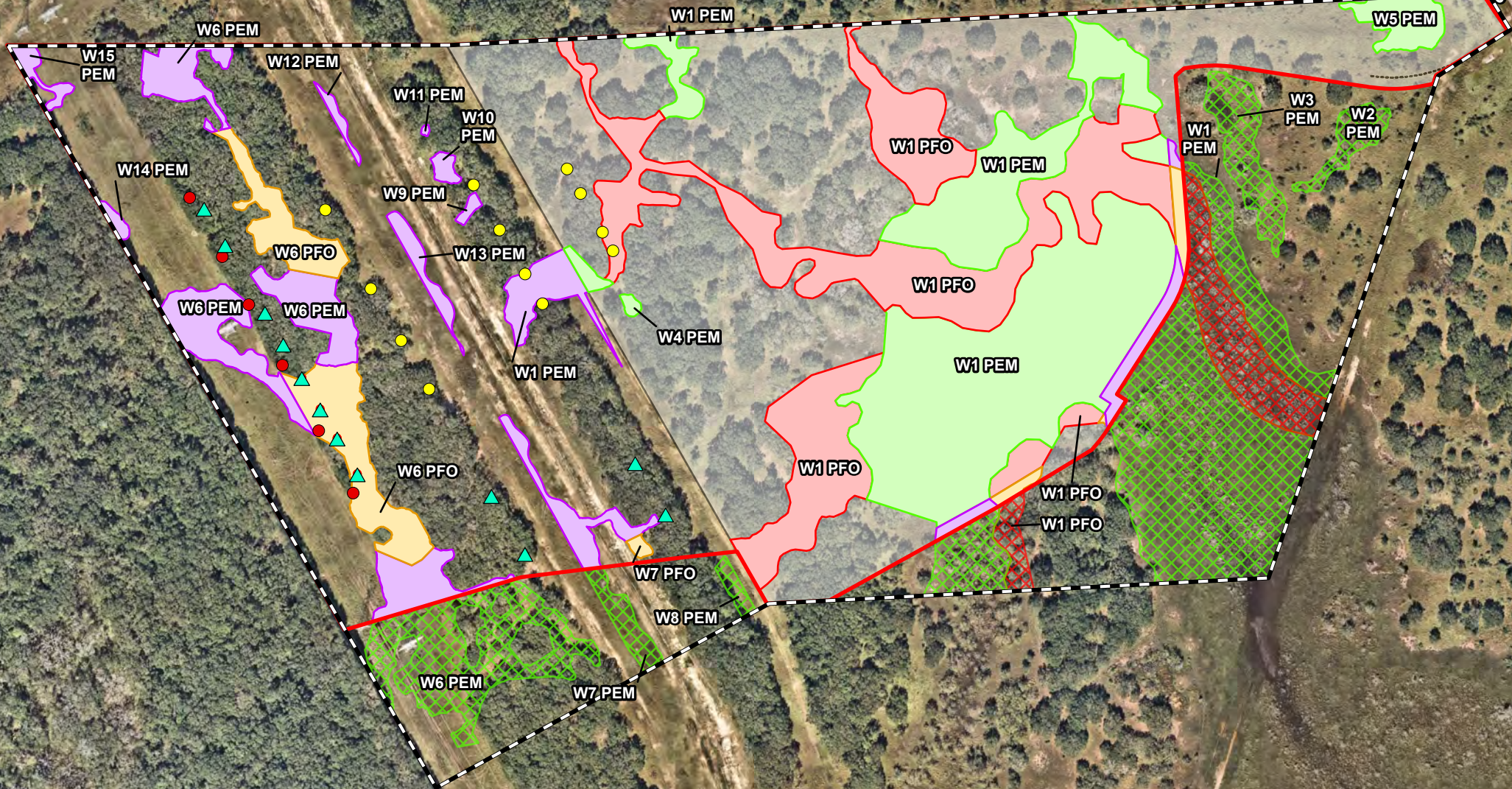
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Figure 6
Site Layout 1
Alternatives Analysis
Clute Substation Project
CenterPoint Energy Houston Electric
Brazoria County, Texas

Prepared By: BGE
Job No.: 10230-00

Scale: 1:3,800
Date: June 2022

FM 523



- Project Area (63.6 acres)
- Parcel Boundary (83.4 acres)
- Substation Footprint
- Transmission Structure Type**
 - Bi-Level Concrete Pole
 - Double Circuit Steel Pole
 - Lattice Tower

- Wetland Impact Type**
- Permanent Conversion - PFO1 to PEM/PSS
 - Permanent Impact - PFO1
 - Permanent Impact - PEM
 - Temporary Impact - PEM
 - Avoided PFO1 Wetland
 - Avoided PEM Wetland

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Figure 7 Site Layout 2 (Preferred Layout) Alternatives Analysis Clute Substation Project CenterPoint Energy Houston Electric Brazoria County, Texas	
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