No-Action Alternative

Under this alternative, the permittee would not construct and operate the proposed Celanese Clear Lake Facility Expansion, and the new CO unit would not be built. This alternative would not result in potential impacts to wetlands or waters of the U.S. No Individual Permit (IP) application would be submitted as such coordination with U.S. Army Corps of Engineers would not be necessary. The No-Action Alternative was analyzed and eliminated for the following reasons: (1) the No-Action Alternative would not serve to accommodate the Facility's need to supply CO for its acetyl operation; and (2) not constructing the CO unit would not meet the Proposed Project's purpose and need.

Additionally, the No Action Alternative leaves Celanese without CO supply and would likely result in the shutdown of some of the operating units within the Clear Lake Plant. Not being able to produce CO would result in significant economic impacts to Celanese. The evaluation of available business options prefers the construction and operation of a new CO unit due to its lower cost as opposed to extending the current contract for continued supply of CO from the existing CO unit that is owned and operated by a 3rd party.

On-site Alternatives

The following table provides a summary of the identified on-site alternatives.

Alternative Number	Location	Description
1	Onsite – Within Existing Facility	Update Existing CO Unit
2	Onsite – Within Existing Facility	Vacant Unit Plot 1
3	Onsite – Within Existing Facility	Vacant Unit Plot 2
4	Onsite – Build North of Existing Facility	North Alternative
5	Onsite – Build West of Existing Facility	West Alternative

Update Existing CO Unit (Alternative # 1)

Celanese currently obtains required CO supply from an on-site 3rd party under contract to Celanese which expires in 2019. This facility is aging and requires significant upgrades, which have been estimated to be comparable to building a new CO unit. To construct the required upgrades (estimated to be a minimum of two (2) years), the existing CO unit would result in a shutdown of the existing CO unit. CO, a key raw material, would not be available to Celanese to support continued operation of CO consuming units at the Clear Lake Plant. This result is an untenable business position for Celanese given the CO consuming units at the Clear Lake Plant would cease operation; an unacceptable business situation. In addition, Celanese does not own the existing CO unit; therefore, Celanese is unable to commit the resources to upgrade and/or retrofit the existing CO unit

Alternatively, the existing CO unit could be shut down, and the unit demolished to allow the new CO unit to be constructed on the same parcel (estimated size 175' x 550'). This alternative would result in the loss of CO supply while the new CO unit is constructed (estimated to be a

minimum of two (2) years), and as indicated above, this is an untenable business positon for Celanese. In addition, the available acreage does not meet the size criteria of 475' x 625' required to construct the new CO unit.

Given CO is a key raw material at the Clear Lake Plant, the existing CO unit must operate through its contract life (December 31, 2019). Therefore, both alternatives discussed for updating the existing CO unit are not practicable as such have been eliminated by the applicant.

Additional Onsite Alternatives Within Existing Facility (Alternatives # 2 & #3)

Two additional onsite alternatives, which are centrally located within the Clear Lake Plant, were considered. Either onsite alternative would avoid impacts to all wetlands and waterbodies within the project area; however, the available acreage does not meet the size criteria of 475' x 625' as summarized in the following table.

Alternative Number	*Description*	*Estimated Size*
2	*Vacant Unit Plot 1*	*175' X 550'*
3	*Vacant Unit Plot 2*	*275 X 375'*

Given Onsite Alternatives #2 and #3 do not meet the size criteria, Celanese believes it will be unable to comply with the layout (process safety) guidelines as developed and published by the CCPS. A design that would require the CO Unit to be built within the available space would result in a tight and congested layout both horizontally and vertically. To mitigate or reduce the anticipated risk from a tight and congested design would be cost prohibitive (if even attainable) to address the significant safety issues including but not limited to inability to manage vapor cloud dispersion and prevention and/or mitigation of "chain" effect fires following an incident. In addition, Onsite Alternative #3 is closer to the facility's Administrative Buildings and as such has been reserved for utility processes to comply with siting (process safety) guidelines for chemical/hydrocarbon production units.

Onsite Alternatives #2 and #3 do not meet the applicant's size, siting (process safety) and layout (process safety) screening criteria; therefore, these alternatives are not practicable as such have been eliminated by the applicant.

West (Alternative # 4) & North (Alternative # 5) Alternatives

Both the North Alternative and West Alternative will require the connection of twelve (12) utilities pipelines to the Clear Lake Plant's existing pipe rack. The existing pipe rack runs east/west and as such, the distance to connect to this existing pipe rack has been identified as a criterion to assist with evaluating available alternatives. Utilizing the North Alternative would require the east/west pipe rack to be extended approximately 3,000' versus the West Alternative, which would require the east/west pipe rack to be extended by 600' for each of the twelve (12) utilities required to support the new CO unit. The distance required for North Alternative is five (5) times greater than the distance required for West Alternative and as such, the project costs for North Alternative is substantially greater than West Alternative. In addition, the environmental impacts related to use of the North Alternative to construct the new CO unit could result in

higher EHS risks given the new CO unit will be located 500 feet from the closest property boundary while use of West Alterative places the new CO unit 1,500 feet from the closest property boundary. Given the distance to the closest property boundary is greater for West Alternative than North Alternative, West Alternative is projected to avoid or minimize negative EHS impacts such as impacts resulting from air emissions to off-site receptors. In addition, the North Alternative presents additional construction and safety concerns including: (1) construction in close proximity to existing ponds, which may affect pond integrity; (2) construction adjacent to Bay Park Road; (3) construction equipment working under existing powerlines; and (4) construction equipment working on and within close proximity to existing pipelines.

The North Alternative includes the necessary operating footprint that includes 20.09 acres and 8.77acres for Phases 1 and 2, respectively. Based on a wetland and waterbody delineation performed in February 2016, this proposed alternative would permanently impact 0.474 acres of emergent wetlands and 2.139 acres of forested wetlands, a total of 2.613 acres of wetlands.

The North Alternative would require construction of new pipeline racks for existing utilities and supply materials required for the operation of the new CO unit. If built in the North Alternative, the pipelines would be constructed over existing natural gas pipelines and under existing powerlines, which could increase safety hazards during construction and future maintenance activities. Construction in close proximity to or under existing ponds is not preferred as, depending on the depth of each pond, construction could impact pond structure integrity. These ponds were constructed as storm water retention ponds and serve a necessary function for plant operation during high rainfall events. They provide little to no aquatic habitat nor would they adversely impact suitable aquatic environment. Although the North Alternative is located in a space with more upland areas, due to increased EHS risks and costs associated with the required additional and unavoidable infrastructure, the North Alterative is not a viable alternative and eliminated by the applicant as it is above the objectives and economic threshold of the project.

West Alternative (Alternative # 5)

Under this scenario, Celanese would construct the proposed CO unit as described in this permit application and would meet the Proposed Project's purpose and need. This alternative requires filling forested wetlands to construct the CO unit and laydown area portions of the Proposed Project.

Due to its location within the property boundary, the placement of fill within wetlands is necessary to raise the site to the same elevation as the existing facility. The position of the CO unit would permanently fill 18.513 acres of wetlands. Table 3 below outlines the required acreage needed to develop the project.

Table 3: Facility expansion acreage.

Phase	Development Type	Acreage
1	CO Unit	22.09 acres
2	Construction laydown area/future facility expansion	8.77 acres
Total Development Acreage		**30.86 acres**

Development of the proposed project would require approximately 30.86 acres of the total 165-acre property. This alternative would meet the site selection criteria for the project's purpose as follows:

- **EHS (Environmental, Health & Safety):** Due to the proximity of West Alternative # 5 to the nearest property boundary, this alternative satisfies the criteria to avoid or minimize negative environmental, health and safety impacts such as impacts resulting from air emissions to off-site receptors.
- **Siting (Process Safety):** The proposed siting for West Alternative # 5 is projected to conform with Guidelines for Evaluating Plant Buildings for Fire, Explosion, and Toxic Releases (API RP 752) and Celanese identified RAGAGEP (Recognized and Generally Accepted Good Engineering Practices) for evaluating and determining facility siting; a requirement established by OSHA's PSM standard (29 CFR 1910.119).
- **Layout (Process Safety):** The proposed siting for West Alternative # 5 is projected to conform to the Guidelines for Facility Siting and Layout as developed and published by CCPS, which will assist in minimizing process safety risks.
- **Size:** The size of West Alternative #5 provides the available acreage needed to satisfy the construction/operating footprint of 475' x 625'.
- **Distance:** A comparison of distance required for both Build Alternatives indicates that West Alternative #5 minimizes the distance required to connect existing facilities and services required to support unit operation.
- **Industry Best Practice:** West Alternative #5 provides for production of CO with the Clear Lake Plant as such achieves the desire for on-site production which minimizes transportation of CO.
- **Supply:** Given Celanese will continue to receive CO supply from the existing CO unit and the new CO unit will be operating/producing CO before the supply contract terminates, West Alternative #5 provides for continuation of CO feed which is a key raw material and required to support unit operation at the Clear Lake Plant. The West Alternative does not appear to have the potential to impact any threatened and endangered species (Attachment I) or cultural resources (Attachment J).

As indicated above, the West Alternative aligns best with the intended purpose and need for the project as such is the preferred alternative.

The applicant considers its preferred alternative to comply with the criteria as the Least Environmentally Damaging Practicable Alternative. Refer to IP application, Attachment C for the project maps and Attachment D for the project drawings.

Off-site Alternatives

40 Code of Federal Regulations (CFR) § 230.10(a)(2) provides as follows:

> *An alternative is 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. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the project may be considered.*[1] (Emphasis added.)

In this instance, there are no otherwise practicable off-site alternative sites that could "reasonably be obtained, utilized, expanded or managed" in order to fulfil the basic purpose of the proposed activity.

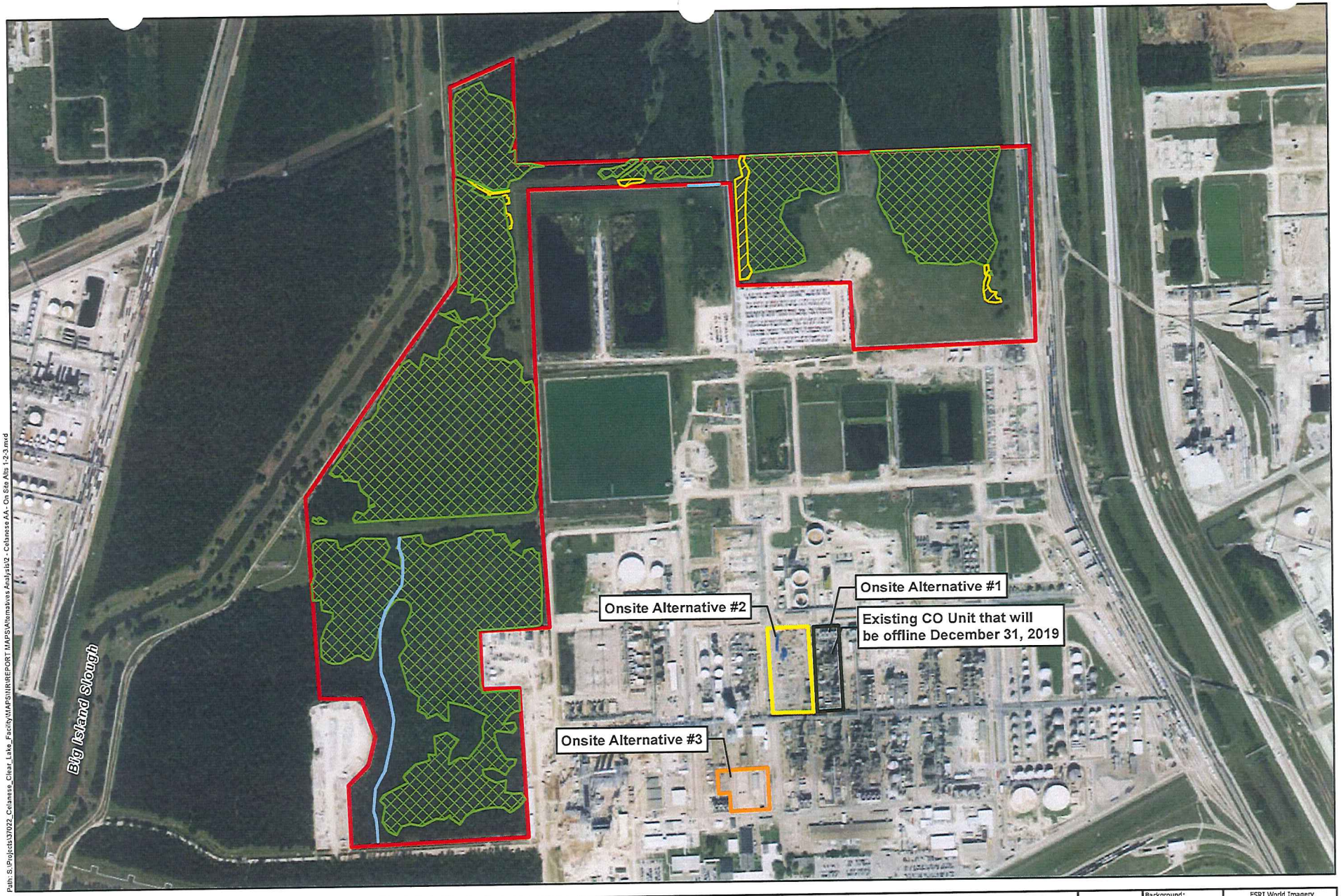
Alternatives for offsite locations not immediately adjacent to the existing facility property were considered, but determined to be not practicable in order to align with industry best practices, which seek to minimize transportation of CO given its classification as a DOT hazardous material for flammability and toxicity.

Compensatory Mitigation

Of the 93.414 acres of wetlands within the proposed project area, 18.513 acres of PFO wetlands were identified to be unavoidable. Therefore, Celanese proposes compensatory mitigation for impacts to 18.513 acres of PFO wetlands.

An interim hydrogeomorphic (iHGM) functional assessment was performed on the 18.513 acres of PFO wetlands proposed to be filled by the Proposed Project. The objective of the iHGM approach is to provide a means of assessing the functional capacity of a given wetland system. Emphasis is placed on the physical, biological, and chemical functional characteristics. The Riverine Forested iHGM Functional Assessment Data Forms were used to calculate a functional capacity index (FCI) for each characteristic of the wetland assessment area. FCI values were then multiplied by the respective wetland acreage to calculate functional capacity units (FCU) for each characteristic. FCUs translate to credits at wetland mitigation banks. The FCU values for each function of the model used for the assessment areas are presented in the table below. Using the Riverine Forested iHGM model, the proposed impact area (WETA003-01) PFO wetlands comprise of 12.553 physical FCU's, 22.568 biological FCU's, and 17.829 chemical FCU's (Table 4).

[1] The USACE's Standard Operating Procedures also provide that: "The level of analysis required for determining which alternatives are practicable will vary depending on the type of project proposed. [...] Under the 404(b)(1) Guidelines, if an alternative is unreasonably expensive to the applicant that alternative is not considered practicable." (Citing 45 Fed. Reg. at 85343.) *See also,* RGL 95-01 (extended by RGL 05-06).



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CELANESE CLEAR LAKE FACILITY

PROPOSED ONSITE ALTERNATIVE #1, #2, AND #3
HARRIS COUNTY, TEXAS

FIGURE 2

- Survey Area
- Onsite Alternative #1 Existing Facility CO Unit
- Onsite Alternative #2
- Onsite Alternative #3
- Ephemeral Waterbody
- Emergent Wetland
- Forested Wetland

Background:	ESRI World Imagery
Scale:	1:10,000
Created By:	JS
Approved By:	AR
SWCA Project No.:	37022
Date Produced:	August 05, 2016

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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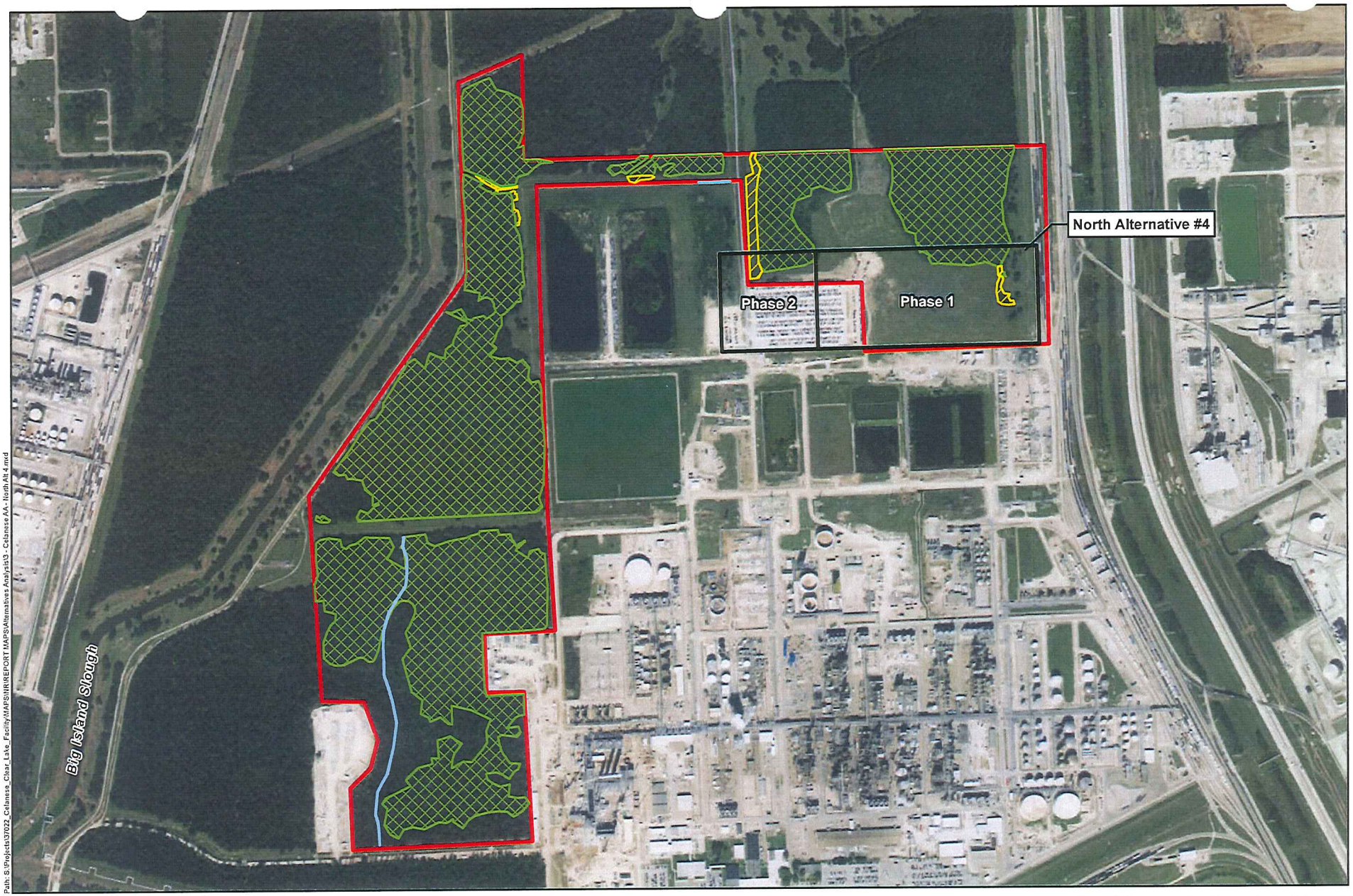

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PROPOSED NORTH ALTERNATIVE #4
HARRIS COUNTY, TEXAS

FIGURE 3

Proposed Project Expansion
Survey Area
Ephemeral Waterbody
Emergent Wetland
Forested Wetland

Background:	ESRI World Imagery
Scale:	1:10,000
Created By:	JS
Approved By:	AR
SWCA Project No.:	37022
Date Produced:	August 05, 2016

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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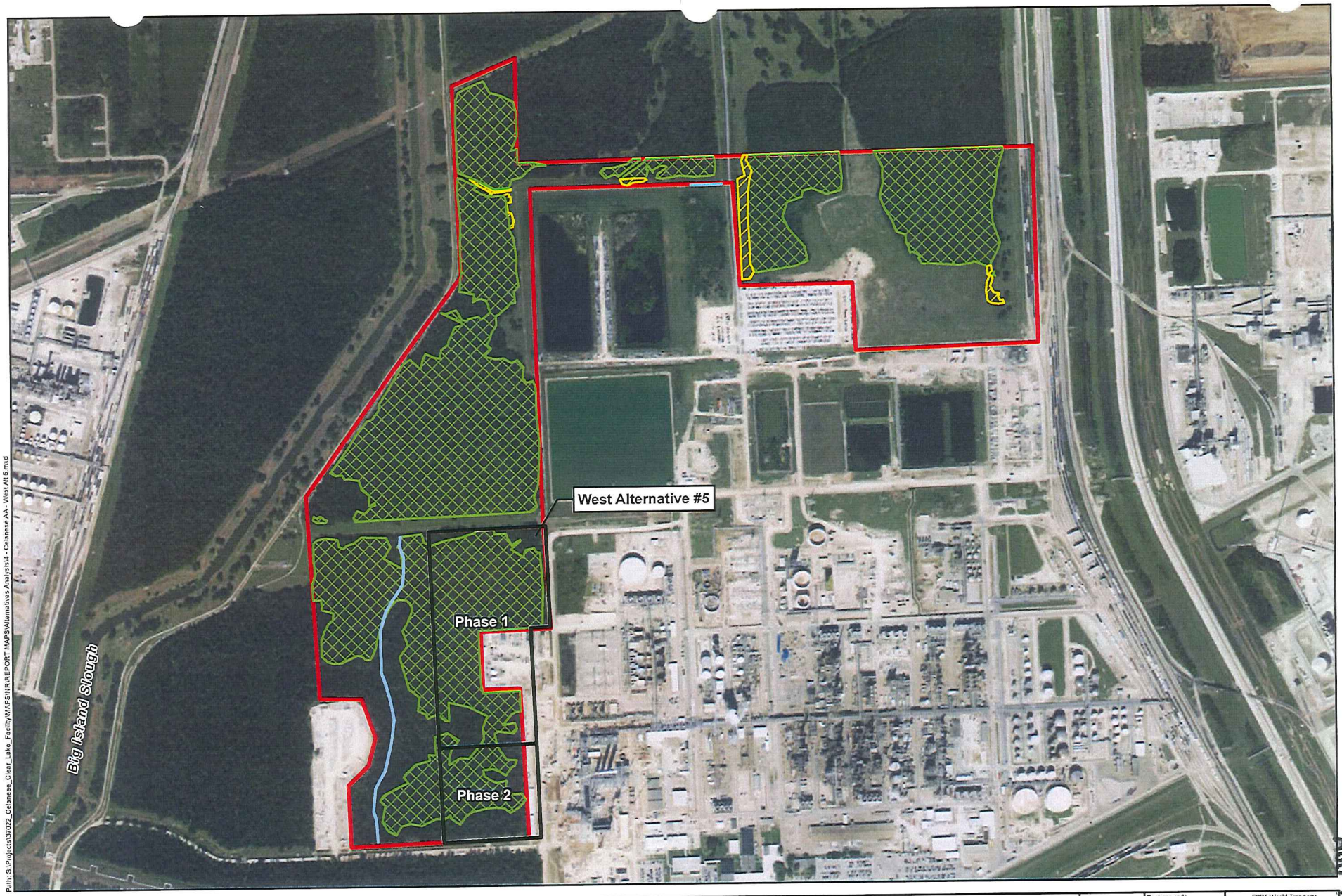

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PROPOSED WEST ALTERNATIVE #5
HARRIS COUNTY, TEXAS

FIGURE 4

Proposed Project Expansion
Survey Area
Ephemeral Waterbody
Emergent Wetland
Forested Wetland

Background:	ESRI World Imagery
Scale:	1:10,000
Created By:	JS
Approved By:	AR
SWCA Project No.:	37022
Date Produced:	August 05, 2016

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

0 500 1,000 Feet
0 100 200 300 Meters