Alternatives Analysis for US Gulf Coast 2 (USGC 2) Project

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Prepared For

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1 Introduction

This memorandum addresses the Clean Water Act (CWA) Section 404(b)(1) guidelines practicable Alternatives Analysis for the US Gulf Coast 2 project (USGC 2 project) proposed by Chevron Phillips Chemical Company, LP (CPChem), and is intended to supplement the discussion of alternatives set forth in both the Form 4345 Attachment and the TCEQ Tier II Alternatives Analysis Checklist. To assist the US Army Corps of Engineers (USACE) Galveston District evaluate CPChem's CWA Section 404 permit application for the proposed project, this document provides an overview of CPChem's identification of potential available practicable alternatives and assessment of the practicability of each alternative identified. Accordingly, this analysis is provided to allow the USACE to make a determination of the Least Environmentally Damaging Practicable Alternative (LEDPA) and comply with its other responsibilities under the 404(b)(1) guidelines.

2 Background

CPChem was formed on July 1, 2000, when Chevron Corporation and Phillips Petroleum Company, now Phillips 66, combined their worldwide petrochemical businesses. Chevron and Phillips 66 each own 50% of Chevron Phillips Chemical Company LLC, which in turn owns, through wholly-owned subsidiaries, 100% of Chevron Phillips Chemical Company LP. The company is one of the world's top producers of olefins and polyolefins; it is also a leading supplier of aromatics, alpha olefins, styrenics, specialty chemicals, piping and proprietary plastics. CPChem produces chemical products that are essential to manufacturing over 70,000 consumer and industrial products. Headquartered in the Woodlands, Texas, CPChem has interests in 33 manufacturing facilities across four continents, seven countries and thirteen states. CPChem has over 4,700 employees worldwide.

CPChem, the applicant, proposes to construct a new production facility producing ethylene via ethane cracking and subsequently converting the ethylene to polyethylene. In addition to the ethylene and polyethylene units at this proposed new facility, it also will include the associated utilities, a pipeline metering station, office buildings, rail lines, a storage-in-transit (SIT) yard, rail and truck loading facilities, locomotive and rail car maintenance facilities, access roads, a raw water and wastewater treatment plant, and detention ponds and other stormwater management infrastructure. Constructing a facility of this size will require temporary construction support facilities, including laydown areas, contractor service areas, parking, and access roads. The proposed project is being planned under a U.S. Gulf Coast expansion initiative for CPChem that utilizes regionally-produced shale gas to produce ethylene, then polyethylene, to serve U.S. and worldwide markets. The project will create over 320 permanent jobs and over 7,000 temporary construction jobs.

A review of existing Gulf Coast facilities was performed in the initial siting study and none had the available area or capability for expansion. As discussed below, CPChem's preferred alternative is to construct this new facility on an approximately 1,810-acre site in Orange, Texas, adjacent to an existing CPChem plant, which has been in operation since 1955. The proposed project site is bounded by Western Avenue along the northern property line, Foreman Road to the east, State Highway (SH) 87 to the west, and Farm-to-Market Road (FM) 1006 to the south. Approximately 210 acres of the site would be used for a borrow pit, heavy haul road and Barge Slip feature, the latter of which is necessary to allow for large process equipment to be transported to the new facility. A public access administration building is also proposed adjacent to the Orange County Airport. Construction of the USGC 2 project on this site also would require onsite clearing, re-routing of the Sabine River Authority canals onsite, improvements to drainage systems, and roadway improvements. Finally, this site would fully enable CPChem to accomplish to construct the proposed USGC 2 project on a property large enough to accommodate building additional facilities in the future, if market conditions allow.

Constructing the proposed USGC 2 project would require the discharge of fill material into wetlands and Waters of the US. CPChem therefore is requesting authorization for the discharge of fill material to wetlands and Waters of the US through an Individual Permit (IP) application to the USACE Galveston District, under

Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. This document outlines the alternatives analyzed during the evaluation and design for the USGC 2 project and the avoidance and minimization measures evaluated in an effort to limit the amount and type of impacts to wetlands and Waters of the US.

Seven potential build alternatives and the No-Build Alternative were studied in this Alternatives Analysis Report, and the two practicable alternatives were then analyzed to identify the LEDPA.

3 Purpose and Need

3.1 Basic Project Purpose

The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed project, and is used by the USACE to determine whether the applicant's project is water-dependent. A project is "water-dependent" if it requires access or proximity to or siting within a special aquatic site (SAS) to fulfill its basic purpose.

The basic project purpose of the proposed USGC 2 project is to produce ethylene and polyethylene pellets for the commercial market. The project is not water-dependent because it does not need to be located in wetlands and Waters of the US to achieve this basic project purpose.

3.2 Overall Project Purpose

The overall project purpose serves as the basis for the USACE's Section 404(b)(1) alternatives analysis and is determined by further defining the basic project purpose in a manner that more specifically describes the applicant's goals and accounts for logistical considerations for the project, and which cabins the reasonable range of alternatives to be analyzed. It is critical that the overall project purpose be defined to provide for a meaningful evaluation of alternatives. It should not be so narrowly defined as to give undue deference to the applicant's wishes, thereby unreasonably limiting the consideration of alternatives. Conversely, it should not be so broadly defined as to render the evaluation unreasonable and meaningless.

Defining the overall project purpose is the USACE's responsibility. Nevertheless, the applicant's purpose and need for the proposed project should inform the USACE's identification of the overall project purpose.

3.3 Applicant's Purpose and Need

The need for the proposed project is the growing market demand for ethylene and polyethylene products, a demand which CPChem currently cannot satisfy with its existing facilities. The USGC 2 project includes construction of ethylene and polyethylene units that will use the latest technology, which will produce both ethylene and polyethylene pellets for the market. The purpose of the USGC 2 project is to build on CPChem's leading position in olefins and feedstocks infrastructure. Construction activities are planned to start in the third quarter of 2020 so that startup of the new units can begin by the end of the third quarter 2024. This schedule, which demands reaching full operational capacity by the third quarter of 2024, is a critical need pathway to achieve the project's purpose in securing market position.

Siting criteria required to meet CPChem's purpose and need for the proposal include the following:

- The project must be located in the North American Texas/Louisiana Gulf Coast Region due to proximity to preferred and existing Gulf Coast material sources and markets.

- Areas with an established/existing industrial presence are preferred, due to land use compatibility and availability of existing infrastructure (such as road, rail lines, pipelines, high voltage electricity, and other utilities) Due to safety and security standards, adjacency to residences and third-party public-access buildings is not preferred.

- The project location must include:
    - Availability of adequate plot area for the ISBL (inside battery limits) and OSBL (outside battery limits) portion of each unit [Note that battery limits are defined as operational limits of each process unit.];
    - Adequate space for product loading into rail cars and rail car movements within the facility, and access to rail lines;
    - Adequate space for a SIT rail yard;
    - Adequate space for OSBL, including a cooling tower, offices, control room, and a quality control laboratory with sufficient spacing from process areas to meet CPChem's safety standards;
    - Adequate space for unloading and storing hexene-1 and isobutene;
    - Adequate space and spacing for catalyst storage and activation;
    - Adequate space and spacing for temporary construction facilities, including construction offices (since these are temporary structures that are typically not designed to be blast-resistant);
    - Adequate space for construction laydown area;
    - Proximity and reliable right-of-way access to existing CPChem source pipelines (ethane, ethylene pipeline, and product pipelines);
    - Proximity to market hub for distributing products;
    - Availability of sufficient and reliable sources of raw and potable water is critical to facility operations;
    - Availability of sufficient and reliable utility sources (electrical, water, nitrogen) is critical to facility operations;
    - Onsite access to a Barge Slip and heavy haul road, or room to construct these features onsite, is required to allow for large process equipment delivery and to facilitate movement of essential facility components such as the furnaces, polyethene reactors, and other large equipment that is too large for public highway or rail transport; and
    - Strong preference for adequate space to accommodate additional ethane cracking and polyethylene units and related facilities in the future if market demand and economic conditions support such additions.

4 Alternatives Analysis

Alternatives considered in this analysis include the No-Action Alternative, and seven preliminary build alternatives. The proposed project site (Preferred Alternative) was also evaluated to determine whether any other practicable onsite alternatives are available, but none were identified due to the facility siting requirements discussed above. Expanding one of CPChem's existing facilities was determined not to meet purpose and need due to lack of available space and capacity required by the proposed project. See Section 3.8 for a discussion of avoidance and minimization measures that are available for the Preferred Alternative. The following discusses the alternatives evaluated for the proposed USGC 2 project.

4.1 Requirements for Demonstrating Least Environmentally Damaging Practicable Alternative

An applicant must demonstrate that they have chosen the LEDPA and that there are no practicable alternatives to the proposed discharge of fill material that would have a less-adverse impact on an aquatic ecosystem and/or water quality, provided that the alternative does not have other significant adverse environmental consequences. A practicable alternative must be available and capable of being performed after considering the cost, existing technology, and logistics, in light of the overall project purpose (40 Code of Federal Regulations [CFR] 230.10(a)(2)). The USACE presumes that practicable alternatives which do not involve special aquatic sites (i.e., wetlands) are available and would have less adverse impacts on the aquatic ecosystem and/or water quality for proposed projects such as the proposed USGC 2 project that are not water-dependent to meet its basic purpose and need.

4.2 Preliminary Alternatives

Based on proximity to market and feed sources (ethane, ethylene pipelines), the preliminary siting study included locations in both Texas and Louisiana, along the Gulf Coast. The project is not water-dependent because it does not need to be located in wetlands or other Waters of the US to achieve the basic project purpose; however, all practicable alternative locations require access to a Barge Slip for receipt of essential facility components manufactured overseas during construction. As described below, all available practicable alternatives identified would require impacts to wetlands and other Waters of the US.

4.2.1 No-Action Alternative

The No-Action Alternative would not result in issuance of an IP for the construction of ethane cracking and polyethylene units to produce ethylene and polyethylene pellets in the Gulf Coast Region. Under the No-Action Alternative, the proposed project would not be constructed and CPChem would be unable to produce the products described in the purpose and need. Accordingly, none of the impacts associated with the action alternatives discussed below would occur. The No-Action Alternative would ostensibly not achieve the applicant's purpose and need of the proposed project because it would not result in the construction of any facility, and therefore not meet the market demand.

4.2.2 Action Alternatives

The proposed USGC 2 project includes construction of ethane cracking and polyethylene units in the Gulf Coast Region, which will produce both ethylene and polyethylene pellets for sale. Siting the project in the Gulf Coast Region (Texas and Louisiana) is necessary to take advantage of its proximity to feedstock (ethane, ethylene) from shale in West Texas, and associated product infrastructure/pipelines connecting West Texas shale to East Texas (Mont Belvieu area). The Mount Belvieu area is the major hub for receipt of product from West Texas shale formations.

Specifically, the action alternatives for the USGC 2 project include the following elements:

- Ethane Cracking and Polyethylene Units;
- Rail and Truck Loading and Unloading;
- Storage in Transit (SIT) Rail Yard;
- Raw Water and Wastewater Treatment Plant (WWTP);
- Office Buildings;
- Facility Access Roads;

- Storm Water Management Features;
- Pipeline Metering Station;
- Utilities (water, electric, nitrogen); and
- Construction Support Facilities - Laydown Areas, Contractor Service Areas, Parking and Access Roads, Barge Slip Access and Heavy Haul Road

The initial screening criteria used to determine the preliminary action alternatives included:

1. Size of Available Land: The alternative must be no less than 500 acres for facility plot plan, safety and construction requirements for the proposed USGC 2 project. In addition, CPChem determined that future market growth necessitated a site with greater than 1,200 acres of contiguous acreage to accommodate potential additional facilities, unrelated to the USGC 2 project, on the property if future market conditions allow.

2. Rail Access: The alternative must be large enough to accommodate onsite rail infrastructure for deliveries and shipments by rail and have access to existing rail infrastructure for efficient movement of materials offsite.

3. Highway Access: The alternative must have highway access for efficient movement of people and materials; particularly during construction.

4. Barge Slip/Heavy Haul Road Access: The alternative must have commercially viable access to a Barge Slip and heavy haul road to facilitate movement of essential facility components such as the furnaces, polyethene reactors, and other large equipment

5. Pipeline Access: The alternative must have reliable access to existing CPChem feedstock and product pipelines because these provide the source material for the project.

6. Work Force Requirements: The alternative must have access to, and the ability to attract, a skilled workforce to accommodate the manpower requirements and logistics during peak operational periods. Up to 7,000 construction jobs and 320 full time operations and maintenance jobs are forecasted.

7. Market Hub: The alternative must be in proximity to Gulf Coast market hub for distributing products.

8. Raw Water Supply: The alternative must have access to adequate raw water source.

Seven preliminary action alternative locations were identified and evaluated for the project objectives, along with the No-Action Alternative: Cedar Bayou, Texas; Lake Charles, Louisiana; Matagorda, Texas; Pasadena, Texas; Port Arthur, Texas; Sweeny, Texas; and Orange, Texas (Preferred Alternative). Both design and environmental constraints were evaluated in determining the preferred alternative location. Each of these alternatives is analyzed below based on their respective practicability.

4.3 Project Criteria Determination of Practicable Alternatives

The site selection process was designed to provide the following:

1. An assessment of the capabilities of each practicable alternative to provide the physical space, infrastructure and services required to build and operate the new facility, as well as accomplish CPChem's strong preference for the site to be large enough to accommodate possible additional facilities in the future if market conditions allow.

2. An evaluation of construction and operating logistics of the new facility.

3. An assessment of constructability issues that could affect project execution.

4. Identification of differences among the location choices that could result in significant capital cost differences.

5. Identification of the viability and the risks to meet the time-to-market requirements associated with each location.

A practicable alternative is an alternative that is or was available and capable of being constructed within the project's time-to-market schedule (third quarter 2024), after taking into consideration existing technology, constraints, economic benefits, and logistics, in light of the overall project purpose. The greatest priority was given to technologies, proximity to feedstock (ethane, ethylene) and CPChem's products (propylene, pygas) and 1-hexene pipelines, raw water source, land availability, constructability, access to existing rail connections and highway infrastructure, and additional regulatory and other requirements that could create uncertainty that could jeopardize the time-to-market schedule. To obtain the information necessary to complete the alternatives analysis, the following criterion were used to evaluate the seven identified alternatives and identify the practicable alternatives:

4.3.1 Technologies

Technologies for each alternative considered the following criteria: Barge Slip and heavy haul access for unloading and transport of essential, large, equipment during construction.

4.3.2 Physical Site Characteristics

The physical site characteristics refer to the parcels of land considered for the facility, and the required temporary facilities needed to support construction. The criteria for evaluation of site features in this category included the following:

1. Availability of adequate plot area for the ISBL (inside battery limits) and OSBL (outside battery limits) portion of each unit.

2. Adequate space for product loading into rail cars and rail car movements within the facility.

3. Adequate space for a SIT rail yard.

4. Adequate space for OSBL, including a cooling tower, offices, control room, and a quality control laboratory with sufficient spacing from process areas to meet CPChem's safety standards.

5. Adequate space for unloading and storing hexene-1 and isobutene.

6. Adequate space and spacing for catalyst storage and activation.

7. Adequate space for temporary construction facilities, including construction offices (since these are temporary structures that are typically not designed to be blast-resistant).

8. Land availability and adequate laydown space to implement storage of large facility units and modular construction method– 500 acres required at a minimum for facility plot plan and construction requirements for the proposed USGC 2 project. In addition, CPChem has a strong preference for a site with greater than 1,200 acres of contiguous acreage to accommodate potential additional facilities on the property if future market conditions allow.

9. Identification of adverse features that could potentially limit site development and use, including:

    a. topography;

    b. flooding potential;

    c. soil conditions;

    d. presence of existing above-ground structures;

    e. pipeline crossings and rights-of-way;

    f. utility and other rights-of-way;

    g. any other restrictions affecting movement of people and equipment between the construction site, offices, laydown areas, and parking areas; and

    h. heavy haul access.

4.3.3 Constructability

The relative constructability of the new facility was a critical component of CPChem's analysis. Although the key criteria evaluated for constructability features overlap with other factors referenced above, the focus of this analysis is the ability to construct the new facilities while minimizing the impact of construction activities on existing and adjacent land uses. Key criteria included:

1. Constructability – site accessibility, space, and suitability of site conditions, such as subsurface (soil or groundwater) conditions, topography, wetlands, floodplains, endangered species and historic/archaeological sites.

2. Accessibility of the site for large cranes and other heavy construction equipment.

3. Ability to receive deliveries of large/heavy process vessels via ship, rail and/or highway routes.

4. Ability to locate nearby laydown areas of suitable size that do not restrict storage of large, heavy process vehicles and other equipment.

5. Effects of potential congestion in the region, including:

    a. ability to accommodate total plant manpower requirements and logistics during peak construction periods; and

    b. ability to move materials and equipment to construction sites during such periods.

4.3.4 Logistics

Logistics for each alternative considered the following project design criteria:

- Proximity of access to construction materials, source materials, market products, and labor;

- Infrastructure availability – road/rail access;

- Ability to access CPChem source pipelines (ethane, ethylene pipeline, and product pipelines); access to market – ethylene pipeline, access to feedstock infrastructure – distance to supply pipelines;
- Proximity to market hub to distribute products;
- Raw and potable water source availability is critical to facility operations; and
- Utility and energy availability are critical to facility operations.

4.3.5 Transportation/Infrastructure Availability

The units will require reliable access to existing pipelines for ethane, ethylene, and storage facilities. Operation of the proposed production facility requires access to railroad for product transportation an import of key materials such as (1-hexene comonomer, and isobutane) Facility requires space for onsite SIT yard. Key transportation criteria are summarized as follows:

1. Reliable access to existing pipelines for ethane, ethylene, and storage facilities.
2. Access to existing rail lines and space for development and operation of SIT yard.
3. Adequate space for in plant rail movements.
4. Access to major highways and ports for delivery of construction equipment and large/heavy process vessels. (Transport of heavy equipment and material inside the plant complexes is addressed under constructability.)

4.3.6 Synergy and Integration

Building near existing pipeline and transportation infrastructure is key to taking advantage of the potential synergies and access to existing markets was found among several of the potential sites. However, some differences between the potential alternatives were found with respect to feedstock (ethane, ethylene), products (propylene, pygas), 1-hexene, and utility logistics.

4.3.7 Raw Materials Access and Availability

The key criteria pertaining to raw material availability are as follows:

1. Reliable availability of adequate ethane and ethylene supply via local plant or pipelines, or ability to acquire new rights-of-ways from third parties on a schedule consistent with the project's required timeframe;
2. Reliable ability to connect to CPChem's ethylene, ethylene pipeline grid, or ability to cost-effectively acquire new rights-of-ways from third parties within the project's required timeframe.
3. Reliable ability to connect to CPChem product (propylene, pygas), 1-hexene pipelines in the region/area, or ability to acquire new rights-of-ways from third parties within the project's required timeframe.

4.3.8 Utilities and Energy

The key factors considered relative to utilities and energy required for reliable operation of the proposed facility are as follows:

1. Reliable electric power supply;
2. Adequate natural gas/fuel gas supply;
3. Adequate raw and potable water supply; and
4. Adequate supply of nitrogen.

4.3.9 Timing Constraints/Regulatory Uncertainties

The analysis of each alternative considered the constraints posing a risk to the project schedule, such as regulatory uncertainties (air permitting/attainment, wetlands and waters of the US, floodplain/floodway, Federal Energy Regulatory Commission [FERC]), time and cost to acquire new ROW from third parties, and the time and costs associated with construction of new or modified/improved infrastructure required to operate the facility in late 2024.

4.4 Practicable Alternatives Determination and Alternatives Eliminated from Further Consideration

Following the practicable alternative analysis, based on CPChem's practicable criteria identified above, five of the seven alternatives were eliminated from further analysis: Cedar Bayou, Lake Charles, Sweeny, Pasadena, and Matagorda. Two alternatives were selected as practicable alternatives (Port Arthur and Orange). The discussion below summarizes the decision for each of the alternatives evaluated.

4.4.1 Alternative 1: Cedar Bayou

Alternative 1 is approximately 540 acres located in Cedar Bayou, Texas, near the intersection of Interstate 10 (I-10) and Sjolander Drive and adjacent to the existing CPChem facility.

Technologies

Alternative 1 would have adequate Barge Slip and heavy haul access for large equipment transport during construction.

Physical Site Characteristics

Limited available land area for Alternative 1 would require separate construction areas for ethylene and derivative units and limited construction access, resulting in low productivity and associated untenable increases in construction costs. The site lacks adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas. While the site is located adjacent to I-10, providing existing heavy haul access, the restriction resulting from the highway acting as a barrier between the site and CPChem existing facility would restrict the movement of people and equipment between the construction site, offices, laydown areas, and parking areas. The site lacks space to accommodate additional CPChem facilities in the future if market conditions allow.

Constructability

Site accessibility and space is limited for construction staging and limits the ability to locate laydown areas of suitable size that do not restrict storage of large, heavy process vehicles and other equipment, due to lack of contiguous space and the barrier created by I-10. The site is located adjacent to a major interstate, which would facilitate receipt of large/heavy process vessels via ship, rail and/or highway routes. Given the location constraints adjacent to an existing facility, interstate highway and rail facility, congestion is a risk, including: ability to accommodate total plant manpower requirements and logistics during peak

construction periods; and the ability to move materials and equipment to construction sites during such periods.

Logistics

Transportation/Infrastructure Availability

The alternative would have access to existing major highways and ports for delivery of construction equipment and large/heavy process vessels. The rail facilities at this location are currently at maximum capacity and SIT yard relocation/expansion would require an extended construction schedule that would jeopardize achieving the time-to-market deadline of the third quarter of 2024. In addition, to increase capacity on the adjacent rail facilities, a reconstruction of an overpass of I-10 would likely be required. The overpass would be a risk to meeting the time-to-market requirements, as it would entail additional costs and uncertainty from federal permitting required to reconstruct an interstate highway overpass.

Synergy and Integration

This alternative is the closest of the alternatives considered to the market hub for feedstocks and product and is located adjacent to an existing facility.

Raw Materials Access and Availability

This alternative is the closest to the market hub for feedstocks and product and is located adjacent to an existing facility.

Utilities and Energy

This alternative would have access to reliable electric power supply; adequate natural gas/fuel gas supply; adequate raw water and potable water supply; and an adequate supply of nitrogen.

Timing Constraints/Regulatory Uncertainties

Alternative 1 is located in a non-attainment area for air emissions and there is uncertainty regarding the cost and the availability of credits required to offset air emissions and the ability to secure required permits to operate the facility. Air credits are not currently available and would be difficult to generate, rendering this alternative too uncertain and unreliable.

A portion of this site is located within the floodplain of Cedar Bayou, which has development restrictions placed by the Harris County Floodplain Administrator. There are some areas of known soil and/or groundwater contamination at the Cedar Bayou complex; these recognized environmental conditions may result in additional development restrictions, mitigation costs, and schedule delays.

Summary

Alternative 1 is not a practicable alternative due to the physical site and construction constraints, lack of contiguous space available for development, lack of rail capacity, potential reconstruction of I-10, floodplain development concerns, the potential inability to adequately mitigate and permit for air quality impacts, and the potential need to address or remediate soil and/or groundwater contamination as part of the development of this site. Therefore, it was eliminated from further study.

4.4.2 Alternative 2: Lake Charles

Alternative 2 is approximately 1,600 acres located north of US 90, near Lake Charles, Louisiana.

Physical Site Characteristics

The site provides adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas, and could accommodate the movement of people and equipment between the construction site, offices, laydown areas, and parking areas. The site is located within a reasonable distance from US 90, providing existing heavy haul access. The site has adequate space to accommodate additional CPChem facilities in the future, if market conditions allow.

Technologies

Alternative 2 would have adequate Barge Slip and heavy haul access for large equipment transport during construction.

Constructability

Site accessibility and space is adequate for construction staging and laydown areas of suitable size that does not restrict storage of large, heavy process vehicles and other equipment. The site is located adjacent to a major interstate, which would facilitate receipt of large/heavy process vessels via ship, rail and/or highway routes. The site has the ability to accommodate total plant manpower requirements and logistics during peak construction periods and move materials and equipment to construction sites during such periods.

Logistics

Transportation/Infrastructure Availability

Alternative 2 would have access to major highways and ports for delivery of construction equipment and large/heavy process vessels. Existing rail facilities are located within a reasonable connectivity distance, and a SIT yard could be accommodated onsite. Access to existing pipeline infrastructure does not exist at this location.

Synergy and Integration

This alternative is the farthest from the market hub for feedstocks and product.

Raw Materials Access and Availability

At approximately 120 miles, this alternative is the farthest from the market hub for feedstock (ethane, ethylene), products (propylene, pygas), 1-hexene, and utility logistics, and would require extensive acquisition of rights-of-way from third party landowners to use those feedstocks, a requirement that would cause significant uncertainty for both the project completion timeline and budget. The construction of new pipelines to feedstock sources would require additional permitting of which could also result in additional environmental impacts and delays. Raw water supplies would be adequate for construction and operations at this location.

Utilities and Energy

This alternative would have access to reliable electric power supply; adequate natural gas/fuel gas supply; adequate raw and potable water supply; and an adequate supply of nitrogen.

Timing Constraints/Regulatory Uncertainties

Alternative 2 is located at a distance, and across state lines, from existing CPChem feedstock, produce and product pipelines, which would trigger additional regulatory permitting (FERC, CWA Section 401/404), reviews, right-of-way access and environmental impacts associated with constructing new interstate pipelines. These additional considerations would be both cost prohibitive and create time constraints and regulatory uncertainties to reach the required construction completion and operational schedule targets.

Summary

Alternative 2 is located the farthest from feedstock (ethane, ethylene), products (propylene, pygas), 1-hexene and market sources, and therefore had the highest risk for timing constraints and ability to permit an interstate pipeline expansion, resulting in the highest cost and risk to schedule considerations. As such, Alternative 2 was eliminated from further consideration due to distance from feedstock and market sources and the regulatory and logistical uncertainties associated with the distance.

4.4.3 Alternative 3: Matagorda

Alternative 3 is approximately 600 acres located in Matagorda County, Texas, southwest of Sweeny and Old Ocean, Texas.

Technologies

Alternative 3 would have adequate Barge Slip and heavy haul access for large equipment transport during construction.

Physical Site Characteristics

The site provides adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas, and could accommodate the movement of people and equipment between the construction site, offices, laydown areas, and parking areas. However, the site is constrained by floodplain/floodway, a nature preserve, and a brownfield site which limits the available space and increases costs for construction. The site is located at a distance from existing infrastructure, which would require extensions of rail lines and heavy haul roads for construction and operational access, as well as the acquisition of required rights of way. The site lacks sufficient space to accommodate additional CPChem facilities in the future if market conditions allow.

Constructability

Due to lack of rail and heavy haul road infrastructure and limiting site access due to floodway/floodplain constraints, site accessibility is limited for construction staging and limits the ability to move and store large, heavy process vehicles and other equipment.

Logistics

Transportation/Infrastructure Availability

The site lacks existing highway and rail infrastructure. The alternative would have limited access to major highways and ports for delivery of construction equipment and large/heavy process vessels.

Synergy and Integration

While location has nearby pipeline access and existing feedstock (ethane, ethylene) storage facilities; significant infrastructure upgrades are needed to accommodate the project's anticipated capacity requirements, thus there are limited synergies at this location.

Raw Materials Access and Availability

This alternative does not have access to an adequate supply of raw materials and would require construction of a water reservoir for potable water, facility construction, and operations.

Utilities and Energy

This alternative would require construction of and extending utilities to access reliable electric power supply; adequate natural gas/fuel gas supply; potable water, and an adequate supply of nitrogen.

Timing Constraints/Regulatory Uncertainties

The majority of Alternative 3 is located within the 100-year floodplain, which presents risk to development and protection of the facility. The alternative is in an area of attainment for air quality standards. The required pipeline and feedstock infrastructure upgrades required to meet the facility's operational needs increase the regulatory uncertainty and limit the certainty of achieving construction completion and operational schedule targets.

Summary

Similar to Alternative 5 (Sweeny, discussed below), Alternative 3 does not have access to required raw water supply and is located even farther from supply and market source pipelines than Alternative 5 (Sweeny), which would increase environmental impacts, and would be cost prohibitive and a risk to the required project timeline.

As such, Alternative 3 was eliminated from further consideration due to the risk associated with securing adequate raw water supply. Additionally, extension of and upgrades to feedstock and product pipelines would be cost prohibitive and a risk to the project's required timeline.

4.4.4 Alternative 4: Pasadena

Alternative 4 is approximately 600 acres located along the Houston Ship Channel in Pasadena, Texas, and adjacent to the existing CPChem facility.

Technologies

Alternative 4 would have adequate Barge Slip and heavy haul access for unloading and large equipment transport during construction.

Physical Site Characteristics

The lack of a contiguous available land area would require separate construction areas for ethylene and derivative units and limited construction access, resulting in low productivity, schedule delays, and associated untenable increases in construction costs. The site lacks adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas. While the site is located adjacent to State Highway 225 providing existing heavy haul access, the capacity and congestion restrictions resulting from the highly developed surrounding industrial area would impede movement of people and equipment between the construction site, offices, laydown areas, and parking

areas, further exacerbating productivity, schedule, and cost impacts. The site lacks sufficient space to accommodate additional CPChem facilities in the future if market conditions allow.

Constructability

Site accessibility and space is limited for construction staging and limits the ability to locate laydown areas nearby of suitable size that do not restrict storage of large, heavy process vehicles and other equipment. The site is located adjacent to a major interstate, which would facilitate receipt of large/heavy process vessels via ship, rail and/or highway routes. The site's adjacency to existing heavy industrial areas, interstate highway and rail facility, creates risks of congestion, including: ability to accommodate total plant manpower requirements and logistics during peak construction periods; and the ability to move materials and equipment to construction sites during such periods.

Logistics

Transportation/Infrastructure Availability

The alternative would have access to major highways and ports for delivery of construction equipment and large/heavy process vessels, and rail access for movement of goods and products. Movement around and access to the facility are constrained by adjacent rail car movements and switching operations, which would be beyond CPChem's control.

Synergy and Integration

This alternative is the close to the market hub for feedstocks and product and is located adjacent to an existing facility which is a positive for synergy and integration but can limit development as discussed above.

Raw Materials Access and Availability

This alternative is approximately 40 miles to the market hub for feedstocks and products and is located adjacent to an existing facility, thereby providing reasonable access to raw materials.

Utilities and Energy

This alternative would have access to reliable electric power supply; adequate natural gas/fuel gas supply; adequate raw and potable water supply; and an adequate supply of nitrogen.

Timing Constraints/Regulatory Uncertainties

Alternative 4 is located in a non-attainment area for air emissions and there is uncertainty regarding the cost and the availability of credits required to offset air emissions. Air credits are not currently available and would be difficult to generate, making it uncertain whether the necessary air permits to operate the new facility could be obtained by the time-to-market deadline.

Summary

Alternative 4 was not found to be a practicable alternative due to the physical site and construction constraints, and the potential inability to adequately mitigate and permit for air quality impacts, therefore it was eliminated from further study.

4.4.5 Alternative 5: Sweeny

Alternative 5 is approximately 630 acres located in Old Ocean, Texas, co-located with an existing facility.

Technologies

Alternative 5 would have adequate Barge Slip and heavy haul access for unloading and large equipment transport during construction.

Physical Site Characteristics

The site provides adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas, and could accommodate the movement of people and equipment between the construction site, offices, laydown areas, and parking areas. However, it is constrained by the operations and capacity of the existing facility and limited infrastructure network for USGC 2 operations. In addition, the site lacks space to accommodate additional CPChem facilities in the future if market conditions allow.

Constructability

Site accessibility is limited for construction staging and limits the ability to move and store large, heavy process vehicles and other equipment due to operations and capacity of the existing facility and limited infrastructure network.

Logistics

Transportation/Infrastructure Availability

The site has existing highway and rail infrastructure, although it has limited capacity. The alternative would have access to major highways and ports for delivery of construction equipment and large/heavy process vessels.

Synergy and Integration

Additional pipeline access and existing feedstock (ethane, ethylene) storage and capacity is limited at this location. Alternative 5 would require upgrades to existing pipeline infrastructure and construction of additional pipelines to gain access to supply and market sources, which would render this alternative unreliable due to the uncertainty of acquiring extensive new rights of ways from third parties. Extending these pipelines also may result in significant additional environmental impacts and would be cost prohibitive.

Raw Materials Access and Availability

This alternative does not have access to an adequate supply of raw materials and would require construction of a water reservoir for facility construction and operations.

Utilities and Energy

This alternative would require construction of and extending utility facilities to access reliable electric power supply; adequate natural gas/fuel gas supply; and an adequate supply of nitrogen. Alternative 5 would also require construction of an approximately 4,500 ac-ft water reservoir to serve the required raw water supply for the USGC 2 project, as this alternative has limited availability of new water rights and would need to store significant reserve water for a drought condition.

Timing Constraints/Regulatory Uncertainties

This alternative is located in a non-attainment area for air emissions and there is uncertainty regarding the cost and the availability of credits required to offset air emissions and the ability to secure required permits to operate the facility. Air credits are not currently available and would be difficult to generate, rendering

this alternative too uncertain and unreliable. Permits needed to construct and operate the required pipeline and feedstock infrastructure upgrades required to meet the facility's operational needs also would pose regulatory uncertainty, which would impact the construction completion and operational schedule.

Summary

Alternative 5 was eliminated from further consideration due to the uncertainty of being able to connect to feedstock and product pipelines (as well as the prohibitive cost increases and increased environmental impacts if such connections could be made), associated regulatory uncertainties, and multiple risks associated with securing adequate raw water.

4.5 Practicable Alternatives Selected for Further Consideration

4.5.1 Alternative 6: Port Arthur

Alternative 6 is approximately 1,000 acres located west of Port Arthur, Texas, south of Highway (Hwy) 73 and north of Taylor Bayou, adjacent to the existing CPChem facility.

Technologies

Alternative 6 would have adequate Barge Slip and heavy haul access onsite for unloading and large equipment transport during construction.

Physical Site Characteristics

The site provides adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas, and could accommodate the movement of people and equipment between the construction site, offices, laydown areas, and parking areas. However, the site is constrained on three sides by existing industrial facilities, the floodway of Taylor Bayou, Taylor Bayou, and Lower Naches River Authority of Texas canal crossings, which will limit access to and from the site. The site has enough space to partially meet CPChem's strong preference of being able to accommodate additional CPChem facilities in the future if market conditions allow.

Constructability

The site has adequate space for construction staging and laydown areas; however, access for construction is limited due to the adjacent industrial facilities, floodplain/floodway of Taylor Bayou, Taylor Bayou, and Sabine River Authority of Texas canal crossings. The site is located adjacent to SH 87, SH 82, and Taylor Bayou, which would facilitate receipt of large/heavy process vessels via ship, rail and/or highway routes. However, there is limited capacity on the existing roadways due to the high level of industrial development in the immediate vicinity of the site. Given the site's location constraints immediately adjacent to an existing facility, interstate highway and rail facility, congestion is a risk, including: ability to accommodate total plant manpower requirements and logistics during peak construction periods; and the ability to move materials and equipment to construction sites during such periods.

Logistics

Transportation/Infrastructure Availability

The alternative would have access to existing major highways and ports for delivery of construction equipment and large/heavy process vessels. The alternative would have space for rail expansion and rail access for movement of goods and products.

Synergy and Integration

This alternative has access to adjacent existing feedstocks and product and is located adjacent to an existing facility. The existing feedstock and product infrastructure would require upgrades to increase capacity on the existing pipelines.

Raw Materials Access and Availability

This alternative has access to adjacent existing feedstocks and product and is located adjacent to an existing facility. The existing feedstock and product infrastructure would require upgrades to increase capacity on the existing pipelines.

Utilities and Energy

This alternative would have access to reliable electric power supply; adequate natural gas/fuel gas supply; adequate raw water supply; and an adequate supply of nitrogen.

Timing Constraints/Regulatory Uncertainties

Alternative 6 is located in an attainment area for air emissions. A portion of this site is located within the floodway of Taylor Bayou, which has development restrictions placed by the County Floodplain Administrator.

Summary

Alternative 6 was determined to be a practicable alternative because it satisfies the purpose and need criteria from a cost, logistics, and technology perspective.

4.5.2 Alternative 7: Orange

Alternative 7 is an approximately 1,800-acre site located in Orange County, Texas, near the intersection of SH 87 and FM 1006, adjacent to the existing Orange facility.

Technologies

Alternative 7 would have adequate Barge Slip and heavy haul access for unloading and large equipment transport during construction.

Physical Site Characteristics

The 1,600-acre facility site provides adequate contiguous space for ISBL and OSBL units, loading and unloading railcars, SIT yard, and temporary construction laydown areas, and could accommodate the movement of people and equipment between the construction site, offices, laydown areas, and parking areas. As a additional benefit of this alternative, an additional 200 acres is available for the borrow pit area, heavy haul road and Barge Slip feature. The site is largely unconstrained; however, there is a construction height restriction on the western side of the facility site, due to the proximity to the Orange County Airport. Several canals, including two owned by the Sabine River Authority of Texas, cross the site. The site has sufficient space to fully satisfy CPChem's strong preference of being able to accommodate additional CPChem facilities in the future if market conditions allow.

Constructability

The site has adequate space for construction staging and laydown areas. The site has adequate space and connectivity for Barge Slip and heavy haul roads as well as access to existing highway and rail

infrastructure, which would facilitate receipt of large/heavy process vessels via ship, rail and/or highway routes. The site has construction access from all sides; however, congestion is a risk on the adjacent county roads, including: ability to accommodate total plant manpower requirements and logistics during peak construction periods; and the ability to move materials and equipment to construction sites during such periods.

Logistics

Transportation/Infrastructure Availability

The alternative would have access to existing major highways for delivery of construction equipment and large/heavy process vessels. The alternative would have space for rail expansion and has adjacent rail access for movement of goods and products.

Synergy and Integration

This alternative has access to adjacent existing feedstocks and product and is located adjacent to an existing facility. The existing feedstock and product infrastructure would not require upgrades to increase capacity on the existing pipelines.

Raw Materials Access and Availability

This alternative has access to adjacent existing feedstocks and product and is located adjacent to an existing facility. The existing feedstock and product infrastructure would not require upgrades to increase capacity on the existing pipelines. Raw water could be supplied for construction and operations by the onsite Sabine River Authority canal system.

Utilities and Energy

This alternative would have access to reliable electric power supply; adequate natural gas/fuel gas supply; adequate raw and potable water supply; and an adequate supply of nitrogen.

Timing Constraints/Regulatory Uncertainties

Alternative 7 is located in an attainment area for air emissions. A portion of the southern end of the site is located within the 100-year floodplain, which may have development restrictions placed by the Orange County Floodplain Administrator, but this is not expected to affect development and operation of the proposed facility.

Summary

Alternative 7 was determined to be a practicable alternative because it satisfies all criteria of the purpose and need from a cost, technology, and logistics perspective.

4.6 Least Environmentally Damaging Practicable Alternative Analysis

Environmental considerations important to the choice of location for the new facility are listed below:

1. Environmental resources, including:
    a. Presence of potentially jurisdictional wetlands and Waters of the US;
    b. Presence of endangered species or critical habitat;

c. Potential for soil and groundwater contamination;

d. Presence of historical or archaeological sites; and

e. Air Quality Attainment Status

Following the practicable alternative determination above, two practicable alternatives were identified for further analysis and determination of LEDPA. Each of these practicable alternatives are detailed below.

4.6.1 Alternative 6: Port Arthur

Alternative 6 is located west of Port Arthur, Texas, south of Hwy 73 and north of Taylor Bayou. Alternative 6 is a practicable alternative with positive rankings for cost, technology, and logistics. Alternative 6 is large enough to accommodate the USGC 2 project footprint, construction facilities, and construction methods, but it is only partially able to satisfy CPChem's strong preference for the project site to accommodate additional facilities in the future if market conditions allow. This alternative also has access to construct a Barge Slip for equipment delivery and is located near supply and market pipelines. The existing canal infrastructure can provide water onsite, without requiring construction of a reservoir or additional facilities. Alternative 6 has rail capacity, and adequate space for SIT yard.

The Alternative 6 site consists of is a mix of existing industrial land and marshlands, and the surrounding area is both industrial and undeveloped marshland. This alternative contains the highest potential impacts to wetlands and Waters of the US. This Alternative is located predominately within the floodway of Taylor Bayou. Executive Order 11988 on Floodplain Management requires avoidance to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplain development wherever there is a practicable alternative. Barge Slip access is available for the proposed facility location.

Based on the US Fish and Wildlife Service's National Wetland Inventory (NWI) Mapper (www.fws.gov/wetlands/Data/Mapper.html), Alternative 6 would impact an estimated 969 acres of wetlands, which would have the greatest impact on wetlands and Waters of the US of the two practicable alternatives identified. No documented records were found indicating a risk of impacts to cultural resources or Federally-listed threatened or endangered species.

Alternative 6 was not chosen as the preferred alternative due to the extensive wetlands and Waters of the US impact potential, floodplain development concerns, resulting in a high level of environmental impact and regulatory uncertainty.

4.6.2 Alternative 7: Orange (Preferred Alternative)

Alternative 7, the Preferred Alternative, is located in Orange County, Texas, near the intersection of SH 87 and FM 1006. Alternative 7 is large enough to accommodate the USGC 2 project footprint, construction facilities, and construction methods, and it has sufficient space to fully satisfy CPChem's strong preference for the project site to also be able to accommodate additional facilities in the future if market conditions allow. This alternative also has access to construct a Barge Slip for equipment delivery and is located near supply and market pipelines. The Sabine River Authority of Texas can provide water onsite, without requiring construction of a reservoir or additional facilities. Alternative 7 has rail capacity, and adequate space for an SIT yard.

Alternative 7 is a mix of existing industrial land and farmland, and the surrounding area is developed for both commercial and industrial uses. Based on the US Fish and Wildlife Service's NWI Mapper (www.fws.gov/wetlands/Data/Mapper.html), Alternative 7 would impact an estimated 130 acres of wetlands. A more detailed wetland delineation performed in 2018 determined that the wetlands onsite total approximately 260 acres. A portion of the site is located within the 100-year floodplain, but not to an extent

that would impede construction or operation of the proposed facility. No documented records were found indicating a risk of impacts to cultural resources or Federally-listed threatened or endangered species.

Table 1 compares the risk of environmental impact in the initial Alternatives 6 and 7 with the modified Preferred Alternative 7 studied in greater detail following the selection of the preferred alternative.

Table 1: Reasonable Alternative Analysis and Determination of LEDPA – Risk of Environmental Impact

Resource	Alternative 6: Port Arthur	Initial Alternative 7: Orange	Current Modified Preferred Alternative 7: Orange
Wetlands and other Waters of the US	969 acres of wetlands*	130 acres of wetlands*	246 acres of wetlands**
Endangered species or Critical Habitat	Unknown	No	No
100-year Floodplain impact	High	Low	No
Potential Soil and Groundwater Contamination	Medium	Low	No
historical or archaeological sites	Low	Low	No
Air Quality Attainment Status	In attainment	In attainment	In attainment

**Based on USFWS NWI Mapping using in initial siting Study*
***Totals are estimated and subject to USACE verification.*

In all, Alternative 7 fully meets the project's purpose and need and had the least estimated impacts to wetlands and Waters of the US, and floodplains. Therefore, it was chosen as the Preferred Action Alternative for detailed study. The alternative was further analyzed in detail, as described below.

4.7 Preferred Alternative Avoidance and Minimization Measures

The Orange County, Texas site was selected as the Preferred Alternative, based on all criteria. **Exhibit 1** and **Exhibit 2** are location and topographic maps of the preferred alternative, respectively. The initial review of this Preferred Alternative site with the US Fish and Wildlife Service's NWI Mapper (www.fws.gov/wetlands/Data/Mapper.html), estimated approximately 130 acres of wetlands potentially impacted by the proposed project. As the proposed project site was studied in detail, CPChem commissioned an aquatic resources delineation of the approximately 1,600-acre main facility site, and the 200 acres for the borrow pit area, a heavy haul road, and a Barge Slip area. Avoidance and mitigation measures were further evaluated for the Preferred Alternative in order to reduce potential impacts to aquatic features found onsite. A more detailed study performed in 2018 determined that the wetlands onsite total approximately 260 acres.

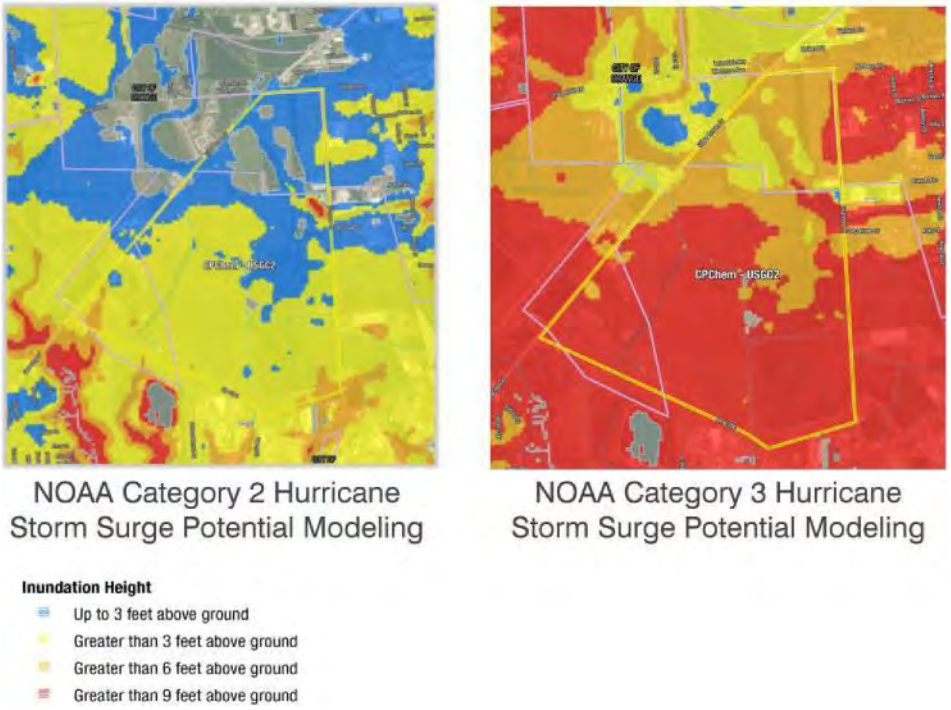
Main Site and Borrow Pit

Although most of the site will be needed for the USGC 2 project footprint, construction laydown and facilities, and provide the flexibility to add new infrastructure and expand the facility in the future if market conditions allow, avoidance and minimization will be incorporated where feasible. The Orange County Airport is located adjacent to the site, which creates some limitation to development and construction due to air space height restrictions, but those limitations would not defeat CPChem's purpose and need for the project. The Orange site provides enough land for the proposed facility, and the site layout plan includes a required 163-feet Above Mean Sea Level air space height restriction area on the west side of the proposed facility, adjacent to the Orange County Airport, approximately 1,936 feet from the airport property border on Edgar

Brown Drive/SH 87 (**Exhibit 4**). Safety setbacks were considered in the siting of the proposed active facility features within the center of the parcel, leaving significant buffer zones between active facility components and residential developed areas within 0.25-mile from the northwestern boundary of the parcel.

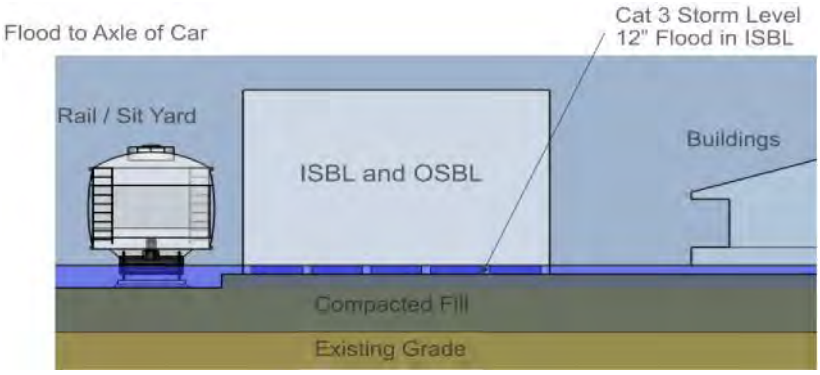
Without site hardening measures, a Category 2 Storm Surge event would result in an estimated 85 percent inundation of the facility (**Figure 1**, **Exhibit 3**). A Category 3 Storm Surge event would result in complete inundation of the facility (**Figure 1**).

Figure 1: National Oceanic and Atmospheric Administration (NOAA) Storm Surge Model



Therefore, the Orange Alternative was designed with fill proposed to increase the base grade elevation from approximately 7-11 feet to 13.5-14 feet above mean sea level, to protect the facility and units from natural disasters, but this fill will be minimized in the 100-year floodplain, as avoidance is proposed for a pipeline corridor that exists along the southern border of the proposed facility. The volume of fill required varies throughout the site, and consideration was given to the placement of fill to facilitate the movement of heavy equipment throughout the site, and areas to be unused or avoided. **Figure 2** illustrates how fill might be used to protect or “harden” various assets across the facility, under a Category 3 Storm Surge event.

Figure 2: Site Hardening Against Storm Surge with Fill



Source: CPChem USGC 2 Project Team

Parcel 1

Parcel 1 is approximately 169 acres, located within the proposed project area, along the eastern border of the site. It was disturbed by the previous landowner prior to purchase by CPChem. The prior landowner's earthwork activities were unrelated to CPChem's proposed project, and included site clearing and the addition of fill material throughout the parcel. Therefore, additional wetland and aquatic resource avoidance on Parcel 1 is not feasible.

Barge Slip, Heavy Haul Road, and Wastewater Treatment Outfall

Minimization measures for the Barge Slip, heavy haul road, and the waste water treatment plant (WWTP) outfall include avoidance and impact minimization of onsite wetlands areas to the east of the proposed facility. The heavy haul road is designed with gravel shoulders. The Barge Slip was designed for minimum dredge activities required within the oxbow of Cow Bayou, and avoidance of the main channel of Cow Bayou. The pipe for the WWTP outfall will be constructed using methods, such as horizontal directional drilling, to avoid conflicts with existing utilities and avoid disturbances to wetlands and Waters of the US.

Table 2 below summarizes the total wetland and other Waters of the US avoidance measures.

Table 2: Total Wetland and Other Waters of the US Avoidance

Resource	Total Onsite* Acres/Linear Feet	Potential Impact Acres/Linear Feet	Potential Temporary Impact Acres/Linear Feet	Total Avoidance
Wetlands (Acres)	264.5 acres	246.2 acres	0.89 acres	17.4 acres
Aquatic Features	24,882 linear feet	24,267 linear feet	0 linear feet	424 linear feet

**Totals are estimated and subject to USACE verification.*

4.7.1 Site Optimization

Beginning in June 2019, the project development team was allowed to engage with local and regional stakeholders in more formal consultations. Information gathered during these consultations resulted in changes to the project layout to address stakeholder concerns and optimize the site plan. Key changes are discussed in this section.

Storm Water Drainage

Existing OCDD drainage ditches convey off-site storm water through the USGC 2 project site to Adams Bayou, east of the site, and Cow Bayou, south of the site. Early planning and engineering designs proposed to reroute all external storm water drainage south toward Cow Bayou. Based on the barrier created by the existing SRA water supply canal routed through site, water north of the canal is currently directed out into

Adams Bayou, so any additional water routed south would be an increase in flow to Cow Bayou via existing outfalls.

During consultation with the OCDD, CPChem learned that there are existing flooding issues at the SH 87/FM 1006 intersection and the neighboring residential community on TX-SH 87 (The Reserve at Cypresswood). The OCDD was concerned that the proposed routing of the storm water drainage from the portion of the project site north of the SRA canal away from Adams Bayou, where it currently drains, may exacerbate existing flood conditions on the south side of site. In order to improve drainage conditions for the project site and the surrounding area, external drainage north of the SRA canal will be routed north, towards Adams Bayou. The drainage ditch will be sizeable (approximately 50 feet in width) and the routing options are limited. As a result, the project footprint now extends further north, within the project site, and impacts additional wetlands. No offsite impacts to either wetlands or drainage functionality are anticipated by the OCDD canal reroute.

SRA Water Supply Canal Rerouting

Preliminary informal conversations with the SRA in the initial project phase suggested that the SRA would not approve plans to reroute the existing water supply canal. More recent formal consultations with SRA officials have indicated that reroutes may be possible, so long as sufficient measures are in place to prevent disruption of service to downstream customers. Rerouting the canal to create a near-perpendicular crossing at the proposed railcar SIT yard is preferable from an engineering design and construction standpoint.

Consultations with the SRA have also indicated that culverted crossings at the proposed railcar SIT yard may be acceptable, as opposed to the initially proposed bridge crossings. Culverts are preferred to bridges, not only for cost considerations, but also because the reroute allows installation of the new culverted crossings without interruption to the canal operation. It also creates a site layout that provides the best fit for the current planned process units and future expansion if necessary.

The proposed SRA canal reroute and elimination of bridge crossings will result in impacts to wetlands and potentially jurisdictional drainage ditches that abut the SRA canal and were avoided in the previous USGC 2 project design. No wetland impacts or service interruptions are anticipated offsite from the relocation of the canal.

Transmission Line Relocation

The original USGC 2 plot plan submitted in the permit application (March 2019) routed the transmission line through the site across the railcar SIT yard. Entergy has since indicated that routing the transmission line across the railcar SIT yard will create unacceptable conditions for maintenance access. Routing the transmission line across the railcar SIT yard presents a safety and operations risk to the facility which projects a railcar loading rate of one car every 28 minutes. There is inherent risk in having high voltage power lines traversing stored hydrocarbons and polymer. Alternatively, the transmission line relocation has been routed north of the railcar SIT yard and then along the western (southbound) side of Foreman Road. As a result, the project footprint now extends further north within the overall parcel and impacts additional wetlands. No impacts are anticipated offsite from the proposed reroute.

Administrative Building

During project development, an administrative building adjacent to the proposed facility, which contains a State of Texas government office, was identified as a potential public safety and/or site safety concern due to traffic congestion. To mitigate this concern and be proactive as a community steward, CPChem is cooperating with State of Texas government officials to relocate the government office to a suitable location on the opposite side of SH 87 to improve safety and maintain service to the immediate area. CPChem relied on the following site selection criteria to screen possible locations for the administrative building: availability, proximity to the existing office location, ease of accessibility by office staff and the public, ability to minimize disruption of the governmental services provided, and ability to avoid and minimize impacts. Based on these criteria, CPChem identified the parcel on the opposite side of SH 87, adjacent to the airfield, for the relocation site and has designed the relocated building to avoid and minimize environmental impacts.

4.8 Finding of LEDPA

Of the two sites evaluated in further detail, the Preferred Alternative (Orange) is the LEDPA. The Preferred Alternative meets the overall purpose and need of the project from a cost, technology and logistics perspective, as previously defined. Five of the alternatives were eliminated from further evaluation as impracticable, and the other practicable alternative would have more environmental impacts than the Preferred Alternative. The Preferred Alternative was extensively reviewed and determined to be the most practical and least disruptive location to surrounding communities and industries. The project design has also undergone stringent reviews and the footprint has been minimized to the extent practicable to still meet the project's purpose and need.

Wetlands and Waters of US

The initial study of the Preferred Alternative in Orange County, Texas determined that it was the least impactful of the practicable alternatives to potential wetlands and Waters of the US, based on available data from NWI maps and US Geological Survey (USGS) topographical maps. The initial estimate of potential aquatic impacts increased following a more detailed aquatic resources delineation performed on the ground, after site access was obtained, but these impacts were still found to be less than those that would result from the other practicable alternative. However, many of the aquatic resources onsite are man-made canals and ditches for the conveyance of water through the area to industrial facilities and former rice fields.

Biological Resources and Threatened and Endangered Species

A review of historical aerial photography and topographic maps determined that the site was largely historically farmed as rice fields throughout the north and center areas of the proposed project site with a network of agricultural ditches and active and abandoned canals for water conveyance throughout. The former rice farms have become ranching over the years, and many fields are fallow. The southern end of the site has commercial and industrial development. Parcel 1 has been cleared for commercial uses by the former landowner, unrelated to the currently proposed project. The area proposed for the heavy haul road and Barge Slip has been previously disturbed, as the proposed Barge Slip area was used for private boat launches. Therefore, no impacts are anticipated to previously undisturbed native or protected habitats within the proposed USGC 2 project area.

An analysis of potential impacts to Federally-listed Threatened and Endangered Species was performed in the Fall of 2018 and Winter of 2019. No Effect is anticipated to the Piping Plover (*Charadrius melodus*), Rufa Red Knot (Calidris canutus rufa), Least Tern (Sterna antillarum), or the West Indian Manatee (*Trichechus manatus*). These determinations will be coordinated with the US Fish and Wildlife Service for concurrence. In addition, there is unlikely to be any impact on the Bald Eagle (*Haliaeetus leucocephalus*).

Air Quality

Preferred Alternative in Orange County is located in an ozone attainment area.

Water Supply and Water Quality

The Preferred Alternative is not anticipated to have a negative impact to water quality in the region. It has a ready water supply through the existing Sabine River Authority of Texas canal onsite, without the need for additional cost or environmental impacts associated with construction of a water supply reservoir. In addition, the proposed wastewater outfall to Cow Bayou will be permitted under the Texas Commission of Environmental Quality and is not anticipated to impact water quality. Stormwater detention is proposed onsite to manage stormwater runoff from the facility.

100-year Floodplain and Stormwater Drainage

The hydrological study area consists of agricultural fields with a network of existing drainage ditches and canals, as well as multiple commercial and industrial developments. The existing drainage area is divided into seven (7) sub-areas based on the topography within the study area. Existing runoff is conveyed via a series of drainage ditches within the site that direct flows to existing outfalls located along the southern and eastern borders of the site. These outfalls ultimately convey runoff downstream through a system of drainage channels and bayous (Adam's Bayou and Cow Bayou) to the Sabine River.

Based on a discussion with the Orange County Floodplain Manager on November 14, 2018, CPChem's consultant, Jacobs, raised the issue of the effectiveness of providing floodplain mitigation for a location where the floodplain is influenced by surge and tides. The floodplain administrator agreed with Jacobs that floodplain mitigation will be ineffective for floodplain areas that are influenced by tides/surges. She also agreed with Jacobs' approach of providing detention volume to offset additional runoff generated from change in impervious cover and not adding floodplain fill volume to the final volume estimates.

The project team proposed up to four detention basins onsite, which will be designed to hold volume from a 24-hour, 100-year storm event, using the most recent NOAA Atlas 14 rainfall data. The new NOAA Atlas 14 rainfall data is anticipated to be implemented as the standard in the region within the next year. The project team will provide a drainage report to Orange County and Orange County Drainage District for approval, demonstrating no impact to downstream/upstream properties and public infrastructure resulting from the planned facility.

Historic/Archeological Resources

An archeological and historic-aged structures analysis was performed in Fall 2018. Two archeological sites and one historic-aged standing structure was determined not to meet National Historic Register of Historic Places (NHRP) eligible criteria, and no further work is anticipated. Based on incidental information from a landowner, the potential for onsite graves was studied. The initial survey did not determine graves in the area; therefore, a geophysical survey was performed of the suspect 5.6-acre area. No evidence of graves or associated funerary artifacts were discovered. An Unanticipated Discoveries Plan has been produced for the construction phase of the proposed project and a No Effect determination recommendation was coordinated with the USACE and the Texas Historical Commission (THC). The THC concurred with this recommendation in September 2019 (**Refer to Appendix H**).

4.9 Project Justification

On the basis of the alternative analysis performed, the Orange site was the only practicable alternative that met CPChem's purpose and need, design and cost criteria, logistics, technology and design, supplies the required resources, met constructability standards, and was the least environmentally damaging alternative.

5 Conclusion

The Preferred Alternative in Orange, Texas is the LEDPA that meets CPChem's purpose and need for the proposed USGC 2 project.

Permanent and temporary impacts to wetlands and other Waters of the US and environmentally sensitive areas have been minimized to the extent practicable while complying with all applicable CPChem safety and design protocols. Unavoidable permanent and temporary impacts to wetlands and other Waters of the US will be mitigated through existing accredited mitigation banks and Permittee Responsible Mitigation Plans.

Exhibits

Exhibit 1: Project Location Map
Exhibit 2: Project Location Map (Aerial)
Exhibit 3: Category 2 Storm Surge Map
Exhibit 4: Air Height Restriction Map

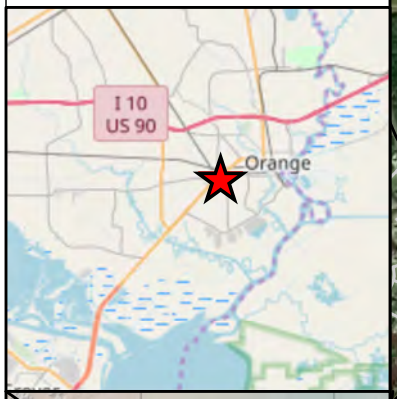
CPChem Site Location Map

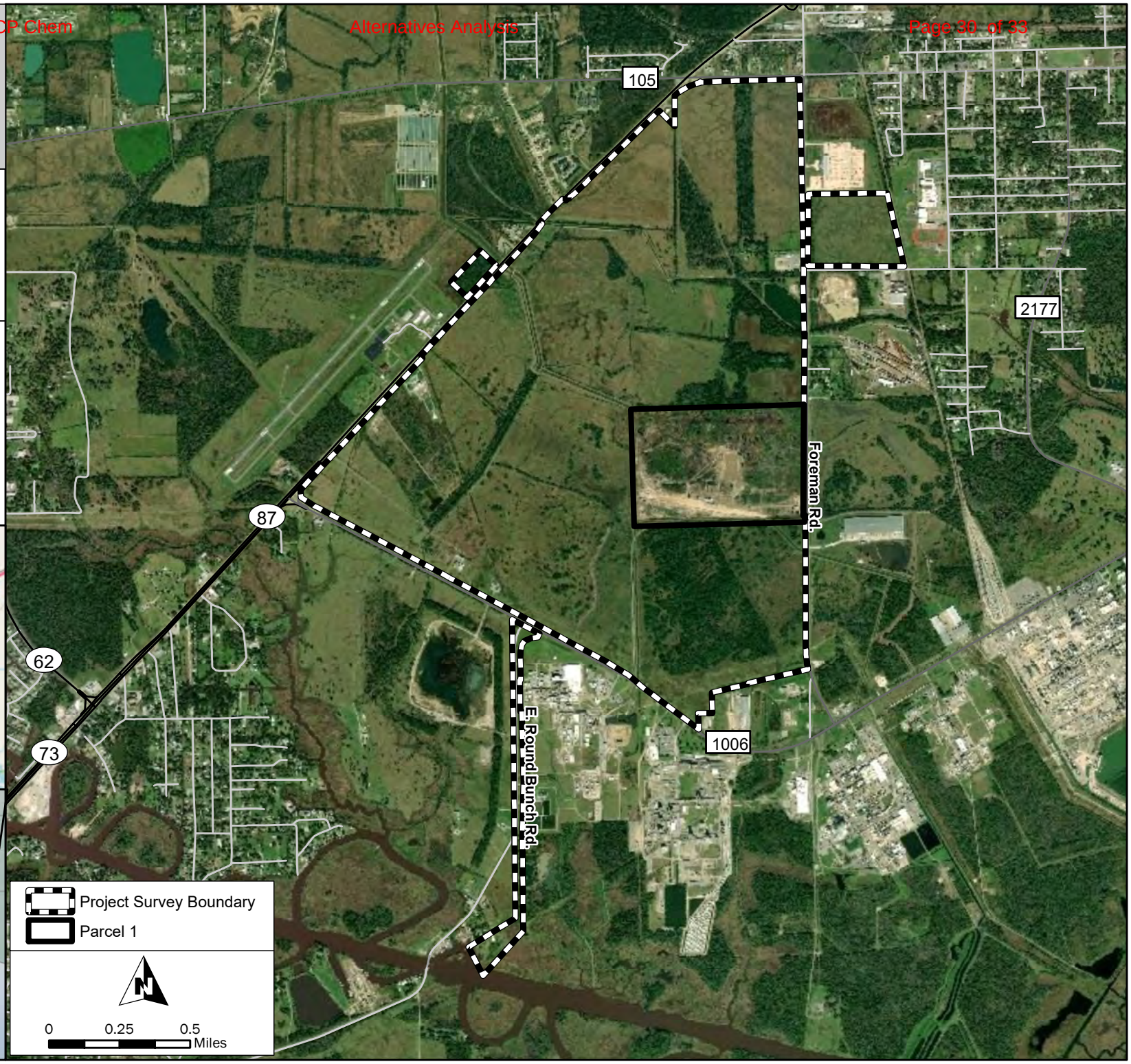
Orange, Texas

Exhibit 2:
Project Location (Aerial)

APPLICANT: CPCHEM
COORDINATES: 30.067586, -93.786364
WATERWAY:COW BAYOU
CITY: ORANGE
COUNTY: ORANGE
STATE: TEXAS
DATE: OCTOBER 2019

DATA SOURCES: NEARMAP (AERIAL),
NATURAL EARTH (STATE MAP),
USGS (STREET MAP)





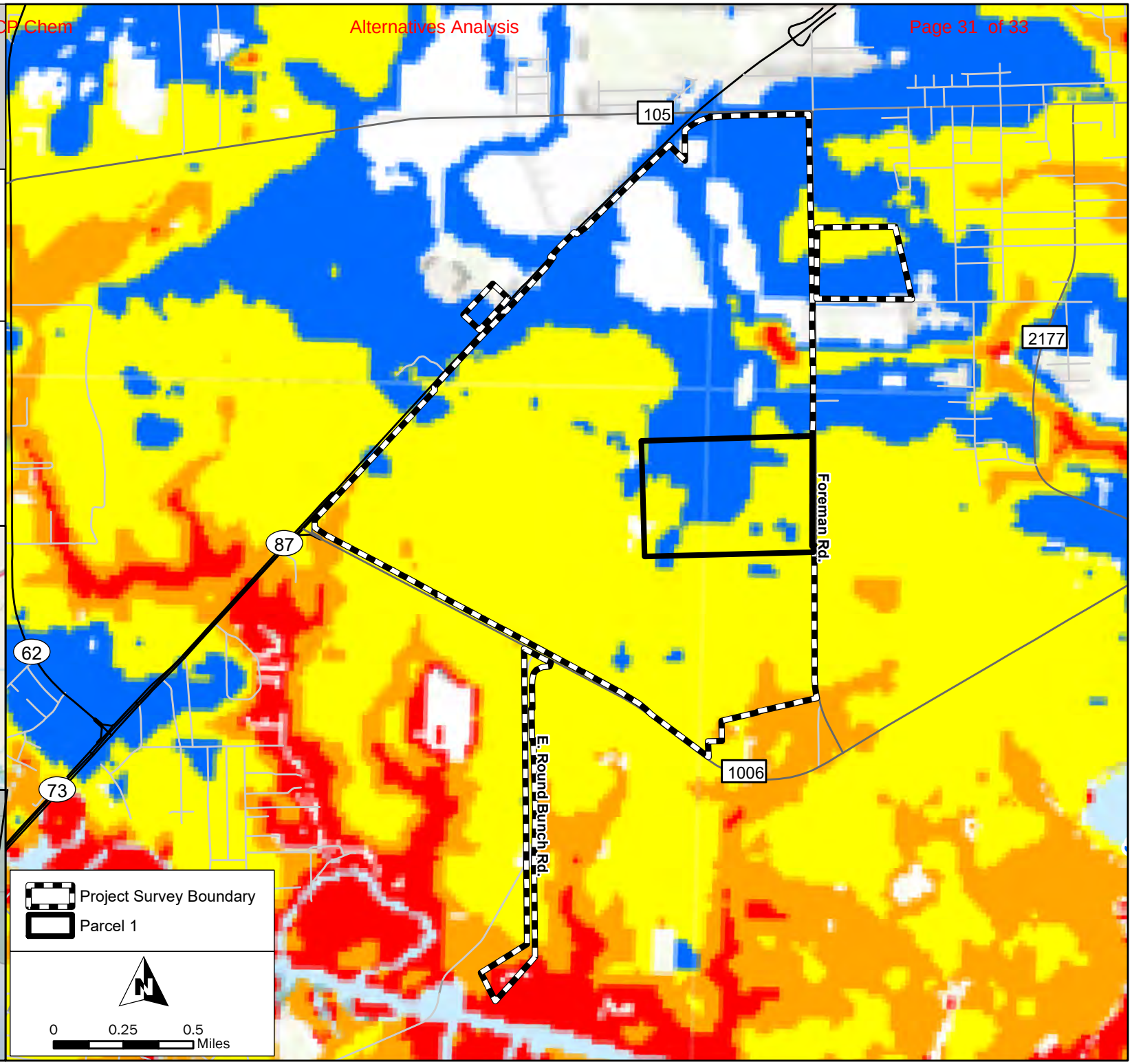
CPChem Site Location Map

Orange, Texas

Exhibit 3:
Category 2 Storm Surge

APPLICANT: CPCHEM
COORDINATES: 30.067586, -93.786364
WATERWAY:COW BAYOU
CITY: ORANGE
COUNTY: ORANGE
STATE: TEXAS
DATE: OCTOBER 2019

DATA SOURCES: NEARMAP (AERIAL),
NATURAL EARTH (STATE MAP),
USGS (STREET MAP)



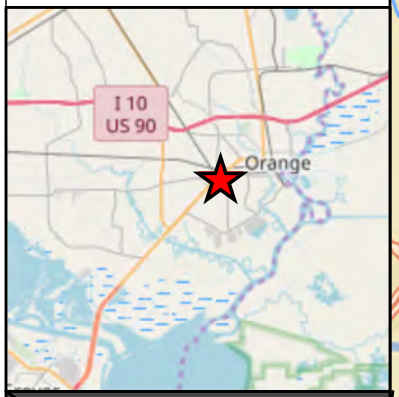
CPChem Site Location Map

Orange, Texas

Exhibit 1
Project Location

APPLICANT: CPCHEM
COORDINATES: 30.067586, -93.786364
WATERWAY:COW BAYOU
CITY: ORANGE
COUNTY: ORANGE
STATE: TEXAS
DATE: OCTOBER 2019

DATA SOURCES: NEARMAP (AERIAL), NATURAL EARTH (STATE MAP), USGS (STREET MAP)



West Orange
Western Ave
FM 105
Administrative Building
Borrow Pit
Irving St
Coon Bayou
Sabine River Authority Canal
Orange County Airport
Sabine River Authority Canal
Parcel 1
Main Facility
Foreman Rd.
Sabine River Authority Canal
Sabine River Authority Canal
Coon Bayou
Heavy Haul Road
E. Round Bunch Rd.
FM 1006
Dock Area
Cow Bayou

Project Survey Boundary
Parcel 1

0 0.25 0.5 Miles

CPChem Site Location Map

Orange, Texas

Exhibit 4:
Air Height Restriction Map

APPLICANT: CPCHEM
COORDINATES: 30.067586, -93.786364
WATERWAY:COW BAYOU
CITY: ORANGE
COUNTY: ORANGE
STATE: TEXAS
DATE: OCTOBER 2019

DATA SOURCES: NEARMAP (AERIAL),
NATURAL EARTH (STATE MAP),
USGS (STREET MAP)