FLINT HILLS
resources®
Corpus Christi Refineries

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February 26, 2014

Mr. Jeffrey Robinson
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Flint Hills Resources Corpus Christi, LLC - West Refinery
Assessment Conducted in Support of the Greenhouse Gas PSD Permit Application
Domestic Crude Project
Corpus Christi, Nueces County

Dear Mr. Robinson:

On behalf of Flint Hills Resources Corpus Christi, LLC (FHR), I am submitting the enclosed draft final Essential Fish Habitat Assessment (EFHA) Report in support of the greenhouse gas (GHG) prevention of significant deterioration (PSD) permit application (dated December 14, 2012; received by USEPA Region 6 on December 18, 2012) to authorize the Domestic Crude Project at FHR's West Refinery. The Domestic Crude Project will allow the West Refinery to process a larger percentage of domestic crude oil, and will also modestly increase the refinery's total crude processing capacity.

This draft final EFHA Report serves to fulfill the requirements of Section 503(b) of the Magnuson-Stevens Fisheries Conservation and Management Act. This version of the report includes responses to comments received from USEPA Region 6 the week of February 17-21, 2014, addresses previous communications with National Marine Fisheries Service (NMFS), and provides updated information based on the continued refinements of the scope of the Project. Enclosed with the report is a CD containing the electronic red-line strikeout version of the EFHA Report. The CD also contains the electronic copies of the references cited in the report.

One of the elements of our original draft EFHA, and continued in this revised draft, is the assessment of potential impacts from non-GHG air pollution deposition. With respect to those potential effects, FHR would offer the observation that because the proposed USEPA action is the issuance of a GHG permit, the indirect effects of air pollution should be limited under Section 503(b) to the indirect effects of GHG emissions authorized by the proposed USEPA action. Because the Department of the Interior has determined that impacts from GHG emissions need not be considered under Section 7 of the Endangered Species Act, indirect effects from non-GHG emissions should not be relevant to the Section 503(b) process. Nevertheless, FHR has included in the revised draft EFHA an analysis of the potential indirect effects of non-GHG air pollutants, including criteria pollutants, VOCs, HAP, and nitrogen/sulfur dioxide impacts on essential fish habitat. FHR would offer the further observation that because the net emissions increase of all non-GHG air pollutants (except ammonia) is zero (or less), the Project will result in no non-GHG, non-ammonia air emission-related potential indirect effects. Nevertheless, FHR has included in the EFHA an analysis of the potential indirect effects of any air pollutant for which there is an increase in allowable emissions from the Project

The technical analyses conducted for this EFHA Report are consistent with the general guidance from the USEPA and NMFS for preparing an EFHA Report. FHR's findings indicate that while EFH are mapped as being present in the Viola Turning Basin (far west end of the Inner Harbor) and the lower Nueces River (Tidal Segment), the Project is not reasonably expected to adversely affect EFH. The NMFS staff has indicated to FHR that if the Project does not have an adverse effect on EFH, there is no need for an informal consultation. Therefore, with submittal of the draft final report to USEPA, we look forward to completion of the EFH review process.

Please call Daren Knowles at (361) 242-8301 if you have any questions or need additional information regarding this support document.

Sincerely,

Valerie Pompa
Vice President and Manufacturing Manager

VP/DK/syw
Air 14-090; W 3 N 22

Enclosures

cc:

Mr. Alfred C. Dumaual, USEPA Region 6
Mr. Kris L. Kirchner, P.E., Waid Environmental, Austin, w/enclosure
Mr. Cliff Twaroski, Barr Engineering Company, Minneapolis, MN (w/o enclosure)
Ms. Courtnay Bot, Barr Engineering Company, Minneapolis, MN (w/o enclosure)

Essential Fish Habitat Assessment

Flint Hills Resources Corpus Christi, LLC
Corpus Christi, Texas

In Support of West Refinery Domestic Crude Project Permit Application

Prepared for
Flint Hills Resources

February 2014

BARR

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Essential Fish Habitat Assessment

Flint Hills Resources Corpus Christi, LLC
Corpus Christi, Texas

In Support of West Refinery Domestic Crude Project Permit Application

February 2014

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Abbreviations and Acronyms

API	America Petroleum Institute
BACT	Best Available Control Technology
CCR	continuous catalytic reformers
CO	carbon monoxide
CO_2e	Carbon dioxide equivalent; standardized metric used to compare emissions of different GHGs
C.F.R.	Code of Federal Regulation
DDS	distillate desulfurizer
DHT	distillate hydrotreating unit
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESL	Effects Screening Levels used by TCEQ air permitting
FCCU	fluid catalytic cracking unit
FHR	Flint Hills Resources Corpus Christi, LLC
GHG	greenhouse gases
GWP	global warming potential
GOHT	gas oil hydrotreating unit
HAP	hazardous air pollutant
MSA	Magnuson-Stevens Fishery Conservation and Management Act
H_2S	hydrogen sulfide
IFR	internal floating roof
I-37	Interstate Highway 37
LDAR	leak detection and repair
MSS	maintenance startup and shutdown
NAAQS	National Ambient Air Quality Standard
NHT	Naptha Hydrotreater
NMFS	National Marine Fisheries Service (also known as NOAA Fisheries)
NO_X	nitrogen oxides
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSR	New Source Review
NWI	National Wetland Inventory
PAH	polycyclic aromatic hydrocarbon

$PM/PM_{10}/PM_{2.5}$	Particulate matter / PM less than 10 microns in size / PM less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
PTE	potential to emit
Region 6	USEPA; encompasses Arkansas, Louisiana, New Mexico, Oklahoma, Texas and 66 Tribes
Sat Gas	Saturates Gas
SCR	selective catalytic reduction
SER	Significant Emission Rate
SIL	Significant Impact Level for PSD Class II areas
SIP	State Implementation Plan
SO_2	sulfur dioxide
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
UDEX	Universal Dow Extraction
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WET	whole effluent toxicity
WWTP	wastewater treatment plant

Units

bbl	barrels
dscf	dry standard cubic feet
ft	feet
gr	grain or grains
gpd	gallons per day
gpm	gallons per minute
HHV	higher heating value
hr	hour
km	kilometer
m	meter
mi	mile
MMBtu	one million British thermal units
MMBtu/hr	one million British thermal units per hour
ppmv	parts per million by volume
ppt	part per thousand (salinity)
psia	pounds per square inch, absolute
scf	standard cubic foot (air flow)
tpy	tons per year
$\mu g/m^3$	microgram per cubic meter
yr	year

Executive Summary

Flint Hills Resources Corpus Christi, LLC (FHR) is proposing modifications to its West Refinery (the Project) located in Corpus Christi, Nueces County, Texas (Figure 1). The proposed modifications require a permit under the U.S. Environmental Protection Agency's (USEPA) Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) Program pursuant to the federal Clean Air Act.

Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801, *et seq.* (MSA), requires USEPA to consult with National Marine Fisheries Service (NMFS) to determine whether USEPA's issuance of a GHG PSD permit for the Project may adversely affect any Essential Fish Habitat (EFH). The purpose of this EFH Assessment is to determine whether any areas of EFH for federally managed fish species will be adversely affected by USEPA's issuance of the GHG PSD permit, and if so, to what extent. Adopting the methodology and approach used in the Endangered Species Assessment Biological Evaluation (Barr 2014), this EFH Assessment evaluated the potential direct effects from the Project (*e.g.*, physical disturbances) and potential indirect effects related to the release of chemicals to air and water, to determine if any effects could be potentially adverse to EFH. The study identified the location of EFH in relation to the Project, and reviewed selected literature for species preferences and habitat use in Corpus Christi Bay, Nueces Bay, the Corpus Christi Inner Harbor and the lower portion of the Nueces River (*i.e.*, the Tidal Segment) to provide an understanding of the potential use of similar habitat near the Project. This EFH Assessment provides the information necessary to support USEPA's obligations under Section 305(b)(2).

Existing Site and Project Description

In 1981, the West Refinery was purchased from Sun Oil Company, and since 2002 it has operated under the name of Flint Hills Resources. Today, the West Refinery has a capacity of about 230,000 barrels per day of crude oil and supplies fuels for major Texas markets such as San Antonio, Austin, and the Dallas-Fort Worth area. In addition, the plant produces various commodity chemicals that are important building blocks for a myriad of household products (FHR 2013a).

The West Refinery is located approximately 13 kilometers [km] (8 miles [mi]) northwest of downtown Corpus Christi and is situated among developed industrial land uses associated with the Corpus Christi Inner Harbor. The Port includes many large industrial developments, dredge disposal areas, a railway system, and an industrial ship channel. The Interstate 37 highway corridor is located approximately 300 meters [m] (1,000 feet [ft]) south of the West Refinery with multiple residential clusters located farther south of the highway corridor. Immediately north of the West Refinery is the Viola Turning Basin, which is the westernmost end of the Inner Harbor. Just to the north of the Viola Turning Basin is the Nueces River and Nueces Bay, which serve as the border between Nueces County, in which the Project is located, and San Patricio County. The Nueces Delta, immediately north of the Nueces River in San Patricio County, is sparsely populated and undeveloped (Figure 1). The West Refinery is wholly located within the Texas Coastal Zone (or Coastal Zone Management Area) for purposes of the Coastal Zone Management Act, 16 U.S.C. § 1461, *et seq.*

FHR proposes changes to the West Refinery to meet the objective of increasing the refinery's domestic crude oil processing capabilities. The Project would also modestly increase the total crude processing capacity at the West Refinery. There are no external linear facilities associated with the Project (*e.g.*, no external pipelines or power lines). With the exception of a parking area to be constructed south of the main refinery operations (Figure 2), the proposed modifications associated with the Project will occur within the existing fence line of the refinery, and within the existing equipment, operations, and maintenance areas of the existing facility (Figure 3).

The Project—including construction of the new emission units, changes to existing emission units, and emissions from upstream and downstream affected units—will not trigger federal PSD for any non-GHG New Source Review (NSR)-regulated pollutants. When considering just the Project emissions, carbon monoxide (CO), particulate matter (PM), sulfur dioxide (SO_2), and hydrogen sulfide (H_2S) emissions increases are below the PSD significance thresholds (*i.e.*, the Project will not result in a significant emissions increase for these pollutants). When considering contemporaneous increases and decreases under the second step of the PSD applicability analysis, the Project will cause a *net* emissions *decrease* for oxides of nitrogen (NO_X), particulate matter (PM) smaller than 10 microns (PM_{10}), PM smaller than 2.5 microns ($PM_{2.5}$), and volatile organic compound (VOC) emissions. In fact, the overall Project will result in decreased emissions of non-GHG pollutants, with the exception of ammonia. Therefore, non-GHG pollutants associated with construction of new emission units and changes to existing emission units are subject only to Texas minor NSR requirements.

Increases in GHG emissions are estimated at approximately 360,000 tons per year (tpy) CO_2 equivalent (CO_2e) compared to the PSD significance threshold of 75,000 tpy. The increase occurs as a result of construction of new sources and changes to, or increased utilization of, various existing emission sources. For more information, refer to Section 3.1 for Affected Emission Unit Descriptions.

Identification of the Project Area

Pursuant to NMFS' "Essential Fish Habitat Consultation Guidance" (April 2004), and 50 C.F.R. § 600.920(f), "consultation [under MSA] should be consolidated, where appropriate, with interagency consultation, coordination, and environmental review procedures required by other statutes, such as . . . [the Endangered Species Act (ESA)]. ..." (NMFS 2004). Accordingly, this EFH Assessment adopts the concept of evaluating potential direct and indirect effects of the Project from the ESA to determine the "Project Area" which bounds the scope of the analysis of effects of the action. Defining the "Project Area" is the first step in the effects analysis process.

MSA regulations include the concept of both direct and indirect adverse effects (50 C.F.R. § 600.810):

> [A]ny impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

FHR identified the Project Area using the following step-wise approach that was adapted from the ESA (see Barr Engineering, 2014). First, FHR established a Preliminary Project Area based on the potential direct effects of the Project. The potential direct effects from the Project include the immediate potential effects of construction and operation of the Project (*e.g.*, ground or habitat disturbance, noise and light).

Second, FHR assessed the potential indirect effects from the Project of the following: (1) air emissions; (2) water intake and consumption; (3) storm water and process wastewater discharges; and (4) changes to marine vessel traffic.

1. For air emission-related potential indirect effects, FHR conducted air dispersion modeling for criteria pollutants and pollutants for which Texas has established Effects Screening Levels (ESLs). The air dispersion modeling results show that neither PSD Significant Impact Levels (SILs) nor ESLs were exceeded at any modeling receptor outside the Preliminary Project Area.

2. For water intake and consumption, additional water for the Project will be obtained from the City of Corpus Christi municipal water system, so it is not reasonably foreseeable that additional water intake or consumptive use will cause potential indirect adverse effects.

3. For storm water discharges, the potential increase in storm water runoff associated with the Project is expected to be insignificant and will be incorporated into the existing storm water handling systems. As a result, it is not reasonably foreseeable that storm water associated with the Project will cause potential indirect adverse effects. For process wastewater discharges, the results of a water quality analysis indicate that any potential increases in concentration, loading, and temperature are small, will not degrade water quality according to Texas water quality guidance, and are within water quality standards. Biomonitoring data from 2012 and 2013 indicate that the current effluent is not toxic to sensitive aquatic species, and because the additional water discharges from the Project are relatively small and similar in chemistry to the existing wastewater, the Project is not expected to have an adverse effect on aquatic life. As a result, it is not reasonably foreseeable that Project wastewater discharges will cause potential indirect adverse effects.

4. For changes to marine vessel traffic, FHR concluded that there will be no increase in barge shipments per month associated with the Project, and it is not reasonably foreseeable that there would be a decrease in barge shipments per month due to the Project.

Third and finally, FHR determined the final Project Area. FHR determined that in the absence of any potential indirect adverse effects outside the Preliminary Project Area from air emissions, water intake and consumption, storm and process wastewater discharges, and changes in vessel traffic, the final Project Area should not be expanded beyond the Preliminary Project Area. The Project Area is therefore defined as follows: (1) the area encompassing the existing equipment, operations, and maintenance activities footprint of the existing refinery; (2) in accordance with USEPA instructions, the specific locations of process and storm water outfalls (*i.e.*, Outfalls 001, 005, and 008) and the 200-foot regulatory mixing zone for Outfall 001 (as defined in TPDES Permit No. WQ 0000531000); and (3) the new parking lot that will support construction of the Project (Figure 3).

Essential Fish Habitat (EFH) in Relation to the Project Area

Outfalls 001, 005, and 008 discharge into EFH for five fishery management units (FMU) [1] (NOAA 2012). These five fishery management units are described in Table ES-1. Specifically, the Viola Turning Basin in the Inner Harbor will receive discharges from Outfall 001, and Nueces River

[1] A "fishery management unit" is considered to be one or more stocks of fish than can be treated as a unit for purposes of conservation and management. *See* MSA § 3(13) (definition of "fishery").

Tidal Segment No. 2101 will receive discharges from Outfalls 005 and 008. No EFH is located within the remainder of the Project Area.

The five FMU with EFH within the Project Area include four species of Shark, Red Drum, four species of Shrimp, Coastal Migratory Pelagics (*e.g.*, king mackerel), and Reef Fish. The locations of these EFH in relation to the Project are set forth in Figure 4.

Table ES-1 Essential Fish Habitat in the Lower Nueces River Tidal Segment and the Viola Turning Basin

Species/Management Unit [1]	Lifestage(s) Found at Location	Fisheries Management Plan (FMP)
Shark species: Bull Spinner Scalloped Hammerhead Atlantis Sharpnose	Neonate, Juvenile	Highly Migratory Species (HMS)
Red Drum	All stages	Red Drum
Shrimp (4 species)	All stages	Shrimp
Coastal Migratory Pelagics (CMP)	All stages	Coastal Migratory Pelagics
Reef Fish (43 species)	All stages	Reef Fish

[1] Species identified in the western portion of Nueces Bay and near the Nueces River Delta by the NOAA Essential Fish Habitat Mapper (NOAA 2012)

Because no Project-related construction or operations will occur in or immediately adjacent to EFH, FHR has assessed only the potential for adverse indirect effects to EFH located in the vicinity of Outfalls 001, 005 and 008 arising from storm water, process wastewater and temperature.

Storm water. The Project may increase storm-water runoff volume by 1% to 3% by slightly increasing the area of impervious surfaces within the Project Area. The additional storm water will be incorporated into the existing storm water handling systems and will be discharged from Outfalls 001, 005 or 008. The water quality of the storm water is not expected to change due to the Project.

Process wastewater. The Project may increase some parameter concentrations and loading at discharges from Outfall 001. These Project-related discharges will meet water quality standards, will be within acceptable load limits (TCEQ 2010), and will not be acutely or chronically toxic to aquatic life.

Temperature. The temperature of the wastewater discharge at Outfall 001 may increase by up to 2°F due to the Project, but this effect is within the variability of the existing discharge temperatures and it is unlikely to be a discernible change.

Overall, it is not reasonably foreseeable that the Project-related storm water, wastewater, or thermal discharges at Outfalls 001, 005, or 008 will adversely affect EFH at those locations.

Conclusions

The potential for adverse effects related to the Project is limited to the areas of construction-, operation-, and maintenance-related potential direct effects. This area of potential direct effects was not extended to account for indirect effects because: (1) modeling results indicate that air concentrations are less than the respective SIL or ESL at all receptors at and beyond the area of potential direct effects; (2) impacts are not reasonably foreseeable as a result of water intake or consumption; (3) water quality impacts are not reasonably foreseeable from storm water or process wastewater discharges; and (4) there are no reasonably foreseeable changes to marine vessel traffic.

USEPA's action in issuing a GHG PSD permit to FHR for the Corpus Christi West Refinery Domestic Crude Project in Nueces County, Texas, will have no adverse effect on EFH for purposes of the MSA because no construction activities or operations will be conducted in or immediately adjacent to EFH, and because there are no reasonably foreseeable indirect adverse effects to EFH in the lower Nueces River Tidal Segment and the Viola Turning Basin from Project air emissions, water intake or consumption, storm water or wastewater discharges, or changes to marine vessel traffic.

1 Introduction and Purpose

Flint Hills Resources Corpus Christi, LLC (FHR) is proposing modifications to its West Refinery in Corpus Christi, Nueces County, Texas. The West Refinery is located approximately 13 kilometers [km] (8 miles [mi]) northwest of downtown Corpus Christi at the far west end of the Port of Corpus Christi Inner Harbor (Inner Harbor), an area primarily developed with industrial land uses associated with Inner Harbor (Figure 1).

Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), this Essential Fish Habitat (EFH) Assessment has been prepared to determine whether the issuance of a greenhouse gas (GHG) Prevention of Significant Deterioration (PSD) permit for the Project by the U.S. Environmental Protection Agency (USEPA) Region 6 may adversely affect any EFH as identified by the National Marine Fisheries Service (NMFS), and to provide the information necessary to support USEPA's obligations under MSA Section 305(b).

2 Statutory and Regulatory Overview

2.1 Environmental Protection Agency Regulations and Standards

USEPA has approved the State of Texas' State Implementation Plan (SIP) with respect to the issuance of New Source Review (NSR)/PSD air permits for non-GHG emissions. Texas' SIP does not include provisions for issuing GHG PSD permits, and USEPA has not delegated the authority to Texas to issue such permits under 40 C.F.R. § 52.21. Consequently, USEPA is the permitting authority in Texas for the issuance of GHG PSD permits.

FHR has applied for a GHG PSD permit from USEPA under 40 C.F.R. § 52.21. This federal air quality permit would authorize GHG emissions associated with the construction and operation of the Project. The Project will not trigger federal PSD for any non-GHG NSR-regulated pollutants.

Section 305(b) of the MSA requires USEPA to consult, as appropriate, with NMFS to ensure that USEPA's issuance of a GHG PSD permit is not likely to adversely affect any EFH. This EFH Assessment provides the information necessary to support USEPA's obligations under Section 305(b)(2).

2.2 Magnuson-Stevens Fishery Conservation and Management Act

The MSA was enacted by Congress to regulate the harvest and management of coastal fisheries by consolidating control over territorial waters. The Act is administered by NMFS, which is part of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The MSA established eight regional fisheries management councils that determine which commercially important marine species needed federal protection. The Gulf of Mexico Fishery Management Council manages the fishery resources in the U.S. federal waters of the Gulf of Mexico. In 1996 an amendment to the MSA added the concept of EFH, which has been defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NMFS 2005).

Under MSA Section 305(b), federal agencies must consult with NMFS "with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under [the MSA]. ..." (16 U.S.C. § 1855(b)(2)). If a federal agency determines that an action does not meet the "may adversely affect EFH" test (*i.e.*, the action will not adversely affect EFH), no consultation is required. The MSA regulations define "adverse effect" to mean:

> [A]ny impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 C.F.R. § 600.810).

As part of the consultation process, Federal agencies should provide early notice to NMFS of federal actions that may adversely affect EFH (50 C.F.R. 600.920(a)(3)), and must provide NMFS with a written EFH Assessment (50 C.F.R. § 600.920(e)). Such EFH Assessments must contain: (1) a description of the proposed action; (2) an analysis of the potential adverse effects of the action on EFH and the managed species; (3) the federal action agency's conclusions regarding the effects of the action on EFH; and (4) proposed mitigation, if applicable (50 C.F.R. § 600.920(e)(3)). If appropriate, the EFH Assessment should also include: (1) the results of an on-site inspection to evaluate the habitat and the site-specific effects of the project; (2) the views of recognized experts on the habitat or species that may be affected; (3) a review of pertinent literature and related information; (4) an analysis of alternatives to the action; and (5) any other relevant information (50 C.F.R. § 600.920(e)(4)).

Thereafter, NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH (16 U.S.C. § 1855(b)(4)(A)). Additionally, each Regional Fishery Management Council may comment on and make recommendations to NMFS and any federal or state agency concerning any such federal or state activities that may affect EFH (16 U.S.C. § 1855(b)(3)). Within thirty days after receiving conservation recommendations from NMFS, Federal agencies must provide a detailed written response to NMFS and any Council comments (16 U.S.C. § 1855(b)(4)(B)). Specifically, the response must "include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impacts of the activity on such habitat," and to the extent the response is inconsistent with NMFS's recommendations, it must explain the agency's reasons for not following the recommendations (16 U.S.C. § 1855(b)(4)(B)).

In general, the consideration of potential impacts of federal actions on EFH can include one of four outcomes:

- **No adverse effect.** If a federal agency determines that an action does not meet the "may adversely affect EFH" test (i.e., the action will not adversely affect EFH), no consultation is required.

- **General Concurrence**. NOAA Fisheries can issue a general concurrence on specific types of federal actions that do not cause greater than minimal adverse effects on EFH and *no further consultation* will generally be required.

- **Abbreviated Consultation**. An abbreviated consultation is only completed if no general concurrence, programmatic consultation, or existing environmental review process is available or appropriate for the federal action. Abbreviated consultation is performed for those projects where the effect on EHF will *not be substantial*.

- **Expanded Consultation**. Expanded consultation should be completed when no other review process is available or appropriate for the federal action, and that action might result in *substantial adverse effects* on EFH. Procedures for expanded consultation allow for more detailed analysis of effects and more time for NOAA Fisheries to coordinate with the action agency and develop EFH conservation recommendations.

2.3 State of Texas

In the State of Texas, EFH requirements apply to all estuarine habitats and inland waters to the extent of salt-water influence. While there are currently no maps that show the extent of saltwater influence, state agencies typically consult the Texas Commission on Environmental Quality (TCEQ) maps that show the extent of tidal influence. On some streams, tidal influence extends a considerable distance inland.

3 Project Description

3.1 Project Purpose and Process

FHR proposes to expand the West Refinery's domestic crude oil processing capabilities and modestly increase the total crude processing capacity with the modification of existing equipment and the addition of new equipment (the Project). Information from the GHG PSD Permit Application and the Non-GHG Permit Application is summarized as follows.

FHR is proposing to construct the following new emission units:

- a new process unit called the Saturates Gas (Sat Gas) Plant No. 3, including equipment piping fugitive components and a new hot oil heater that will be equipped with selective catalytic reduction (SCR) to reduce oxides of nitrogen (NO_X) emissions and a catalyst bed to reduce carbon monoxide (CO) and volatile organic compound (VOC) emissions
- a new cooling tower in the Mid-Plant area
- new equipment piping fugitive components in several existing process units
- two new internal floating roof tanks

FHR is proposing changes to existing emission units:

Changes to CCR Hot Oil Heater and NHT Charge Heater

- an increase in permitted firing duty of the CCR (Continuous Catalytic Reformers) Hot Oil Heater
- installation of SCR on the CCR Hot Oil Heater and Naptha Hydrotreater (NHT) Charge Heater to reduce NO_X emissions from the heaters
- a decrease in the maximum hourly sulfur dioxide (SO_2) allowable emission rate for the CCR Hot Oil Heater and the NHT Charge Heater as a result of decreasing the maximum sulfur content in the fuel gas from 10 grains (gr)/100 dry standard cubic feet (dscf) to 7.2 gr/100 dscf based on fuel gas sampling

- a decrease in the CO allowable emission rates for the CCR Hot Oil Heater and the NHT Charge Heater as a result of the new CO concentration limit of 50 parts per million by volume (ppmv) (at 3% O_2) in the exhaust

Changes to Marine Terminal/Marine Vapor Combustor

- an increase in permitted annual loading rate of naphtha and gasoline into ships and barges at the marine terminal

- incorporation of PBR Registration Nos. 103051 and 103706, which were associated with the Marine Vapor Combustor (EPN VCS-1)

- a decrease in the annual benzene loading rate from 18,250,000 barrels (bbl)/year (yr) to 4,000,000 bbl/yr

- a decrease in the permitted hourly loading rate of several of the materials loaded at the marine terminal where emissions are controlled by the Marine Vapor Combustor

- removal of "Penexate" as an authorized material loaded at the marine terminal since this material is no longer produced at the refinery

- revising the method for calculating the NO_X and CO allowable emission limits for the Marine Vapor Combustor to be based on the firing capacity of the Marine Vapor Combustor rather than the heat content of the vapors routed to the combustor

- revising the method for calculating the hourly VOC emission rate from the Marine Vapor Combustor based on the maximum emission rate from any one material rather than the summation of multiple materials

- a decrease in the fuel sulfur content of the natural gas combusted in the Marine Vapor Combustor to more accurately reflect supplier specifications and sampling. The hourly sulfur content is being decreased from 6 gr/100 scf to 5 gr/100 dscf based on supplier specifications, and the annual sulfur content is being decreased from 10 gr/100 dscf to 0.5 gr/100 dscf based on sampling.

- revising the method for calculating crude oil emissions from the marine vapor combustor to be based on AP-42, Equation 5.2-1 rather than AP-42, Equations 5.2-2 and 5.2-3

- an increase in the control efficiency and a decrease in the NO_X and CO emission factors at the Marine Vapor Combustor based on recent stack test data

- inclusion, for the first time, particulate matter (PM), PM smaller than 10 microns (PM_{10}), PM smaller than 2.5 microns ($PM_{2.5}$), and hydrogen sulfide (H_2S) emission rate limits applicable to the Marine Vapor Combustor

Changes to Other Existing Emission Units

- implementation of annual flange/connector monitoring in some of the process units to reduce VOC emissions

- an increase in permitted throughputs for storage tanks and increase in true vapor pressures of materials stored in some tanks

- inclusion, for the first time, of H_2S emission rate limits applicable to crude oil storage tanks

- revising the calculation method for all pollutants for the American Petroleum Institute (API) Separator Flare (EPN V-8) based on the measured flow rate and composition of the vent gas stream routed to the flare rather than the calculated (using AP-42 emission factors) stream flow rate and composition

- conversion of the current Gas Oil Hydrotreating Unit (GOHT) to a Distillate Hydrotreating Unit (DHT)

- an increase in annual Maintenance, Startup, and Shutdown (MSS) emissions as a result of new equipment being installed

- physical changes to the Sulfur Recovery Complex to reduce its processing rate. As part of this, FHR is proposing to shutdown Sulfur Recovery Unit No. 1.

- operation of the Fluid Catalytic Cracking Unit (FCCU) Catalyst Regenerator in full burn to reduce CO emissions

- treatment of the Mid-Plant fuel gas system to reduce the amount of sulfur in the fuel gas prior to combustion in the heaters utilizing this fuel gas system, which would reduce SO_2 emissions from heaters

In addition, there will be increases in actual emissions for some emission units as a result of increased utilization or debottlenecking.

There are no external linear facilities (*e.g.*, pipelines, power lines, or rail lines) related to the Project. Some new piping will be installed in an existing pipe rack that connects the West Crude Area with the Mid-Plant Area. Raw materials will be delivered to the West Refinery, and products will be distributed, using existing infrastructure. The Project is independent of any other projects that may be under consideration along the Inner Harbor.

The following provides more detailed information about the Project and associated emission units and process-related changes.

CCR/NHT Units

The Continuous Catalytic Regeneration (CCR) and Naphtha Hydrotreater (NHT) Units are existing process units at the West Refinery currently authorized by TCEQ Permit No. 8803A. FHR is proposing process changes in the CCR and NHT Units that require an increase in the firing duty of the CCR Hot Oil Heater (39BA3901) from 90 million British thermal units per hour (MMBtu)/hr) (higher heating value [HHV]) to 123.6 MMBtu/hr (HHV) and the installation of new equipment piping components in the CCR and NHT Units. FHR is installing a SCR system to reduce NO_X emissions from the NHT Charge Heater (39BA3900) and the CCR Hot Oil Heater. These two heaters share a common stack (EPN JJ-4), and the SCR system will be installed after the emissions from the two heaters are combined.
FHR is reducing the CO allowable emission limit of the CCR Hot Oil Heater and NHT Charge Heater based on 50 ppmv (at 3% O2) in the exhaust. FHR is reducing the hourly SO_2 allowable emission limit for both heaters as a result of decreasing the maximum sulfur content in the fuel gas from 10 gr/100 dscf to 7.2 gr/100 dscf based on fuel gas sampling. FHR is proposing a Leak Detection and Repair (LDAR) program to reduce fugitive emissions of VOC from new equipment piping components at these units. Last, FHR is proposing annual instrument monitoring for all new and existing gas/vapor and light liquid flanges/connectors at these units.

General Process Description. The purpose of the NHT Unit is to remove sulfur, nitrogen, and saturate olefins catalytically from the naphtha feed to the CCR unit. Hydrotreating removes impurities from a petroleum fraction by contacting the stream with hydrogen in the presence of a catalyst at high temperatures and pressures. The CCR Unit converts naphtha to aromatics consisting primarily of benzene, toluene, and xylene. Aromatics are produced by the dehydrogenation of naphthenes and cyclization of paraffins. The dehydrogenation process also produces a hydrogen by-product. The aromatic compounds are then separated and further processed in other units. Hydrogen is consumed as fuel gas or used as feed to other units.

DHT Unit (Previously GOHT Unit)

The GOHT Unit is an existing unit at the West Refinery currently authorized by TCEQ Permit No. 8803A. FHR is converting the existing GOHT Unit to the Distillate Hydrotreater (DHT) Unit. The Project will require installation of new equipment piping components in the DHT Unit. There are no proposed physical changes or changes in method of operation for the DHT Stripper Reboiler (37BA2). However, as a result of this Project, the reboiler could potentially run at a higher duty and experience an increase in actual emissions of all pollutants except SO_2 above past actual emissions. The increased actual emissions will be below the currently authorized allowable emission rates. Therefore, FHR is not proposing any increases in the current allowable emission rates.

FHR is proposing an LDAR program to reduce fugitive emissions of VOC from new equipment piping components at the DHT Unit. FHR is proposing annual instrument monitoring for all new and existing gas/vapor and light liquid flanges/connectors at the DHT Unit. FHR is also proposing an emission reduction project that will reduce the sulfur content of the fuel gas prior to combustion in the DHT Charge Heater (37BA1) and the DHT Stripper Reboiler (37BA2). Therefore, these two heaters will see a reduction in actual SO_2 emissions from past actual emission levels. FHR is proposing to decrease the SO_2 allowable emission limit for these two heaters to reflect the emission reduction project.

General Process Description. The DHT Unit removes sulfur from a mixed distillate feed consisting of naphtha, gas oil, light cycle oil, and diesel to produce a diesel fuel product meeting the USEPA requirements for sulfur content.

Mid Crude Unit

The Mid Crude Unit is an existing unit at the West Refinery currently authorized by TCEQ Permit No. 8803A. The Project will require the installation of new equipment piping components in the Mid Crude Unit. FHR is not proposing any physical changes or changes in the method of operation for the Mid Crude Charge Heater or the Mid Crude Vacuum Heater and, based on a process engineering analysis, these emission units are not considered downstream or upstream sources affected by the Project.

FHR is proposing an LDAR program to reduce fugitive emissions of VOC from new equipment piping components. FHR is proposing annual instrument monitoring for all new and existing gas/vapor and light liquid flanges/connectors. FHR is also proposing an emission reduction project which will reduce the sulfur content of the fuel gas prior to combustion in the Mid Crude Charge Heater (42BA1) and the Mid Crude Vacuum Heater (42BA3). Therefore, these two emission units will see a reduction in actual SO_2 emissions from past actual emission levels. FHR is proposing to decrease the SO_2 allowable emission limit for these two emission units to reflect the emission reduction project.

General Process Description. The Mid Crude separates crude oil into fractions by distillation and steam stripping using the differences in boiling ranges to effect the separation. Distillate fractions produced by the crude unit include light ends, naphtha, jet fuel, diesel fuel or No. 2 fuel oil, gas oil, and residual oil. Pressures range from atmospheric to near full vacuum.

Saturates Gas Plant No. 3

FHR is proposing to construct a new Saturates Gas (Sat Gas) Plant No. 3 Unit. The new unit will include the Sat Gas No. 3 Hot Oil Heater and new equipment piping components. FHR will install an SCR system on the Sat Gas No. 3 Hot Oil Heater to reduce NO_X emissions and a catalyst bed to reduce CO and VOC emissions. The hot oil heater will have a maximum fired duty of 450 MMBtu/hr (HHV). FHR is proposing an LDAR program to reduce fugitive emissions of VOC from new equipment piping components, including annual instrument monitoring for all new gas/vapor and light liquid flanges/connectors.

General Process Description. The Saturates Gas Plant No. 3 will operate to recover propane and heavier hydrocarbons from a number of refinery streams and to fractionate the recovered hydrocarbons into various product streams. Hydrocarbon recovery will be via absorption by a combination of internally produced "lean oil" for propane recovery and by externally fed sponge oil(s) for heavy-ends recovery.

The unit will produce a fuel gas that is lean in C3+ hydrocarbons, a propane liquid product, a isobutene product, a normal butane product, a C5+ liquid product, a rich sponge oil return liquid and a sour water waste stream. Each of these streams will be sent out of the unit for further treating, sales or as feedstocks.

UDEX Unit

The Universal Dow Extraction (UDEX) Unit is an existing unit at the West Refinery currently authorized by TCEQ Permit No. 8803A. The Project will require installation of new equipment piping components in the UDEX Unit. FHR is proposing an LDAR program to reduce fugitive emissions of VOC from new equipment piping components, including annual instrument monitoring for all new gas/vapor and light liquid flanges/connectors.

General Process Description. The UDEX Unit removes aromatics from a feed stream composed of toluene, mixed xylenes, benzene and heavy aromatics. The aromatics are removed from the feed stream through using glycol and liquid-liquid extraction and exit the unit as extract product that is further separated in downstream fractionation columns. The non-aromatics along with some aromatics end up in the raffinate product stream.

West Crude

The West Crude Unit is an existing unit at the West Refinery currently authorized by TCEQ Permit No. 8803A. The Project will require installation of new equipment piping components in the West Crude Unit. FHR is proposing an LDAR program to reduce fugitive emissions of VOC from new equipment piping components. FHR is also proposing annual instrument monitoring for all new and existing gas/vapor and light liquid flanges/connectors.

General Process Description. The West Crude separates crude oil into fractions by distillation and steam stripping using the differences in boiling ranges to affect the separation. Distillate fractions produced by the crude unit include light ends, naphtha, jet fuel, diesel fuel or No. 2 fuel oil, gas oil, and residual oil. Pressures range from atmospheric to near full vacuum.

Utilities

The utilities area at the West Refinery consists of four existing boilers. There are no proposed physical changes or changes in method of operation to any of these boilers. However, as a result of this Project, there will be an increase in steam demand so the boilers could potentially run at a higher duty and experience an increase in actual emissions above past actual emissions as a result of increased utilization. The increased actual emissions will be below the currently authorized allowable emission rates. Therefore, FHR is not proposing any increases in any of the boilers' current permit allowable emission rates or authorized maximum duty rates.

FHR is also proposing an emission reduction project that will reduce the sulfur content of the fuel gas prior to combustion in the Mid Crude Boiler. Therefore, the Mid Crude Boiler will see a reduction in actual SO_2 emissions from past actual emission levels. FHR is proposing to decrease the SO_2 allowable emission limit for the boiler to reflect the emission reduction project. Lastly, FHR is decreasing the CO allowable emission rate limit for the Mid Crude Boiler by updating the emission factor to more accurately reflect emissions measured by the continuous emissions monitor.

General Process Description. The Boilers provide steam for use throughout several process units.

Marine Loading

As a part of the Project, FHR is proposing to increase the permitted annual loading rate of naphtha and gasoline into ships and barges at the marine terminal. Emissions resulting from these loading operations are controlled by the Marine Vapor Combustor, which is authorized under TCEQ Permit No. 6819A. FHR is not proposing any increases to the annual loading rates of other products loaded at the marine terminal and controlled by the Marine Vapor Combustor. However, FHR is proposing to decrease the hourly loading rates of several of the materials loaded at the marine terminal and controlled by the Marine Vapor Combustor.

The Marine Vapor Combustor is considered a modified source for minor NSR purposes because of the proposed increase in the permitted annual naphtha and gasoline loading rates. FHR is also

- increasing the control efficiency and decreasing the NO_X and CO emission factors at the Marine Vapor Combustor based on recent stack test data;
- adding Light Straight Run, or Mixed Pentanes, as an authorized material as a result of incorporating PBR Registration No. 103051;
- incorporating PBR Registration No. 103706, which authorized an increase in the annual gasoline loading rate from 1,900,000 bbl/yr to 4,000,000 bbl/yr (Note: this amendment proposes to increase the gasoline loading rate to 6,935,000 bbl/yr);
- decreasing the permitted annual benzene loading rate from 18,250,000 bbl/yr to 4,000,000 bbl/yr;
- decreasing the permitted hourly loading rate of many of the materials controlled by the Marine Vapor Combustor;
- revising the method for calculating the NO_X and CO allowable emission limits for the Marine Vapor Combustor to be based on the firing capacity of the Marine Vapor Combustor rather than the heat content of the vapors routed to the combustor;
- revising the method for calculating the hourly VOC emission rate from the Marine Vapor Combustor based on the maximum emission rate from any one material rather than the summation of multiple materials;

- decreasing the fuel sulfur content of the natural gas combusted in the Marine Vapor Combustor to more accurately reflect supplier specifications and sampling. The hourly sulfur content is being decreased from 6 gr/100 scf to 5 gr/100 dscf based on supplier specifications, and the annual sulfur content is being decreased from 10 gr/100 dscf to 0.5 gr/100 dscf based on sampling;
- revising the method for calculating crude oil emissions from the marine vapor combustor to be based on AP-42, Equation 5.2-1 rather than AP-42, Equations 5.2-2 and 5.2-3; and
- removing penexate as a material loaded at the marine terminal since the product is no longer produced at the refinery.

The result of all of the above changes is an overall decrease in the annual NO_X, CO, and VOC allowable emissions.

FHR is also proposing for the first time PM, PM_{10}, $PM_{2.5}$, and H_2S emission limits for the Marine Vapor Combustor. The particulate matter and H_2S emissions are not new emissions resulting from a physical change or change in the method of operation, but are being estimated now consistent with current TCEQ practices.

General Process Description. FHR's West Refinery uses three docks (No. 8, 9, and 10) for marine loading of both ships and barges. When loading toluene, benzene, xylene (all isomers), gasolines and blend stocks, naphthas, cumene, pseudocumene, light straight run (mixed pentanes), and crude oil, emissions are captured by a vacuum-assisted loading operation and routed to the Marine Vapor Combustor (VCS-1) for control. The Marine Vapor Combustor is an enclosed flare with a minimum VOC destruction efficiency of 99.5% based on stack testing. The Marine Vapor Combustor converts H_2S to SO_2 at a minimum efficiency of 98%. The Marine Vapor Combustor uses natural gas as the fuel to the burners of the combustor.

Tank Farm

FHR is proposing to construct two new internal floating roof (IFR) tanks and increase the throughput for and/or change the vapor pressure of the materials stored in other existing tanks. FHR is also proposing to establish grouped annual emission rate limits for some of the tanks while maintaining an hourly emission rate limit for each individual tank in the group.

The two new IFR tanks will have capacities of 100,000 bbl and 75,000 bbl, respectively, and will have internal floating roofs. The new IFR tanks will be equipped with a suspended floating roof to minimize emissions from fittings and a primary and secondary seal to minimize emissions from rim seals. These tanks will store materials with a true vapor pressure less than 10.9 pounds per square inch, absolute (psia).

Tanks 08FB108R1, 08FB109R, 40FB4012, and 40FB4013 are existing internal floating roof tanks authorized to store materials with a true vapor pressure less than 10.9 psia. Tank 15FB507 is an existing external floating roof tank authorized to store materials with a true vapor pressure less than 10.9 psia. Tank 40FB3041 is an existing fixed-roof tank authorized to store materials with an annual true vapor pressure less than 0.02 psia and a maximum true vapor pressure less than 0.07 psia. There are no physical changes or changes in method of operation proposed for storage tanks 08FB108R1, 08FB109R, 15FB507, 40FB3041, 40FB4012, and 40FB4013. However, as a result of this Project, the tanks will experience an increase in emissions of VOCs above past actual emissions. The increased actual emissions will be below the currently authorized allowable emission rates. Therefore, for these tanks, FHR is not proposing any increases in the current permit allowable emission rates.

Tanks 08FB137 and 08FB147 are existing internal floating roof tanks and Tank 08FB142 is an existing external floating roof tank. All three tanks are authorized to store materials with a true vapor pressure less than 10.9 psia. There are no physical changes or changes in the method of operation proposed for storage tanks 08FB137, 08FB142, and 08FB147. However, as a result of this Project, the tanks will experience an increase in emissions of VOCs above past actual emissions. The increased actual emissions will be below the currently authorized allowable emission rates. Therefore, FHR is not proposing any increases in the current permit allowable VOC emission rates. FHR is also proposing for the first time H_2S emission limits for storage tanks 08FB137, 08FB142, and 08FB147. The H_2S emissions are not new emissions resulting from a physical change or change in the method of operation, but are now being estimated consistent with TCEQ practices.

Tanks 11FB402 and 11FB403 are existing internal floating roof tanks and are authorized to store materials with a true vapor pressure less than 10.9 psia. There are no physical changes or changes in the method of operation proposed for storage tanks 11FB402 and 11FB403. However, as a result of this Project, the tanks will experience an increase in actual emissions of VOCs above past actual emissions.

Tanks 11FB408, 11FB409, and 11FB410 are existing external floating roof tanks. FHR is proposing to increase the currently permitted annual throughput for Tanks 11FB408, 11FB409, and 11FB410 and to decrease the currently permitted true vapor pressure of the materials stored in the tanks to 0.5 psia, which result in an overall decrease in allowable emission rates. FHR is also proposing an annual grouped emission limit for these three tanks and an individual hourly emission limit for each of the tanks. The tanks' future potential emissions are based on the proposed allowable throughput and vapor pressure.

Tank 15FB508 is an existing external floating roof tank, and Tank 15FB510 is an existing fixed-roof tank. There are no physical changes or changes in the method of operation proposed for existing storage tank 15FB508. FHR is proposing to decrease the true vapor pressure of the materials stored in Tank 15FB508 to 0.5 psia. FHR is proposing to increase the currently permitted annual throughput for Tank 15FB510 and increase the true vapor pressure of the materials stored in the tank to 0.5 psia, which is higher than prior permit representations. Therefore, Tank 15FB510 is considered a modified source for minor NSR purposes. FHR will be installing an internal floating roof in Tank 15FB510 as part of a pollution control project separate from the Project proposed in this application. FHR is also proposing an annual grouped emission limit for these two tanks and an individual hourly emission limit for each of the tanks. There is an overall decrease in emissions as a result of the pollution control project and proposed changes for these tanks. Although there are no physical changes or changes in the method of operation proposed for Tank 15FB508, the tank is considered modified for minor NSR purposes because it is being included in a group with Tank 15FB510, which is considered modified because of the increase in permitted throughput and vapor pressure. The tanks' future potential emissions are based on the proposed allowable throughput and vapor pressure.

Tanks 40FB3043 and 40FB3044 are existing fixed-roof tanks. FHR is proposing to increase the currently permitted annual throughput for Tanks 40FB3043 and 40FB3044 and increase the true vapor pressure of the materials stored in the tanks to 0.5 psia, which is higher than prior permit representations. Because the annual throughput and true vapor pressure of the tanks will be increasing above permitted rates as a result of this Project, the tanks are considered modified sources for minor NSR purposes. FHR will be installing an internal floating roof in both tanks as part of a pollution control project separate from the Project proposed as part of this application. FHR is also proposing an annual grouped emission limit for these two tanks and an individual hourly emission limit for each of the tanks. There is an overall decrease in emissions as a result of the pollution control project and proposed changes for these tanks. The tanks' future potential emissions are based on the proposed allowable throughput and vapor pressure.

Tanks 40FB4010 and 40FB4011 are existing external floating roof tanks. FHR is proposing to increase the currently authorized annual throughput for Tanks 40FB4010 and 40FB4011 and limit the annual and hourly true vapor pressure of the materials stored in the tanks to 9 psia and 10.9 psia, respectively. Because the permitted annual throughputs are increasing as a result of this Project, these tanks are considered modified sources for minor NSR purposes. FHR is also proposing an annual grouped VOC emission limit for these tanks and an individual hourly VOC emission limit for each of the tanks. There is an overall decrease in VOC emissions as a result of the proposed changes for these tanks. The tanks' future potential emissions are based on the proposed allowable throughput and vapor pressure. FHR is also proposing for the first time H_2S emission limits for storage tanks 40FB4010 and 40FB4011. The H_2S emissions are not new emissions resulting from a physical change or change in the method of operation, but are now being estimated consistent with TCEQ practices. FHR is proposing an annual grouped H_2S emission limit for these tanks and an individual hourly H_2S emission limit for each of the tanks.

Tanks 40FB4014 and 40FB4015 are existing fixed-roof tanks. FHR is proposing to increase the true vapor pressure of the materials stored in Tanks 40FB4014 and 40FB4015 to 0.5 psia, which is higher than prior permit representations. Therefore, these tanks are considered modified sources for minor NSR purposes. FHR will be installing an internal floating roof in the tanks as part of a pollution control project separate from the Project proposed in this application. There is an overall decrease in emissions as a result of the pollution control project and proposed changes for these tanks. The tanks' future potential emissions are based on the proposed allowable vapor pressure.

Tanks 40FB4016 and 15FB509 are existing fixed-roof tanks. FHR is proposing to increase the true vapor pressure of the materials stored in Tanks 40FB4016 and 15FB509 to 0.5 psia, which is higher than prior permit representations. Therefore, these tanks are considered modified sources for minor NSR purposes. FHR will be installing an internal floating roof in the tanks as part of a pollution control project separate from the Project proposed in this application. FHR also is proposing an annual grouped emission limit for these tanks and an individual hourly emission limit for each of the tanks. There is an overall decrease in emissions as a result of the pollution control projects and proposed changes for these tanks. The tanks' future potential emissions are based on the proposed allowable vapor pressure.

FHR is proposing the installation of new equipment piping components (EPN F-TK-VOC) as part of constructing two new storage tanks. FHR also is proposing the installation of new equipment piping components (EPN F-GB) to upgrade the gasoline blending system. FHR is proposing an LDAR program to reduce fugitive emissions of VOC from new equipment piping components. FHR also is proposing annual instrument monitoring for all new and existing gas/vapor and light liquid flanges/connectors associated with the gasoline blender system.

Cooling Towers

FHR is proposing to construct a new Mid Plant Cooling Tower No. 2 (44EF2) in the Mid Plant area. The new Mid Plant Cooling Tower No. 2 will be equipped with a high efficiency drift eliminator that will achieve a drift loss of 0.0005% or less. FHR is including proposed PM, PM_{10}, and $PM_{2.5}$ emission limits for the new Mid Plant Cooling Tower.

FHR will be installing a high efficiency drift eliminator on the existing Mid Plant Cooling Tower to reduce particulate matter emissions as part of a pollution control project separate from the Project proposed as part of this application. The drift eliminator will achieve a drift loss of 0.0005% or less.

General Process Description. The West Refinery is provided cooling water from a number of cooling towers throughout the refinery. The cooling towers are equipped with a TCEQ approved air-stripping system as described in Appendix P of TCEQ's Sampling and Procedure Manual. The cooling towers are monitored monthly for VOC emissions.

Wastewater Treatment

There are no proposed physical changes or changes in the method of operation for the API Separator Flare (EPN V-8). However, as a result of this Project, the flare could potentially be used to control more emissions from increased flow through the Monroe API Separator. Through this increased utilization, the flare could see an increase in actual emissions above past actual emissions. The increased actual emissions will be below the currently authorized allowable emission rates.

FHR is revising the calculation method for the potential to emit of all pollutants based on the flow rate and composition of the vent gas stream.

General Process Description. The wastewater streams affected by this Project enter the Monroe API Separator where slop oil and sludge are removed and sent to storage. Emissions from the Monroe API Separator are controlled by the API Separator Flare (EPN V-8). FHR operates a caustic scrubber on the Monroe API Separator to reduce sulfur in the waste gas stream routed to the API Separator Flare. The API Separator Flare meets the requirements of 40 C.F.R. 60.18 based on historical performance tests and provides a minimum VOC destruction efficiency of 98% based on TCEQ guidance.

Other Sources

FHR is not proposing any physical changes or changes in the method of operation for the FCCU CO Boiler/Scrubber, LSG Hot Oil Heater (47BA1), the Metaxylene Hot Oil Heater (54BA1), the distillate desulfurizer (DDS) Charge Heater (56BA1), the DDS Fractionator Reboiler (56BA2), equipment piping components in the FCCU Unit, or equipment piping components in the Hydrocracker Unit that will increase emissions. There will, however, be emissions reductions at these units. FHR will operate the FCCU catalyst regenerator at full burn which will reduce the annual average CO concentration in the exhaust from the scrubber. FHR is reducing the annual CO concentration limit in the exhaust gas from 250 ppmv, dry to 50 ppmv, dry. FHR is proposing an emission reduction project that will reduce the sulfur content of the fuel gas prior to combustion in the heaters. Therefore, the SO_2 allowable emission limits are being reduced as a result of the emission reduction project. FHR is proposing an emission reduction project for the existing equipment piping components in the FCCU and Hydrocracker Units. Specifically, FHR will reduce VOC emissions by committing to annual flange monitoring in these unit. There are no new equipment piping components proposed for the FCCU and Hydrocracker Units.

As part of installing the SCR controls on some of the heaters, there will be new equipment piping components in ammonia service. FHR is proposing an Audio, Visual, and Olfactory LDAR monitoring program to reduce fugitive emissions of ammonia from these new equipment piping components.

Planned Maintenance, Start-up, and Shutdown Emissions

FHR is proposing to authorize planned MSS activities as described below as a result of constructing the new Sat Gas Plant No. 3 Unit and new storage tanks.

General Process Description. Various maintenance activities have fugitive emissions associated with them.

- *Vessel and Equipment Openings after Decommissioning*. Once equipment has been cleaned, blinds for maintenance are installed. This requires opening the equipment to atmosphere releasing any residual VOC to the atmosphere.

- *Tank Landings and Degassing*. MSS activities associated with tanks are landing the floating roofs, degassing and cleaning for the purposes of product service changes, off-spec product removal, and other tank maintenance. When a tank is cleaned, material in the tank is removed. Diesel is introduced into the tank several times to absorb any remaining VOCs in the tank. For tanks storing material with a TVP > 0.5 psia, the tank is degassed to a control device while the diesel is being flushed into the tank. The diesel and any residual liquid are then removed from the tank. Degassing continues until the VOC concentration in the tank is below 10,000 ppmv. At that time, the tank is opened to vent any remaining VOCs.

- *Frac Tanks*. Frac tanks are utilized as temporary storage containers for refinery process and chemical cleaning materials. Emissions are generated from filling and breathing loss. The frac tanks are controlled by carbon canisters.

- *PAN Emissions*. Emissions are generated from residual hydrocarbons that remain in the process equipment after decommissioning. Emissions are also generated from leaks that occur during repair/replacement of components such as pumps, filters, valves, etc.

- *Vacuum Truck Loading*. Vacuum trucks are used to transfer materials from one container to another and empty tanks and other vessels during maintenance activities. Vacuum trucks are also used for blinding activities, pump maintenance, and dewatering crude tanks etc. Vacuum truck emissions will be controlled by a carbon canister system, an engine, or a thermal oxidizer. Consistent with prior TCEQ permitting actions, a VOC control efficiency of 98% is used in the calculations.

Summary of Project Emissions

For each of these Project components, CO_2 equivalent (CO_2e) emissions are defined as the sum of the mass emissions of each individual GHG adjusted for its global warming potential (GWP). The CO_2e emission rates for each GHG are estimated by multiplying the emission rates for each GHG by its GWP value provided in Table A-1 of 40 C.F.R. Part 98, Subpart A. Potential PSD air pollutant air emissions associated with the Project are provided in Table 1.

Table 1 Estimated Emissions of Prevention of Significant Deterioration (PSD) Air Pollutants for the Flint Hills Resources West Refinery Project

Pollutant	Estimated Project Emissions Increase (tpy) [1]	PSD Significant Emission Rate (SER) Threshold (tpy)	Estimated Project Emissions > Major Source Threshold	Project Contemporaneous Emission Changes after Netting Analysis [2] (tpy)	"Net" Emissions Exceed PSD Threshold?
NO_X	**61.83**	40	YES	- 228.33 [2]	NO
CO	65.37	100	NO	-801.45 [3]	n/a
SO_2	15.34	40	NO	-156.36 [3]	n/a
PM	23.79	25	NO	-15.42 [4]	n/a
PM_{10}	**23.01**	15	YES	- 2.13 [2]	NO
$PM_{2.5}$	**22.41**	10	YES	- 4.28 [2]	NO
VOC	**67.48**	40	YES	- 39.14 [2]	NO
H_2S	0.76	10	NO	-1.44 [3]	n/a
GHGs (as CO_2-equivalents)	~360,000	75,000	YES	n/a	YES

n/a = not applicable   PSD = Prevention of Significant Deterioration

[1] **Bolded values** indicate the Project-only estimated emissions increases exceed the PSD permitting threshold. Emissions as estimated by Waid Environmental for the PSD permitting. Project emissions information obtained from TCEQ Form 2-F.

[2] WAID Environmental calculated contemporaneous emission increases/decreases for PSD netting analysis for any PSD regulated pollutant showing an estimated significant increase. Netting analysis results are from Table 3-F in the TCEQ permit application for each pollutant.

[3] A PSD netting analysis was not required by the TCEQ for CO, SO_2 or H_2S because Project emissions increases of these pollutants were below the PSD significant emission rates. Therefore, for these pollutants the change in permit allowable emissions is provided.

[4] Although a PSD netting analysis was not required by the TCEQ for PM because the Project emissions increase for this pollutant is below the PSD significant emission rate, FHR has calculated the net change in PM emissions as a result of the Project along with contemporaneous emission increases/decreases.

3.2 General Construction Information

The West Refinery is located outside the corporate city limits of Corpus Christi; however, it is located within the city's Extra Territorial Jurisdiction boundary. Within this boundary, the refinery is situated within the Industrial Heavy zoning district. The proposed construction activities would occur within the Industrial Heavy zoning district.

Construction activities will begin as soon as possible after construction permits have been approved and issued. The Project will be constructed with conventional construction techniques and equipment. Project activities within the main refinery operations area will include site preparation and grading, construction of foundations, and then the eventual erection of major structures (*e.g.*, Saturates Gas Plant No. 3, cooling tower).

Temporary noise impacts will result from the use of the construction equipment. The timing and decibel level of the noise will vary throughout the construction time period. Construction equipment will be fitted with standard noise reduction equipment and standard practices will be followed to operate and maintain the equipment to minimize noise generation (*e.g.*, regular maintenance and lubrication).

The construction areas are within the existing equipment, operations, and maintenance areas of the West Refinery, with the exception of the new parking area (Figure 2), which will be located on FHR property adjacent to the existing equipment, operations, and maintenance areas of the facility. The noise associated with construction and equipment operations and maintenance is not expected to be discernible from existing refinery operations. The proposed parking area to the south of the main refinery operations area will be constructed with conventional techniques and equipment. Construction-related activity will be a one-time occurrence. It is expected that any land-shaping will be minimal due to the existing flat terrain and that the parking area surface will be installed within a relatively short period of time. The temporary noise from equipment and haul trucks is expected to be similar to the current types and levels of noise in the Interstate 37 (I-37) corridor. Therefore, noise associated with construction of the parking area is not expected to be discernible from other types of traffic-related noise in the area.

3.3 General Operation and Maintenance

The majority of the Project sources of noise, lights, and maintenance activities will be within the existing equipment, operations, and maintenance footprint of the refinery (Figure 3). Potential noise associated with the Project during operations will be similar to existing activities and processes at the refinery. The

Project noise levels are expected to be indistinguishable from existing facility noise levels. Construction-related noise is discussed in Section 3.2.

3.4 Emission Controls

The air emissions permitting applications completed for the Project included a Best Available Control Technology (BACT) analysis for GHGs under 40 C.F.R. § 52.21, and a BACT analysis for Texas-regulated pollutants under the TCEQ minor NSR program. BACT-controlled emission rates were used in this analysis to assess air quality-related potential indirect effects. Additional information regarding BACT controls may be found in the respective USEPA PSD GHG and TCEQ minor NSR permit applications.

3.5 Water Use/Intake

Current operations at the West Refinery rely on water obtained from the Nueces River and the City of Corpus Christi Municipal Water Supply. Water use associated with the Project is estimated to have a net increase of about 500 gallons per minute (gpm). The City of Corpus Christi Municipal Water Supply will supply the makeup water for the Project. Therefore, there is no increase in water obtained from the Nueces River for the West Refinery.

3.6 Discharge to Surface Waters

3.6.1 Texas Pollution Discharge Elimination System

The West Refinery discharge is required to meet federal and state water quality standards at the discharge location (*i.e.*, no dilution zone allowed). Federal authority to regulate the National Pollutant Discharge Elimination System (NPDES) is delegated to the State of Texas, TCEQ, Texas Pollutant Discharge Elimination System (TPDES).

The West Refinery has an existing water quality permit (TPDES Permit No. WQ0000531000) that allows discharge of wastewater and storm water. Discharge locations are identified as follows:

- Outfall 001: treated water is routed from the wastewater treatment plant (WWTP) via a pipeline to the Viola Turning Basin just to the north of the West Refinery. Outfall 001 is located about 30 yards to the east of Dock #8 and is an underwater discharge into the Viola Turning Basin. The Viola Turning Basin forms the very west end of the Inner Harbor. The Inner Harbor is separate from the Nueces River and opens into Corpus Christi Bay. Therefore, there is no opportunity for a direct discharge of water from Outfall 001 into the Nueces River. Water discharged into the Viola Turning Basin from the West Refinery travels approximately 13 km (8 mi) before reaching Corpus Christi Bay.

- Outfalls 002, 004, 007, 009, and 012: water is routed to unnamed ditches, and then to a tidal bayou (Tule Lake outlet) and then to the Tule Lake Turning Basin.

- Outfall 003: water is routed to an unnamed ditch, then to the Tule Lake Channel (the Tule Lake Channel is the portion of the Inner Harbor between the Tule Lake Turning Basin and the Chemical Turning Basin).

- Outfalls 006, 011, and 013: water is routed to unnamed ditches, then to the Viola Turning Basin.

Water from these outfalls is then routed to the Corpus Christi Inner Harbor Segment No. 2484 of the Bays and Estuaries.

- Outfalls 005, 008, and 010: water is routed to a ditch, and then to the Nueces River Tidal Segment No. 2101 of the Nueces River Basin. For Outfalls 005, 008, and 010, there is no direct discharge to the Nueces River. Rather, water is first discharged into ditches which flow northward into impounded wetlands that border the FHR property. The wetlands appear to drain to the northwest and discharge to the Nueces River Tidal Segment about 3 km (1.9 mi) from the FHR outfalls and about 6 km (3.7 mi) upstream from Nueces Bay.

Wastewater related to the Project will be routed to the WWTP and then to Outfall 001. The wastewater streams associated with the Project will be integrated with the current wastewater streams from existing operations and are not considered a new source. Further, the waste streams associated with the Project are characteristically similar to existing permitted waste streams that feed the West Refinery's WWTP. Therefore, the expectation is the waste streams and wastewater from the Project will not impact the treatability of the existing wastes or prevent the treatment system from meeting the authorized final effluent limits. Wastewater streams from the Project will be similar in temperature to the wastewater from existing similar operations. Project wastewater flows *may* increase the temperature of the discharged water by up to 2 degrees Fahrenheit (ºF) at Outfall 001—about a 3% increase and unlikely to be discernible above background water temperatures —but are not expected to increase the temperature of the discharged water above the currently permitted limit of 115ºF.

Maximum water discharge from permitted Outfall 001 is 6.7 million gallons per day (gpd) (approximately 4,650 gpm, with the daily average permitted discharge set at 5.3 million gpd (approximately 3,680 gpm). Average discharge volume from Outfall 001 is approximately 2,300 gpm (average for 2011). The Project is conservatively estimated to increase the actual discharge volume by approximately 150 gpm; an increase of about 6% from the 2011 average annual discharge. This estimated increase in the annual average discharge water volume (from about 2,300 gpm to about 2,450 gpm) is within the currently permitted discharge volume and will not require any modification to the current TPDES permit for the West Refinery.

Sanitary sewerage related to the Project will be routed to the City of Corpus Christi municipal wastewater system and will not be discharged from the TPDES permitted outfalls.

3.6.2 Storm Water

Storm water associated with construction activities will be managed under the storm water portion of the TPDES water quality permit. Acquiring a General Construction Permit (TXR150000) and implementing best management practices based on the acreage of the impacted soil will address potential storm water impacts during the construction of the proposed units. Short-term and long-term storm water runoff from within the fence-line in the main refinery operations area is not expected to increase appreciably due to the Project because the existing construction, laydown, and proposed parking areas in this portion of the property currently consist of previously disturbed and compacted areas and/or impervious surfaces (*i.e.*, concrete, asphalt, or caliche). Three construction areas totaling about 20 acres, approximately 3% of the main refinery operations area, currently have herbaceous cover and these will be converted to less pervious surfaces and therefore, may cause more storm water runoff. However, this potential change in storm water runoff for the main refinery operations area is estimated to be small, potentially a 1% to 2% increase from existing conditions. Therefore, additional construction will not result in a measurable change in runoff from impervious surfaces within the main refinery operations area. It is currently estimated that the overall run-off coefficient for the portions of the areas affected by the Project in the main refinery operations area will not change appreciably from current conditions (*i.e.*, already impervious surfaces dominate in these areas).

Storm water from within the West Refinery operations area is expected to be routed to and through the Mid-Plant and West Crude areas storm water grit chambers to respective first flush tanks, and then routed to either: (1) the WWTP for treatment and discharged via Outfall 001; or (2) routed to Outfall 008 or Outfall 005 for discharge. Storm water is expected to have chemistry similar to urban runoff and therefore does not typically require treatment.

Outfalls 005 and 008 are within the FHR property boundary. For both Outfall 005 and 008, storm water is discharged directly to a ditch which then exits the northern FHR property boundary to connect to a narrow wetland/open water area that extends northward toward the Suntide Dredge Material Placement Area. The wetland/open water area appears to drain to the northwest between the dredge spoil area and Hearns Ferry Road and then discharge to the Nueces River just to the west of the Union Pacific Railroad bridge approximately 3 km (1.9 mi) to the northwest of Outfalls 005 and 008 and approximately 6 km (3.7 mi) upstream from Nueces Bay. Storm water discharged at Outfalls 005 and 008 co-mingles with other storm water from the I-37 corridor and Inner Harbor industrial areas, ambient water from within the respective wetland areas and likely storm water and/or drainage water from the dredge spoil area.

For the proposed parking area to the south of the main refinery operations (Figure 2), the terrain of the approximately 10 acre site is relatively flat and current storm water is managed as urban runoff and routed to nearby ditches and through the municipal storm water management system. The location is a previously disturbed, partially grassy area (former school site), with predominantly clay soils at the ground surface. Other surface features include patches of overgrown asphalt, a former parking area and a former running track. Given the current site conditions which tend to promote runoff (clay soils, overgrown asphalt and a former parking area) there is uncertainty as to the extent of changes in impervious surfaces as the land is converted to the parking area. Best management practices will be implemented and the runoff water will continue to be considered urban runoff and routed to the existing ditching system. The construction of the parking area will require FHR to obtain a construction permit for storm water discharge (TCEQ 2006; 2013) and to develop and implement a Storm Water Pollution Prevention Plan (SWP3). Also, notification must be provided to the Municipal Separate Storm Sewer System (MS4) operator (TCEQ 2006; 2013) (*i.e.,* for this Project notice must be provided to the City of Corpus Christi).

Overall, when considering the Project construction areas 3, 17, 18 (within the main refinery operations area), and 19 (parking area to the south of the main refinery operations) that will be converted from currently vegetated areas to more impervious areas due to equipment installation and construction of the parking areas; Figure 2), there may be a 1% to 3% increase in runoff associated with the Project. This potential increase in runoff volume is expected to be within the variability of existing runoff from the FHR property and is considered an insignificant change from existing conditions.

3.7 Marine Terminal Use and Vessel Traffic

The Port of Corpus Christi averages about 6,000 vessels per year (average for the 2005 to 2011 time period; includes tankers and barges) and about 82,000,000 short tons shipped (includes petroleum at 84% of total tons shipped) (Port of Corpus Christi 2013a). The West Refinery is located near the Viola Turning Basin, which is part of the Inner Harbor area and is one of a number of facilities that receives raw materials and ships products via the Inner Harbor.

Shipments to the West Refinery are typically received at Public Oil Dock #8. The Project will not require any physical changes or modifications to Public Oil Dock #8, nor require any changes in the dock operations. In addition, the Project will not require any in-water construction activities or dredging.

The proposed Project shifts the refinery from using light foreign crude oil and heavier domestic crude to domestic sweet light crude oil. The domestic light crude oil is to be delivered to the West Refinery by existing pipelines and will reduce the number of ships of ships exporting refined products from the West Refinery. Because the post-Project refinery will process primarily light crude oil, a number of products associated with heavy crude oil will be reduced in quantity. At the same time, the production of some products associated with light crude oil processing will increase. The reduction or elimination of some products and increases in other products (*e.g.*, naptha and gasoline) results in a net effect of no change in marine vessel traffic associated with the Project. Overall, there will be no increase in barge shipments per month associated with the Project, and it is not reasonably foreseen that there would be a decrease in barge shipments per month associated with the Project.

4 Determination of the Project Area

Pursuant to NMFS' "Essential Fish Habitat Consultation Guidance" (April 2004), and 50 C.F.R. § 600.920(f), "consultation [under MSA] should be consolidated, where appropriate, with interagency consultation, coordination, and environmental review procedures required by other statutes, such as . . . [the Endangered Species Act]. ..." (NMFS 2004). Accordingly, this EFH Assessment adopts the concept of evaluating potential direct and indirect effects of the Project from the ESA, with the first step to determine the "Project Area" which bounds the scope of the analysis of the effects of the action.

MSA regulations include the concept of both direct and indirect adverse effects (50 C.F.R. § 600.810):

> [A]ny impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Potential contamination from deposition of air pollutants and from wastewater discharges is considered a "direct effect" to EFH according to NMFS (2004) guidance. However, pollutants delivered to aquatic ecosystems via deposition can also be considered as an indirect effect (*i.e.*, non-point source pollution). To maintain consistency with the assessment of potential direct and indirect effects in the Endangered Species Assessment Biological Evaluation (Barr Engineering 2014), the potential for atmospheric deposition of pollutants and wastewater discharge to EFH are discussed as potential indirect effects (Step Two).

4.1 Step One: Identify a Preliminary Project Area Based on Potential Direct Effects

First, FHR established a Preliminary Project Area based on the potential direct effects of the Project. The potential direct effects from the Project include the immediate potential effects of construction and operation of the Project (e.g., ground or habitat disturbance, noise, and light).

4.1.1 Ground Disturbance and Construction Activities

The locations of the majority of Project-related ground disturbance and construction activities are within the existing equipment, operations and maintenance footprint of the West Refinery (Figure 3). There will also be some ground disturbance and construction activities associated with the development of the proposed parking area (Figure 2), which is south of the main refinery operations. These areas of ground disturbance and construction are therefore included in the Preliminary Project Area for potential direct effects.

4.1.2 Noise

General construction activities related to the Project will primarily occur within the existing equipment, operations, and maintenance footprint of the West Refinery. There will be some construction activities related to the development of the proposed parking area. This parking area already has some refinery-related activities occurring on it (*e.g.*, storage of materials).

Overall, processes and operations associated with the Project are similar to existing processes and operations, and Project-related sources (new and modified) are within the existing equipment, operations, and maintenance footprint of the West Refinery. Potential types of noise and noise levels (in decibels) related to the Project operations will be similar to those from the existing process operations and maintenance activities.

The noise levels from the Project may be additive to the noise levels from the existing refinery and the nearby I-37 corridor, including the insignificant and temporary noise from constructing the proposed parking area. However, decibel levels are on a logarithmic scale such that a small incremental increase in noise related to the Project may not change the overall decibel level of noise associated with the refinery and local vehicle traffic. Moreover, noise decreases inversely with the square of the distance from the noise source, and so noise impacts diminish rapidly with distance.

Overall, the additional incremental noise from the Project is not expected to be discernible from the noise of the existing refinery or the current activities at the proposed parking area. Therefore, the Preliminary Project Area for noise is the area identified as the area encompassed by the existing West Refinery equipment, operations, and maintenance activities and the area encompassed by the proposed parking area.

4.1.3 Lighting and Visual Impacts

Lights associated with the Project will be similar to other lighting at the existing West Refinery and are not expected to be discernible from the baseline lighting.

Lighting of the parking area is expected to be similar to other nearby urban street lighting. Potential direct adverse effects from lighting are not reasonably foreseeable given the location of the proposed parking area near other sources of industrial/urban lights.

4.2 Step Two: Determine if the Preliminary Project Area Should be Expanded by Potential Indirect Effects

FHR assessed whether any potential indirect effects of the Project should cause the Preliminary Project Area to be expanded. FHR assessed two categories of potential indirect effects: (1) effects from pollutant air concentrations and potential deposition, and (2) effects related to water intake and storm water and wastewater discharges.[2]

FHR used an air dispersion modeling receptor grid for non-GHG criteria pollutants and other air contaminants extending out to 3 km (1.9 mi) from the West Refinery property boundary as the zone within which potential indirect effects were assessed (Figure 5). In our best professional judgment and experience, 3 km (1.9 mi) is a reasonable distance in which to assess potential indirect effects from air emissions because maximum modeled impacts typically occur at the property boundary and decrease relatively quickly with distance from the property boundary. No unusual circumstances are present here that would suggest going beyond the 3 km (1.9 mi) distance.

As set forth in more detail below, our analysis of potential indirect impacts within 3 km (1.9 mi) of the FHR property boundary demonstrates that the extent of the air dispersion modeling grid is more than adequate to capture discernible potential indirect effects to EFH.

4.2.1 Air Quality

The Project will result in decreases in emissions for all non-GHG PSD regulated pollutants (Table 1). Further, the Project will not result in an increase of any non-PSD pollutant regulated by Texas, with the

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[2] FHR has concluded that there will be no increase in barge shipments per month associated with the Project, and it is not reasonably foreseeable that there would be a decrease in barge shipments per month due to the Project. Accordingly, FHR does not analyze marine vessel traffic further as an additional potential indirect adverse effect of the Project.

exception of ammonia. Because the Project emission changes for these pollutants are either insignificant or negative, the Project will not result in any potential indirect adverse effects from ammonia or other non-GHG pollutants.

Nevertheless, FHR has prepared an air quality impacts assessment of the potential indirect effects of any air pollutant for which the Project will result in an increase in *allowable* emissions at any unit. FHR conducted this modeling in accordance with TCEQ minor NSR air quality modeling protocols. The results of this air quality impacts assessment show that: (1) no Significant Impact Levels (SILs) were exceeded at any model receptors outside the Preliminary Project Area boundary; and (2) there were no impacts to model receptors above Effects Screening Levels (ESLs) outside the Preliminary Project Area boundary.

In addition, FHR conducted two qualitative air quality analyses with respect to hazardous air pollutant (HAP) air emissions and the potential for nitrogen/sulfur deposition. These additional analyses support the "no adverse impact" conclusion as follows: (1) emissions from the Project are below USEPA HAP screening levels; and (2) because there is an overall reduction in emissions of NO_2 and SO_2 associated with the Project there are no adverse effects on soils or vegetation from nitrogen or sulfur emissions. Consequently, based on the SIL and ESL modeling—as further supported by the qualitative HAP analysis and nitrogen and sulfur emissions/deposition analyses—the Preliminary Project Area was not expanded to account for air quality-related indirect effects. Our detailed findings are set forth in the following subsections.

4.2.1.1 Air Dispersion Modeling for Non-GHG NSR-regulated Air Pollutants

When considering only the Project emissions, emissions expected from the Project are below the significance thresholds for CO, PM, SO_2, and H_2S (*i.e.*, the Project will not result in a significant emissions increase for these pollutants) (Table 1). When considering contemporaneous increases and decreases under the second step of the PSD applicability analysis, the Project will cause a *net* emissions *decrease* for NO_X, PM_{10}, $PM_{2.5}$, and VOC emissions. The Project will also cause a *net* emissions *decrease* for PM. A comparison of permit allowable emissions (current to future) identified a net reduction in emissions for CO, SO_2, and H_2S (Table 1). In fact, the overall Project will result in decreased emissions of non-GHG pollutants, with the exception of ammonia. Therefore, non-GHG pollutants associated with construction of new emission units and changes to existing emission units are subject only to Texas minor NSR requirements.

FHR has prepared an air quality impacts assessment of the potential indirect effects of any air pollutant for which the Project will result in an increase in allowable emissions at any unit. FHR conducted this modeling in accordance with TCEQ minor NSR air quality modeling protocols. The air modeling included receptors out to a distance of 3 km (1.9 mi) beyond the furthest extent of the FHR property boundary (Figure 5). A 25-meter (m) (82-foot [ft]) receptor spacing was used out to a distance of at least 300 m (984 ft) from each emission source at the West Refinery. This was done to help ensure that each pollutant's area of maximum impact would be captured by the dense receptor grid. Beyond this dense near field grid, receptor spacing was increased to 100 m (328 ft) out to 1 km (0.6 mi), and to 500 m (1,640 ft) from 1 km (0.6 mi) out to 3 km (1.9 mi) (Figure 5 and Figure 6). Because the receptor spacing is based on the furthest extent of the West Refinery property boundary (*e.g.,* very western, southern and eastern extent of the boundary), some portions of the grid extend out to about 6 km (3.7 mi) from the central part of the refinery where the Project emission units will be constructed or modified (Figure 5).

Modeling results for NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ indicate that all modeled air concentrations are below the respective SILs at and beyond the Preliminary Project Area boundary (Table 2). USEPA uses SILs to determine whether emission increases from a proposed project will have any more than *de minimis* impacts on the consumption of PSD increments or attainment and maintenance with a National Ambient Air Quality Standard (NAAQS).[3] Modeled emissions impacts below the respective SIL are interpreted to mean that Project emissions will also have insignificant effect on soils and vegetation per the USEPA definition and use of a SIL. These modeling results indicate that estimated emissions from the Project have insignificant impacts to air quality, soils, and vegetation according to USEPA policies regarding SILs, outside the Preliminary Project Area. Modeled air concentrations declined with distance from the Preliminary Project Area, meaning that air concentrations were well below the respective SIL at the more distant locations on the receptor grid.

[3] FHR followed the guidance in USEPA's (2013a) March 4, 2013, "Draft Guidance for $PM_{2.5}$ Permit Modeling."

Table 2 Air Dispersion Modeling Results for Non-GHG Criteria Pollutants Beyond the Preliminary Project Area

Pollutant	Averaging Time	SIL[1] (µg/m^3)	Primary NAAQS (µg/m^3)	Secondary NAAQS (µg/m^3)	Maximum Modeled Impact (µg/m^3)	Percentage of the SIL (%)
NO_2	1-hr	7.5	188	None	0.9	12.1
NO_2	Annual	1	100	100	0.14	14.4
CO	1-hr	2000	40000	None	5.22	0.26
CO	8-hr	500	10000	None	3.07	0.61
SO_2	1-hr	7.8	196	None	0.12	1.6
SO_2	3-hr	25	None	1300	0.10	0.42
PM_{10}	24-hr	5	150	150	1.12	22.4
$PM_{2.5}$	24-hr	1.2	15	15	1.12	93.4
$PM_{2.5}$	Annual	0.3	35	35	0.10	33.3

NAAQS = National Ambient Air Quality Standard

[1] Significant Impact Levels (SILs) per 40 C.F.R. §51.165(b)(2)

In addition to air dispersion modeling for criteria pollutants, FHR also conducted modeling for speciated VOC emissions, particulate metal emissions, ammonia, and polycyclic aromatic hydrocarbon (PAH) emissions associated with the Project. FHR compared those modeling results to TCEQ's acute and chronic ESLs. Results for the acute and chronic modeling are reported in Table 3 and Table 4, respectively. ESLs are screening levels used in TCEQ's air permitting process to evaluate air dispersion modeling's predicted impacts. They are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. ESLs are based on data concerning health effects, the potential for odors to be a nuisance, and effects on vegetation. They are not ambient air standards. If predicted airborne levels of a constituent do not exceed the screening level, adverse health or welfare effects are not expected. If predicted ambient levels of constituents in air exceed the screening levels, it does not necessarily indicate a problem but rather triggers a review in more depth.

None of the maximum modeled acute (1-hour) (Table 3) or chronic (Table 4) air concentrations exceed the respective ESLs at or beyond the boundary of the Preliminary Project Area. This provides additional support that the Project will have no reasonably foreseeable potential adverse effect beyond the Preliminary Project Area.

Table 3 Estimated Potential One-hour Emissions of Speciated VOCs, Particulate Metals, Ammonia and Polycyclic Aromatic Hydrocarbons (PAHs) for the West Refinery Project and Comparison of Maximum Modeled One-hour Air Concentration to Effects Screening Levels Beyond the Preliminary Project Area

Contaminant	Total Project Emission Rate (lb/hr) [1]	Estimated Max Impact (μg/m³) [2]	Short Term ESL [3] (μg/m³)	Ratio (Project Impact / ESL)	Percent of ESL (%)
1,2,4 Trimethylbenzene	1.70E-02	1.54E+01	700	0.02	2.2%
1,3 Butadiene	5.88E-04	3.27E-01	510	0.0006	0.06%
2-Methylnaphthalene	1.40E-05	1.08E-05	30	0.0000004	0.00004%
3-Methylchloranthrene	1.03E-06	7.91E-07	0.02	0.00004	0.004%
7,12-Dimethylbenz(a)anthracene	9.20E-06	7.14E-06	0.5	0.00001	0.001%
Acenaphthene	1.03E-06	7.91E-07	1	0.0000008	0.00008%
Acenaphthylene	1.03E-06	7.91E-07	1	0.0000008	0.00008%
Ammonia	3.63E+00	1.64E+00	170	0.010	1.0%
Anthracene	1.40E-06	1.08E-06	0.5	0.000002	0.0002%
Arsenic	1.15E-04	8.92E-05	3	0.00003	0.003%
Benz(a)anthracene	1.03E-06	7.91E-07	0.5	0.000002	0.0002%
Benzene	4.75E-01	1.30E+02	170	0.8	76.4%
Benzo(a)pyrene	6.90E-07	5.35E-07	0.03	0.00002	0.002%
Benzo(b)fluoranthene	1.03E-06	7.91E-07	0.5	0.000002	0.0002%
Benzo(g,h,i)perylene	6.90E-07	5.35E-07	0.5	0.000001	0.0001%
Benzo(k)fluoranthene	1.03E-06	7.91E-07	0.5	0.000002	0.0002%
Beryllium	6.90E-06	5.35E-06	0.02	0.0003	0.03%
Biphenyl	6.01E-04	5.46E-01	2.3	0.2	23.7%
Butane	6.80E-01	2.37E+02	66000	0.004	0.4%
Butenes	8.28E-03	2.60E-02	820	0.00003	0.003%
Cadmium	6.40E-04	4.98E-04	0.1	0.005	0.5%
Chromium	8.00E-04	6.12E-04	3.6	0.0002	0.02%
Chrysene	1.03E-06	7.91E-07	0.5	0.000002	0.0002%
Cobalt	4.70E-05	3.60E-05	0.2	0.0002	0.02%
Cresols	2.00E-04	1.82E-01	5	0.04	3.6%
Crude Oil	1.09E+00	1.9E+01	3500	0.005	0.5%
Cumene	8.92E-04	7.92E-01	230	0.003	0.3%
Dibenzo(a,h)anthracene	6.90E-07	5.35E-07	0.5	0.000001	0.0001%
Dichlorobenzene	6.90E-04	5.35E-04	600	0.0000009	0.00009%
Ethylbenzene	6.27E-02	1.48E+01	740	0.02	2.0%
Ethylene	6.50E-03	8.34E-01	1400	0.0006	0.06%
Fluoranthene	1.66E-06	1.29E-06	0.5	0.000003	0.0003%
Fluorene	1.53E-06	1.18E-06	10	0.0000001	0.00001%
Formaldehyde	4.21E-02	3.26E-02	15	0.002	0.2%
Gasoline	1.02E+00	3.75E+00	3500	0.001	0.1%
Hexane	2.15E+00	1.56E+02	5300	0.03	2.9%

Contaminant	Total Project Emission Rate (lb/hr) [1]	Estimated Max Impact (µg/m^3) [2]	Short Term ESL [3] (µg/m^3)	Ratio (Project Impact / ESL)	Percent of ESL (%)
Indeno(1,2,3-cd)pyrene	1.03E-06	7.91E-07	0.5	0.000002	0.0002%
Isobutane	1.92E-01	6.04E-01	23000	0.00003	0.003%
Isopentane	6.69E-02	2.10E-01	3800	0.00006	0.006%
Manganese	2.16E-04	1.66E-04	2	0.00008	0.008%
Mercury	1.41E-04	1.10E-04	0.25	0.0004	0.04%
Naphtha	0.00E+00	0.00E+00	3500	0.0	0.0%
Naphthalene	3.95E-03	3.28E+00	200	0.016	1.6%
Nickel	1.21E-03	9.32E-04	0.33	0.003	0.3%
Pentane	4.11E-02	1.29E-01	4100	0.00003	0.003%
Petroleum Distillates	3.96E+00	1.40E+03	3500	0.4	40.1%
Phenanathrene	9.80E-06	7.54E-06	0.5	0.00002	0.002%
Phenol	0.00E+00	0.00E+00	44	0.0	0.0%
Propane	4.53E-01	4.70E+01	No ESL	-	-
Propylene	1.15E-01	7.37E+01	No ESL	-	-
Pyrene	2.81E-06	2.18E-06	0.5	0.000004	0.0004%
Selenium	1.40E-05	1.08E-05	2	0.000005	0.0005%
Styrene	4.21E-03	3.82E+00	110	0.03	3.5%
Toluene	1.59E-01	6.56E+01	3470	0.02	1.9%
Xylene	1.60E-01	3.13E+01	350	0.09	8.9%

[1] All emissions data is from the ESL modeling spreadsheet file provided by Waid Environmental to Barr Engineering on October 30, 2013 and updates provided by Waid Environmental on January 28, 2014. Project emission rates (lb/hr) were calculated as the sum of each respective pollutant from each emission unit included in the air dispersion modeling (*i.e.*, Project increases were modeled and did not account for offsets or overall reductions in VOC or particulate emissions).

[2] The "Estimated Max Impact" for each contaminant was obtained from Waid Environmental (calculation spreadsheet). Each "Estimated Max Impact" was determined as follows:

- Each Project emission unit was modeled at a unit emission rate of 1 lb/hr.
- The "Estimated Max Impact" air concentration at or beyond the boundary of Preliminary Project Area for each modeled emission unit was identified in the air modeling output file and inserted into the calculation spreadsheet (this is a "unitized air concentration"; µg/m3 per lb/hr)
- Then, for each contaminant associated with an emission unit, the unitized air concentration is multiplied by the specific air contaminant emission rate (lb/hr) to derive an estimated air concentration for that contaminant from that emission unit.
- For each contaminant, the estimated air concentration from each emission unit are summed up to derive an overall estimated air

This approach assumes that each individual air concentration is occurring at the same location, when in actuality, the impacts (air concentrations) determined at a unit 1 lb/hr emission rate occurred at different locations because the emission units themselves are located at various places around the refinery. Therefore, this is a conservative approach to estimating contaminant air concentrations to compare to available ESLs.

[3] Effects Screening Levels from the Texas Commission on Environmental Quality as of February 2013. http://www.tceq.texas.gov/toxicology/esl/list_main.html

Table 4 Estimated Potential Annual Emissions of Speciated VOCs, Particulate Metals, Ammonia, and Polycyclic Aromatic Hydrocarbons (PAHs) for the West Refinery Project and Comparison of Maximum Modeled Annual Air Concentration to Effects Screening Levels Beyond the Preliminary Project Area

Contaminant	Project Emission Rate (tpy) [1]	Estimated Max Impact (µg/m^3) [2]	Long Term ESL[3] (µg/m^3)	Ratio (Project Impact / ESL)	Percent of ESL (%)
1,2,4 Trimethylbenzene	7.43E-02	3.57E-02	125	0.0003	0.03%
1,3 Butadiene	2.65E-03	2.56E-03	9.9	0.0003	0.03%
2-Methylnaphthalene	6.00E-05	4.55E-07	3	0.0000002	0.00002%
3-Methylchloranthrene	4.47E-06	3.39E-08	0.002	0.00002	0.002%
7,12-Dimethylbenz(a)anthracene	4.07E-05	3.07E-07	0.05	0.00001	0.0006%
Acenaphthene	4.47E-06	3.39E-08	0.1	0.0000003	0.00003%
Acenaphthylene	4.47E-06	3.39E-08	0.1	0.0000003	0.00003%
Ammonia	1.15E+01	5.00E-02	17	0.003	0.3%
Anthracene	6.00E-06	4.55E-08	0.05	0.0000009	0.00009%
Arsenic	5.00E-04	3.81E-06	0.067	0.0001	0.01%
Benz(a)anthracene	4.47E-06	3.39E-08	0.05	0.0000007	0.00007%
Benzene	1.57E+00	7.69E-01	4.5	0.2	17.1%
Benzo(a)pyrene	3.05E-06	2.30E-08	0.003	0.00001	0.0008%
Benzo(b)fluoranthene	4.47E-06	3.39E-08	0.05	0.0000007	0.00007%
Benzo(g,h,i)perylene	3.05E-06	2.30E-08	0.05	0.0000005	0.00005%
Benzo(k)fluoranthene	4.47E-06	3.39E-08	0.05	0.0000007	0.00007%
Beryllium	3.05E-05	2.30E-07	0.002	0.0001	0.01%
Biphenyl	2.63E-03	1.26E-03	1	0.001	0.1%
Butane	3.03E+00	1.88E+00	7200	0.0003	0.03%
Butenes	3.63E-02	3.33E-03	No ESL	-	-
Cadmium	2.80E-03	2.12E-05	0.01	0.002	0.2%
Chromium	3.56E-03	2.69E-05	0.041	0.0007	0.07%
Chrysene	4.47E-06	3.39E-08	0.05	0.0000007	0.00007%
Cobalt	2.04E-04	1.55E-06	0.02	0.00008	0.008%
Cresols	8.78E-04	4.21E-04	10	0.00004	0.004%
Crude Oil	4.78E+00	4.47E-01	350	0.001	0.1%
Cumene	3.86E-03	1.84E-03	250	0.00001	0.0007%
Dibenzo(a,h)anthracene	3.05E-06	2.30E-08	0.05	0.0000005	0.00005%
Dichlorobenzene	3.05E-03	2.30E-05	60	0.0000004	0.00004%
Ethylbenzene	7.48E-02	5.44E-02	570	0.0001	0.01%
Ethylene	2.86E-02	8.43E-03	34	0.0002	0.02%
Fluoranthene	7.30E-06	5.56E-08	0.05	0.000001	0.0001%
Fluorene	6.80E-06	5.19E-08	1	0.0000001	0.00001%
Formaldehyde	1.90E-01	1.43E-03	3.3	0.0004	0.04%
Gasoline	5.03E+00	1.18E+00	350	0.003	0.3%
Hexane	9.90E+00	1.27E+00	200	0.006	0.6%
Indeno(1,2,3-cd)pyrene	4.47E-06	3.39E-08	0.05	0.0000007	0.00007%

Contaminant	Project Emission Rate (tpy) [1]	Estimated Max Impact ($\mu g/m^3$) [2]	Long Term ESL[3] ($\mu g/m^3$)	Ratio (Project Impact / ESL)	Percent of ESL (%)
Isobutane	8.42E-01	7.75E-02	7200	0.00001	0.001%
Isopentane	2.93E-01	2.70E-02	7100	0.000004	0.0004%
Manganese	9.30E-04	7.04E-06	0.2	0.00004	0.004%
Mercury	6.30E-04	4.82E-06	0.025	0.0002	0.02%
Naphtha	0.00E+00	0.00E+00	350	0.0	0.0%
Naphthalene	1.73E-02	7.60E-03	50	0.0002	0.02%
Nickel	5.20E-03	3.91E-05	0.059	0.0007	0.07%
Pentane	1.80E-01	1.65E-02	7100	0.000002	0.0002%
Petroleum Distillates	1.34E+01	8.22E+00	350	0.02	2.3%
Phenanathrene	4.32E-05	3.26E-07	0.05	0.00001	0.0007%
Phenol	0.00E+00	0.00E+00	19	0.0	0.0%
Propane	4.47E+00	2.76E+00	No ESL	-	-
Propylene	2.92E-01	2.26E-01	No ESL	-	-
Pyrene	1.24E-05	9.42E-08	0.05	0.000002	0.0002%
Selenium	6.00E-05	4.55E-07	0.2	0.000002	0.0002%
Styrene	1.84E-02	8.85E-03	140	0.00006	0.01%
Toluene	5.55E-01	3.40E-01	1200	0.0003	0.03%
Xylene	2.62E-01	2.40E-01	180	0.001	0.1%

[1] All emissions data is from the ESL modeling spreadsheet file provided by Waid Environmental to Barr Engineering on October 30, 2013 and updates provided by Waid Environmental on January 28, 2014. Project emission rates (tpy) were calculated as the sum of each respective pollutant from each emission unit included in the air dispersion modeling (*i.e.*, Project increases were modeled and did not account for offsets or overall reductions in VOC or particulate emissions)

[2] The "Estimated Max Impact" for each contaminant was obtained from Waid Environmental (calculation spreadsheet). Each 'Estimated Max Impact" was determined as follows:
Each Project emission unit was modeled emitting at a unit emission rate of 4.38 tpy.

- The "Estimated Max Impact" air concentration at or beyond the boundary of the Preliminary Project Area for each modeled emission unit was identified in the air modeling output file and inserted into the calculation spreadsheet (this is a "unitized air concentration"; $\mu g/m^3$ per tpy).
- Then, for each contaminant associated with an emission unit, the unitized air concentration is multiplied by the specific air contaminant emission rate (tpy) to derive an estimated air concentration for that contaminant from that emission unit.
- For each contaminant, the estimated air concentration from each emission unit are summed up to derive an overall estimated air concentration (*i.e.* "Estimated Max Impact") and reported in the above table.

This approach assumes that each individual air concentration is occurring at the same location, when in actuality, the impacts (air concentrations) determined at a unit 4.38 tpy emission rate occurred at different locations because the emission units themselves are located at various places around the refinery. Therefore, this is considered a conservative approach for estimating air concentrations to compare to available ESLs.

[3] Effects Screening Levels from the Texas Commission on Environmental Quality as of February 2013. http://www.tceq.texas.gov/toxicology/esl/list_main.html

4.2.1.2 Supporting Qualitative Assessment of Hazardous Air Pollutants

HAPs include speciated VOCs (*e.g.*, benzene, toluene), polycyclic organic matter (POM; speciated as individual PAHs), and particulate metals (*e.g.*, cadmium, chromium). In addition to performing air dispersion modeling for criteria pollutants (and in the case of ozone, its VOC precursors), FHR also evaluated potential impacts from HAP emissions and other pollutants for which ESLs have been established.

4.2.1.2.1 Volatile Organic Compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAHs)

Total VOC emissions associated with the Project are estimated to decrease by about 39 tpy (Table 1). Because VOCs tend to remain in air and generally do not deposit to terrestrial or aquatic ecosystems to any great extent, and because of the overall net reduction in VOC emissions (Table 1), it is concluded that the Preliminary Project Area should not be expanded based on potential indirect effects from these pollutants.

Additionally, Table 3 (1-hour) and Table 4 (annual) provide modeling results for speciated VOC emissions and polycyclic aromatic hydrocarbon (PAH) emissions associated with the Project compared to the ESLs. The modeling included receptor locations at the Preliminary Project Area boundary and out to 3 km (1.9 mi) from the property boundary. None of the modeled air concentrations exceed the respective ESLs (Table 3and Table 4). As identified by the TCEQ, a modeled air concentration below a respective ESL indicates that no adverse impacts to health or welfare would be expected. The ESL modeling results provide additional support for the conclusion that the Preliminary Project Area should not be expanded based on potential indirect effects from these pollutants.

4.2.1.2.2 Particulate Matter and Particulate Metals

Particulate emissions associated with the Project are primarily related to combustion sources. All modeled particulate emission concentrations were below the SILs at and beyond the Preliminary Project Area boundary (Table 2). This SIL analysis not only demonstrates an overall *de minimis* impact to PM air concentrations beyond the Preliminary Project Area, but by extension the SIL analysis also demonstrates insignificant impact to soils and vegetation (USEPA 1990, Section D.II.C.). The analysis also evaluated PM metals for which there are ESLs, and the summary information in Table 3 (1-hour) and Table 4 (annual) indicate that modeled air concentrations are below the ESLs for these substances at and beyond the Preliminary Project Area boundary.

In addition to these quantitative conclusions regarding the insignificant potential indirect effects from particulate metals, FHR compared calculated annual particulate metal Project emissions increases to screening emission rates available from USEPA (1980). These USEPA screening rates were developed to assist in the evaluation of whether annual emissions would be expected to cause significant air quality impacts to soils, vegetation, and in some cases, fauna. The summary information from Table 5 indicates that Project emissions are below the lowest screening emissions rates for those metals being compared.

Taken together, these analyses support the conclusion that the Preliminary Project Area should not be expanded based on potential indirect adverse effects from these pollutants.

Table 5 Comparison of Annual Particulate Metal Emissions Estimated for the West Refinery Project to Available Screening Emission Rates

Pollutant	Emission Estimate Project Sources[1] (tons/year)	Screening Emission Rate (SER)[2] (tons/year)	Ratio (Project Emissions / screening emission rate)
Arsenic	5.00E-04	2.4E-01	0.002
Beryllium	3.05E-05	5.7E-02[3]	0.0005
Cadmium	2.80E-03	3.7E-02	0.08
Chromium	3.56E-03	1.1E+00	0.003
Cobalt	2.04E-04	1.2E+00	0.0002
Manganese	9.30E-04	3.3E-01	0.003
Nickel	5.2E-03	6.7E+01	0.00008
Selenium	6.0E-05	1.7E+00	0.00004

[1] Emission estimates provided by WAID Environmental, October 30, 2011.

[2] Lowest screening emission rate from Table 5.7 in USEPA 1980, unless otherwise noted.

[3] Screening emission rate for beryllium is from Table 5.6 in USEPA 1980.

4.2.1.3 Potential Emissions of Nitrogen and Sulfur and the Potential Adverse Effects to Soil and Vegetation

Table 1 identified that there will be net reductions of 228 tpy NO_X and 156 tpy SO_2. This means that neither NO_X nor SO_2 emissions will increase as a result of the Project, and will therefore not increase local deposition of nitrogen or sulfur.

Ammonia is not a criteria pollutant or HAP as defined in the Clean Air Act but is a pollutant of interest with regard to potential nitrogen deposition. A potential emissions increase in ammonia of 11.54 tpy was estimated for the Project. As shown in Table 6, even with a potential increase of Project-related ammonia emissions, overall decreases in NO_X result in an overall net reduction in nitrogen emissions from the facility.

Emissions of both SO_2 and H_2S emissions are estimated to decrease with the Project (Table 1). The overall decreases in SO_2 and H_2S emissions results in an overall net reduction in sulfur emissions.

Because sulfur and nitrogen have estimated reductions in emissions associated with the Project, the overall effect of the proposed Project is not to increase deposition. Therefore, the Project is not expected to have a reasonably foreseeable adverse impact to soil or vegetation from either pollutant.

An overall reduction in nitrogen and sulfur emissions associated with the Project may provide some beneficial effect within the Preliminary Project Area (and possibly beyond), but it is uncertain if there would be a *measurable* beneficial effect. Because of this uncertainty it is not reasonably foreseeable that an overall reduction in nitrogen and sulfur emissions would have a potentially beneficial indirect effect, the Preliminary Project Area should be not be expanded.

Table 6 Estimated Reduction in Overall Nitrogen Emissions Associated with the West Refinery Project

Pollutant / Speciation	Emission Estimate (tpy)	Comments
NO_X	-228	Emission reduction estimate of 228 tpy from Table 1
N (portion of N emissions from NO and NO_2 emissions)	- 97.5	Assume NO_x emissions are 75% NO and 25% NO_2. Molecular weight of N = 14 Molecular weight of O = 16 Ratio of N for NO: 14/(14+16) = 0.47 Multiply -228 tpy x 0.75 x 0.47 = -80.4 tpy of N Ratio of N for NO_2: 14 / (14+16+16) = 0.30 Multiply -228 tpy x 0.25 x 0.30 = -17.1 tpy of N Reduction in tpy of N = -80.4 + -17.1 = -97.5
NH_3	11.54	Emission increase estimated for the Project Emissions information provided by WAID Environmental.
N (portion of N emissions from NH_3 emissions)	9.5	Molecular weight of N = 14 Molecular weight of H = 1 (account for 3 Hydrogen) Ratio: 14/(14+3) = 0.82 Multiply 11.54 tpy x 0.82 = 9.5 tpy of N
"Net" N Emissions	- 88.0	"Net Emissions" = - 97.5 + 9.5 = - 88

4.2.2 Water Intake and Discharge Water Volume and Water Quality

For this report, all potential effects related to water are considered to be indirect effects. Potential effects from increased water intake, storm water discharge and wastewater discharge are discussed below.

4.2.2.1 Water Intake

The current facility uses water from both the Nueces River and the City of Corpus Christi Municipal Water Supply system. The Project is estimated to need approximately 500 gpm of water. This additional water is planned to be obtained from the City of Corpus Christi Municipal Water System. It is not reasonably foreseeable that additional water use will cause potential indirect adverse effects. Therefore, the Preliminary Project Area does not need to be expanded based on increased water intake.

4.2.2.2 Storm Water Discharge and Water Quality

Storm water associated with the Project within the existing equipment, operations, and maintenance footprint of the refinery will be managed using the existing collection and routing system at the West Refinery. Project-related storm water will be routed to either Outfall 001, Outfall 005, or Outfall 008. Runoff volume within the refinery operations area is not expected to change appreciably (potential increase of 1% to 2%) during or after Project construction because the overall area of impervious surfaces within the areas to be effected by the Project will be small (20 acres) compared to the main refinery operations area of approximately 700 acres.

Storm water routed to Outfall 001 will first be treated to remove solids, sent to the WWTP, and then discharged to the Viola Turning Basin. Storm water routed to Outfalls 005 and 008 will be treated to remove solids and then discharged into ditches which flow northward into impounded wetlands that border the FHR property. The wetlands appear to drain to the northwest and discharge to the Nueces River Tidal Segment about 3 km (1.9 mi) from the FHR outfalls and about 6 km (3.7 mi) upstream from Nueces Bay. Storm water discharged at Outfalls 005 and 008 co-mingles with other storm water from the I-37 corridor and Inner Harbor industrial areas, ambient water from within the respective wetland areas and likely storm water and/or drainage water from the dredge spoil area. It is not reasonably foreseeable that storm water from Outfalls 005 and 008 would be discernible from other storm water at the point of discharge into the Nueces River. Therefore, even though there may be a small volume increase in storm water it is not reasonably foreseeable that Project-related storm water from this portion of the Preliminary Project Area will cause potential indirect adverse effects.

For the proposed parking area to the south of the main refinery operations (Figure 2), the terrain is relatively flat and storm water is managed as urban runoff and routed to nearby ditches. The location is a previously disturbed, partially grassy area (a former school site), from which storm water is conducted through the municipal storm water management system. Soils are predominantly clay, with surface features including overgrown asphalt, a former parking area, and a former running track. There may be an increase in runoff from the site as the parking area is constructed, although it is uncertain as to the magnitude of the potential change given the current site conditions. The parking area will likely be more than one acre in size and will require a construction permit and a storm water pollution prevention plan (SWP3) to be developed and implemented. Best management practices will be implemented and the runoff water will continue to be considered urban runoff and routed to the existing ditching system.

Because the majority of the storm water associated with the Project is from within the existing equipment, operations, and maintenance footprint of the refinery, water quality of the storm water associated with the Project will be similar to the storm water quality from the existing West Refinery. Storm water from the Project, including the proposed parking area, and from the existing West Refinery is expected to have chemistry and temperature similar to urban runoff and therefore does not typically require treatment beyond the removal of solids. The chemistry of storm water from the FHR facility and the proposed parking area to the south of the main refinery operations is not expected to change due to the Project and it is not reasonably foreseeable that it will cause potential indirect adverse effects.

The overall conclusion is that the Preliminary Project Area does not need to be expanded to include the receiving water at the permitted TPDES discharge locations for storm water. The Preliminary Project Area will, however, be expanded in accordance with USEPA's request to include points noting the locations of Outfalls 001, 005, and 008 for the purpose of identifying the storm water discharge outfalls.

4.2.3 Process Wastewater Discharge and Water Quality

Process wastewater from the Project sources will be routed to the WWTP and then to TPDES permitted Outfall 001, located in the Viola Turning Basin, which forms the west end of the Port of Corpus Christi Inner Harbor. FHR conducted an analysis of the potential indirect effects of process wastewater discharges on water quality from Outfall 001.

The current facility is permitted to discharge storm water and wastewater from Outfall 001. The maximum permitted discharge is 6.7 million gpd (approximately 4,650 gpm) while the allowed daily average is 5.3 million gpd (approximately 3,680 gpm). The annual average discharge rate from Outfall 001 is approximately 2,300 gpm based on 2011 data. It is conservatively estimated that the Project will increase wastewater discharge by 150 gpm; about a 6% increase from the average annual discharge volume. The Project's potential effect on the actual volume of wastewater to be discharged is small and is within the permitted limit.

The current TPDES permit (FHR, Corpus West Permit No. WQ0000531) includes authorization for the specific discharge of pollutants and limits the concentrations of specific pollutants and water quality parameters for Outfall 001 (e.g., total suspended solids) (Table 7). Table 7 provides a comparison of potential incremental changes in average parameter concentrations associated with the Project to the Average Base Case concentrations that are estimated from the average daily flow and the average parameter concentrations associated with the annual average flow. Eight of the parameters are shown to have a decrease in concentration or no change, while the remaining twelve parameters show a small increase in concentration. The potential increases in concentrations are generally less than 5% of the Average Base Case concentrations. The highest estimated changes in concentration are 8% for aluminum and 7% for silica (as SiO_2).

Table 8 provides an estimate of potential incremental parameter loading at Outfall 001 from the Project compared to an estimated High Base Case loading that is estimated from the maximum daily permitted flow and the average parameter concentrations associated with annual average flow for the Average Base Case (see Table 7 for concentrations). Estimates of mass loading at Outfall 001 indicate the Project has a small potential increase in loading. All estimates of incremental parameter loads are less than 10% of the estimated High Base Case loads and less than 1% of existing background loads to the Viola Turning Basin (Table 8).

TCEQ's Water Quality Division has issued procedures for implementing State water quality standards, which include guidelines for evaluating the potential for water quality degradation (TCEQ 2010). The guidelines call for an initial screening "to determine whether sufficient potential for degradation exists to require further analysis" (*Id.* at 63). Applying this screen allows one to decide that "an increase in loading is small enough to preclude the need for additional evaluation" (*Id.*).

For existing discharges, a potential increase that is less than 10% of an existing permitted loading is ". . . usually not considered to constitute potential degradation if (1) the increase will attain all water quality standards, (2) the aquatic ecosystem in the area is not unusually sensitive to the pollutant of concern, and (3) the discharge is not relatively large . . . ." (*Id.*). The discussion below evaluates potential incremental changes in parameter concentrations and loading due to the Project against these three criteria.

- **Attainment of water quality standards.** As shown in Table 7, all potential changes in parameter concentrations will meet water quality standards.

- **Sensitivity of the aquatic ecosystem.** The Corpus Christi Inner Harbor, which includes the Viola Turning Basin, is classified as an estuary (TCEQ designation for Segment No. 2484). Primary water quality concerns for screening levels are nutrient enrichment related to ammonia, chlorophyll-a, and nitrate (TCEQ 2012a). Recent sampling of receiving waters for nutrients and metals indicate no exceedances of screening levels for metals. There were exceedances of the ammonia and nitrate screening levels (TCEQ 2012a), but the available data from TCEQ (2012a) indicates there has been no exceedance of any water quality standard. Given that all potential changes in parameter concentrations will achieve compliance with water quality standards, and because recent sampling data for the Inner Harbor demonstrate no exceedance of levels of concern for metals, the sensitivity of the aquatic ecosystem to a potential small incremental addition of the listed parameters from the West Refinery is judged to be low.

- **Relative size of discharge.** Parameter loading due to the Project will represent a very small incremental increase relative to the cumulative loadings from all discharges to the Inner Harbor. In the absence of detailed data on parameter loading from other permitted discharges, permitted flows may serve as a surrogate for assessing the relative size of the additional loading due to the Project. Available information from the Nueces River Authority (NRA 2010) indicates there are 18 facilities permitted to discharge to the Inner Harbor (segment 2484), including the City of Corpus Christi Broadway wastewater treatment plant. Permitted wastewater discharge volumes range from 320,000 gpd to 20,000,000 gpd, and the estimated total for all discharges is 55,000,000 gpd. In comparison, the maximum permitted discharge from the West Refinery is 6,700,000 gpd, and the incremental increase from the Project is about 216,000 gpd or approximately 0.4% of all permitted discharges to the Inner Harbor. The incremental wastewater discharge from the Project is very small compared to existing permitted discharges to the Inner Harbor.

When using the non-degradation criteria (TCEQ 2010), the small potential increase in loading from the Project compared to the High Base Case scenario and current background loading is not considered to constitute degradation and is expected to have no adverse effect on aquatic receptors.

Whole effluent toxicity (WET) tests are required to be conducted for Outfall 001 and the No Observed Effect Concentration for survival reported (TPDES Permit No. WQ00000531000). Acute WET tests (24-hour) estimate the "end of pipe" effluent conditions on sensitive biota without any dilution considerations while chronic WET tests (7-day) estimate the effects of effluent on sensitive biota when dilution is taken into consideration. WET test data for acute toxicity from 2012 and 2013 show that percent survival of opossum shrimp (Mysid shrimp, *Mysodopsis bahia*) and inland silverside (minnow *Menidia beryllina*) in 100% effluent was essentially the same as the percent survival in the control solution (*i.e.*, receiving water, Viola Turning Basin) (FHR 2012a,b; FHR 2013b,c). Data from 2012 and 2013 for chronic tests show that percent survival and reproduction of opossum shrimp and inland silverside were in compliance with permit requirements (FHR 2012c,d,e,f; FHR 2013d,e,f). Based on the acute and chronic WET test results, the effluent discharged at Outfall 001 is not toxic and is not expected to cause harm to aquatic life in the receiving water. Because the relatively small additional wastewater discharges associated with the Project are similar in chemistry to the existing wastewater (Table 7), the Project is not expected to have an adverse effect on the acute or chronic toxicity of the wastewater discharged from Outfall 001 and therefore constitutes no change from existing conditions.

The potential increase in temperature of the discharge at Outfall 001also was evaluated. Modeling indicates a potential relative increase of up to 2°F for the post-Project wastewater discharge from Outfall 001or about a 3% increase. This potential increase is within the variability of the existing effluent temperature. When the discharge water is allowed to mix in the Outfall 001 mixing zone (200-foot mixing zone as defined in TPDES Permit No. WQ 0000531000), the increase in temperature of the surface water is expected to be below the maximum allowed change of 1.5°F in June, July, and August and the maximum allowed change of 4°F from September to May (TCEQ 2012b). Therefore, the Project is not expected to have an adverse effect on the receiving water temperature in the mixing zone of Outfall 001.

Conclusion. Overall, with an estimated increase in wastewater discharge volume of approximately 150 gpm (approximately 216,000 gpd), and a very small associated increase in chemical load for some parameters, the percent increase in potential loading for each chemical is not a significant increase when compared to the estimated High Base Case load and background load. The increase in chemical load does not degrade water quality according to TCEQ criteria (2010). The acute and chronic WET test results for Outfall 001 indicate the current discharges are not toxic to aquatic life, and because the additional water discharges from the Project are relatively small and similar in chemistry to the existing wastewater, the Project is not expected to have an adverse effect on aquatic life. The potential increase in temperature of the wastewater discharge also is estimated to be small (a potential relative change of about 2 °F for the wastewater discharge and less than a 2°F increase in the mixing zone of Outfall 001), and is within water quality standards. Based on the small potential increase in chemical loading and temperature from the Project, no reasonably foreseeable adverse effects are expected from the Project's wastewater discharge. Nevertheless, the Preliminary Project Area is expanded at USEPA's request to include the point identifying the location of Outfall 001 and the 200-foot regulatory mixing zone because of the estimated small increase in wastewater discharges and associated changes in parameter concentrations and loadings.

Table 7 Wastewater Modeling Results for Outfall 001 and the Potential Incremental Change in Chemical Concentrations Due to the Project Compared to the Average Base Case Scenario and Background in the Viola Turning Basin

Parameter	Permitted Daily Average or Water Quality Based Effluent Limit	Permitted Daily Maximum or Water Quality Based Effluent Limit	Average Base Case (Conc. at Annual Average Flow)	Average Base Case + Project (Conc. for Project at Potential Flow)	Change due to Project (Incremental Increase or Decrease)	Change due to Project (Incremental Conc. Change compared to Average Base Case)	Existing Viola Turning Basin (Total Background Conc. From 2000 to Current) [2]	Texas Water Quality Standards, Criteria or Screening Level (SL) [3]
Flow (gallons per day)	5,300,000	6,700,000						
Flow (gallons per minute, gpm)	3,681	4,653	2,306	2451	146	6.3%		
Concentration (mg/L)								
Alkalinity (M-)			211.4	201.1	-10.3	-4.9%	132.1	--
Aluminum			0.13	0.14	0.01	7.7%	0.16	--
Ammonia Nitrogen (NH_3-N)	9							--
Ammonia (as NH_3)			0.48	0.47	-0.01	-2.1%	0.17	0.0001 (SL)
Barium			0.35	0.37	0.02	5.7%		2.0, dissolved
Boron			0.66	0.69	0.03	4.5%		--
Calcium			130.4	139.0	8.6	6.6%	340.6	--
Chloride			663.3	686	22.7	3.4%		--
Chromium, total								
Chromium, hexavalent								0.062, dissolved
Copper, total								0.004, dissolved
Fluoride			0.1	0.09	-0.01	-10.0%	0.96	4.0
Magnesium)			36.9	38.2	1.3	3.5%	1,015.6	--
Manganese			0.08	0.08	0	0.0%	0.02	--

Parameter	Permitted Daily Average or Water Quality Based Effluent Limit	Permitted Daily Maximum or Water Quality Based Effluent Limit	Average Base Case (Conc. at Annual Average Flow)	Average Base Case + Project (Conc. for Project at Potential Flow)	Change due to Project (Incremental Increase or Decrease)	Change due to Project (Incremental Conc. Change compared to Average Base Case)	Existing Viola Turning Basin (Total Background Conc. From 2000 to Current) [2]	Texas Water Quality Standards, Criteria or Screening Level (SL) [3]
Nitrate (as N) [1]			4.23	4.40	0.17	4.1%	0.58	10.0 0.00017 (SL)
Phenolic compounds								--
Potassium			30.2	31.3	1.1	3.6%	227.5, dissolved	--
Silica (as SiO_2)			50.8	54.4	3.6	7.1%		--
Sodium			728.8	728.4	-0.4	-0.1%	9222.0	--
Sulfate			922.8	926.6	3.8	0.4%	2602.4	
Sulfide (as S)								
Strontium			1.10	1.15	0.05	4.5%		
Total Dissolved Solids			2791.2	2817.6	26.4	0.9%		
Total Suspended Solids (TSS)								
Zinc	0.251 [4]	0.530 [4]	0.22	0.22	0	0.0%	0.009	0.08, dissolved
Carbonate (as CO_3^{-2})			8.87	8.41	-0.46	-5.2%	132.1	
Bicarbonate (as HCO_3^-)			239.7	228.1	-11.6	-4.8%		

Results from Wastewater Modeling conducted for Outfall 001; wastewater modeling conducted for total concentrations

[1] Nitrate concentrations converted from nitrate basis to nitrogen basis for direct comparison with water quality standards and Viola Turning Basin background concentration by Barr Engineering Co. on 1-10-2013.

[2] Viola Turning Basin background concentration obtained from Station ID 13439 on TCEQ Surface Water Quality Web Reporting website.

[3] Texas Water Quality Standards values obtained from Table 1 and Table 2 of Chapter 307 – Texas Surface Water Quality Standards.

[4] Calculated using daily average and daily maximum water quality based effluent limit for zinc per TPDES Permit No. WQ000053-1000.

Table 8 Wastewater Modeling Results for Outfall 001 and the Potential Incremental Change in Chemical Loads due to the Project Compared to Estimated Average and High Base Case Loads

Parameter	Permitted Daily Average or Load Estimate Using Water Quality Based Effluent Limit	Permitted Daily Maximum or Load Estimate Using Water Quality Based Effluent Limit	High Base Case Load [1, 2, 3] (Permitted Daily Max Flow and Average Base Case Total conc.) (mg/day)	Average Base Case Load [1, 2, 3] (Annual Average Flow) (mg/day)	Average Base Case + Project Load (Project at Potential Flow) (mg/day)	Change due to Project (Incremental increase or Decrease) (mg/day)	Change due to Project (Incremental Change in Load as % of Estimated High Base Case Load)	Existing Background Viola Turning Basin Load (Total Conc. From 2000-Current x Volume of Basin) [5, 6] (mg/day)	Incremental Change in Load due to Project as % of Viola Turning Basin Load
Flow (gallons per day)	5,300,000	6,700,000							
Flow (gallons per minute, gpm)	3,681	4,653	4,653	2,306	2451	146	3.1%		
	Loading (mg/day) [4]	Loading (mg/day) [4]							
Alkalinity (M-)			5.366E+09	2.659E+09	2.690E+09	3.029E+07	0.6%	3.010E+11	0.01%
Aluminum			3.300E+06	1.635E+06	1.872E+06	2.371E+05	7.2%	3.658E+08	0.06%
Ammonia Nitrogen (NH_3-N)	1.103E+08	1.839E+08							
Ammonia (as NH_3)			1.218E+07	6.038E+06	6.286E+06	2.478E+05	2.0%		
Barium			8.885E+06	4.403E+06	4.948E+06	5.457E+05	6.1%		
Boron			1.675E+07	8.302E+06	9.228E+06	9.259E+05	5.5%		
Calcium			3.310E+09	1.640E+09	1.859E+09	2.187E+08	6.6%	7.762E+11	0.03%
Chloride			1.684E+10	8.344E+09	9.175E+09	8.309E+08	4.9%		
Chromium, total	5.675E+06	1.607E+07							
Chromium, hexavalent	4.812E+05	1.071E+06							
Copper, total									
Fluoride			2.538E+06	1.258E+06	1.204E+06	-5.425E+04	-2.1%	2.194E+09	0.00%
Magnesium			9.367E+08	4.642E+08	5.109E+08	4.672E+07	5.0%	2.314E+12	0.00%
Manganese			2.031E+06	1.006E+06	1.070E+06	6.359E+04	3.1%	3.715E+07	0.17%
Nitrate (as N)			1.073E+08	5.317E+07	5.883E+07	5.655E+06	5.3%	1.329E+09	0.43%
Phenolic compounds	3.768E+06	7.809E+06							
Potassium			7.666E+08	3.799E+08	4.186E+08	3.872E+07	5.1%	1.02E+12	0.00%
Silica (as SiO_2)			1.290E+09	6.390E+08	7.276E+08	8.853E+07	6.9%		
Sodium			1.850E+10	9.168E+09	9.742E+09	5.740E+08	3.1%	2.097E+13	0.00%
Sulfate			2.342E+10	1.161E+10	1.239E+10	7.844E+08	3.3%	5.929E+12	0.01%
Sulfide (as S)	2.906E+06	6.447E+06							
Strontium			2.792E+07	1.384E+07	1.538E+07	1.543E+06	5.5%		

Parameter	Permitted Daily Average or Load Estimate Using Water Quality Based Effluent Limit	Permitted Daily Maximum or Load Estimate Using Water Quality Based Effluent Limit	High Base Case Load [1, 2, 3] (Permitted Daily Max Flow and Average Base Case Total conc.) (mg/day)	Average Base Case Load [1, 2, 3] (Annual Average Flow) (mg/day)	Average Base Case + Project Load (Project at Potential Flow) (mg/day)	Change due to Project (Incremental Increase or Decrease) (mg/day)	Change due to Project (Incremental Change in Load as % of Estimated High Base Case Load)	Existing Background Viola Turning Basin Load (Total Conc. From 2000-Current x Volume of Basin) [5, 6] (mg/day)	Incremental Change in Load due to Project as % of Viola Turning Basin Load
Total Dissolved Solids			7.085E+10	3.511E+10	3.768E+10	2.572E+09	3.6%		
Total Suspended Solids (TSS)	4.685E+08	7.400E+08							
Zinc	7.258E+08 [7]	1.937E+10 [8]	5.585E+06	2.767E+06	2.942E+06	1.749E+05	3.1%	2.12E+07	0.83%
Carbonate (asCO_3^{-2})			2.252E+08	1.116E+08	1.125E+08	8.986E+05	0.4%		
Bicarbonate (as HCO_3^-)			6.085E+09	3.015E+09	3.051E+09	3.540E+07	0.6%		

Average Base Case and "Average Base Case + Project" Results from Wastewater Modeling for Outfall 001[1]

]1] Parameter concentrations from Table 7

]2] Factors in equations gpm to cubic feet per second =0.00223 Liters per cubic feet =28.31625 Seconds per day =86400

]3] Convert Flow in million gallons per day to gallons per minute: hour per day =24 hours per minute =0.01666667

[4] Loading estimate from the NPDES Permit:

Convert daily average load in pounds/day to mg/day: grams per pound =454 milligrams per gram =1000

[5] Viola Turning Basin background concentration obtained from Station ID 13439 on TCEQ Surface Water Quality Web Reporting website.

[6] Viola Turning Basin Load determined by multiplying the calculated Viola Turning Basin Volume by total background concentration.

Viola Turning Basin Volume determined by assuming a circular cylinder shape with a diameter of 460 m and depth of 13.7 m.

[7] Estimated Daily Average Zinc Load determined by multiplying daily average water quality based effluent limit for dissolved zinc and TPDES Permit Daily Average Discharge Rate.

[8] Estimated Daily Maximum Zinc Load determined by multiplying daily maximum water quality based effluent limit for dissolved zinc and TPDES Permit Daily Maximum Discharge Flow Rate.

4.3 Step Three: Define the Final Project Area

Based on the foregoing steps, FHR defines the final Project Area as the area within the West Refinery property boundary that is encompassed by the existing equipment, operations, and maintenance areas of the West Refinery and the proposed parking area to the south of the refinery (Figure 3). Additionally, at the request of USEPA, the Project Area also includes as points the specific outfall locations expected to receive storm water (Outfalls 005 and 008) and both storm water and process wastewater (Outfall 001) related to the Project. USEPA also requested the 200-foot regulatory mixing zone for Outfall 001 be included in the Project Area because of the small potential increase in discharge volume and potential changes in parameter concentrations and loading.

Other factors that were evaluated but do not expand the Project Area include the following:

- The current facility uses water from both the Nueces River and the City of Corpus Christi Municipal Water Supply system. It is not reasonably foreseeable that additional water use will cause potential indirect adverse effects. Therefore, the Preliminary Project Area does not need to be expanded based on increased water intake.

- The additional incremental increase and storm water discharge volume related to the Project was found to be small and is not expected to have any adverse effects on potential ecological receptors.

- The air dispersion modeling results demonstrate that all air concentrations at the Preliminary Project Area boundary and out to the edge of the receptor grid are less than the SILs and the ESLs. Modeling below the respective SIL and ESL at and beyond the Preliminary Project Area boundary indicates a very small area for potential indirect impacts from air emissions. Additional qualitative analyses of HAP and nitrogen/sulfur deposition support this conclusion. Accordingly, ground level receptors beyond the Preliminary Project Area are not included in the Project Area.

Overall, FHR determined that in the absence of air quality- and water quality-related indirect effects beyond the Preliminary Project Area, the final Project Area should include only the Preliminary Project Area that bounds potential direct effects, the three points identifying the locations of Outfalls 001, 005, and 008, and the regulatory mixing zone for Outfall 001.

5 Environmental Setting and Resource Inventory

5.1 General Description

The Project is located within Nueces County, Texas, at the far west end of the Corpus Christi Inner Harbor. The Inner Harbor includes many large industrial developments, dredge disposal areas, a railway system and the industrial ship channel. Two of the active dredge disposal areas are within 100 m (330 ft) east and north/northwest of the refinery.

Population around the West Refinery is generally located to the south of the I-37 corridor and is approximately 2,000 to 6,000 persons per census tract (USDOT 2013). Approximately 305,000 persons are estimated to reside in the City of Corpus Christi and approximately 340,000 persons in Nueces County (US Census 2010).

5.1.1 Land Use

The Project is located within the Western Gulf Coast Plains ecoregion recognized for its mild and humid climate, with hot summers and mild winters. Flat coastal plains, barrier islands, dunes, beaches, bays, estuaries, and tidal marshes characterize the ecoregion (USEPA 2012; Griffith et al. 2007).

The area surrounding the West Refinery includes the Inner Harbor to the north and the I-37 corridor to the south. East and west of the West Refinery are similar industrial land uses. The closest residential land use is south of the I-37 corridor.

The National Land Cover Data (NLCD) for the land surrounding the West Refinery identifies it as primarily "Developed Medium Intensity" and "Developed High Intensity Developed". North of the I-37 corridor are areas of "Barren Land" and "Open Water" associated with Nueces River, the Inner Harbor, and Nueces Bay. "Emergent Herbaceous Wetlands" associated with the open water areas are also recognized. Minor areas of "Shrub/Scrub" with even more minor areas of "Deciduous Forest" occur within the area north of the I-37 corridor. South of the I-37 corridor are areas of "Developed Low Intensity" and "Developed Medium Intensity". The developed land transitions into an area predominantly characterized by "Cultivated Crops." Refer to Figure 7 for a complete map of the NLCD 2006 landcover data.

5.1.2 Climate

Based on weather records provided by the City of Corpus Christi, the average annual temperature is 71°F with average relative humidity at 61%. Prevailing winds are from the southeast. Average rainfall amount is 32 to 33 inches per year (Climate Zone 2013).

5.1.3 Topography

The land area surrounding the West Refinery is within the Annaville (TX) 1:24,000 topographic quadrangle and is generally on level terrain about 15 m (50 ft) above sea level (USGS 2010).

5.1.4 Geology

According to the U.S. Geological Service, the underlying geology is Quaternary-aged Beaumont Formation composed of clay, silt, sand, and gravel deposited along waterways within the past 2.6 million years (BEG 1992).

5.1.5 Soils

According to the U.S. Department of Agriculture Soil Conservation Service (2009), the area around the West Refinery includes several different soil categories. Table 9 summarizes soils information for the area within 3 km (1.9 mi) of the Project.

Table 9 Soil Type Information (within 3 km of the Project)

Series	Acres	Percent of Total
Aransas clay, saline	1,424	10.6
Barrada-Tatton association	1,743	13.0
Clareville loam, 0 to 1 percent slopes	175	1.3
Comitas fine sand	747	5.6
Edroy clay	23	0.2
Edroy clay, 0 to 1 percent slopes, ponded	11	0.1
Galveston and Mustang fine sands	339	2.5
Ijam clay loam	33	0.2
Miguel fine sandy loam, 0 to 1 percent slopes	169	1.3
Miguel fine sandy loam, 1 to 3 percent slopes	161	1.2
Miguel fine sandy loam, 3 to 5 percent slopes	267	2.0
Monteola clay, eroded	345	2.6
Oil-waste land	392	2.9
Orelia fine sandy loam	741	5.5
Pits	25	0.2
Point Isabel clay	63	0.5
Raymondville complex, 0 to 1 percent slopes	215	1.6
Raymondville complex, 1 to 3 percent slopes	223	1.7
Raymondville complex, 3 to 5 percent slopes	10	0.1
Tidal flats	811	6.0
Victoria clay, 0 to 1 percent slopes	3,707	27.5
Victoria clay, 1 to 3 percent slopes	115	0.9
Victoria clay, low	75	0.6
Water	1,568	11.6
Willacy fine sandy loam, 1 to 4 percent slopes	84	0.6
Totals	**13,466**	**100[1]**

[1] – does not sum to 100% due to independent rounding

5.1.6 Water Resources

Immediately north of the Project Area (within about 100 m [330ft]) is the Viola Turning Basin which is the western-most end of the Corpus Christi Inner Harbor. The Inner Harbor is a man-made feature constructed by the US Army Corp of Engineers. Construction began in 1925, and the Inner Harbor opened to shipping in 1926. Over time, the Inner Harbor channel has been widened and deepened: it is now dredged to a depth of about 14 m (45 ft). Dredging of the Inner Harbor, including the Viola Turning Basin, is conducted about every 10 years by the USACE. Available records indicate the Inner Harbor is planned to be dredged in the 2013/2014 calendar years. The Inner Harbor was last dredged in 2003 (the Industrial Canal through the Viola Turning Basin) (USACE 2013). A search of available information from the USACE and the Port of Corpus Christi did not identify any records of maintenance dredging specifically for Oil Dock #8. The Port of Corpus Christi is the fifth busiest port in the United States, by tonnage, serving over 6,000 vessels in 2012 (Port of Corpus Christi 2013b).

The Viola Turning Basin is considered a tidally influenced open water estuary habitat. Outfall 001 is located about 27 m (90 ft) to the east of the Port of Corpus Christi Dock #8, at a point where the water is approximately 0.6 to 1.2 m (2 to 4 ft) deep. The water depth increases quickly to accommodate ship and barge traffic within about 15 m (50 ft) of the outfall structure. No vegetation was observed within the aquatic habitat near the outfall structure. The shoreline is currently a concrete wall. While the Viola Turning Basin provides an open water habitat, periodic channel dredging likely limits the growth of aquatic vegetation and creates a relatively steep-sided water body in order for barges and ships to effectively utilize the existing docks. In the vicinity of Outfall 001, the littoral area is limited to essentially the area immediately adjacent to the shoreline.

Just north of the Inner Harbor, extending from the northwest, is the Nueces River. A thin strip of land separates the Inner Harbor from the Nueces River. The nearest stretch of the Nueces River is approximately 300 m (1000 ft) to the north of the FHR property boundary. The Nueces River flows into Nueces Bay. The nearest portion of Nueces Bay is approximately 1.4 km (0.9 mi) to the northeast of the Project Area. Nueces Bay then connects to Corpus Christi Bay, a bay just off of the Gulf of Mexico.

Outfalls 005 and 008 are within the FHR property boundary, west/southwest of the Viola Turning Basin, and approximately 0.8 km (0.5 mi) from the closest part of the Nueces River. Storm water discharged at Outfalls 005 and 008 flows through ditches to a narrow wetland/open water area that skirts the southern edge of the Suntide Dredge Material Placement Area. The wetland/open water area appears to drain to the northwest and discharge to the Nueces River approximately 3 km (1.9 mi) to the northwest of Outfalls 005 and 008 and approximately 6 km (3.7 mi) upstream from Nueces Bay. The ditches on FHR's property provide no EFH as they are narrow man-made channels that are periodically maintained. The quality of the EFH provided by the wetland areas to the north of the FHR property is uncertain as they are considered to be impounded and are not directly connected to tidally influenced waters.

The National Wetlands Inventory (NWI) mapping indicates significant tidally influenced estuarine emergent wetlands associated along the western portion of Nueces Bay and the Nueces River Tidal Segment (TPWD 2000) that includes the stretch of the Nueces River approximately 300 m (1000 ft) to the north of the FHR property boundary. Additional minor palustrine emergent wetlands are indicated by NWI mapping associated with the Nueces River Delta 300 to 400 m (1,000 to 1,300 ft) north of the FHR property boundary, on the north side of the Nueces River, and with Tule Lake approximately 1.4 km (0.9 mi) to the east of the Project Area. These brackish marshes associated with the Nueces Delta are typically comprised of a variety of saline tolerant vegetation.

5.1.7 Vegetation

The Project is in an ecoregion typified by flat topography and native grassland vegetation that includes little bluestem (*Schizachyrium scoparium*), yellow Indiangrass (*Sorghastrum nutans*), tall dropseed (*Sporobolus asper*); and invasive species that include honey mesquite (*Prosopis glandulosa*), huisache (*Acacia smallii*), blackbrush (*Acacia rigidula*), and granjeno (*Celtis pallida*) (USEPA 2012).

Most of the regional native coastal prairie is now pastureland, cropland, or residential, urban, commercial, and industrial development. Primary crops in this coastal region include rice, grain, sorghum, cotton, and soybeans, and approximately 40% of the ecoregion to the south and southwest of the West Refinery have been classified as Prime Farm Lands (USDA 2009).

While the Project is located within the Western Gulf Coast Plains ecoregion, the Project Area is highly disturbed from past and current industrial activity, with minimal areas of vegetation (minimal acreage vegetated in the northwest and southeast portions of the facility footprint near the edges of the Project Area) and minimal areas of aquatic vegetation in the Viola Turning Basin due to periodic dredging.

For Outfall 005, vegetation around the storm water drainage included mesquite, retama, huajillo (*Havardia pallens*), and mustang grape (*Vitis mustangensis*). Vegetation around Outfall 005 included Jesuit's bark (*Iva frutescens*) and mesquite. Vegetation around Outfall 008 and in the nearby shrub wetland included Jesuit's bark, eastern baccharis, and wax myrtle (*Morella cerifera*). Minimal aquatic vegetation is associated with the drainage ditches at Outfalls 005 and 008.

5.2 EFH and Fishery Management Units

5.2.1 Initial Federal Agency Contacts

FHR staff was designated as non-federal representatives by USEPA Region 6 for consultations related to this EFH Assessment (USEPA 2013b). FHR contacted the NOAA Fisheries Southeast Regional Office (FHR 2013g) to provide Project information and initiate the informal consultation process. No specific concerns about the Project's potential effects to EFH were raised by NMFS during this initial consultation. Because there are no areas of concern for EFH near the Project and the assessment results indicated no adverse effects to EFH, NMFS staff identified that they would not need consultation for the Project and that FHR should retain the record of the assessment for future review if needed.

5.2.2 Identification of EFH and Fishery Management Units

An EFH is defined as "those waters and substrate necessary to fish spawning, breeding, feeding, or growth and maturity," Within estuaries, EFH is further defined as "all waters and substrates (mud, sand, shell, rock, and associated biological communities) within these estuarine boundaries, including the subtidal vegetation (sea grasses and algae) and adjacent tidal vegetation (marshes and mangroves)" (GMFMC 1998).

Outfalls 001, 005, and 008 discharge into EFH for five fishery management units (FMU) [4] (NOAA 2012). These five fishery management units are described in (Table 10). Specifically, the Viola Turning Basin in the Corpus Christi Inner Harbor will receive discharges from Outfall 001, and Nueces River Tidal Segment No. 2101 will receive discharges from Outfalls 005 and 008. No EFH is located within the remainder of the Project Area.

The five FMU with EFH within the Project Area include four species of Shark, Red Drum, four species of Shrimp, Coastal Migratory Pelagics (*e.g.*, king mackerel), and Reef Fish. The locations of these EFH in relation to the Project are set forth in Figure 4.

Table 10 Essential Fish Habitat in the Lower Nueces River Tidal Segment and the Viola Turning Basin

Species/Management Unit [1]	Lifestage(s) Found at Location	Fisheries Management Plan (FMP)
Shark species: Bull Spinner Scalloped Hammerhead Atlantis Sharpnose	Neonate, Juvenile	Highly Migratory Species (HMS)
Red Drum	All stages	Red Drum
Shrimp (4 species)	All stages	Shrimp
Coastal Migratory Pelagics (CMP)	All stages	Coastal Migratory Pelagics
Reef Fish (43 species)	All stages	Reef Fish

[1] Species identified in the western portion of Nueces Bay and near the Nueces River Delta by the NOAA Essential Fish Habitat Mapper; accessed online November 8, 2012

[4] A "fishery management unit" is considered to be one or more stocks of fish than can be treated as a unit for purposes of conservation and management. *See* MSA § 3(13) (definition of "fishery").

5.2.3 Description of Managed Species

Sharks

Sharks are highly mobile species and are widely dispersed in oceanic, neritic (waters over the continental shelf), coastal, and estuarine waters (NMFS 2009). They frequently swim great distances, and also migrate vertically within the water column.

Four species of shark are included in this management unit (Bull, Spinner, Scalloped Hammerhead, and Atlantis Sharpnose). Sharks display complex habitat use that varies with ontogenetic development. In general, current designations of EFHs for sharks are based on life history information, expert opinion regarding the importance of certain areas, and a combination of presence/absence and relative abundance information from fishery independent and dependent sources, analyzed using Geographic Information System (GIS) technology. EFH typically include the nearshore zone for neonates and early juveniles and out to 40 to 80 km (25 to 50 mi) from shore and to depths of 200 m (650 ft) or more for adults (NMFS 2009; Chapter 5). Refer to Appendix A for specific descriptions of shark species.

Red Drum

According to the Texas Parks and Wildlife Department 2012 Red Drum Fact Sheet (TPWD 2012):

> For the first three years of their lives red drum live in the bays or in the surf zone near passes. Evidence from tag returns shows that they remain in the same area and generally move less than 5 km (3 mi) from where they were tagged. As red drum mature, they move from the bays to the Gulf of Mexico where they remain the rest of their lives, except for infrequent visits to the bays. Although there is little evidence of seasonal migrations, anglers find concentrations of red drum in rivers and tidal creeks during the winter. Daily movement from the shallows to deeper waters is influenced by tides and water temperatures. During the fall, especially during stormy weather, large adult red drum move to the Gulf of Mexico beaches, possibly for spawning, where they can be caught from piers and by surf anglers. This is known as the "bull redfish run."
>
> Young red drum feed on small crabs, shrimp, and marine worms. As they grow older, they feed on larger crabs, shrimp, and small fish. They generally are bottom feeders but will feed in the water column when the opportunity arises. A phenomenon called "tailing" occurs when the red drum feed in shallow water with their head down in the grass and the tail exposed to the air. Predators include humans, birds, larger fish, and turtles.

Between their third and fourth years, the red drum reaches sexual maturity. Spawning season is from mid-August through mid-October in Gulf of Mexico waters, near the mouths of passes and shorelines. During spawning, red drum males attract females by producing a drum-like noise by vibrating a muscle in their swim bladder. Eggs incubate for 24 hours. Larvae are carried into tidal bays by the current. They move to quiet, shallow water with grassy or muddy bottoms to feed on detritus (dead or decomposing plant and animal matter).

Red drum are related to black drum, spotted sea trout, weakfish, mullets, and croakers, most of which also make drumming sounds. Scientists believe that the black spot near their tail helps fool predators into attacking the red drum's tail instead of their head, allowing the red drum to escape.

Red drum range from Massachusetts to Key West, Florida, and along the Gulf Coast to Tuxpan, Mexico. They prefer shallow waters (1 to 4 ft [0.3 to 1 m] deep) along the edges of bays with submerged vegetation such as sea grasses. Red drum are found over all bottom types but they seem to prefer areas with submerged vegetation and soft mud. These fish are also commonly found around oyster reefs. Breaks in continuity of shorelines such as coves, points, jetties, and old pier pilings attract them. They prefer soft mud along pier pilings and jetties. They are often found in water so shallow that their backs are exposed while swimming. During cold spells large numbers of red drum can be found in tidal creeks and rivers. They can live in fresh water and have been found many miles upriver.

Shrimp (4 species)

According to the Gulf of Mexico Fish Management Council's 1998 Generic Amendment for Addressing Essential Fish Habitat Requirements (GMFMC 1998):

Brown Shrimp: Brown shrimp eggs are demersal (i.e., sink to the sea bed) and occur offshore. The larvae also occur offshore and begin to migrate to estuaries as postlarvae. Migration occurs through passes on flood tides at night, mainly from February to April, with a minor peak in the fall. In estuaries, brown shrimp postlarvae and juveniles are associated with shallow vegetated habitats, as well as silty sand and non-vegetated mud bottoms. Postlarvae and juveniles have been collected in waters ranging in salinity from 0 to 70 part per thousand (ppt). The density of late postlarvae and juveniles is highest in marsh edge habitat and submerged vegetation, followed by tidal creeks, inner marsh, shallow open water, and oyster reefs. In unvegetated areas, muddy substrates seem to be preferred. Juveniles and sub-adults of brown shrimp occur from secondary estuarine channels out to the continental shelf but prefer shallow estuarine areas, particularly the soft, muddy areas associated with plant-water interfaces. Sub-adults migrate from estuaries on ebb tides at night when there is a new moon or a full moon. The abundance of brown shrimp in offshore areas correlates positively with turbidity and negatively with hypoxia (low levels of oxygen in the water). Adult brown shrimp occur in neritic Gulf of Mexico waters (i.e., marine waters extending from mean low tide to the edge of the continental shelf) and are associated with silt, muddy sand, and sandy substrates. They generally spawn from spring to early summer in Gulf waters greater than 20 m (65 ft) deep and throughout the year in waters from 50 to 120 m (165 to 400 ft) deep, with a major peak from September to November and a minor peak from April to June.

White Shrimp: White shrimp are offshore and estuarine dwellers and are pelagic or demersal, depending on life stage. The eggs are demersal and larval stages are planktonic; both stages occur in near-shore marine waters (includes nearshore ocean areas as well as estuarine habitats). Postlarvae migrate through passes mainly from May to November with peaks in June and September. Migration is in the upper 3 m (10 ft) of the water column at night and at mid-depths during the day. Once they reach estuaries, postlarval white shrimp seek shallow water with muddy-sand bottoms high in organic detritus or abundant marsh, where they become benthic and develop into juveniles. Postlarvae and juveniles inhabit mostly mud or peat bottoms with large quantities of decaying organic matter or vegetative cover. Densities are usually highest in marsh edges and submerged aquatic vegetation, followed by marsh ponds and channels, inner marsh, and oyster reefs. White shrimp juveniles prefer salinities of less than 10 ppt and frequently are found in tidal rivers and tributaries. They move to coastal areas to mature and spawn. Migration from estuaries occurs in late August and September. Adult white shrimp are demersal and inhabit soft mud or silt bottoms, generally in near-shore Gulf waters to depths less than 30 m (100 ft). They spawn from spring through fall in waters ranging in depth from 8 to 34 m (25 to 110 ft).

Pink Shrimp: Pink shrimp occupy a variety of habitats, depending on their life stage. The eggs are demersal, whereas larvae are planktonic until the postlarval stage, when they become demersal. Postlarvae and juveniles of pink shrimp occur in estuarine waters of wide-ranging salinity (0 to >30 ppt). Recruitment into estuaries occurs in spring and fall at night, primarily on flood tides, through passes or open shoreline. Within estuaries, pink shrimp juveniles are commonly found in areas with submerged aquatic vegetation, where they burrow into the substrate by day and emerge at night; however, postlarvae, juveniles, and sub-adults may prefer coarse sand/shell/mud mixtures. Densities of pink shrimp have been found to be highest in or near submerged aquatic vegetation and lowest in mangroves. Pink shrimp are nearly absent from marshes. Adults inhabit offshore marine waters in depths of 9 to 45 m (30 to 150 ft) and prefer substrates of coarse sand and shell with a mixture of less than 1% organic material. They spawn in the Dry Tortugas throughout the year in waters ranging in depths from 24 to 52 m (80 to 170 ft).

Royal Red Shrimp: EFH for royal red shrimp include the upper regions of the continental slope from 180 m (590 ft) to about 730 m (2,395 ft), with concentrations found at depths of between 250 m (820 ft) and 475 m (1,558 ft) over blue/black mud, sand, muddy sand, or white calcareous mud. In addition the Gulf Stream is an EFH because it provides a mechanism to disperse royal red shrimp larvae (SAFMC 2009).

Coastal Migratory Pelagics

As of June 2013, three species, cobia, king mackerel, and Spanish mackerel, are included in the coastal migratory pelagics management unit (South Atlantic Fishery Management Council, 2013). The mackerels in this group are often referred to as scombrids. The family Scombridae includes tunas, mackerels, and bonitos. They are among the most important commercial and sport fishes.

The habitat of coastal pelagic adults includes the coastal waters out to the edge of the continental shelf in the Atlantic Ocean. Within this area, the occurrence of coastal migratory pelagic species is governed by temperature and salinity. All species are seldom found in water temperatures less than 68°F. Salinity preference varies, but these species generally prefer high salinity. Salinity preference of cobia is not well defined. The larval habitat of all species in the coastal pelagic management unit is the water column. Within the spawning area, eggs and larvae are concentrated in the surface waters.

Reef Fish

Reef fish are found mostly in offshore waters and at considerable depths, as well as around offshore reefs, wrecks, buoys, oil rigs, and the like. They are mostly associated with near-bottom structure in these areas at depths of 18 to 73 m (60 to 240 ft). Migrations appear to be linked to spawning behavior, which in the Atlantic occurs from March through June. Evidence suggests that spawning may occur in offshore oceanic waters, but few studies have been conducted, although spawning fish are known to congregate over reefs and wrecks.

6 Effects of the Federal Action

Outfalls 001, 005, and 008 discharge into EFH for five fishery management units that include four species of Shark, Red Drum, four species of Shrimp, Coastal Migratory Pelagics (*e.g.*, king mackerel) and Reef Fish (Table 10). Specifically, the Viola Turning Basin in the Corpus Christi Inner Harbor will receive discharges from Outfall 001, and Nueces River Tidal Segment No. 2101 will receive discharges from Outfalls 005 and 008. The locations of these EFH in relation to the Project are set forth in Figure 4. No EFH is located within the remainder of the Project Area.

6.1 Air Quality

Air emissions of non-GHG criteria pollutants from the Project are below the respective significant emission rates for PSD air permitting and indicate there are no significant or adverse effects to vegetation, soils or water quality. Air dispersion modeling results indicate that air concentrations are below the respective SILs and ESL values over the Viola Turning Basin and lower Nueces River Tidal Segment, further indicating no significant or adverse effects to soils, vegetation or water quality. Overall reductions in NO_X and SO_2 emissions means there will be no increase in nitrogen or sulfur deposition associated with the Project and indicates no adverse effects from either nitrogen or sulfur to aquatic resources. Based on the results of the air quality analyses, air emissions from the Project are not reasonably foreseen to adversely impact any EFH.

6.2 Water Quantity and Water Quality

Water for the Project will be supplied by the City of Corpus Christi Municipal Water Supply. Therefore, there is no increase in water obtained directly from the Nueces River, and potential adverse impacts to EFH from Project water use are not reasonably foreseeable.

Evaluation also indicates that potential adverse effects to EFH are not reasonably foreseeable due to Project-related changes at Outfall 001 in wastewater volume, chemistry, or temperature. The potential incremental increase in wastewater discharge volume related to the Project is estimated to be small (about 0.4% of currently permitted discharges to the Inner Harbor) and is not expected to have any reasonably foreseeable adverse effects on potential ecological receptors. The Project is estimated to increase the volume of wastewater to be discharged by about 6% over the West Refinery's current annual average actual discharge. Total facility wastewater discharge including Project-related wastewater will be within the currently permitted discharge volume and will not require any modification to the current TPDES permit for the West Refinery.

Water chemistry changes associated with the incremental wastewater discharges from the Project at Outfall 001 in the Viola Turning Basin are small; 8 of 20 parameters show a decrease in concentration or no change; the other 12 parameters have small increases in concentrations (most less than a 5% change). All parameters will meet water quality standards. Estimated loading from the Project is less than 10% of the High Base Case loadings, with the highest potential increase estimated to be about 8% (*i.e.*, aluminum, 0.01 mg/L change). Estimated loading from the Project is less than 1% of the existing background loading to the Inner Harbor. The current wastewater discharge is not toxic on an acute or chronic basis and the Project is not expected to affect future toxicity test results. The potential small increase in parameter loading is not expected to have any reasonably foreseeable adverse effects on EFH.

The temperature of the wastewater discharge at Outfall 001 may increase by up to 2°F due to the Project. This would be about a 3% increase and would not increase the temperature of the discharged water above the currently permitted limit. This change is within the variability of the existing discharge temperatures and it is unlikely to be a discernible change.

Finally, no reasonably foreseeable adverse effects are expected to occur to EFH due to Project-related storm water at Outfalls 001, 005 or 008. Storm water runoff may increase slightly because the Project will convert four small areas (~ 30 acres total) of previously disturbed and/or industrial lands that currently have some vegetative cover to equipment or parking areas with more impervious surfaces. For the entire Project, there may be a 1% to 3% increase in storm water runoff from current conditions. The storm water from the main refinery operations area related to the Project is expected to have the same water quality as other storm water at the facility and will be handled similarly to the other storm water. Storm water discharged at Outfall 001 will have been treated at the WWTP while storm water discharged from Outfalls 005 and 008 will mix with other storm water runoff from the I-37 corridor and other areas north and west of the FHR property, and be indiscernible from other storm water as it travels approximately 3 km (1.9 mi) northwest to the Nueces River. For the parking area to the south of the main refinery operations area, a storm water pollution prevention plan will be developed and implemented by FHR and the future runoff will be handled similarly to other urban runoff.

6.3 Noise

The Project is within an active industrial area and transportation corridor that is subject to routine construction, operations and maintenance activities, as well as transportation-related road construction and vehicle traffic and harbor activities (*e.g.,* ship and barge traffic). Project-related construction activities will be managed to reduce noise impacts including proper construction equipment maintenance and use of standard noise reducing equipment. The additional noise associated with the Project construction (including construction of the proposed parking area), and then Project operations is not expected to be discernible from the noise associated with the existing facility or with existing transportation-related activities. Therefore, the potential incremental increase in noise levels associated with the construction and operation of the Project will have no adverse effect on EFH.

6.4 Infrastructure-Related Impacts

The Project will not require any modification to existing docks and no Project construction will occur in or immediately adjacent to the Viola Turning Basin. There are no linear facilities associated with the Project. No new infrastructure independent of the new equipment and piping to be installed within the Project Area identified in the Project description is required to support the Project. Marine vessel traffic is not reasonably foreseen to increase or decrease with the Project.

Therefore, there are no infrastructure-related adverse impacts to consider for the Project and a determination of "no adverse effect" to EFH is made.

6.5 Human Activity Impacts

Minor temporary increases in human activity compared to the existing operation of the refinery will result from the Project during the construction and operation phases. It has been estimated that at times, up to 1,000 additional temporary workers may be needed for the construction phase of the Project with some additional employees hired to handle the work related to the additional process operations. However, the existing West Refinery and Project are within a zoned industrial area that is also part of the I-37 corridor and adjacent to the Corpus Christi Inner Harbor. As a result of the industrial nature of the area, transportation corridor characteristics, and existing human activity related to the area's general construction, operations, and maintenance activities, the temporary incremental increase of construction-related activity and the smaller incremental activity from long-term operations is expected to have no adverse effect on EFH.

Additionally, no Project-related construction or operations will occur in EFH, therefore, no direct construction-related adverse impacts are reasonably foreseen for EFH.

7 Summary and Conclusions

USEPA's action in issuing a GHG PSD permit to FHR for the Corpus Christi West Refinery Domestic Crude Project in Nueces County, Texas, will have no adverse effect on EFH for purposes of the MSA because no construction activities or operations will be conducted in or immediately adjacent to EFH, and because there are no reasonably foreseeable indirect adverse effects to EFH in the lower Nueces River Tidal Segment and the Viola Turning Basin from Project air emissions, water intake or consumption, storm water or wastewater discharges, or changes to marine vessel traffic.

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9 References

NOTE: USEPA Region 6 staff is requiring that electronic copies of all references be provided to them as part of the BE submittal and the Section 7 ESA consultation process. Therefore, to fulfill the requirement of the ESA-BE review process and the Section 7 consultation, FHR and Barr Engineering will be providing the following references to USEPA Region 6 with the expectation that USEPA Region 6 will comply with all applicable copyright and intellectual property protection requirements.

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Figures

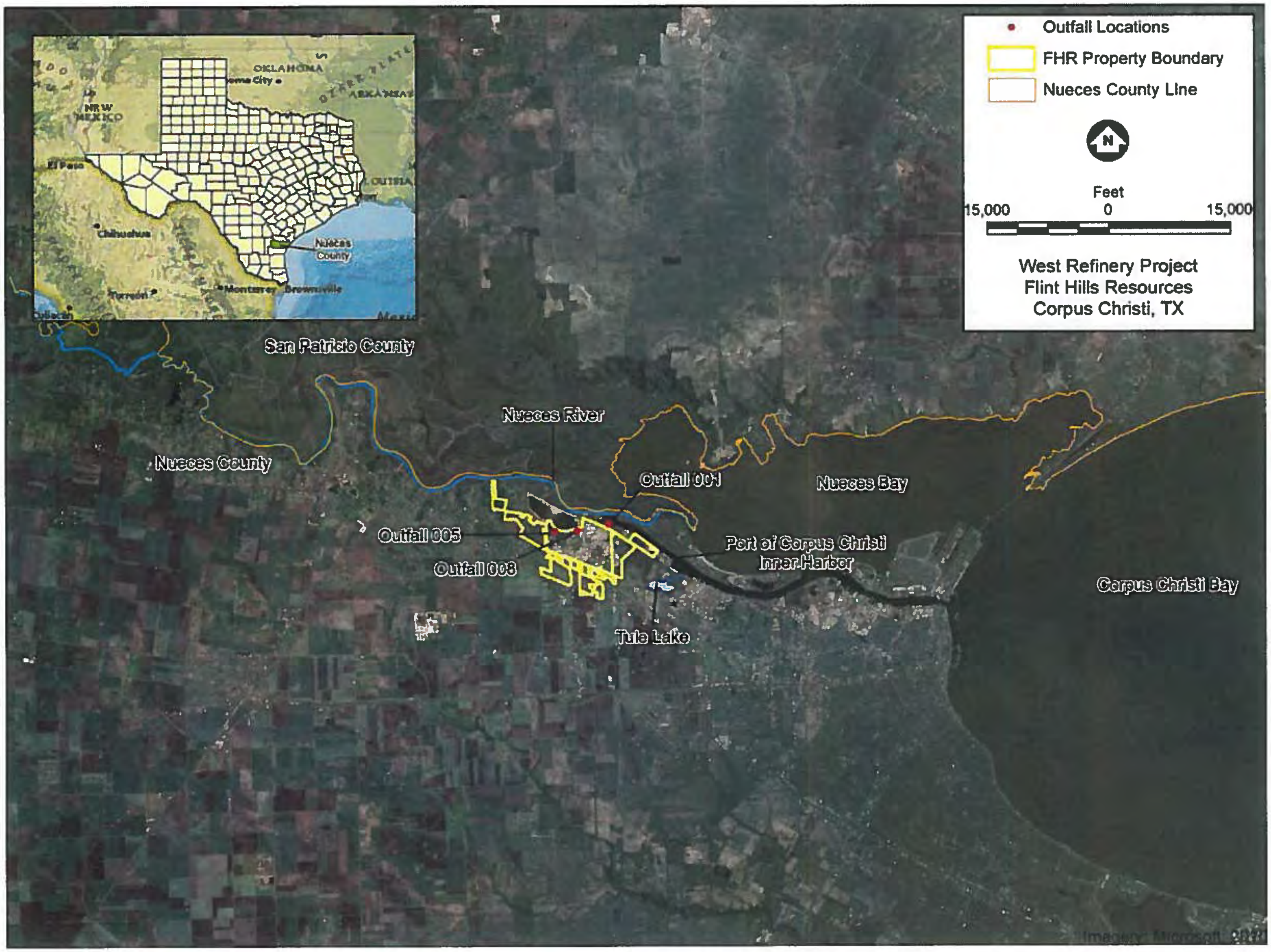

Figure 1 Project Location

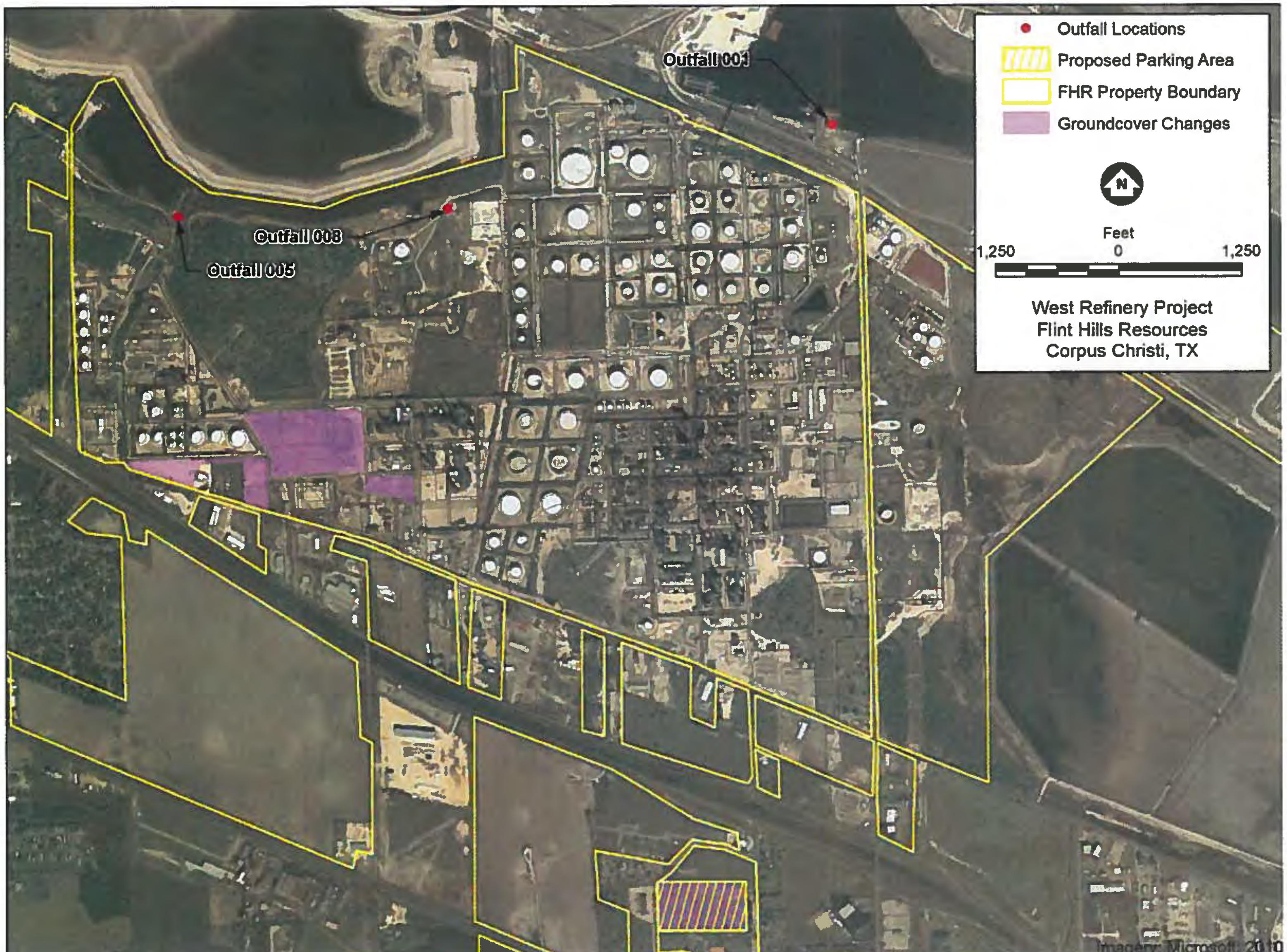

Figure 2 General Property Boundary, Proposed Parking Area and Other Construction-Related Areas with Groundcover Changes

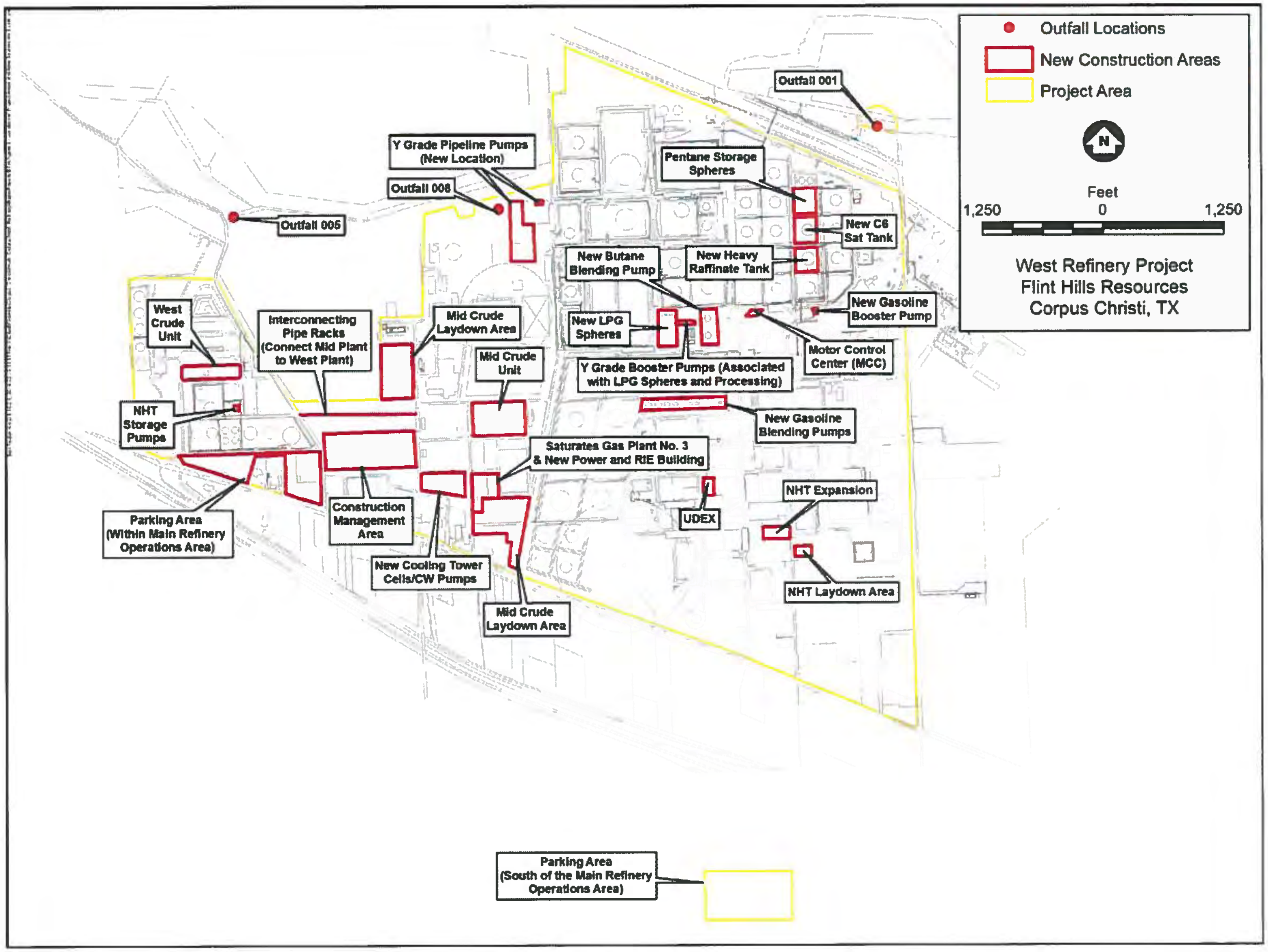

Figure 3 Location of New Construction Areas and New Sources

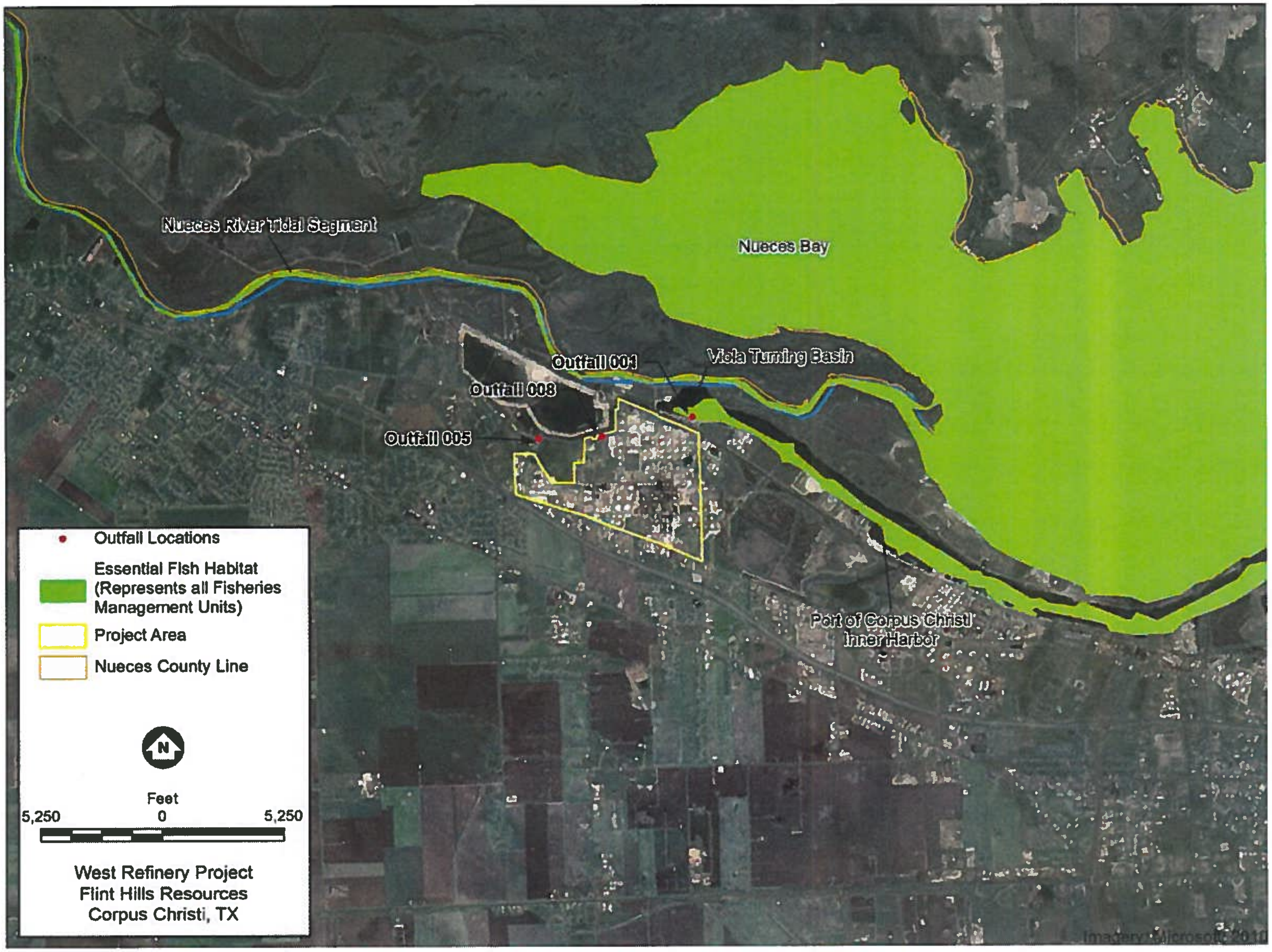

Figure 4 Essential Fish Habitat (represents habitat for all Fisheries Management Units)

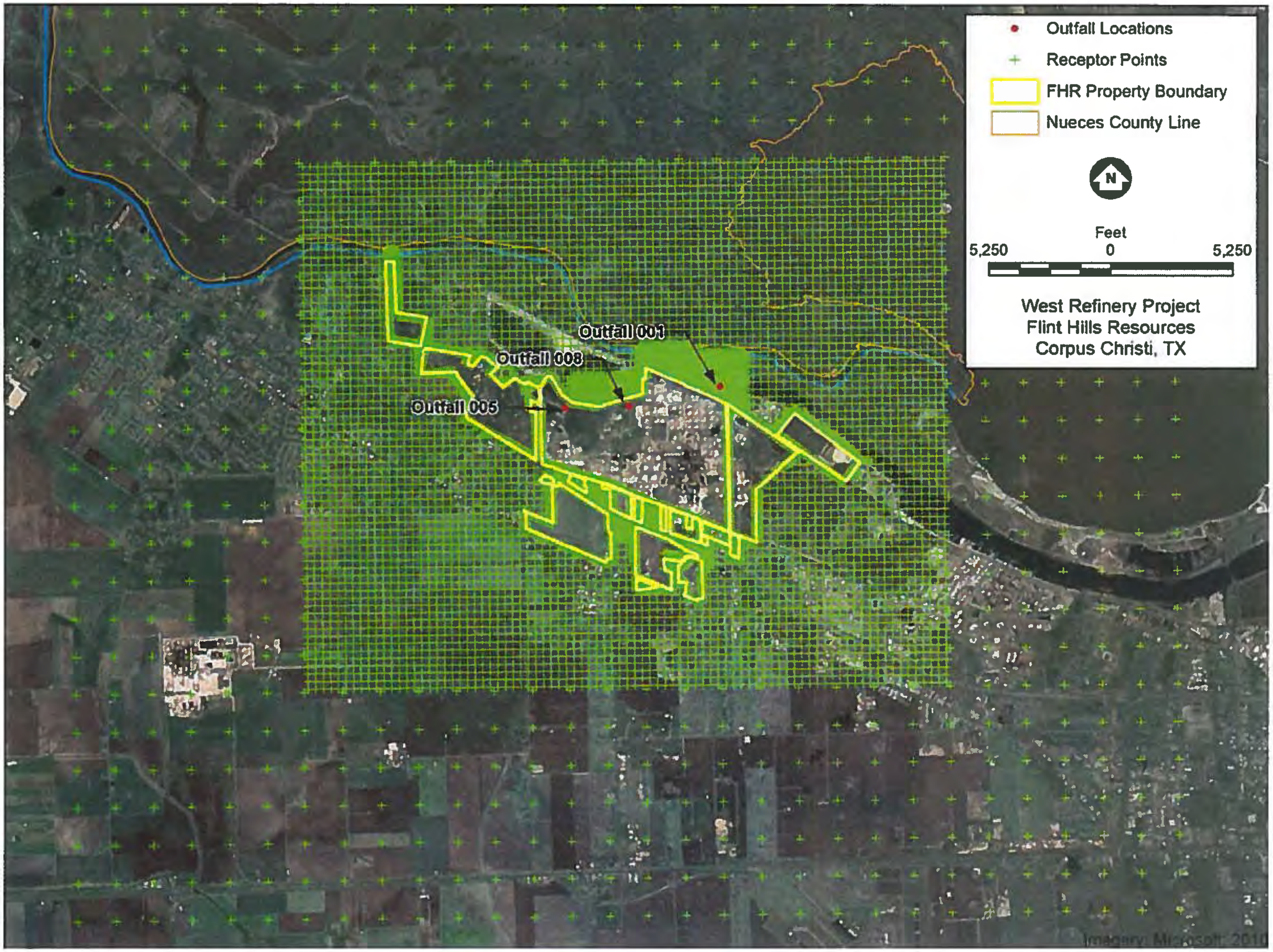

Figure 5 Air Dispersion Modeling Grid Out to 3 Kilometers

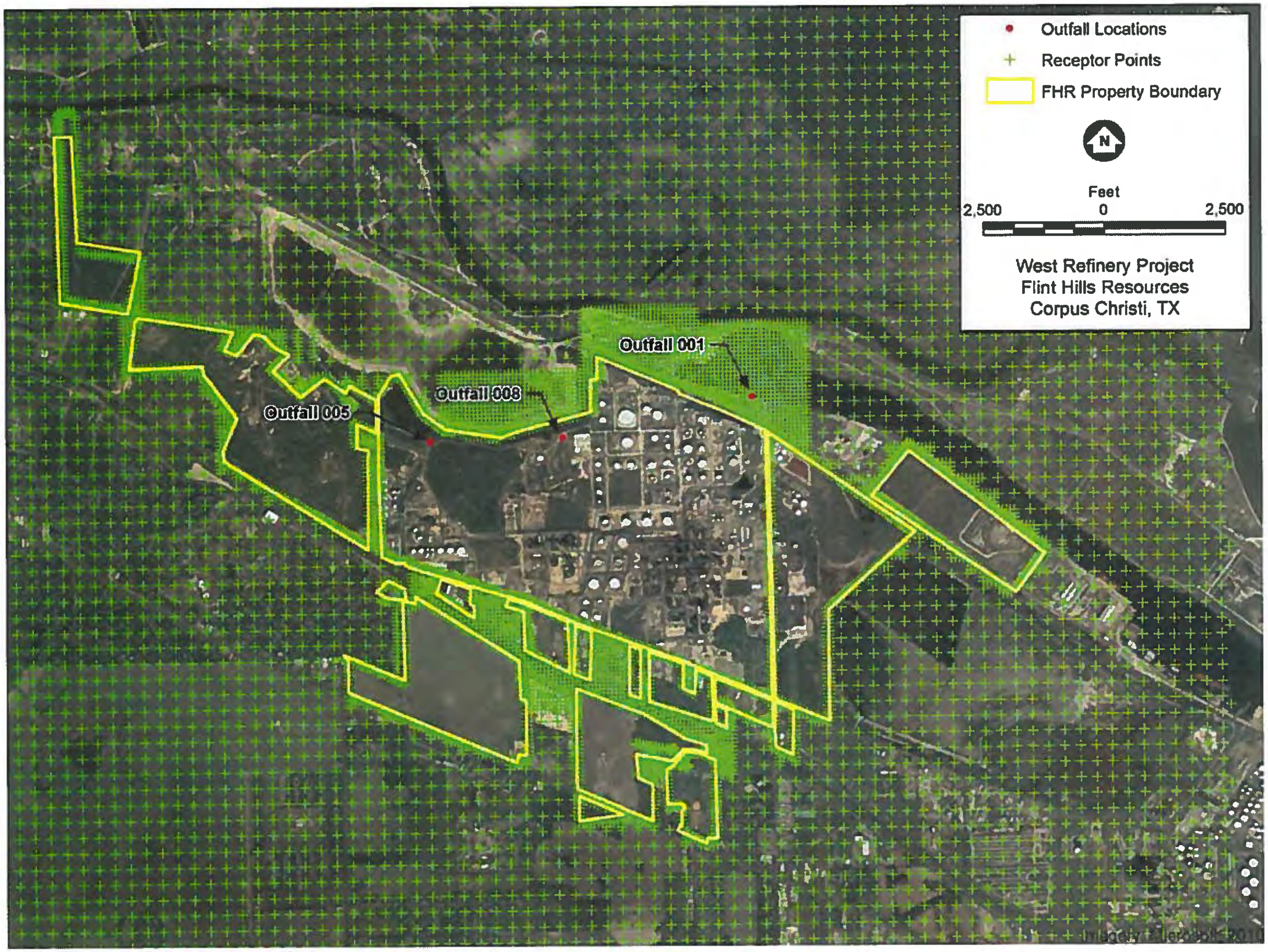

Figure 6 Air Dispersion Modeling Grid Showing Near Field Receptors

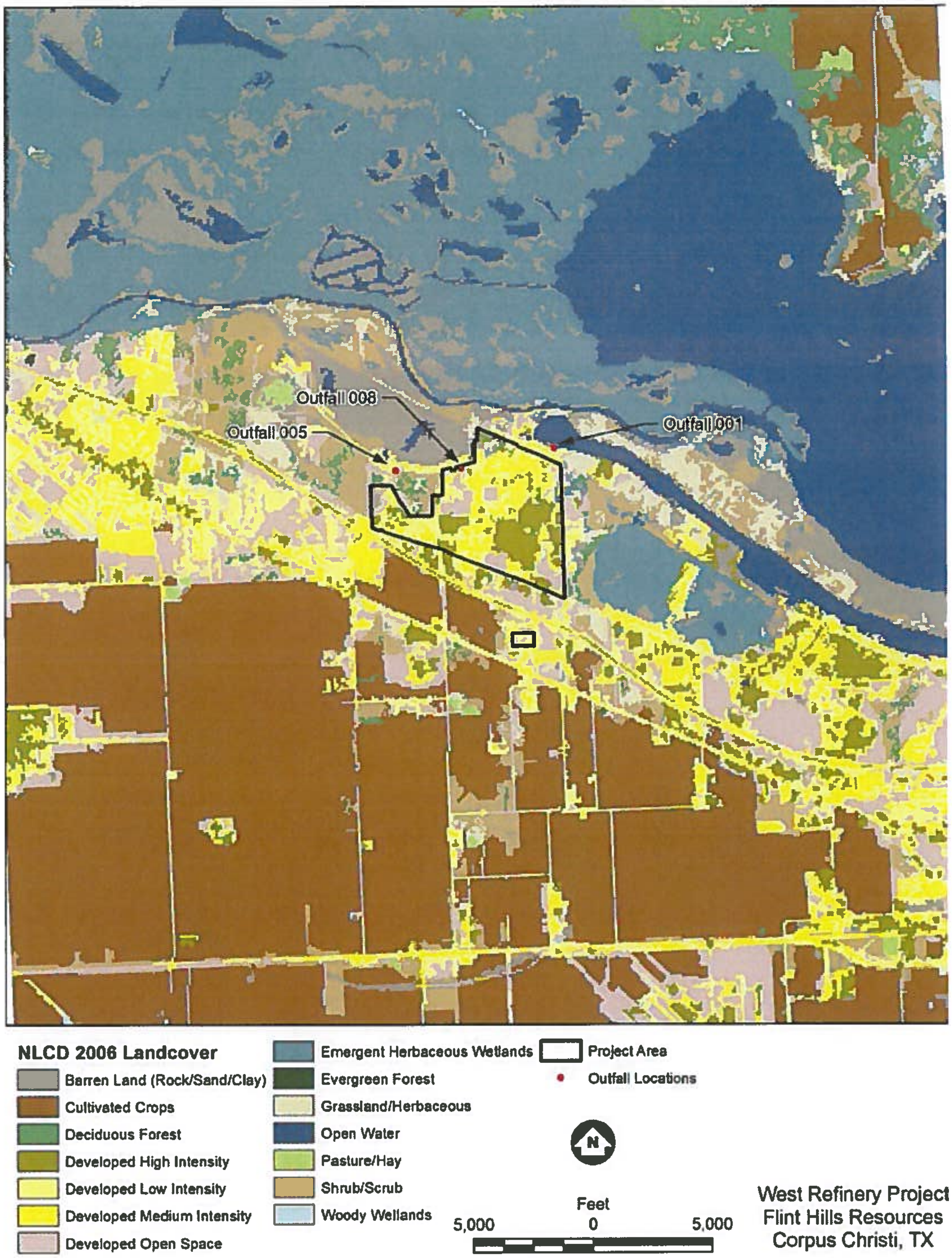

Figure 7 Land Use / Land Cover

Appendices

Appendix A

Shark Species Descriptions

The following information is taken from the NMFS (2009; Chapter 5).

5.1.5.3.1 Atlantic Sharpnose Shark

Atlantic sharpnose shark (Rhizoprionodon terraenovae) *The Atlantic sharpnose shark is a small coastal carcharhinid, inhabiting the waters of the northeast coast of North America. It is a common year-round resident along the coasts of South Carolina, Florida, and in the Gulf of Mexico and an abundant summer migrant off Virginia. The Atlantic sharpnose shark is the most abundant and exploited small coastal shark in U.S. Atlantic and Gulf of Mexico waters (Cortés, 2002). Atlantic sharpnose sharks are known to occur in a variety of coastal habitats in the Gulf of Mexico, some of which are proposed nursery areas (McCandless et al., 2002). In the northeast Gulf of Mexico, juvenile and mature Atlantic sharpnose sharks recruit to coastal waters beginning in April (Carlson and Brusher, 1999). Neonate sharks begin arriving in June (Carlson and Brusher, 1999; Carlson, 2002) and all life stages are present by late June and generally remain in-shore until they emigrate offshore in the fall (Carlson and Brusher, 1999).*

Reproductive potential: *Mating is in late June; the gestation period is about 11 to 12 months (Castro and Wourms, 1993).*

Crooked Island Sound and the Apalachicola Bay system (e.g., St. Vincent Island) have been hypothesized to serve as nursery areas for Atlantic sharpnose sharks in the northeast Gulf of Mexico (Carlson, 2002; Bethea et al., 2006). Young of the year (YOY) and juveniles were found in temperatures of 21.8° to 31.7° C, salinities of 29.0 to 37.2, and DO of 2.7 to 6.9 ml/l. Habitat associations for YOY included mud, sand, and seagrass, and for juveniles, sand, seagrass, and mud in descending order of predominance (Bethea et al., 2006). A recent study indicates that juvenile sharpnose sharks may not exhibit philopatry (tendancy to return to a specific location in order to breed or feed), but likely utilize a series of coastal bays and estuaries throughout the juvenile stage (Carlson et al., 2008).

Essential Fish Habitat for Atlantic Sharpnose:

- ***Neonate/YOY (≤60 cm TL):*** *Gulf of Mexico coastal areas from Texas through the Florida Keys. In the Atlantic from the mid-coast of Florida to Cape Hattaras. Please refer to Figure 5.67 for detailed EFH map.*

- ***Juveniles (61 to 71 cm TL):*** *Gulf of Mexico coastal areas from Texas through the Florida Keys. In the Atlantic from the mid-coast of Florida to Cape Hattaras, and a localized area off of Delaware.*

- ***Adults (≥72 cm TL):*** *Gulf of Mexico from Texas through the Florida Keys out to a depth of 200 meters. In the Atlantic from the mid-coast of Florida to Maryland.*

5.1.4.6.3 Bull Shark

Bull shark (Carcharhinus leucas) *The bull shark is a large, shallow water shark that is cosmopolitan in warm seas and estuaries (Castro, 1983). It often enters fresh water, and may penetrate hundreds of kilometers upstream; bull sharks are the only shark species that is known to be physiologically capable of spending extended periods in freshwater (Thorson et al., 1973).*

Reproductive potential: *In the United States the nursery areas are in low salinity estuaries of the Gulf of Mexico Coast (Castro, 1983) and the coastal lagoons of the east coast of Florida (Snelson et al., 1984).*

Neonate bull sharks have been found in Yankeetown, Tampa Bay, Charlotte Harbor, Ten Thousand Islands, and Texas between the months of May and August (Hueter and Tyminski, 2007). Young-of-the-year bull sharks are found in these same areas throughout the warm months and remain in these primary nurseries until as late as November or until water temperatures fall to about 21°C (Hueter and Tyminski, 2007). However, first-year bull sharks have been documented in Florida estuaries at temperatures as low as 16.4°C, returning to these nursery areas the following spring as early as March. Thus, these same Florida areas (Yankeetown, Tampa Bay, Charlotte Harbor, Ten Thousand Islands, and the Keys) may also function as secondary nurseries for the bull shark (Hueter and Tyminski, 2007). Older juveniles return to these nursery areas in the spring as early as April and remain in the bays throughout the summer *before undertaking their fall migration in October and November (Hueter and Tyminski, 2007). Texas bull sharks show a similar temporal pattern (Hueter and Tyminski, 2007); although older juvenile bull sharks utilize estuarine nursery areas (1.7 to 41.1 ppt), they do not appear to venture as far into freshwater as the neonates and young-of-the-year (Hueter and Tyminski, 2007). Additionally, young-of-the-year and older juvenile bull sharks have been found in the warm water effluents of Tampa Bay and Yankeetown power plants during the winter months (Hueter and Tyminski, 2007). Presumably, these sharks become entrapped within these warm water plumes when the temperature of the surrounding water falls below the sharks' tolerance level, but definitive data are lacking (Hueter and Tyminski, 2007). Steiner et al. (2007) found sharks did not travel far between capture and recapture locations, indicating a relatively low rate of movement of the bull sharks within the estuary.*

Essential Fish Habitat for Bull Shark:

- ***Neonate/YOY (≤95 cm TL):*** *Gulf of Mexico coastal areas along Texas, and localized areas off of Mississippi, the Florida Panhandle, and west coast of Florida; as well as the Atlantic mid-east coast of Florida.*

- ***Juveniles (96 to 219 cm TL):*** *Gulf of Mexico coastal areas along the Texas coast, eastern Louisiana to the Florida Panhandle, and the west coast of Florida through the Florida Keys. Atlantic coastal areas localized from the mid-east coast of Florida to South Carolina.*

- ***Adults (≥220 cm TL):*** *Gulf of Mexico along the southern and mid-coast of Texas to western Louisiana, eastern Louisiana to the Florida Keys. East coast of Florida to South Carolina in the Atlantic.*

5.1.4.3.2 Scalloped Hammerhead Shark

Scalloped hammerhead (Sphyrna lewini) *This is a very common, large, schooling hammerhead of warm waters. It is the most common hammerhead in the tropics and is readily available in abundance to inshore artisanal and small commercial fisheries as well as offshore operations (Compagno, 1984). It migrates seasonally north-south* *along the eastern United States. Scalloped hammerhead sharks are widely distributed, but they are also dependent on discrete coastal nursery areas (Duncan et al., 2006). Tagging data indicate that scalloped hammerhead sharks use offshore oceanic habitat, but do not regularly roam across large distances (Kohler and Turner, 2001). Rather, individuals appear to disperse readily across continuous habitat (continental shelves) (Duncan et al., 2006). Hammerheads are known for their unique head morphology. This morphology is thought to aid in a greater lateral search area, which may increase the probability of prey encounter, and enhanced maneuverability, which may aid in prey capture (Kajiura and Holland, 2002).*

Reproductive potential: *There is sexual segregation of males and females with females found more often in deeper water and a tendency to move into offshore waters at a smaller size than males (Klimley 1987; Branstetter, 1987b; Stevens and Lyle, 1989). Peircy et al. (2007) found that the northwestern Atlantic Ocean and Gulf of Mexico populations grow more slowly and have smaller asymptotic sizes than previously reported studies for this species in the Pacific Ocean.*

The reproductive cycle is annual (Castro, 1993b), and the gestation period is nine to ten months (Stevens and Lyle, 1989) but may be as long as 12 months (Branstetter, 1987b). Young-of-the-year scalloped hammerheads are present in bays and nearshore nurseries during the summer months in the Florida areas of Yankeetown, Tampa Bay, and Charlotte Harbor as well as along the beaches of the lower Texas coast (Hueter and Tyminski, 2007). These first- year sharks typically move out of these areas by late October (Hueter and Tyminski, 2007). Secondary nurseries for this species extend into deeper coastal waters particularly off Texas, where they have been captured during longline surveys and on rod-and-reel around offshore oil rigs at depths of at least 53 m (Hueter and Tyminski, 2007).

Juvenile scalloped hammerhead sharks reside within nursery habitats for extended periods of time (at least on year post parturition) (Duncan and Holland, 2006).

Essential Fish Habitat for Scalloped Hammerhead:

- ***Neonate/YOY (≤60 cm TL):*** *Coastal areas in the Gulf of Mexico from Texas to the southern west coast of Florida. Atlantic east coast from the mid-east coast of Florida to southern North Carolina.*

- ***Juveniles (61 to 179 cm TL):*** *Coastal areas in the Gulf of Mexico from the southern to mid-coast of Texas, eastern Louisiana to the southern west coast of Florida, and the Florida Keys. Offshore from the mid-coast of Texas to eastern Louisiana. Atlantic east coast of Florida through New Jersey.*

- ***Adults (≥180 cm TL):*** *Coastal areas in the Gulf of Mexico along the southern Texas coast, and eastern Louisiana through the Florida Keys. Offshore from southern Texas to eastern Louisiana. Atlantic east coast of Florida to Long Island, NY.*

5.1.4.6.12 Spinner Shark

Spinner shark (Carcharhinus brevipinna) *The spinner shark is a common, coastal-pelagic, warm-temperate and tropical shark of the continental and insular shelves (Compagno, 1984). It is a common inhabitant of inshore waters less than 30 m deep, but ranges offshore to at least 150 m deep (Aubrey and Snelson, 2007). The spinner shark is often seen in schools, leaping out of the water while spinning. It is a migratory species, but its patterns are poorly known. Off the eastern United States it ranges from Virginia to Florida and in the Gulf of Mexico.*

Predator-prey Relationships: *A study on shark foraging ecology conducted by Bethea et al. (2004) in Apalachicola Bay, Florida, showed that young-of-the-year and juvenile spinner sharks fed mainly on teleosts, with Clupeids (mostly Brevoortia spp.) the dominant prey.*

Reproductive potential: *The spinner shark has a biennial reproductive cycle (Castro, 1993c) in late May and early June. The litters usually consist of six to 12 pups (Castro, 1983). However, Jong et al. (2005) found litters ranging from three to 14 pups.*

Nursery areas for the spinner shark have been found along the beaches and in the bays of Texas during the summer months.

Essential Fish Habitat for Spinner Shark:

- ***Neonate/YOY (≤70 cm TL):*** *Localized coastal areas in the Gulf of Mexico along Texas, eastern Louisiana, the Florida Panhandle, Florida west coast, and the Florida Keys; and in the Atlantic along the east coast of Florida to southern North Carolina.*

- ***Juveniles (71 to 179 cm TL):*** *Gulf of Mexico coastal areas from Texas to the Florida Panhandle, and the mid-west coast of Florida to the Florida Keys. Atlantic east coast of Florida through North Carolina.*

- ***Adults (≥180 cm TL):*** *Localized areas in the Gulf of Mexico off of southern Texas, Louisiana through the Florida Panhandle, and from the mid-coast of Florida through the Florida Keys. In the Atlantic along the east coast of Florida, and localized areas from South Carolina to Virginia.*

REFERENCES: see NMFS 2009.