Sabine Pass to Galveston Bay, Texas
Coastal Storm Risk Management and Ecosystem Restoration
Final Integrated Feasibility Report and Environmental Impact Study

APPENDIX I

CLEAN AIR ACT EMISSIONS MODELING

May 2017

APPENDIX I

AIR QUALITY ASSESSMENT AND IMPACTS DURING CONSTRUCTION

for the

Final Integrated Feasibility Report/Environmental Impact Statement
for
Sabine Pass to Galveston Bay, Texas
Coastal Storm Damage Risk Management Study

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1 BACKGROUND

The Tentatively Selected Plan (TSP) for the Sabine Pass to Galveston Bay (S2G) Draft Integrated Feasibility Report (DIFR-EIS) consists of three separable elements in two regions of the upper Texas Gulf Coast. The Orange-Jefferson Coastal Storm Risk Management (CSRM) Plan and the Port Arthur CSRM plan are located in the Sabine Region (Orange and Jefferson counties) (Figures 1 and 2); the Freeport CSRM Plan is located in the Houston-Galveston-Brazoria (HGB) Region (Brazoria County) (Figure 3). The Orange-Jefferson CSRM Plan involves the construction of a new levee/floodwall system, while the Port Arthur and Freeport CSRM plans would reconstruct portions of existing Hurricane Flood Protection systems. The Orange-Jefferson CSRM Plan is made up of three parts – Orange Reach 3 in Orange County, and the Jefferson Main Reach and Beaumont Reach A in Jefferson County. The Orange-Jefferson and Port Arthur CSMR plans fall within a common air quality region, or airshed, while the Freeport CSRM Plan falls in a separate airshed. The potential projects, along with their estimated start dates, durations, and airshed are provided in Table 1-1.

Table 1-1. S2G CSRM Alternatives

Alternatives	Start Year	Duration (years)	County	Airshed
Orange	2020	8	Orange	Sabine
Jefferson	2028	2	Jefferson	Sabine
Beaumont	2023	1	Jefferson	Sabine
Port Arthur	2024	4	Jefferson	Sabine
Freeport	2020	3	Brazoria	HGB

The air emission impacts assessed in this report are based on preliminary estimates and schedules for evaluated alternatives in accordance with USACE SMART Planning guidelines. The impact assessments utilized conservatively-high duration and quantity estimates to ensure that all potential impacts are identified and disclosed for review. Furthermore, the alternatives include all potential damage reaches, while the actual TSP recommends only the reaches listed above.

The purpose of this assessment is to evaluate impacts on ambient air quality from the Proposed Action. Air quality impacts from the Proposed Action would be significant if emissions would:

1) increase ambient air pollution concentrations above the National Ambient Air Quality Standards (NAAQS),
2) contribute to an existing violation of the NAAQS,
3) interfere with or delay timely attainment of the NAAQS,

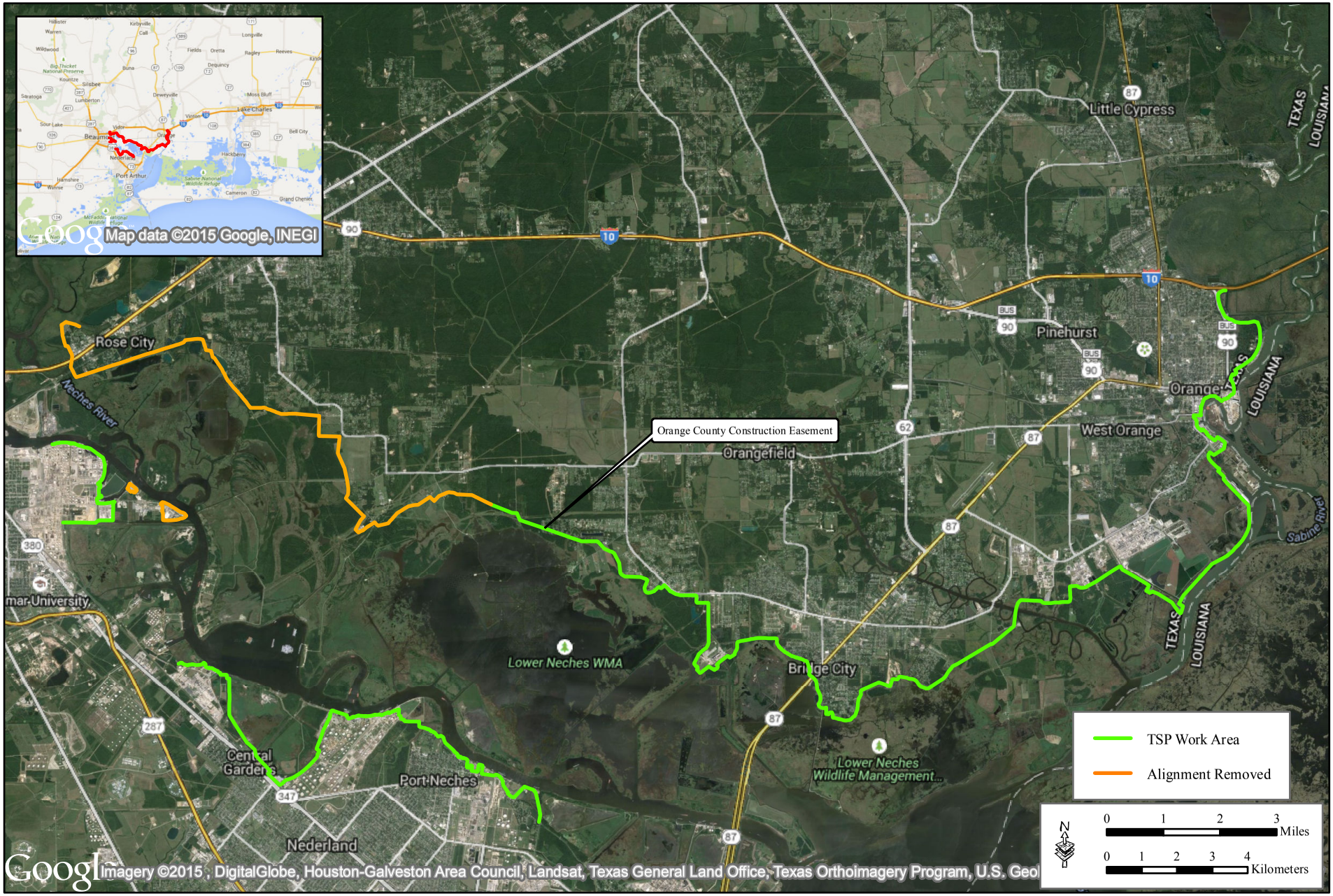

Figure 1. Orange-Jefferson Tentatively Selected Plan Alignment and Work Areas

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Figure 2. Port Arthur Tentatively Selected Plan Alignment and Work Areas

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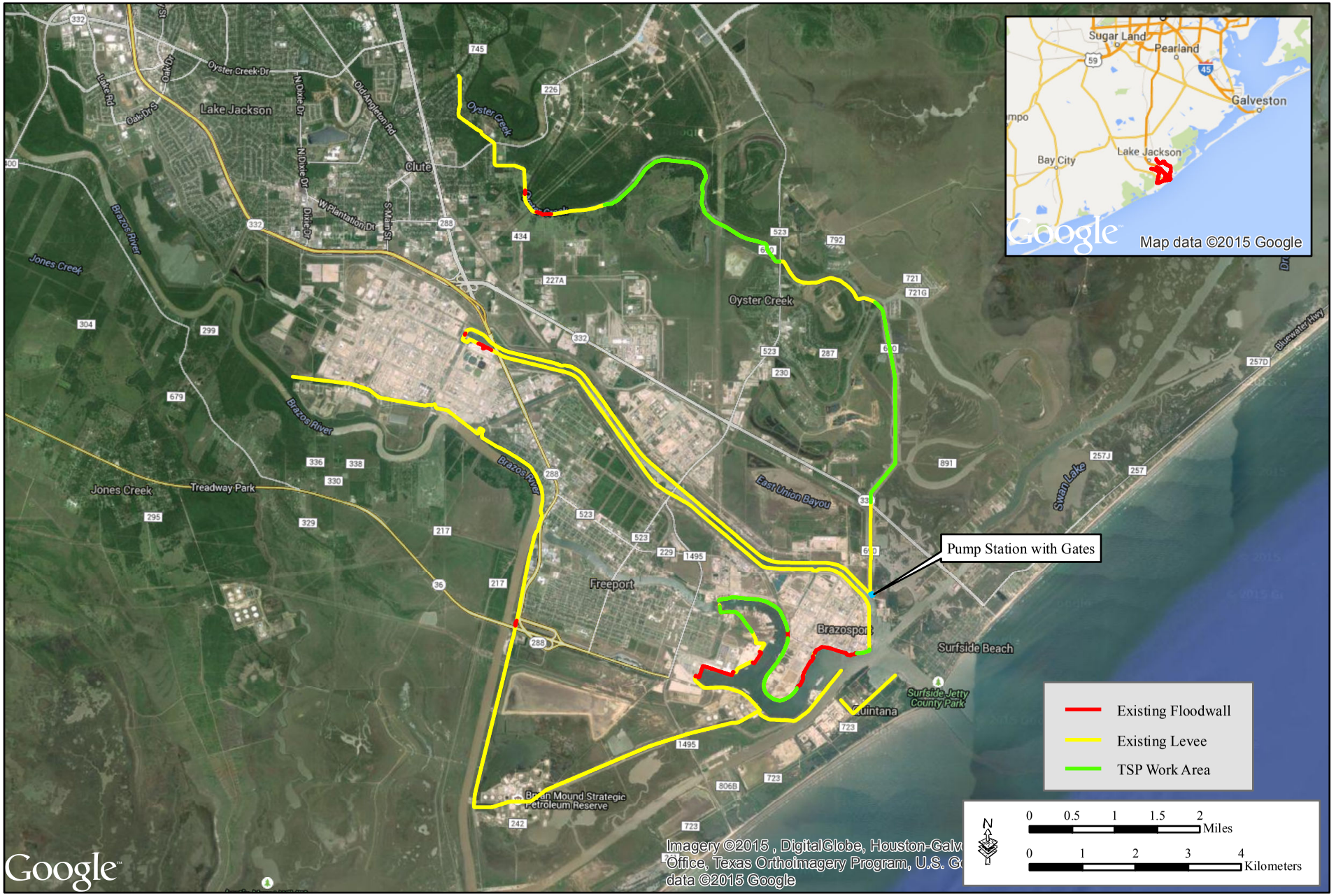

Figure 3. Freeport Tentatively Selected Plan Alignment and Work Areas

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4) impair visibility within Federally mandated Prevention of Significant Deterioration (PSD) Class I areas,
5) result in the potential for any new stationary source to be considered a major source of emissions as defined in 40 Code of Federal Regulations (CFR) Part 52.21 (total emissions of any pollutant subject to regulation under the Clean Air Act (CAA) that are greater than 250 tons per year for attainment areas),
6) for mobile source emissions, the increase in emissions to exceed 250 tons per year for any pollutant, or
7) for greenhouse gases (GHG) emissions, exceed 25,000 metric tons (27,557 U.S. tons) of direct carbon dioxide (CO_2)-equivalent emissions on an annual basis.

Brazoria County is currently designated as Severe Non-attainment for the 8-Hr Ozone (1997) standard and Marginal Non-attainment for the 8-Hr Ozone (2008) standard as part of the Houston-Galveston-Brazoria (HGB) airshed region as defined in the Texas State Implementation Plan (SIP), adopted in 1972 and revisions thereafter. In compliance with the Texas SIP, fuels testing and vehicle inspections for ozone emission components are required in the HGB airshed. The HGB region is in attainment for other criteria pollutants. According to the U.S. Environmental Protection Agency (USEPA) Region 6 (http://www.epa.gov/region6/6pd/air/pd-l/non.htm), the Beaumont-Port Arthur (Sabine) region has been re-designated as attainment with the 1997 8-hour Ozone NAAQS. Further, the Sabine region is designated as attainment for all other criteria pollutants.

2 AIR QUALITY IMPACTS FROM THE PROPOSED ACTION

Sources of air quality changes from the Proposed Action are expected to result from the following:

- Direct emissions from construction and demolition equipment (nonroad equipment), such as cranes, excavators, bulldozers, concrete pumps, saws, and generators; and
- Indirect emissions from commuting workers and delivery vehicles (on-road vehicles) such as cars, pickup trucks, flatbed trucks, dump trucks, and concrete trucks.

Air quality impacts are expected to be temporary and confined to the duration of the construction events. The S2G DIFR-EIS has determined that no additional induced development would result from implementation of the Proposed Action.

A list of equipment (including anticipated hours of usage) was provided by USACE Galveston for each of the alternatives. The USEPA software package Motor Vehicle Emissions Simulator 2014 (MOVES2014) was utilized to generate emission factors based on the types of construction equipment and vehicles anticipated. MOVES2014 is the USEPA's most current software, and supersedes previous versions of MOVES, as well as legacy USEPA software such NONROAD and MOBILE 6. The equipment list provided by USACE Galveston was divided into motor vehicles (on-road) and non-road vehicles and MOVES2014 equipment categories were assigned based on the type, fuel, and size of each piece of equipment. Since the non-road and on-road equipment lists, along with their proposed operations, are quite lengthy, they have not been included in this report; however, they are available upon request.

Key assumptions that were utilized in running the emissions simulations are presented below.

Assumptions for Calculating Emissions using MOVES2014:

1. USEPA's software model MOVES2014 was used to estimate non-road and on-road equipment emissions.
2. For trucks used on the construction site, it was assumed 15 miles per hour of use onsite.
3. For commuting workers, it was assumed 1.5 workers per piece of equipment, plus 200 additional commuter vehicles per day for the duration of the project. Commuter vehicles were assumed to be an even mix of gasoline-fired passenger vehicles and passenger trucks. Commuter vehicles were assumed to each have a roundtrip of 20 miles/day.
4. The model used 2020, August, weekday, 12:00 as the daily surrogate for worst-case emissions.

5. The model used Urban Unrestricted roads for running emissions.
6. National average was used for vehicle model year.
7. Construction was assumed to occur in currently-developed urban areas; therefore, emissions from fugitive dust and asphalt paving were assumed to be negligible and not quantified.
8. The equipment list provided by USACE Galveston was matched to equipment lists and horsepower ranges provided within MOVES2014. Where fuel type or power rating were not provided, best engineering judgement was used to select an appropriate category and rating.
9. Total usage (hours, miles) and emissions were spread out evenly over the entire duration of each project.

MOVES2014 was used to generate criteria pollutant emission rates based on the type of equipment. Non-road equipment emission rates were output in grams of pollutant per horsepower-hour of usage (g/hp-hr); on-road emission rates were output in pounds of pollutant per mile driven (lb/mile). The emission rates were combined and subtotaled for the various operating conditions within each equipment type (e.g., engine start, running exhaust, refueling loss) in order to develop equipment-specific emission factors for each criteria pollutant. The non-road and on-road emission factors are provided in Attachments D and E, respectively.

The emission factors were then combined with the activity (hp-hr or miles) to calculate the emissions estimates for each piece of equipment within each alternative area for each year. The detailed emissions estimates (lb/year) for non-road and on-road equipment are quite lengthy; the estimates are summarized in the tables below; detailed estimates are available upon request. Total emissions (tons/year) for each alternative in the Sabine airshed are provided in Table 2-1, and the total emissions for the alternative in the HGB airshed are provided in Table 2-2.

Table 2-1. Air Quality Impacts in the Sabine Airshed from the Proposed Action

Year	Alternatives	Airshed	Pollutant (tons/year)						
			CO	NOx	PM-10	PM-2.5	SO_2	VOC	Lead
2020	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2021	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2022	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2023	Beaumont	Sabine	30.6	37.4	2.9	2.8	0.1	9.0	0.0
2023	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2024	Port Arthur	Sabine	17.9	44.4	2.8	2.7	0.1	6.6	0.0
2024	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2025	Port Arthur	Sabine	17.9	44.4	2.8	2.7	0.1	6.6	0.0
2025	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2026	Port Arthur	Sabine	17.9	44.4	2.8	2.7	0.1	6.6	0.0

Table 2-1, continued

Year	Alternatives	Airshed	Pollutant (tons/year)						
			CO	NOx	PM-10	PM-2.5	SO_2	VOC	Lead
2026	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2027	Port Arthur	Sabine	17.9	44.4	2.8	2.7	0.1	6.6	0.0
2027	Orange	Sabine	21.0	25.7	2.1	2.0	0.1	5.8	0.0
2028	Jefferson	Sabine	16.9	26.3	1.8	1.8	0.1	4.9	0.0
2029	Jefferson	Sabine	16.9	26.3	1.8	1.8	0.1	4.9	0.0

CO=carbon monoxide, NOx=nitrous oxides, PM-10=particulate matter less than 10 microns, PM-2.5=particulate matter less than 2.5 microns, SO_2=Sulphur dioxide, VOC=volatile organic carbons

Table 2-2. Air Quality Impacts in the HGB Airshed from the Proposed Action

Year	Alternative	Airshed	Pollutant (tons/year)						
			CO	NOx	PM-10	PM-2.5	SO_2	VOC	Lead
2020	Freeport	HGB	12.2	3.0	0.5	0.4	0.0	2.3	0.0
2021	Freeport	HGB	12.1	3.0	0.5	0.4	0.0	2.3	0.0
2022	Freeport	HGB	12.1	3.0	0.5	0.4	0.0	2.3	0.0

CO=carbon monoxide, NOx=nitrous oxides, PM-10=particulate matter less than 10 microns, PM-2.5=particulate matter less than 2.5 microns, SO_2=Sulphur dioxide, VOC=volatile organic carbons

2.1 SIGNIFICANCE OF AIR QUALITY IMPACTS FROM THE PROPOSED ACTION

Per 40 CFR Part 93, Chapter 153, a conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates. The General Conformity thresholds are provided in Table 2-3.

Table 2-3. General Conformity Rule *de minimis* Thresholds for NAAQS Nonattainment Areas

General Conformity de minimis Levels		
Pollutant	**Area Type**	**Tons/Year**
Ozone (VOC or NOx)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NOx)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100

General Conformity de minimis Levels		
Pollutant	**Area Type**	**Tons/Year**
	Moderate nonattainment and maintenance	100
PM2.5: Direct emissions, SO2, NOx (unless determined not to be a significant precursor), VOC or ammonia (if determined to be significant precursors)	All nonattainment & maintenance	100
Lead (Pb)	All nonattainment & maintenance	25
40 CFR 93 § 153 defines de minimis levels, that is, the minimum threshold for which a conformity determination must be performed, for various criteria pollutants in various areas.		

The Sabine airshed is classified as attainment for all NAAQS pollutants and, therefore, the General Conformity Rule does not apply. The single greatest increase of any criteria pollutant from all projects within the Sabine airshed is 70.1 tons/year of NOx (2024 – 2027). Since the General Conformity Rule *de minimis* thresholds do not apply and the total emissions from all activities are demonstrated to be below the significance thresholds identified above, the Proposed Action would not have significant impacts on ambient air quality within the Sabine airshed.

The HGB airshed is classified as Marginal Non-attainment for the 2008 ozone NAAQS, and Severe Non-attainment for the 1997 ozone NAAQS. Therefore, the General Conformity Rule applies to the precursors of ozone (NOx and VOC) resulting from the Proposed Action. The *de minimis* thresholds are 25 tons/year for NOx and VOC. Emissions of NOx and VOC are estimated to increase by 3.0 tons/year and 2.3 tons/year, respectively, for years 2020 and 2021; therefore, the *de minimis* thresholds are not exceeded and a conformity determination is not required. Emissions from the other criteria pollutants are demonstrated to be below the significance thresholds identified above. Because the Proposed Action levels fall below the *de minimis* thresholds for non-attainment pollutants and are below significance levels for attainment pollutants, the Proposed Action would not have significant impacts on ambient air quality within the HGB airshed.

2.2 GREENHOUSE GAS IMPACTS

Air emissions from the operation of internal combustion engines that produce exhaust result in Greenhouse Gases (GHG) emissions that could contribute to global climate change. The Council on Environmental Quality (CEQ) published Final Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change on National Environmental Policy Act Reviews, August 1, 2016 (CEQ 2016). The guidance recommends that Federal agencies use projected GHG emissions associated with proposed actions as a proxy for assessing potential effects on climate change. GHG emissions per year should be considered in a qualitative and quantitative manner in NEPA reporting; however, there are no implementing regulations to direct development of these analyses for federal projects. .All emissions would come from individual mobile internal

combustion engines in on-road and non-road equipment, and it is likely that the total GHG emissions from mobile sources for the three elements of the Recommended Plan would exceed 25,000 metric tons per year of carbon dioxide (CO2)-equivalent (CO2e) per year.

Detailed GHG analysis was not performed in conjunction with this study with the exception of the NAAQS pollutants emitted by these mobile sources as indicated in Tables 2-1 and 2-2. However, the following estimate was developed based on comparison to a similar waterfront construction project. Temporary GHG emissions from construction and commuting vehicles are expected to vary between 4,500 and 14,000 tons of CO^2 and CO^2 equivalents per year in the Sabine airshed and approximately 3,200 tons of CO^2 and CO^2 equivalent per year in the Brazoria airshed. New pump stations included in the Proposed Action would will only be used intermittently and for short periods when the gates and culverts need to be closed during storm surges. It is therefore likely that annual discharges will be below the thresholds required for state permitting and reporting. However, SWG will coordinate with the Texas Commission on Environmental Quality when final PED designs have been developed to determine if state permits will be required for the new pump stations planned in conjunction with the Orange 3 Recommended Plan.

Emissions reduction practices for non-road and gasoline engines would be implemented that would contribute significantly to many pollutant loads, including GHGs. In recent years, EPA has set standards for engines used in most new construction equipment. However, because construction equipment can last 25-30 years, it will take many years before existing equipment is fully replaced by newer, cleaner-burning equipment. With this in mind, EPA developed the Clean Construction USA program to assist operators of heavy non-road, diesel-powered equipment to reduce emissions from older engines that are in operation today. Emission reduction methods include:

- Idle-reduction practices that save money, reduce emissions, add fuel savings, extend engine life, and provide a safer and better work environment for equipment operators;
- Switching to ultra-low-sulfur fuel, which in addition to reducing sulfur (non-GHG) emissions, improves engine efficiency by reducing wear, deposits, and oil degradation;
- Retrofitting equipment to reduce emissions; and
- Installing catalysts and filters verified by EPA to ensure emissions reduction and durability of retrofit technologies. Engine upgrade kits are also available and can be installed during routinely scheduled engine rebuilds.

Roughly one-third of the temporary annual GHG emission impacts are estimated to come from delivery vehicles and worker commuter vehicles. As an additional mitigation measure, construction contractors, the USACE would encourage alternate transportation means. The encouragement of alternative transportation methods, including carpooling, public transportation,

and use of local labor could potentially reduce these GHG emissions by as much as 40 percent. Incentives for these initiatives can include preferred parking for carpoolers.

With implementation of these reduction measures, total GHG emissions may reasonably be reduced by up to 25 percent over the lifespan of the projects, resulting in emission rates as low as between 3,375 and 10,500 tons of CO^2 and CO^2 equivalents per year in the Sabine airshed and approximately 2,400 tons of CO^2 and CO^2 equivalent per year in the Brazoria airshed.

3 REFERENCES

Council on Environmental Quality (CEQ) (2016). Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. August 1, 2016.

USEPA (2015a). National Ambient Air Quality Standards (NAAQS). Available online: www.epa.gov/air/criteria.html

USEPA (2015b). Welcome to the Green Book Nonattainment Areas for Criteria Pollutants. Available online: www.epa.gov/oar/oaqps/greenbk