

The logo for K&L GATES, featuring the company name in white, uppercase letters on a dark blue rectangular background.

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November 17, 2021

Ms. Kimberly D. Bose  
Office of the Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426

**Re: Rio Grande LNG, LLC, CP21-\_\_\_\_-000  
Application of Rio Grande LNG, LLC for Limited Amendment to NGA Section 3  
Authorization**

Dear Ms. Bose:

On November 22, 2019, the Federal Energy Regulatory Commission (FERC), under Section 3 of the Natural Gas Act (“NGA”), 15 U.S.C. § 717b, authorized Rio Grande LNG, LLC (“RGLNG”) to site, construct, and operate the Rio Grande LNG Terminal (“RGLNG Terminal”). The RGLNG Terminal, located on the northern embankment of the Brownsville Ship Channel in Cameron County, Texas, would consist of five (5) of natural gas liquefaction trains, and be capable of exporting up to approximately 27 million metric tonnes per year of liquefied natural gas (“LNG”) per year.

Enclosed for filing pursuant to Section 3(a) of the NGA, as amended, 15 U.S.C. § 717b, and 18 C.F.R. Part 153, RGLNG hereby submits an application for a limited amendment (“Limited Amendment”) to RGLNG’s existing NGA Section 3 authorization to enable RGLNG to incorporate a carbon capture and sequestration (“CCS”) system into the approved design and operation of the RGLNG Terminal (“CCS Systems”). By voluntarily incorporating the CCS Systems into the RGLNG Terminal, RGLNG will be able to capture at least 90% of the RGLNG Terminal’s CO<sub>2</sub> emissions, and provide foreign markets with a significantly less carbon-intensive source of domestically produced LNG.

RGLNG respectfully submits that, as explained more thoroughly within, authorization of this Limited Amendment will not be inconsistent with the public interest, and will, in fact, enhance the already significant public benefits provided by the FERC-authorized RGLNG Terminal. Accordingly, RGLNG respectfully requests the Commission approve the Limited Amendment

expeditiously, and allow RGLNG to incorporate the vital CCS Systems into the RGLNG Terminal as soon as possible.

The Limited Amendment application consists of the following materials:

- Transmittal Letter and Abbreviated Application;
- Opinion of Counsel;
- Form of Federal Register Notice; and
- Other exhibits as required by 18 C.F.R. Part 153.

The enclosed submission also contains sensitive security information. In accordance with 18 C.F.R. § 388.113, these materials are marked "CUI/PRIV - PRIVILEGED AND CONFIDENTIAL INFORMATION – DO NOT RELEASE." The Commission routinely treats this type of information as Privileged and Confidential. RGLNG requests that the Commission treat this information as Privileged and Confidential.

If you have any questions regarding this filing, please contact me at (202) 778-9014 or at [david.wochner@klgates.com](mailto:david.wochner@klgates.com).

Best regards,

A handwritten signature in black ink, appearing to read "David L. Wochner". The signature is fluid and cursive, with the first name "David" being the most prominent.

David L. Wochner  
*Counsel for Rio Grande LNG, LLC*

UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION

Rio Grande LNG, LLC

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Docket No. CP21-\_\_\_\_-000

**APPLICATION OF RIO GRANDE LNG, LLC FOR LIMITED AMENDMENT TO  
AUTHORIZATION GRANTED UNDER SECTION 3 OF THE NATURAL GAS ACT**

Pursuant to Section 3(a) of the Natural Gas Act (“NGA”)<sup>1</sup> and Part 153 of the Federal Energy Regulatory Commission (“FERC” or “Commission”) regulations,<sup>2</sup> Rio Grande LNG, LLC (“RGLNG”) hereby files this application seeking a limited amendment (“Limited Amendment”) to RGLNG’s November 22, 2019 authorization (“Authorization”) to site, construct and operate the Rio Grande LNG Terminal (“RGLNG Terminal”), in Docket No. CP16-454-000 (“Authorization Order”),<sup>3</sup> as amended by Commission Staff’s August 13, 2020 letter order (“August 13 Letter Order”).<sup>4</sup> RGLNG requests the Commission permit RGLNG to amend the Authorization to incorporate carbon capture and sequestration (“CCS”) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture and sequester at least 90% of the carbon dioxide (“CO<sub>2</sub>”) produced at the RGLNG Terminal. The carbon capture process, as detailed in the exhibits submitted herewith, removes CO<sub>2</sub> from both the feed gas to be liquefied at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. To provide context for this 90% reduction, according to the national net carbon dioxide equivalent (“CO<sub>2</sub>e”) emissions estimate in the Environmental Protection Agency’s (“EPA”) *Inventory of U.S. Greenhouse Gas Emissions and Sinks* (EPA 2019), 5.769 billion metric tons of CO<sub>2</sub>e were emitted

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<sup>1</sup> 15 U.S.C. § 717b(a).

<sup>2</sup> 18 C.F.R. Part 153 (2020).

<sup>3</sup> *Rio Grande LNG, LLC*, 169 FERC ¶ 61,131 (2019) (“Authorization Order”), *reh’g denied*, 170 FERC ¶ 61,046 (2020) (“Order on Rehearing”).

<sup>4</sup> *Rio Grande LNG, LLC*, Docket No. CP16-454-000 (FERC Staff Letter Order “Approval of Design Change Proposals” issued Aug. 13, 2020) (“August 13 Letter Order”).

at the national level in 2019 (inclusive of CO<sub>2</sub>e sources and sinks).<sup>5</sup> As contemplated in the Authorization Order, the operational emissions of the RGLNG Terminal were assessed to potentially increase the annual CO<sub>2</sub>e emissions based on the 2017 levels by approximately 0.17 percent at the national level. Deploying CCS systems at the RGLNG Terminal that capture 90% or more of the CO<sub>2</sub> means the RGLNG Terminal would potentially increase the annual CO<sub>2</sub>e emissions based on the 2019 national levels by approximately 0.0001 percent. Accordingly, recent precedent should allow the Commission to expeditiously find that the RGLNG Terminal's contribution to global climate change with CCS systems operating would not be significant.<sup>6</sup>

Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control ("UIC") Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems."

RGLNG respectfully requests expeditious approval of this Limited Amendment, so that RGLNG may incorporate the CCS Systems into the design of the RGLNG Terminal without delay, and – consistent with the climate goals set forth under the Paris Agreement – proceed to provide world markets access to what RGLNG believes is the greenest liquefied natural gas ("LNG") in the world.

In support of this Limited Amendment, RGLNG states as follows:

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<sup>5</sup> EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019, at ES-21 (2021), <https://www.epa.gov/sites/default/files/2021-04/documents/us-ghg-inventory-2021-main-text.pdf>.

<sup>6</sup> FERC News Release, March 18, 2021. FERC assessed the significance of the proposed Northern Natural gas pipeline (Docket No. CP20-487) project's impact on global climate change based on comparison of the project's expected CO<sub>2</sub>e emissions with national and state levels. <https://ferc.gov/news-events/news/ferc-reaches-compromise-greenhouse-gas-significance>.

## I. DESCRIPTION OF THE APPLICANT

The exact legal name of the applicant is Rio Grande LNG, LLC, a limited liability company formed under the laws of the State of Texas and registered to conduct business in that state. RGLNG's principal place of business is located at 1000 Louisiana Street, 39<sup>th</sup> Floor, Houston, Texas, 77002. RGLNG is a wholly owned subsidiary of NextDecade LNG, LLC (NextDecade), a U.S. energy project development and management company.<sup>7</sup>

RGLNG is not owned, in whole or in part, nor subsidized, directly or indirectly, by any foreign government; nor are they contractually committed to ownership or subsidization by any foreign government entity.

## II. COMMUNICATIONS AND CORRESPONDENCE

Correspondence and communications regarding this Limited Amendment should be addressed to the following and those designated with an (\*) should be included on the Commission's official service list:

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<sup>7</sup> NextDecade LNG, LLC is wholly owned by NextDecade Corporation, a publicly traded company.

### III. BACKGROUND

As authorized by the Commission in the Authorization Order and the subsequent August 13 Letter Order, the RGLNG Terminal will be located on an approximately 1,000-acre site on the northern embankment of the Brownsville Ship Channel in Cameron County, Texas, and features the following approved facilities:

- five (5) natural gas liquefaction trains, each with a nominal capacity of 5.4 million tonnes per annum (“MTPA”), for a total nominal capacity of 27 MTPA;<sup>8</sup>
- four (4) full-containment LNG storage tanks, each with a net capacity of approximately 180,000 cubic meters (m<sup>3</sup>);
- two (2) LNG carrier loading berths and one 1,500-foot-diameter turning basin;
- truck loading and unloading facilities; and
- appurtenant facilities including but not limited to administrative buildings, a central control building, a workshop, a warehouse, and electrical equipment enclosures.

In the Authorization Order, the Commission found that construction and operation of the RGLNG Terminal was not inconsistent with the public interest, and approved its construction and operation, subject to conditions as provided in the Authorization Order.<sup>9</sup> Certain parties sought rehearing of the Authorization Order. On January 23, 2020, the Commission affirmed its prior finding that construction and operation of the RGLNG Terminal was not inconsistent with the public interest.<sup>10</sup>

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<sup>8</sup> RGLNG has received authorization from the Department of Energy, Office of Fossil Energy (DOE/FE) to export annually up to 1,318 billion cubic feet (Bcf) (equivalent to the total nominal capacity of the RGLNG Terminal) to countries with which the United States has a Free Trade Agreement (*Rio Grande LNG, LLC*, DOE/FE Docket No. 15-190-LNG, Order No. 3869 (2016)) and countries with which the United States does not have such an agreement (*Rio Grande LNG, LLC*, DOE/FE Docket No. 15-190-LNG, Order No. 4492 (2020)).

<sup>9</sup> Authorization Order, 169 FERC ¶ 61,131 at P 25.

<sup>10</sup> Order on Rehearing, 170 FERC ¶ 61,046, at P 123.

On August 13, 2020, Commission staff issued the August 13 Letter Order approving certain changes to the design of the RGLNG Terminal to allow RGLNG to reduce the number of liquefaction trains from six to five, and increase the capacity of the remaining trains to maintain the RGLNG Terminal's previously approved total export capacity of 27 MTPA.<sup>11</sup> Again, certain parties sought rehearing of Commission staff's letter order; on rehearing, the Commission upheld Commission Staff's authorization of the design changes.<sup>12</sup>

In February 2020, a number of individuals and non-governmental organizations (collectively, "Petitioners")<sup>13</sup> petitioned the United States Court of Appeals for the District of Columbia Circuit (D.C. Circuit) for review of the Authorization Order and Order on Rehearing in this proceeding, as well as several other related proceedings.<sup>14</sup> On appeal, Petitioners sought judicial review of myriad issues, including:

- whether the projects were in the public interest if they were dedicated to the export of LNG;
- whether the Commission erred in approving infrastructure with capacity beyond the stated purpose of the project;
- whether the Commission's environmental justice analysis was sufficient;

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<sup>11</sup> See August 13 Letter Order.

<sup>12</sup> *Rio Grande LNG, LLC*, 174 FERC ¶ 61,048 (2021) ("Design Change Order"). While certain parties appealed Commission staff's August 13 Letter Order and the Design Change Order to the U.S. Court of Appeals for the D.C. Circuit, see *Vecinos para el Bienestar de la Comunidad Costera, et al., v. FERC*, USCA Case No. 20-1491, those parties moved to voluntarily dismiss their appeal petition, which the court granted on August 27, 2021.

<sup>13</sup> Petitioners included Vecinos para el Bienestar de la Comunidad Costera, Sierra Club, the City of Port Isabel, Save RGV from LGV, Cynthia Hinojosa, and Gilberto Hinojosa.

<sup>14</sup> Parties sought review of the Commission's issuance of an NGA Section 7 certificate of public convenience and necessity to Rio Bravo Pipeline Company, LLC in Docket No. CP16-455-000 for the associated feed gas pipeline, and the Commission's NGA Section 3 authorizations of the construction and operation of two other FERC-authorized LNG export facilities in Brownsville, the Texas LNG and Annova LNG facilities, in Docket Nos. CP16-116-000 and CP16-480-000, respectively.

- whether the Commission’s analysis of greenhouse gas (“GHG”) emissions was sufficient;
- whether the Commission was required to review the DOE/FE’s authorization of the export of LNG to non-Free Trade Agreement nations in its NEPA review as a connected action; and
- whether the Commission’s public interest determination was flawed for failure to respond to concerns regarding environmental impacts.

The D.C. Circuit denied Petitioners’ petition for review on all claims, including the Commission’s public interest finding for the Project, with two narrow exceptions—remanding to the Commission for further explanation only its analyses of impacts from the projects on climate change and environmental justice communities.<sup>15</sup> The D.C. Circuit did so without *vacatur*, and accordingly, RGLNG’s existing Authorization remains legally valid.<sup>16</sup>

#### IV. PROPOSAL

As noted above, RGLNG seeks authorization pursuant to Section 3(a) of the NGA to modify the Commission-approved design of the RGLNG Terminal to incorporate the CCS Systems. Doing so will enable RGLNG to voluntarily capture the vast majority of the RGLNG Terminal’s CO<sub>2</sub> emissions.

For more than two years, RGLNG’s parent company, NextDecade, and its affiliates have been intensely focused on the development of methods to significantly reduce the emissions impact of the RGLNG Terminal, as a direct result of (1) global market demand for LNG with a lower carbon footprint produced from responsibly sourced natural gas; and (2) RGLNG’s desire to be a

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<sup>15</sup> *Vecinos Para el Bienestar de la Comunidad Costera, et al. v. FERC*, 6 F.4th 1321, 1325 (D.C. Cir. 2021) (“Remand Order”).

<sup>16</sup> Remand Order, 6 F.4th 1321, 1325.

responsible, environmentally engaged leader in south Texas that provides thousands of good-paying jobs for communities suffering from high unemployment and lack of development. The CCS systems that RGLNG is deploying apply proprietary processes to existing carbon capture technology allowing for cost-efficient, large-scale capture of CO<sub>2</sub> emissions. To this end, over the last 18 months, a subsidiary of NextDecade Corporation, NEXT Carbon Solutions, LLC (“NEXT Carbon Solutions”), has filed numerous patent applications with the U.S. Patent and Trademark Office (“USPTO”), and has been issued patents from the USPTO, to protect aspects of its proprietary processes.

By incorporating the CCS Systems into the design and operation of the RGLNG Terminal, RGLNG will be able to capture *at least 90%* of the CO<sub>2</sub> that would have been emitted during commercial operation of the previously FERC-approved RGLNG Terminal project. With this expected reduction in CO<sub>2</sub> emissions, the RGLNG Terminal will increase the national CO<sub>2</sub> emissions by just 0.0001 percent. Through incorporation of the CCS Systems, and consistent with the climate goals set forth under the Paris Agreement, RGLNG will be able to provide world markets with a cleaner, domestically produced source of energy with minimal CO<sub>2</sub> emissions and substantially reduced climate impacts.

Standing alone, the CCS Systems are non-jurisdictional facilities, as they do not relate to the liquefaction and export of LNG. Commission approval is needed for construction and operation of the CCS Systems, however, because the CCS Systems will tie-in to FERC jurisdictional facilities, be incorporated into the overall design of the RGLNG Terminal, and be largely located within the RGLNG Terminal footprint.

The CCS Systems will primarily consist of:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)

- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

Engineering and design material related to this equipment is included within the exhibits filed with this Application. RGLNG plans to commence construction of the RGLNG Terminal early in 2022. As such, RGLNG requests expedited consideration of the CCS Systems so that it can commence construction of the CCS Systems soon thereafter.

Operationally, the RGLNG Terminal will be able to function independently of the CCS Systems. For example, in the event that the CCS Systems were taken offline for maintenance once in service, the RGLNG Terminal will be able to operate seamlessly at full capacity in order to meet its legally binding, contractual commitments to its liquefaction customers.

A critically important aspect of global efforts to reduce GHG emissions is the monitoring, reporting, and verification (“MRV”) of emissions reduction initiatives. NextDecade Corporation and its subsidiaries support MRV efforts, and to that end, NextDecade has formed a joint pilot project with Project Canary<sup>17</sup> for monitoring, reporting, and independent third-party measurement and certification of the GHG intensity of LNG to be sold from the RGLNG Terminal.<sup>18</sup> The

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<sup>17</sup> Project Canary is a Series-A growth stage company based in Denver, Colorado. Project Canary is an independent, mission-driven public benefit corporation that opens the door to being a part of solving climate change for oil & gas, agriculture, and landfill companies by providing science, hardware, and continuous monitoring software. Project Canary provides on the order of 4 to 5 magnitudes more usable data that is 200% more accurate than previous methods, which relied on point-in-time measurements. Its goal is to materially mitigate climate change by helping companies deliver products that account for and address their environmental impact. It provides independent data in a real-time dashboard, so companies are cleaner, more efficient, and more sustainable.

<sup>18</sup> Reuters, *NextDecade to certify natgas emissions for Texas Rio Grande LNG* (Apr. 19, 2021), available at <https://www.reuters.com/business/energy/nextdecade-certify-natgas-emissions-texas-rio-grande-lng-2021-04-19/>.

voluntary joint effort is the first of its kind in the LNG industry. As explained by Project Canary, it “will deploy its TrustWell™ certification process to confirm that each element of the natural gas value chain – from the wellhead to the ship at the RGLNG Terminal – has achieved low emissions targets and utilized the highest standards of environmental performance and social responsibility. This partnership will enable the development of a responsibly sourced natural gas supply chain from leading producers in the Permian Basin and Eagle Ford Shale and independent, third-party certification of the GHG intensity of LNG.”<sup>19</sup> In short, all CO<sub>2</sub> captured by the CCS Systems will be subject to an independent, third-party verification process.

Once captured at the RGLNG Terminal, the CO<sub>2</sub> will be transported via a non-jurisdictional pipeline to an EPA-authorized Class VI underground injection well for sequestration. The geologic formations in south Texas are ideal for sequestration of CO<sub>2</sub>. In fact, there are several sequestration sites in very close proximity to the RGLNG Terminal site. In the event that RGLNG needs to sequester the captured CO<sub>2</sub> outside of the RGLNG Terminal site, NextDecade announced an agreement with Oxy Low Carbon Ventures to transport and sequester the CO<sub>2</sub> captured at the RGLNG Terminal<sup>20</sup> and is in discussions with other providers of sequestration services. Any pipeline that is required in order to transport the CO<sub>2</sub> to the sequestration site will not be FERC jurisdictional,<sup>21</sup> and instead will be subject to the jurisdiction of the Texas Railroad Commission (“TXRRC”), Texas Commission on Environmental Quality, and other Texas agencies. Such

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<sup>19</sup> *NextDecade and Project Canary Launch GHG Measurement and Certification Framework, First for Global LNG Industry* (Apr. 19, 2021), available at <https://www.projectcanary.com/next-decade-and-project-canary-launch-ghg-measurement-and-certification-framework-first-for-global-lng-industry/>.

<sup>20</sup> Reuters, *Occidental unit to transport CO<sub>2</sub> from NextDecade's Texas LNG export project* (Mar. 25, 2021), available at <https://www.reuters.com/article/us-nextdecade-rio-grande-lng-plant/occidental-unit-to-transport-co2-from-nextdecades-texas-lng-export-project-idUSKBN2BH3AH>.

<sup>21</sup> In fact, FERC previously has disclaimed jurisdiction over carbon pipelines under both the NGA, see *Cortez Pipeline Co.*, 7 FERC ¶ 61,024 (1979), and the Interstate Commerce Act, see *Cortez Pipeline Co.*, 45 Fed. Reg. 85,177 (1980). The latter decision was issued by the Interstate Commerce Commission, FERC's predecessor with regard to jurisdiction over interstate oil and oil product pipelines.

pipeline will be very short, likely fewer than 10 miles given the facility's proximity to geologic formations optimal for CO<sub>2</sub> sequestration.

CO<sub>2</sub> will be stored in the pore space pursuant to Class VI injection well permitting for CO<sub>2</sub> sequestration, an EPA-administered permit program which includes meaningful public engagement. This existing federal regulatory framework is rigorous and capable of managing permitting and review actions while protecting the environment, public health, and safety as carbon capture, utilization, and sequestration projects move forward in the United States.<sup>22</sup> Accordingly, RGLNG is currently working under the guidelines provided by the EPA to advance the CCS Systems.

RGLNG has begun conducting site characterization of favorable storage sites under EPA guidelines among various initial steps required for EPA Class VI permitting for geological sequestration. Site characterization consists of extensive review of the area(s) proposed for geological storage of CO<sub>2</sub> to ensure adequate geology exists to accept the anticipated volume of CO<sub>2</sub> to be injected over time and to ensure the CO<sub>2</sub> remains contained underground with no possibility of contaminating underground sources of drinking water or leaking to the surface.

## **V. PUBLIC INTEREST**

Pursuant to Section 3(a) of the NGA, “[t]he Commission shall issue [an] order upon application, unless...it finds that the proposed exportation...will not be consistent with the public interest.”<sup>23</sup> Section 153.7(c) of the Commission's regulations, which implements Section 3(a) of the NGA, requires a showing that the proposal is not inconsistent with the public interest.<sup>24</sup>

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<sup>22</sup> As noted by the Council on Environmental Quality Report to Congress on Carbon Capture, Utilization, and Sequestration (CCUS), Delivered to the Committee on Environment and Public Works of the Senate and the Committee on Energy and Commerce, the Committee on Natural Resources, and the Committee on Transportation and Infrastructure of the House of Representatives, as directed in Section 102 of Division S of the Consolidated Appropriations Act, 2021.

<sup>23</sup> 15 U.S.C. § 717b(a).

<sup>24</sup> 18 C.F.R. § 153.7(c) (2020).

In the Authorization Order, the Commission already has found that construction and operation of the RGLNG Terminal is not inconsistent with the public interest;<sup>25</sup> the Commission has upheld that finding on rehearing.<sup>26</sup> RGLNG respectfully submits to the Commission that amending the existing, approved design of the RGLNG Terminal to incorporate the CCS Systems, and thereby enabling the capture and storage of more than 90% of the RGLNG Terminal's CO<sub>2</sub> emissions, does not negatively impact this prior public interest determination. In fact, incorporation of the CCS Systems into the RGLNG Terminal serves to reinforce the Commission's prior findings.

Climate change, and reducing the anthropogenic CO<sub>2</sub> emissions which exacerbate it, has been recognized as the most important environmental consideration of our time. U.S. Secretary of Energy Jennifer Granholm repeatedly has expressed her support for and the Energy Department's robust engagement on CCS. In her nomination testimony before the U.S. Senate Committee on Energy and Natural Resources, Secretary Granholm referred to "point source carbon capture and removal technolog[y]," such as the CCS Systems, as "essential" to enabling reductions in atmospheric CO<sub>2</sub>.<sup>27</sup> Specifically noting how critical CCS is to achieve climate goals set forth under the Paris Agreement, Secretary Granholm has elaborated on the Department of Energy's position on CCS.

The Intergovernmental Panel on Climate Change has said that you can't get to net-zero carbon emissions without carbon capture, utilization and storage (CCUS). We are excited about that. Obviously, it's still nascent technology in capturing CO<sub>2</sub> emissions, but we've got to do it on all types of fuel, if we're going to get to net zero.

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<sup>25</sup> See, e.g. Authorization Order, 169 FERC ¶ 61,131 at P 25.

<sup>26</sup> Order on Rehearing, 170 FERC ¶ 61,046 at P 123.

<sup>27</sup> *The Nomination of the Honorable Jennifer M. Granholm to be Secretary of Energy, U.S. Senate Committee on Energy and Natural Resources*, 117th Congress (2021) (Statement of the Honorable Jennifer M. Granholm).

I'm really excited about it, especially for communities in transition. You think of Appalachia, for example: They have coal; they have natural gas. Those workers, if they're interested, could shift skills to be able to do installation of this technology. The CO2 pipelines that will be necessary for it could put lots of people to work, so I think it's a big job opportunity, I think it's a big carbon reduction opportunity, and we're going to be bullish about it.<sup>28</sup>

These views, representing the views of the Biden Administration, reflect a commitment to deploying CCS technologies and processes to achieve the country's climate objectives.

Seeking to combat climate change, the United Nations Framework Convention on Climate Change ("UNFCCC") has recognized CCS systems such as those proposed by RGLNG as a measure that can "play a significant role in mitigating carbon emissions in the future, and is a key technology for the decarbonization of the energy sector in the long term."<sup>29</sup> CCS technologies have been further cited as critical to meeting the goals of the landmark 2015 Paris Climate Agreement.<sup>30</sup>

Through this Limited Amendment, RGLNG seeks to answer the call for increased incorporation of CCS technology in the natural gas sector, and become an industry leader in producing greener LNG. By implementing CCS technology into the design of the RGLNG Terminal, enhanced and made cost-effective by NEXT Carbon Solutions' proprietary carbon capture process, RGLNG will be able to export significantly less carbon-intensive LNG, providing the world with a cleaner fuel source, while demonstrating the feasibility of doing so to the broader

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<sup>28</sup> Lesley Clark and Jeremy Dillon, *Granholm on coal, carbon capture, DOE's net-zero playbook*, Politico Pro (Mar. 8, 2021) [subscription required]. See also U.S. Department of State Online Press Briefing with Energy Secretary Jennifer Granholm (Sep. 22, 2021) (noting that DOE has been "actively working with the Greek Government on carbon capture, use, and sequestration technology to remove CO2 emissions at its remaining coal plant") <https://www.state.gov/online-press-briefing-with-energy-secretary-jennifer-granholm/>; U.S. Secretary of Energy Jennifer Granholm (@SecGranholm), Twitter (Aug. 4, 2021, 4:51 PM), <https://twitter.com/secgranholm/status/1423023737289408512?lang=en> (stating that carbon capture will "help us to combat the climate crisis and create jobs).

<sup>29</sup> UNFCCC Website: *Thematic Areas - Carbon capture, use, and storage*, <https://unfccc.int/resource/climateaction2020/tep/thematic-areas/carbon-capture/index.html>.

<sup>30</sup> United Nations UN News report, *UN report calls for scaling-up carbon capture, use and storage* (Mar. 3 2021), available at <https://news.un.org/en/story/2021/03/1086312>.

energy and industrial sectors. The need for cleaner, American energy sources is particularly evident as European markets, highly dependent on Russian natural gas supplies, are experiencing record-high natural gas prices,<sup>31</sup> while the European Union has sought to have LNG suppliers reduce their GHG emissions.

Such a significant reduction in CO<sub>2</sub> emissions also will naturally result in an immediate reduction in the project's already minor impacts on local environmental justice communities in south Texas, leading to an even more sustainable contribution to the area. Most importantly, given the long-term nature of climate change impacts, by reducing CO<sub>2</sub> emissions to such a substantial and meaningful extent, RGLNG believes that the CCS Systems address future impacts on these communities.

RGLNG respectfully submits that approval of the Limited Amendment, enhancing the already substantial benefits of the RGLNG Project<sup>32</sup> by allowing the incorporation of CCS technology and processes enabling the capture of over 90% of the RGLNG Project's CO<sub>2</sub> emissions, is not inconsistent with the public interest and provides considerable additional public benefits above and beyond those already recognized and approved by the Commission.

## **VI. PERMITS, APPROVALS, AND CONSULTATIONS**

As with many modifications to the physical LNG facilities, the U.S. Pipeline and Hazardous Materials Safety Administration ("PHMSA") will need to review the proposed CCS systems and tie-ins to the RGLNG Terminal to assess any impacts on its previous conclusions in

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<sup>31</sup> Vladimir Soldatkin and Katya Golubkova, *European gas prices hit all-time highs as Russian flows slump*, Reuters.com, (Oct. 1, 2021), available at <https://www.reuters.com/business/energy/european-gas-prices-hit-all-time-highs-russian-flows-slump-2021-10-01/>.

<sup>32</sup> RGLNG has previously submitted to the Commission the public benefits of construction and operation of the RGLNG Terminal, including employment of up to approximately 5,200 temporary and 270 permanent workers, and tax revenues to local entities in Cameron County, Texas of over \$260 million over 25 years of RGLNG Terminal operations. See May 5, 2016 Application of Rio Grande LNG, LLC, et al. at 25-26. RGLNG incorporates by reference these and the other benefits noted in the May 5, 2016 Application.

its October 15, 2020, Letter of Determination related to safety hazards associated with the RGLNG Terminal. RGLNG has initiated conversations with PHMSA Engineering & Research Division in order to support that agency's analysis and RGLNG's conclusion that incorporation of the CCS systems result in no new offsite impacts.

As noted above, EPA is responsible for the permitting of Class VI injection wells for CO<sub>2</sub> sequestration. For several months, RGLNG has engaged with EPA and the TXRRC, to which EPA is expected to eventually delegate primacy, to discuss the CCS Systems. Both agencies have expressed significant support for the initiative, recognizing the value that a leading-edge project like RGLNG's CCS Systems can provide in encouraging other large emitters to consider similar actions or to take advantage of technology and/or infrastructure that RGLNG will help bring to market in order to reduce their own emissions.

Exhibit H identifies all permits and authorizations required, as well as RGLNG's activities to date with those agencies relevant to the authorization of the CCS Systems.

## **VII. ENVIRONMENTAL IMPACTS**

In authorizing the RGLNG Terminal, the Commission found pursuant to NEPA that its construction and operation would constitute an "environmentally acceptable" action.<sup>33</sup> Approval of this Limited Amendment and incorporation of the CCS Systems would result in exceedingly minor incremental environmental impacts aside from those already considered,<sup>34</sup> while allowing for the dramatic reduction in the RGLNG Terminal's CO<sub>2</sub> emissions.

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<sup>33</sup> Authorization Order, 169 FERC ¶ 61,131 at P 133.

<sup>34</sup> The Commission has previously held that in an amendment proceeding, comments or concerns regarding a project as a whole, and not with regard to the specific modifications proposed in the amendment, are outside the scope of the proceeding and are therefore not considered. *See, e.g., PennEast Pipeline Co.*, 170 FERC ¶ 61,198, at PP 17, 14 (2020), *on reh'g*, 171 FERC ¶ 61,229 (2020).

As discussed in the attached Environmental Report, the environmental impacts from construction and operation of the CCS Systems would be minor in scale and would be mitigated to less-than-significant levels. The majority of the CCS Systems' components would be located within the existing, already-approved footprint of the RGLNG Terminal, and any additional land needed for the non-jurisdictional CO<sub>2</sub> take-away pipeline would be within existing rights-of-way or obtained via negotiation with the landowner(s). Aside from where the CCS systems would tie-in to the RGLNG Terminal's facilities, no modifications to previously authorized facilities are proposed, and incorporation of the CCS Systems would have no adverse impacts on construction or operation of the RGLNG Terminal. The construction process will take place in five stages, with the start of each train's construction and associated CCS systems ideally occurring between six to nine months after the previous train's commenced construction. RGLNG has developed a staged construction schedule to avoid an excessive amount of pre-investment in supporting utilities and infrastructure that will only be needed when later constructed trains and CCS systems come into operation, which will also reduce peak manpower requirements and thereby reduce environmental impacts. With an average monthly workforce during construction of approximately 600 dedicated to CCS systems, it is estimated that approximately 30% will be locally sourced from the historically underserved counties of Cameron, Willacy, and Hidalgo. At full build-out with five liquefaction trains, operation of the CCS Systems will require the employment of approximately 30 permanent operations workers, not including outside servicing contractors. This permanent workforce will consist primarily of operations workers, maintenance workers, and managers assigned to duties directly relating to running, monitoring, and maintaining CCS operations. A smaller percentage will consist of health, safety, security, environment workers, and general

support staff. Local labor will be hired to the maximum extent practicable. A significant number of operational employees are expected to be hired from the local labor pool.

### **IX. EXEMPTION FROM PRE-FILING**

Given the purpose and scale of the CCS Systems, RGLNG respectfully submits this Limited Amendment be exempt from the Commission's otherwise mandatory pre-filing procedures as set forth in Section 157.21 of the Commission's regulations.<sup>35</sup> Section 157.21(a) of the Commission's regulations states that mandatory pre-filing procedures apply when a prospective applicant seeks authorization to "site, construct and operate" LNG terminal facilities, or when "prospective modifications to an existing LNG terminal...involve significant state and local safety considerations that have not been previously addressed."<sup>36</sup> Section 157.21(a) further provides that examples of such modifications requiring pre-filing review include (but are not limited to) "the addition of LNG storage tanks; increasing throughput requiring additional tanker arrivals or the use of larger vessels; or changing the purpose of the facility from peaking to base load."<sup>37</sup>

As discussed above, the purpose of the CCS Systems is solely to capture and store the RGLNG Terminal's CO<sub>2</sub> emissions. No modifications to the RGLNG Terminal's storage tanks or throughput are proposed, and no additional LNG tankers, or use of larger LNG tankers, would be needed to accommodate the CCS systems. Moreover, the CCS Systems will have no impact on the RGLNG Terminal's operations, and the purpose of the RGLNG Terminal will remain the same: liquefaction and export of up to 27 MPTA of LNG to countries around the globe which depend on reliable, less carbon-intensive supplies of American natural gas. As discussed herein and in the

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<sup>35</sup> 18 C.F.R. § 157.21 (2020).

<sup>36</sup> *Id.*

<sup>37</sup> *Id.*

attached Environmental Report, construction and operation of the CCS systems will not raise any significant state or local safety considerations, and any resulting environmental impacts will be minor in scope, and all mitigated to less-than-significant levels. Accordingly, for the reasons provided, RGLNG avers that this Limited Amendment is exempt from the Commission's pre-filing process, consistent with treatment of prior, similar proposals.<sup>38</sup>

## **IX. OTHER RELATED APPLICATIONS**

There are no other applications before the Commission affecting this Limited Amendment application. In addition to the authorization requested herein, RGLNG will require other federal, state, and local authorizations for the CCS Systems, including but not limited to an EPA UIC Class VI Well permit. RGLNG has included in the attached Exhibit H an updated list of all required permits, authorizations, and certificates for the CCS Systems, the agencies with which the applications for such permits or certificates have been or are expected to be filed, and the status of such permits or certificates.

## **X. REQUIRED EXHIBITS**

RGLNG submits the following additional information as required by FERC's regulations at 18 C.F.R. § 153.8 in support of its request herein. To the extent that any required exhibits have been omitted, RGLNG requests that the Commission treat the omitted material as inapplicable or

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<sup>38</sup> In *Freeport LNG Development, L.P.*, the Commission approved Freeport LNG Development, L.P.'s (Freeport) proposed Noble Gas Project, which modified Freeport's previously authorized LNG Export Terminal to incorporate a non-jurisdictional helium extraction and purification plant, with jurisdictional tie-ins to jurisdictional facilities, similar to how the CCS Systems will be incorporated into the RGLNG Terminal. *Freeport LNG Development, L.P.*, 175 FERC ¶ 61,237 (2021). Prior to submitting its application for the Noble Gas Project, Freeport requested and received a determination from FERC Staff that the Noble Gas Project would not be subject to the Commission's pre-filing procedures, as the Noble Gas project did not modify the facility's purpose, change its throughput, or require additional LNG storage tanks or tankers. See *Freeport LNG Development, L.P.*, Docket No. PF20-2-00 (Commission Staff's Letter Order "Determination of the Applicability of the Pre-Filing Process" issued May 1, 2020).

otherwise unnecessary to fully disclose the nature and extent of the Limited Amendment as described herein.

- |                              |   |
|------------------------------|---|
| Exhibit A<br>§ 153.8(a)(1)   | <b>Formation Documents</b><br>In accordance with 18 C.F.R. § 153.8(b), a Certified Copy of the Certificate of Formation and the Limited Liability Company Agreement of RGLNG is included.   |
| Exhibit B<br>§ 153.8(a)(2)   | <b>Detailed Statement of Financial and Corporate Relationships</b><br>In accordance with 18 C.F.R. § 153.8(b), an explanation of the financial and corporate relationship existing between RGLNG and other persons or corporations is included.                       |
| Exhibit C<br>§ 153.8(a)(3)   | <b>Statement Regarding Authorized Powers</b><br>In accordance with 18 C.F.R. § 153.8(b), an Opinion of Counsel regarding authorized powers is included.   |
| Exhibit D<br>§ 153.8(a)(4)   | <b>Agreement for Border Interconnections</b><br>Agreement for border interconnects - omitted as not applicable.   |
| Exhibit E<br>§ 153.8(a)(5)   | <b>Evidence of Appropriate and Qualified Concern, including Detailed Engineering and Design Information</b><br>In accordance with 18 C.F.R. § 153.8(b), a report containing detailed engineering and design information related to the Limited Amendment is included. |
| Exhibit E-1<br>§ 153.8(a)(6) | <b>Report on Earthquake Hazards and Engineering</b><br>In accordance with 18 C.F.R. § 153.8(b), RGLNG hereby incorporates by reference its report on earthquake hazards and engineering, previously provided to the Commission.                                       |
| Exhibit F<br>§ 153.8(a)(7)   | <b>Environmental Report</b><br>In accordance with 18 C.F.R. § 153.8(b), an Environmental Report containing all appropriate revisions and specific differences resulting from the changes related to this Application is included.                                     |
| Exhibit G<br>§ 153.8(a)(8)   | <b>Geographic Map</b><br>In accordance with 18 C.F.R. § 153.8(b), RGLNG hereby incorporates by reference its previously submitted Exhibit G.  |

Exhibit H  
§ 153.8(a)(9)

**List of Federal Authorizations**

In accordance with 18 C.F.R. § 153.8(b), an updated list of all required permits and certificates for the CCS Systems is included.

Federal Register Notice

A form of notice suitable for publication in the *Federal Register* is attached.

**XI. CONCLUSION**

For the reasons discussed above, RGLNG respectfully requests that the Commission expeditiously grant the instant Limited Amendment and authorize RGLNG to amend its authorization to site, construct, and operate the RGLNG Terminal, to allow for the incorporation of the CCS Systems as described herein.

Respectfully submitted,

/s/ David L. Wochner

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david.wochner@klgates.com

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*Counsel for Rio Grande LNG, LLC*

Dated: November 17, 2021

**Exhibit A**

Certificate of Formation of Rio Grande LNG, LLC



## Office of the Secretary of State

### Certificate of Fact

The undersigned, as Deputy Secretary of State of Texas, does hereby certify that the document, Certificate of Formation for Rio Grande LNG, LLC (file number 801969331), a Domestic Limited Liability Company (LLC), was filed in this office on April 09, 2014.

It is further certified that the entity status in Texas is in existence.

In testimony whereof, I have hereunto signed my name officially and caused to be impressed hereon the Seal of State at my office in Austin, Texas on September 21, 2021.



A handwritten signature in black ink, appearing to read "Jose A. Esparza".

Jose A. Esparza  
Deputy Secretary of State

Form 205  
(Revised 05/11)

Submit in duplicate to:  
Secretary of State  
P.O. Box 13697  
Austin, TX 78711-3697  
512 463-5555  
FAX: 512 463-5709  
Filing Fee: \$300



**Certificate of Formation  
Limited Liability Company**

This space reserved for office use.

**FILED**  
In the Office of the  
Secretary of State of Texas

**APR 09 2014**

**Corporations Section**

**Article 1 – Entity Name and Type**

The filing entity being formed is a limited liability company. The name of the entity is:

Rio Grande LNG, LLC

The name must contain the words "limited liability company," "limited company," or an abbreviation of one of these phrases.

**Article 2 – Registered Agent and Registered Office**

(See instructions. Select and complete either A or B and complete C.)

A. The initial registered agent is an organization (cannot be entity named above) by the name of:

**National Registered Agents, Inc.**

OR

B. The initial registered agent is an individual resident of the state whose name is set forth below:

*First Name* *M.I.* *Last Name* *Suffix*

C. The business address of the registered agent and the registered office address is:

1999 Bryan Street, Suite 900 Dallas TX 75201  
*Street Address* *City* *State* *Zip Code*

**Article 3—Governing Authority**

(Select and complete either A or B and provide the name and address of each governing person.)

A. The limited liability company will have managers. The name and address of each initial manager are set forth below.

B. The limited liability company will not have managers. The company will be governed by its members, and the name and address of each initial member are set forth below.

**GOVERNING PERSON 1**

NAME (Enter the name of either an individual or an organization, but not both.)

IF INDIVIDUAL

Kathleen Eisbrenner  
*First Name* *M.I.* *Last Name* *Suffix*

OR

IF ORGANIZATION

*Organization Name*

**ADDRESS**

3 Waterway Square Place, Suite 400 Houston TX USA 77380  
*Street or Mailing Address* *City* *State* *Country* *Zip Code*

<b>GOVERNING PERSON 2</b>				
NAME (Enter the name of either an individual or an organization, but not both.)				
IF INDIVIDUAL				
First Name	M.I.	Last Name	Suffix	
OR				
IF ORGANIZATION				
Organization Name				
ADDRESS				
Street or Mailing Address		City	State	Country Zip Code

<b>GOVERNING PERSON 3</b>				
NAME (Enter the name of either an individual or an organization, but not both.)				
IF INDIVIDUAL				
First Name	M.I.	Last Name	Suffix	
OR				
IF ORGANIZATION				
Organization Name				
ADDRESS				
Street or Mailing Address		City	State	Country Zip Code

**Article 4 – Purpose**

The purpose for which the company is formed is for the transaction of any and all lawful purposes for which a limited liability company may be organized under the Texas Business Organizations Code.

**Supplemental Provisions/Information**

Text Area: [The attached addendum, if any, is incorporated herein by reference.]

**Organizer**

The name and address of the organizer:

James A. Cogan

*Name*

1001 McKinney, Suite 1600

*Street or Mailing Address*

Houston

*City*

TX 77002

*State Zip Code*

**Effectiveness of Filing** (Select either A, B, or C.)

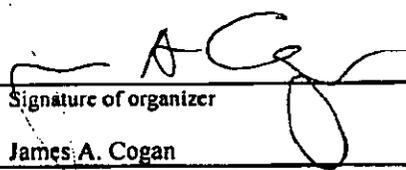
- A.  This document becomes effective when the document is filed by the secretary of state.
- B.  This document becomes effective at a later date, which is not more than ninety (90) days from the date of signing. The delayed effective date is: \_\_\_\_\_
- C.  This document takes effect upon the occurrence of the future event or fact, other than the passage of time. The 90<sup>th</sup> day after the date of signing is: \_\_\_\_\_

The following event or fact will cause the document to take effect in the manner described below:

**Execution**

The undersigned affirms that the person designated as registered agent has consented to the appointment. The undersigned signs this document subject to the penalties imposed by law for the submission of a materially false or fraudulent instrument and certifies under penalty of perjury that the undersigned is authorized to execute the filing instrument.

Date: 4/8/14



Signature of organizer

James A. Cogan

Printed or typed name of organizer

**Exhibit A**

Limited Liability Company Agreement

**COMPANY AGREEMENT****OF****RIO GRANDE LNG, LLC**

This Company Agreement of Rio Grande LNG, LLC, a Texas limited liability company (the "Company"), is adopted pursuant to the Texas Limited Liability Company Act to be effective on April 9, 2014, by the undersigned Members of the Company.

**ARTICLE 1**  
**DEFINITIONS**

1.1 Certain Definitions. The following terms shall have the meanings specified below when used in this Company Agreement unless otherwise expressly specified herein to the contrary:

(a) Accounting Year means the Company's accounting year for accounting and tax purposes, which shall be the twelve month period from January 1<sup>st</sup> through December 31<sup>st</sup> of each calendar year.

(b) Act means the Texas Limited Liability Company Act, as such statute may be amended from time to time. All references herein to the Act shall include any corresponding provision or provisions of succeeding law.

(c) Additional Contribution means those contributions required of the Members as permitted herein that are in excess of the Agreed Contribution.

(d) Agreed Contribution means any sum that a Member has agreed in writing to make as an Initial Contribution to the Company.

(e) Authorized Purposes shall mean the purposes of the Company specified in the Certificate of Formation or as may be authorized by a vote of a majority of all Members in accordance with Texas law and the provisions of this Company Agreement.

(f) Capital Account means, with respect to any Member, the account maintained for such Member in accordance with Section 4.4 of this Company Agreement.

(g) Capital Contribution means any Initial Contribution, Additional Contribution or Optional Contribution to the capital of the Company in cash or property when and as such contribution is actually made to the Company by a Member.

(h) Certificate of Formation means the Certificate of Formation of the Company as filed with the Secretary of State of the State of Texas effective on the 9<sup>th</sup> day of April, 2014, under Filing Number 801969331, as the same may be amended from time to time as provided in the Act and this Company Agreement.

(i) Code means the Internal Revenue Code of 1986, as amended.

(j) Company means Rio Grande LNG, LLC, a Texas limited liability company organized pursuant to the Act.

(k) Company Agreement means this Company Agreement as originally adopted and as may be amended from time to time as herein provided.

(l) Distributable Cash means the amount by which: (a) the aggregate amount of all cash and other current funds on account from time to time held by the Company on hand or in bank accounts or other temporary investments pending distribution, exceeds; (b) the aggregate amount of all amounts paid or set aside by the Company for; (c) all principal and interest payments on indebtedness of the Company and all other sums payable to lenders; (d) all cash expenditures incurred incident to the normal operations of the Company's business; and (e) such cash reserves as the Members deem reasonably necessary for the proper operation of the Company's business.

(m) Initial Contribution means the initial Capital Contribution to the Company that each Member has agreed to make.

(n) Initial Ownership Interest means the initial ownership interest, expressed in units, of the Members of the Company as of the date hereof, and which are specified on Schedule A attached hereto.

(o) Losses means the losses and deductions of the Company for each Accounting Year determined in accordance with accounting principles consistently applied from year to year under the Company's Method of Accounting and as reported, separately or in the aggregate as appropriate, on the Company's information tax return filed for federal income tax purposes, plus any expenditures described in Section 705(a)(2)(B) of the Code.

(p) Manager, Managers or Board of Managers, as the case may be, means that person or those persons, or entity, if any, who from time to time shall have been granted the right and authority by a majority of the Members to act for, and manage, the Company.

(q) Member means each person or legal entity designated as a Member of the Company on Schedule A, which is attached hereto and hereby made a part hereof by reference for all purposes, any successor to all or any part of any such person's Ownership Interest in the Company who has been duly admitted as a Member of the Company in accordance with this Company Agreement, and any other person admitted as an additional Member of the Company in accordance with this Company Agreement.

(r) Members means all Members of the Company collectively in their capacity as Members of the Company (unless reference is made in specific instances to a smaller group of Members).

(s) Method of Accounting shall mean an accrual method of accounting.

(t) Officer or Officers means such officer or officers appointed by the Managers or the Member pursuant to the provisions of Article III of this Company Agreement.

(u) Optional Contribution means any voluntary contribution by a Member of cash or property, real or personal, to the Company which is accepted by the Company following approval by a majority of all Members, and which is in addition to such Member's Agreed Contribution.

(v) Ownership Interest means any ownership interest, expressed as a percentage of all Ownership Interest in the Company.

(w) Principal Office means 3 Waterway Square Place Ste. 400, The Woodlands, Texas 77380.

(x) Profit means, for each Accounting Year (or portion thereof, as may be applicable), the income and gains of the Company determined in accordance with accounting principles consistently applied under the Company's Method of Accounting and as reported, separately or in the aggregate as appropriate, on the Company's tax return filed for federal income tax purposes, plus any income described in Section 705(a)(1)(B) of the Code.

(y) Registered Agent means the registered agent for the Company specified in the Certificate of Formation, as such registered agent may be changed from time to time in accordance with the Act.

(z) Registered Office means the registered office for the Company specified in the Certificate of Formation, as such registered office may be changed from time to time in accordance with the Act.

(aa) Term means the term of existence of the Company, which shall be perpetual commencing after the date on which the Certificate of Formation was filed with the Secretary of State in the State of Texas, unless the Company is earlier dissolved in accordance with the provisions of either this Company Agreement or the Act.

1.2 Additional Definitions. Additional terms which are defined in other provisions of this Company Agreement shall have the meanings assigned to such terms in such provisions.

## **ARTICLE II** **MEMBERS**

2.1 Place of Meetings of Members. All meetings of the Members shall be held at the Principal Office of the Company or at such other place within or without the State of Texas as may be determined by the Manager.

2.2 Annual Meetings of Members. The annual meeting of the Members for the transaction of such business by the Members as may properly come before the meeting, shall be held at such time and on such date as determined by the Manager.

2.3 Special Meetings of Members. Special meetings of the Members may be called by any Member at any time for the consideration of any business of the Company.

2.4 Notices of Meetings of Members. Notice of any meeting of Members may be given by any Member to the other Members orally or in writing stating the place, date and time of the meeting and delivered not less than five (5) days nor more than thirty (30) days prior to the date of such meeting.

2.5 Waiver of Notice. Attendance of a Member at any meeting shall constitute a waiver of notice of such meeting, except where the Member attends a meeting for the express purpose of objecting to the transaction of business at such meeting because such Member was not properly notified of such meeting and was therefore unable to properly prepare.

2.6 Quorum of Members. A majority of all Members shall constitute a quorum at all meetings of the Members, except as otherwise provided by law or the Certificate of Formation. Once a quorum of Members is present at a meeting of the Members, the subsequent withdrawal from the meeting of any Member prior to adjournment or the refusal of any Member to vote shall not affect the presence of a quorum at the meeting. If, however, such quorum shall not be present at any meeting of the Members, the Members present shall have the power to adjourn the meeting from time to time, without notice other than

announcement at the meeting, until Members owning the requisite amount of Ownership Interest shall be present or represented.

2.7 Voting at Meetings of Members. At any meeting of the Members at which a quorum is present, the vote of Members that are present in person or by proxy representing a majority of all Members shall be the act of the Members, unless the vote of a greater percentage of the Ownership Interest is required by law, the Certificate of Formation or this Company Agreement.

2.8 Voting by Proxy. Each Member shall be authorized to vote by proxy at any meeting of the Members. Each proxy must be executed in writing by the Member or such Member's duly authorized attorney-in-fact. No proxy shall be valid more than eleven (11) months after the date of its execution. Each proxy shall be revocable unless the proxy form states conspicuously that the proxy is irrevocable and the proxy is coupled with an interest.

2.9 Members of Record. The Company shall be entitled to treat the holder of record of any Ownership Interests as the holder in fact of such Ownership Interests for all purposes. Accordingly, the Company shall not be bound to recognize any equitable or other claim to or interest in any Ownership Interests on the part of any other person which is not reflected on the transfer records of the Company, whether or not it shall have actual or other notice of such claim or interest, except as expressly provided to the contrary by this Company Agreement or applicable law.

2.10 Actions by Members Without a Meeting. Any action required by the Act or this Company Agreement to be taken by the Members at a meeting may be taken by the Members without a meeting, without prior notice and without a vote, if a written consent or consents, setting forth the action so taken, shall be signed by Members having not less than the minimum number of votes which would be necessary to take such action at a meeting at which all Members entitled to vote on the action were present and voted.

2.11 Meetings by Conference Telephone. Subject to the provisions of this Company Agreement regarding notice and waiver thereof, annual and special meetings of the Members may be conducted by conference telephone call or other electronic means allowing all Members present at such meeting to communicate among themselves.

2.12 Ultimate Control by Members. Although the day to day operations of the Company will be managed by Managers as set forth in Article III below, the Members shall have ultimate control and decision making powers of the Company and may instruct the Managers with regard to material decisions of or actions to be taken by the Company.

### **ARTICLE III**

#### **RIGHTS AND DUTIES OF MANAGERS AND OFFICERS**

3.1 Management Powers. All day-to-day business and affairs of the Company, including contracting (including registering and executing all contracts) for, or incurring, debts, liabilities and other obligations on behalf of the Company, may be exercised by any Manager subject to ultimate direction and control by the Members.

3.2 Contracts and Obligations. Any debts, liabilities or other obligations to be incurred by the Company, including any contracts and/or other instruments that obligate the Company, must be authorized and executed on behalf of the Company by any Manager or, as instructed by the Manager, by the President or other officers of the Company as set forth in Section 3.5 below.

3.3 Removal or Designation of a Manager. A majority of the Members may at any time, and from time to time, remove any serving Manager and designate and appoint a Member or any other person, persons, or legal entity, to serve as the replacement Manager with such powers as may, in writing, be granted to any Manager or the Member.

3.4 Resignation of Manager. Any serving Manager may resign as Manager at any time upon thirty (30) days written notice to the Members.

3.5 Officers. Pursuant to the provisions of the Texas Business Organizations Code, Section 3.103, the Manager(s) or Member of the Company may appoint and remove officers, including a President, a Chief Operating Officer, one or more Vice Presidents, a Chief Financial Officer, a Treasurer and a Secretary. The President shall have power and authority to manage the day-to-day business and affairs of the Company as authorized by the Manager(s), including contracting and executing all contracts for, or incurring, debts, liabilities and other obligations on behalf of the Company. Any Vice President may also execute contracts on behalf of the Company as authorized by the Manager(s). The other officers of the Company shall have such power and authority approved by the Managers or the Member and shall otherwise possess such powers and perform such duties customary for officers of Texas, domestic entities and as otherwise authorized by the Act and the Texas Business Organizations Code.

#### **ARTICLE IV** **CONTRIBUTIONS TO CAPITAL**

4.1 Initial Contributions. Concurrently with the adoption of this Company Agreement, each Member shall contribute cash and/or property to the capital of the Company in the amount of the Initial Contribution of such Member and shall receive his interest, all as set forth on Schedule A hereto.

4.2 Additional Contributions. If, at any time, the revenues and other funds available to the Company are not adequate to meet its obligations, then any Manager may call a meeting of Members for the purpose of approving a Call for Additional Contributions in the amount of the funds required to defray such deficiency. Upon the approval of such Call for Additional Contributions by a majority of all Members, each Member shall make a contribution to the Company in the amount of such Member's pro-rata share of such Call for Additional Contributions, determined in accordance with the Members' respective Ownership Interest. Each such Additional Contribution shall be due and payable within ten (10) days after the approval of such Call for Additional Contributions. The obligation of each Member to make an Additional Contribution to the Company, which is required and authorized in the manner herein prescribed, shall be a nonrecourse obligation which is enforceable only against the Ownership Interests of the Member failing to make such Additional Contribution by means of a forced sale of such Ownership Interests by the Managers.

4.3 Optional Contributions. Any Member may at any time, and from time to time, make voluntary contributions to the capital of the Company, of cash or property, real and/or personal, which is acceptable to the Managers.

4.4 Maintenance of Capital Accounts. A separate Capital Account shall be established and maintained for each Member and shall be increased and decreased in accordance with the following provisions:

(a) Each Member's Capital Account will be increased by (1) the amount of money contributed by such Member to the Company; (2) the fair market value of any property contributed by such Member to the Company; (3) the amount of any liabilities of the Company that are assumed by such Member, or that are secured by any property distributed by the Company to such Member and (4) the amount of Profits allocated to such Member.

(b) Each Member's Capital Account will be decreased by (1) the amount of money distributed to such Member by the Company; (2) the fair market value of any property distributed to such Member by the Company; (3) the amount of any liabilities of such Member that are assumed by the Company or that are secured by any property contributed by such Member to the Company; and (4) the amount of Losses allocated to such Member.

4.5 Compliance with Code and Treasury Regulations. The Members intend that the terms of this Company Agreement regarding the computation and maintenance of the Capital Accounts of the Members shall comply in all respects with the provisions of Section 704(b) of the Code and Treasury Regulations Section 1.704-1(b)(2)(iv) and other applicable provisions of any succeeding law or regulation. The Company shall make such adjustments as may from time to time be necessary in order to effectuate the intent of the Members with respect to such compliance.

4.5 Effect of Transfers. In the event of a permitted sale or other disposition of Ownership Interests in the Company, the Capital Account of the transferor shall become the Capital Account of the transferee to the extent such Capital Account relates to the transferred portion of the Ownership Interests.

4.6 No Interest on Capital Contributions. No Member shall be entitled to receive any interest on such Member's Capital Contributions to the Company.

4.7 Withdrawal of Capital Contributions. No Member shall have the right to withdraw all or any part of such Member's Capital Contribution, or to receive any return on or of any part of such Member's Capital Contribution.

4.8 No Priority. No Member shall have priority over any other Member, either as to the return of Capital Contributions or as to Profits, Losses or distributions; provided, however, that this subsection shall not apply to loans which a Member or Members have made to the Company with the approval of the Manager.

4.9 Negative Capital Accounts. No Member shall at any time have any liability to the Company or the other Members for any negative balance in such Capital Accounts except to the extent that such negative balance arose as the result of distributions in violation of this Company Agreement or applicable law.

4.10 Limited Liability of Members. No Member shall be liable for the debts, obligations or liabilities of the Company beyond the total of such Member's Contributions to the Company. Except as otherwise permitted by Section 4.02 above, no Member shall be required to make any Capital Contribution or loan to the Company beyond the amount of such Member's Agreed Contribution.

## **ARTICLE V**

### **ALLOCATIONS AND DISTRIBUTIONS**

5.1 Allocations of Profits and Losses. The Profits and Losses of the Company for each Accounting Year (or a portion thereof) shall be allocated among the Members in proportion to their respective Ownership Interest in the Company. Any credit available for federal income tax purposes shall be allocated among the Members in the same manner.

5.2 Interim Distributions. Interim distributions of Distributable Cash shall be made, not less often than annually and at such other times as shall be determined by the Manager, by the Company to the Members pro-rata in accordance with their respective Ownership Interest.

5.3 Distribution on Withdrawal. A Member who has completed the payment of all of such Member's Agreed Contribution to the Company and any Additional Contributions required as permitted by Section 4.02 above, and who thereafter withdraws from the Company with the consent of the Manager, shall receive an amount equal to the book value of such Member's Ownership Interests in the Company, determined as of the end of the Accounting Year next preceding the effective date of such withdrawal. Such amount shall be paid by the Company to such Member in cash without interest within one (1) year after the effective date of such withdrawal.

5.4 Distributions on Termination. Upon the dissolution and winding-up of the Company, its assets shall be distributed in the manner prescribed in Section 8.04 hereof.

5.5 Limitation on Distributions. Any other provision hereof to the contrary notwithstanding, no interim distribution, withdrawal distribution or termination distribution to any Member shall be declared and paid unless, after the distribution is made, the fair market value of the assets of the Company will be in excess of all liabilities of the Company other than liabilities to the Members on account of their Capital Contributions.

5.6 Distributions in Kind. Regardless of the form of a Member's Capital Contribution to the Company, such Member shall not be entitled to demand or receive a distribution from the Company in any form other than cash.

## **ARTICLE VI**

### **ACCOUNTING AND TAX MATTERS**

6.1 Books and Records. At the expense of the Company, the Members, Managers and Officers shall maintain full and complete books and records of the operations and expenditures of the Company at the Principal Office of the Company. Such books and records shall include, without limitation, the following:

- (a) A current list that states the name and mailing address of each Member and the Ownership Interests in the Company owned by each such Member;
- (b) Copies of the federal, state and local information or income tax returns for each of the Company's six most recent tax years;
- (c) A copy of the Certificate of Formation and this Company Agreement, together with all amendments or restatements thereof, executed copies of any powers of attorney and copies of any document that creates, in the manner provided by the Certificate of Formation or this Company Agreement, if any, classes or groups of Members;
- (d) Unless contained in this Company Agreement, a written statement of the following:
  - (1) The amount of the cash Capital Contribution and a description and statement of the agreed value of any other Capital Contribution made by each Member;
  - (2) The events requiring Additional Contributions to be made;
  - (3) The events requiring the Company to be dissolved and its affairs wound up; and
  - (4) The date on which each Member in the Company became a Member.

(e) Correct and complete books and records of account of the Company maintained in accordance with its Method of Accounting.

6.2 Tax Returns. The Members shall cause the timely preparation and filing of all tax returns required to be filed by the Company pursuant to the Code and all other tax returns deemed necessary and required in each jurisdiction in which the Company does business. Copies of such returns, or pertinent information therefrom, shall be furnished to all Members within seventy-five (75) days after the end of each Accounting Year of the Company.

6.3 Tax Elections. All tax elections permitted to be made by the Company under federal, state or local laws shall be made by the Manager.

## **ARTICLE VII**

### **TRANSFERS OF OWNERSHIP INTEREST**

7.1 Transfers in General. Except as expressly limited by the Certificate of Formation, this Company Agreement, or by any other written agreement unanimously approved by the Members, each Member shall have the right to sell, transfer or assign all or any portion of such Member's Ownership Interests in the Company.

7.2 Tax Restrictions on Transfers. Any other provision hereof to the contrary notwithstanding, no Member shall sell, transfer or assign, any portion of such Member's Ownership Interests without first offering to sell such Ownership Interest to the other Members of the Company upon the same terms and conditions as the proposed sale.

7.3 Termination of Member's Membership. Upon the death, retirement, resignation, expulsion, bankruptcy, legal incapacity or dissolution of a Member, or the occurrence of any other event (other than an assignment as herein provided) which terminates a Member's continued membership in the Company, the liquidator, personal representative, trustee, receiver, or other representative of the estate of such Member, shall have all the rights of a Member for purposes of settling or managing such estate and such power as the Member possessed to assign all or any part of such Member's Ownership Interests and to join with the assignee in satisfying conditions precedent to such assignee's becoming a substituted Member.

7.4 Assignment Procedures. Subject to the foregoing restrictions, and unless otherwise unanimously agreed in writing to the contrary by the Members, all or any part of a Member's Ownership Interests (the "Assigned Interest") may be transferred by such assigning Member (the "Assignor") to the assignee (the "Assignee") named in a written instrument of assignment (the "Assignment") in form and substance satisfactory to the Company and which otherwise complies with the provisions of this Company Agreement. An Assignment shall be duly executed and acknowledged by the Assignor and the Assignee (or their respective personal representatives or authorized agents) and shall contain an agreement by the Assignee to be bound by all of the terms of this Company Agreement. The Assignment shall be delivered to the Company and shall be accompanied by such evidences of authority, such assurances of genuineness and effectiveness, such consents, approvals or waivers of governmental or other authorities and such other documentation as may reasonably be required by the Company. Such Assignment and other documentation shall be accompanied by a payment to the Company of such amount as shall be reasonably required as reimbursement by the Company for its costs and expenses paid or incurred in connection with such Assignment. Any such Assignment shall be effective, as to the Company, as of the later of (i) the effective date specified in such Assignment; or (ii) the date on which such Assignment has been determined by the Company to conform to the requirements of this Company Agreement and has been duly recorded in the books of the Company.

7.5 Effect of Assignment. No Assignment, other than an assignment to a corporation, company or partnership that, following such assignment, is controlled by or under common control with the assigning Member, shall entitle the Assignee to become, or to exercise the rights or powers of, a Member of the Company until and unless the requirements of Section 7.7 hereof have been satisfied. Whether or not an Assignee becomes a Member of the Company, the Assignor shall not be released from the Assignor's liability to the Company with respect to the Assigned Interest until and unless an Assignee becomes a Member in accordance with Section 7.7 hereof, the Assignor will continue to be a Member with respect to the Assigned Interest and will continue to have the power to exercise any rights or powers of a Member with respect to such Assigned Interest, except to the extent that such rights or powers are assigned; provided, however, that the assignment of such rights or powers shall, except as otherwise expressly provided herein to the contrary, be binding only as between the Assignor and the Assignee and the Company may continue to rely on the exercise of such rights and powers by the Assignor as to the Assigned Interest until and unless the Assignee becomes a Member in the manner herein prescribed with respect to the Assigned Interest. Except as otherwise provided in the preceding sentence, an Assignor who has assigned all of such Assignor's Ownership Interests shall cease to be a Member of the Company.

7.6 Rights of Assignees. An Assignee who has not become a Member shall be entitled to receive distributions from the Company with respect to the Assigned Interest from and after the effective date of the Assignment.

7.7 Admission of Assignees as Members. Any assignment of all or any part of a Member's interest (i) to a corporation, company or partnership that, immediately following such assignment, is controlled by or under common control with such assigning Member shall, after written notice to the other Members accompanied by the assigning Member's representation that he will be in control of or under common control with the Assignee following such assignment, will automatically result in such Assignee being admitted as a Member to the extent of such Assignee's ownership in the Company. No Assignor shall have the right to substitute an Assignee as a Member with respect to any Assigned Interest other than the substitution of an Assignee that, immediately following such assignment, is controlled by the Assignor. Subject to the foregoing any such Assignee may be admitted as a Member of the Company with respect to the Assigned Interest only with the written consent of the Managers, which consent may be granted or withheld in the sole discretion of the Managers. The foregoing provisions notwithstanding, however, any Assignee who was a Member prior to and at the time of any Assignment shall automatically be entitled to exercise the rights of a Member with respect to the Assigned Interest without any further action on the part of the other Members.

7.8 Admission of New Members. Any person may become a Member by purchasing a new Ownership Interest from the Company on such terms and conditions as shall have been approved by the unanimous act of all Members.

7.9 Withdrawal of Members. Any Member may withdraw or resign as a Member of the Company by giving not less than thirty (30) days' prior written notice of such withdrawal or resignation to the Company; provided, however, that any Member who has not completed the payment of such Member's Agreed Contribution to the Company may not withdraw or resign as a Member of the Company without the prior written consent of a majority of the other Members, which consent may be granted to withheld in the sole discretion of such other Members.

7.10 Transferability. Notwithstanding anything contained herein to the contrary, each Member shall be permitted to pledge or hypothecate any or all of its Ownership Interests, including all interests, economic rights, control rights and status rights as a Member, to any lender to the Company or an affiliate of the Company or any agent acting on such lender's behalf, and any transfer of such Ownership Interests pursuant to any such lender's (or agent's) exercise of remedies in connection with any such pledge or

hypothecation shall be permitted under this Company Agreement with no further action or approval required hereunder. Notwithstanding anything contained herein to the contrary, upon a default under the financing giving rise to any pledge or hypothecation of Ownership Interests, the lender (or agent) shall have the right, as set forth in the applicable pledge or hypothecation agreement, and without further approval of any Member and without becoming a Member, to exercise the membership/partnership voting rights of the Member granting such pledge or hypothecation. Notwithstanding anything contained herein to the contrary, and without complying with any other procedures set forth in this Company Agreement, upon the exercise of remedies in connection with a pledge or hypothecation, (a) the lender (or agent) or transferee of such lender (or agent), as the case may be, upon its election to do so, shall become a Member under this Company Agreement and shall succeed to all of the rights and powers, including the right to participate in the management of the business and affairs of the Company, and shall be bound by all of the obligations, of a Member under this Company Agreement without taking any further action on the part of such lender (or agent) or transferee, as the case may be, and (b) following such exercise of remedies, the pledging Member shall cease to be a Member and shall have no further rights or powers under this Company Agreement. The execution and delivery of this Company Agreement by a Member shall constitute any necessary approval of such Member under the Texas Limited Liability Company Act (or any successor statute) to the foregoing provisions of this Section 7.10. This Section 7.10 may not be amended or modified so long as any of the Ownership Interests is subject to a pledge or hypothecation without the pledgee's (or the transferee of such pledgee's) prior written consent. Each recipient of a pledge or hypothecation of the Ownership Interests shall be a third party beneficiary of the provisions of this Section 7.10.

#### **ARTICLE VIII**

#### **DISSOLUTION AND TERMINATION**

8.01 Causes of Dissolution. The Company shall be dissolved upon the earliest to occur of the following events:

- (a) The expiration of the Term of the Company;
- (b) Upon the election to dissolve the Company by the Manager.
- (c) Upon the death, retirement, resignation, expulsion, bankruptcy, legal incapacity or dissolution of any Member unless the business of the Company is continued by the consent of all of the remaining Members within ninety (90) days after the occurrence of such event; or
- (d) The entry of a final decree of judicial dissolution of the Company under section 6.02 of the Act.

8.02 Effect of Dissolution. Upon the dissolution of the Company, the Company shall cease to carry on its business, except insofar as may be necessary for the winding up thereof, and the assets of the Company shall be liquidated as herein provided. Dissolution of the Company shall be effective as of the day on which the event occurs which results in such dissolution, but the Company shall not terminate until there has been a winding-up of the Company's business and affairs and the assets of the Company have been liquidated and distributed as herein provided. Upon the dissolution of the Company, the Company shall cause written notice of its intention to dissolve to be mailed to each known creditor of and claimant against the Company in the manner required by the Act.

8.3 Winding Up Procedures. Upon the dissolution of the Company, the Company shall proceed to collect its assets; convey and dispose of such of its properties as are not to be distributed in kind to the Members; pay, satisfy and discharge its liabilities, or make adequate provision for payment and discharge

thereof; and do all other acts required to liquidate its business and affairs. The Manager may cause any part or all of the assets of the Company to be sold in such manner as he shall determine in an effort to obtain the best prices for such assets.

8.4 Distribution of Assets Upon Dissolution. In settling the accounts of the Company after its dissolution, the assets of the Company shall be applied and distributed in the following order of priority:

(a) First, to the extent otherwise permitted by law, and in accordance with the priorities, if any, established by applicable law, to creditors in satisfaction of liabilities of the Company, including liabilities of the Company to Members who are creditors (other than for distributions and Capital Contributions), whether by payment or establishment of reserves; provided, however, that if the property and assets of the Company are not sufficient to satisfy or discharge all of the Company's liabilities and obligations, the Company shall apply its property and assets so far as they will go to the just and equitable payment of its liabilities and obligations;

(b) Second, to the Members, amounts due and unpaid with respect to distributions to which such Members have previously become entitled;

(c) Third, an amount equal to the then remaining positive balances, if any, in the Capital Accounts of the Members shall be distributed to the Members in proportion to the amounts of such positive balances; and

(d) Fourth, any remaining amount shall be distributed to and among the Members pro-rata in accordance with their respective Ownership Interest.

8.5 Distributions in Kind. If any assets of the Company are distributed in kind, such assets shall be distributed to the Members entitled thereto as tenants in common in the same proportions as the Members would have been entitled to cash distributions if such property has been sold for cash and the net proceeds thereof distributed to the Member. In the event that distributions in kind are made to the Members upon dissolution and liquidation of the Company, the Capital Account balances of such Members shall be adjusted to reflect the Members' allocable share of gain or loss which would have resulted if the distributed property had been sold at its fair market value.

8.6 Certificate of Formation of Dissolution. When all liabilities and obligations of the Company have been paid or discharged, or adequate provision has been made therefor, or in case its property and assets are not sufficient to satisfy and discharge all the Company's liabilities and obligations, then when all the property and assets of the Company have been applied so far as they will go to the just and equitable payment of the Company's liabilities and obligations, and all of the remaining property and assets of the Company have been distributed to its Members according to their respective rights and interests, then Certificate of Formation of Dissolution shall be executed on behalf of the Company by the Members and shall be filed with the Secretary of State of the State of Texas, and the Members shall execute, acknowledge and file any and all other instruments necessary or appropriate to reflect the dissolution and termination of the Company.

## **ARTICLE IX**

### **MISCELLANEOUS PROVISIONS**

9.1 Notices. Any notice, demand or communication required or permitted to be given by any provision of this Company Agreement shall be made in writing, shall be sent or addressed as set forth below and shall be deemed to have been sufficiently given or served for all purposes (I) upon actual receipt thereof, if given by regular mail, personal delivery, courier service, email, facsimile transmission or other

commercially reasonable means; and (ii) upon the earlier of actual receipt or three (3) business days after being deposited in a receptacle for the deposit of mail regularly maintained by the U.S. Postal Service, if given by registered or certified mail, return receipt requested, with postage and charges prepaid. Notices and other communications to the Company shall be sent or addressed to its Principal Office and notices and other communications to the Members shall be sent or addressed to their last known address as it appears on the records of the Company. The Company and any Member shall be entitled to change any such address for notice purposes upon giving not less than ten (10) days' prior written notice of such change of address to the Company or the Member, as may be applicable.

9.2 Governing Law. This Company Agreement and the construction, interpretation and application thereof, shall be governed exclusively by the Act and other applicable laws of the State of Texas.

9.3 Captions and Headings. The captions and headings used in this Company Agreement are for convenience of reference only and shall not be taken into account in construing the meaning and/or intent of this Company Agreement.

9.4 Amendment of Certificate of Formation. The Certificate of Formation may be amended, supplemented or restated only by written consent of the Managers and by the execution and filing of such supplemented or restated Certificate of Formation in accordance with the Act.

9.5 Amendment of Company Agreement. Except as herein otherwise expressly provided, this Company Agreement may be amended, supplemented or restated only by written consent of the Members.

9.6 Number and Gender. Where the context so indicates, the singular shall include the plural, the use of any gender shall include all other genders and any reference to the term person shall include an individual and a corporation, limited liability company, association, partnership, joint venture, estate, trust or any other entity.

9.7 Binding Effect. Except as herein otherwise expressly provided, this Company Agreement shall be binding upon and shall inure to the benefit of the Members and their respective heirs, legal representatives, executors, administrators, distributees, successors and assigns.

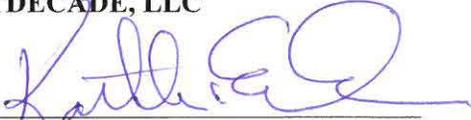
9.8 Severability. If any one or more of the provisions contained in this Company Agreement for any reason are held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provisions hereof and this Company Agreement shall be construed as if such invalid, illegal or unenforceable provisions had never been contained herein,

9.9 Counterparts. This Company Agreement may be executed in counterparts, each of which shall be deemed to be an original, but all of such counterparts shall constitute the same Company Agreement and may be sufficiently evidenced by one counterpart.

**IN WITNESS WHEREOF**, the undersigned Members have adopted and signed this Company Agreement to be effective as of the date first written above.

**MEMBERS:**

**NEXTDECADE, LLC**

By:   
Kathleen Eisbrenner  
CEO of NextDecade, LLC

**SCHEDULE A**

**RIO GRANDE LNG, LLC  
NAMES AND OWNERSHIP INTEREST OF MEMBERS**

<b><u>Name</u></b>	<b><u>Number of Units</u></b>
NextDecade, LLC	1,000 (100% of outstanding units)

**Officers and Governing Authority of Rio Grande LNG, LLC**

1. Each of the persons named below is a duly elected, qualified and acting officer director of Rio Grande LNG, LLC (the “**Company**”):

<b>Name</b>	<b>Position</b>	<b>Nationality</b>
Matthew Schatzman	President and Chief Executive Officer	American
Brent Wahl	Chief Financial Officer	Canadian
Vera de Gyarfaz	General Counsel and Secretary	American
Ariel Handler	Senior Vice President, Finance and Market Analysis	American

2. The Company is managed by its sole member, NextDecade LNG, LLC, a Delaware limited liability company (“**NextDecade**”).

3. NextDecade is managed by its sole member, NextDecade Corporation, a Delaware corporation (the “**Parent**”).

4. Each of the persons named below is a duly elected, qualified and acting officer director of the Parent as of the date of this Officer's Certificate.

<b>Name</b>	<b>Nationality</b>
Matthew Schatzman	American
Khalifa Abdulla Al Romaithi	UAE
Brian Belke	American
Frank Chapman	British
Taewon Jun	South Korean
Avinash Suresh Kripalani	American
William Charles Vratos	American
Edward Andrew Scoggins, Jr.	American
Louis Spencer Wells	American

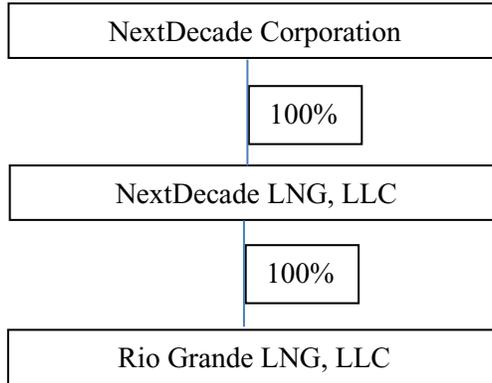
**Exhibit B**

Statement of Financial and Corporate Relationships of Rio Grande LNG, LLC

**Statement of Financial and Corporate Relationships of Rio Grande LNG, LLC**

1. Rio Grande LNG, LLC is a limited liability company formed under the laws of Texas.
2. Rio Grande LNG, LLC is a wholly-owned subsidiary of NextDecade LNG, LLC, a limited liability company formed under the laws of Delaware.
3. NextDecade LNG, LLC is a wholly-owned subsidiary of NextDecade Corporation, a corporation formed under the laws of Delaware.
4. The principle place of business of Rio Grande LNG, LLC is 1000 Louisiana Street, Suite 3900, Houston, Texas 77002.
5. Rio Grande LNG, LLC is currently engaged in the business of developing a liquefied natural gas terminal facility at the Port of Brownsville in southern Texas, as authorized by the Federal Energy Regulatory Commission under Section 3 of the Natural Gas Act.
6. None of the officers or directors of NextDecade Corporation owns any membership interest in Rio Grande LNG, LLC.

**Beneficial Ownership/Corporate Structure of Rio Grande LNG, LLC**



**Exhibit C**

Opinion of Counsel Regarding Authorized Powers

The logo for K&L GATES, featuring the company name in white, uppercase letters on a dark blue rectangular background.

David Wochner  
david.wochner@klgates.com

T +1 202 778 9014  
F +1 202 778 9100

November 17, 2021

Ms. Kimberly D. Bose  
Office of the Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426

**Re: Rio Grande LNG, LLC, CP21-\_\_\_\_-000  
Rio Grande LNG, LLC Application for Limited Amendment to NGA Section 3  
Authorization to Incorporate Carbon Capture and Storage Facilities at the Rio  
Grande LNG Terminal  
Exhibit C - Opinion of Counsel**

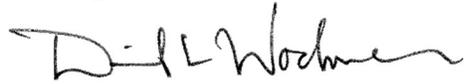
Dear Ms. Bose:

Rio Grande LNG, LLC ("RGLNG") is applying to the Federal Energy Regulatory Commission ("Commission") for a limited amendment ("Amendment") to its November 22, 2019 authorization ("Authorization") to site and construct the RGLNG Terminal on the north embankment of the Brownsville Ship Channel in Cameron County, Texas. RGLNG seeks Commission authorization to amend its Authorization to allow for the incorporation of a carbon capture and sequestration system ("CCS Systems") into the design of the RGLNG Terminal.

This opinion is furnished to you pursuant to Section 153.8(a)(3) of the Commission's regulations, 18 C.F.R. § 153.8(a)(3), and in connection with RGLNG's Amendment to its Authorization. I am counsel for RGLNG, a limited liability company organized under the laws of the State of Texas. I have reviewed and relied upon the limited liability company formation documents of RGLNG and information provided to me by RGLNG. Based on the foregoing, and for the purpose of this Amendment to RGLNG's Authorization, I am of the opinion that the construction and operation of the CCS Systems and the RGLNG Terminal as described in the Amendment and Authorization is within the limited liability company powers of RGLNG, and that RGLNG has complied with the laws and regulations of the states in which it operates that are applicable to this Amendment.

If you have any questions regarding this filing, please contact me at (202) 778-9014 or at [david.wochner@klgates.com](mailto:david.wochner@klgates.com).

Best regards,

A handwritten signature in black ink that reads "David L. Wochner". The signature is written in a cursive style with a large, stylized initial "D".

David L. Wochner  
*Counsel for Rio Grande LNG, LLC*

**Exhibit D**

Agreement for Border Interconnects

Omitted, Not Applicable

**Exhibit E**

Evidence of Appropriate and Qualified Concern, including Detailed Engineering and Design Information

This information is included in Resource Report 13 in joint Exhibit F Environmental Report filed separately as part of this Application

**Exhibit E-1**

Report on Earthquake Hazards and Engineering

RGLNG incorporates by reference its report on earthquake hazards and engineering, previously provided to the Commission

**Exhibit F**

Environmental Report

Filed separately in joint Exhibit F Environmental Report

**Exhibit G**

Geographic Map

RGLNG incorporates by reference its previously submitted Exhibit G

**Exhibit H**

List of Federal Authorizations

## List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
<b>Federal</b>			
Federal Energy Regulatory Commission (FERC)	NGA - Section 3(a) - Authorization for construction and operation of liquefaction facility	Application filed on May 5, 2016. FERC Order received on November 22, 2019	Amendment Application filed on November 17, 2021
Department of Energy (DOE)	Authorization to export LNG by vessel to FTA and non-FTA nations	Application filed on December 23, 2015 FTA Authorization received on August 19, 2016 Non-FTA Authorization received on August 19, 2016	Completed
U.S. Army Corps of Engineers (COE)	Permit application pursuant to the CWA Section 404 / RHA - Section 10	Permit application filed on July 27, 2016 Permit received on February 21, 2020 Permit Modification Request submitted on September 22, 2020 Permit Modification received on September 22, 2021	Completed
	Real Estate Outgrant	Application filed on April 12, 2018 Outgrant received on March 17, 2020	Completed
U.S. Coast Guard (USCG)	LOR as to the suitability of waterway for LNG marine transit	LOI submitted March 18, 2015. Follow-on WSA submitted on December 17, 2015. Annual renewal continues	Completed
Department of Transportation (DOT) Pipeline and Hazardous Materials Safety	49 CFR 192 Consultation (standards for natural gas pipelines)	Original LOD received on March 26, 2019	Completed

## List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
Administration (PHMSA)	49 CFR 193, Subpart B	Updated LOD reflecting 5-train design received on October 15, 2020	
Environmental Protection Agency (EPA)	UIC Class VI Well Operating Permit	Permit application pending.	TBA
	CWA Section 402 – NPDES - Hydrostatic Test Water Discharge Permit; Construction Waste Water Discharge Permit, and Operational Waste Water Discharge Permit	Permit application pending.	TBA
U.S. Fish and Wildlife Service (USFWS)	ESA Section 7 Consultation	USFWS issued the Biological Opinion and Incidental Take Statement to FERC on October 1, 2019 (amended on October 8, 2019) for the ocelot and Gulf Coast jaguarundi. Concurrence with the eastern black rail determination received on January 25, 2021. Consultation under Endangered Species Act for species under USFWS purview is complete.	Completed
	Fish and Wildlife Coordination Act Consultation	Technical Assistance Request Submitted on March 27, 2015. Multiple follow-up meetings through 2019.	Completed
	MBTA Consultation	Submitted Migratory Bird Conservation Plan Rev 1 on July 12, 2019; USFWS approved plan on August 28, 2019.	Completed
	ESA Section 7 Consultation	NMFS issued a letter to FERC on August 8, 2019 stating that consultation under Endangered	Completed

List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
National Marine Fisheries Service (NMFS)		Species Act for species under NMFS purview is complete.	
	MMPA Section 101(a)(5) - Consultation, in conjunction with FWS, for potential impacts on federally protected marine mammals	Received Incidental Harassment Authorization on June 29, 2020, expired on June 30, 2021. New permit application pending.	TBA
	Fish and Wildlife Coordination Act Consultation MSFCMA Consultation	Technical assistance request Submitted on March 27, 2015. Follow-up meetings in 2017 and 2018. FERC submitted a final EFH Assessment to NMFS for review on February 14, 2019, and NMFS concurred on February 15, 2019.	Completed
National Park Service (NPS)	Consultation on potential impacts on cultural resources and pursuant to Section 106 of the NHPA	SHPO concurrence sent to NPS on January 14, 2020 (NPS responded on 1/21/20 stating 106/110f complete)	Completed
Federal Aviation Administration (FAA)	FAA Determination of Hazard or Determination of No Hazard pursuant to 14 CFR 77	Notice of Proposed Construction or Alteration (FAA Form 7460-1) filed on June 21, 2018.  FAA Determination of No Hazard to Air Navigation for Temporary Structure received on July 3, 2018	Completed
<b>State</b>			
Texas Commission on Environmental Quality (TCEQ)	CAA; New Source Review - Prevention of Significant Deterioration (PSD) permits	PSD Permit (Construction) Application filed on May 12, 2016.  PSD Permit Application – Revision 1 filed on Nov 30, 2016.  PSD Permit Application – Revision 2 filed on Mar 22, 2017.	Completed

## List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
		Final Air Quality Analysis Modeling Report for Terminal filed on Jun 26, 2017.  TCEQ Order granting the application and issuing the PSD Permits received on Dec 17, 2018.	
	Title V Operating Permit	Anticipated permit application submittal: one year prior to Operation.	TBA
	Temporary Water Use Permit  Title 2, Texas Water Code – Section 11.138	Permit application pending.	TBA
Texas Department of Transportation (TxDOT)	Form 1058, Permit to Construct Access Driveway Facilities on Highway Right-of-Way pursuant to Texas Administrative Code (TAC), Part 1, Chapter 11, Subchapter C: Access Connections to State Highways Rule 11.56: delegation of Access Permit Authority to Municipalities of Eligible Counties	Permit application pending.	TBA
Texas Parks and Wildlife Department (TPWD)	Consultation pursuant to Title 5, TPWD Code- Chapters 67, 68, and 88 and Title 31, TAC – Section 65	Technical assistance request submitted on March 27, 2015. Follow-up meetings through 2021. Consultation is ongoing.	Completed
Texas Historical Commission (THC) – State Historic	Letter of approval on assessment and protection of historic properties pursuant to Section 106 of the NHPA; Title 9, Texas	Phase I cultural survey report submitted on May 8, 2015; SHPO concurred with the findings on May 15, 2015.	Completed

List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
Preservation Officer (SHPO)	Natural Resources Code-Chapter 191 "Antiquities Code of Texas"	<p>Phase I cultural survey for offsite facilities associated with the LNG Terminal submitted in October 2016; SHPO concurred with the findings on December 1, 2016.</p> <p>Approval of the Project Unanticipated Discovery Plan received on November 10, 2016.</p> <p>Concurrence with the viewshed and noise assessments on potential impacts to the Palo Alto and Palmito Ranch Battlefields on March 19, 2018.</p>	
Railroad Commission of Texas (RRC)	CZMA Section 307 - Coastal Use Permit Coastal Zone Management Consistency Determination.	Consistency Determination received on February 14, 2020.	Completed
	CWA Section 401 - Water Quality Certification Title 16, TAC - Section 3.93.	Water Quality Certification received on February 14, 2020.	Completed
	Title 2, Texas Water Code - Section 26.131 - Hydrostatic Discharge Permit	Permit application pending.	TBA
	Title 2, Texas Water Code- Section 26.131(b) - Operations Discharge and Surface Water Management Permit	Anticipated Operations Discharge and Surface Water Management Permit application submittal prior to Operations.	TBA

**UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION**

**Rio Grande LNG, LLC**

)

**Docket No. CP21-\_\_\_-000**

**NOTICE OF APPLICATION FOR LIMITED AMENDMENT FOR CONSTRUCTION  
AND OPERATION OF CARBON CAPTURE AND SEQUESTRATION FACILITIES AT  
NATURAL GAS EXPORT TERMINAL**

Take notice that on November 17, 2021, Rio Grande LNG, LLC (“RGLNG”), with a principal place of business at 1000 Louisiana Street, 39<sup>th</sup> Floor, Houston, TX 77002, filed with the Federal Energy Regulatory Commission (“Commission”) a limited amendment to its November 22, 2019 authorization (“Authorization”) for construction and operation of the RGLNG Terminal, a natural gas liquefaction and export facility located on the northern embankment of the Brownsville Ship Channel in Cameron County, Texas. Through the limited amendment, RGLNG seeks Commission authorization under Section 3(a) of the Natural Gas Act to incorporate carbon capture and sequestration systems (“CCS Systems”) into the design of the RGLNG Terminal.

RGLNG’s limited amendment to its Authorization is more fully set forth in the November 17, 2021 filing, which is on file with the Commission and open to public inspection. The filing is accessible on-line at <http://www.ferc.gov>, using the “eLibrary” link and is available for review in the Commission’s Public Reference Room in Washington, D.C. There is an “eSubscription” link on the web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email [FERCOnlineSupport@ferc.gov](mailto:FERCOnlineSupport@ferc.gov), or call (866) 208-3676 (toll free). For TTY, call (202) 502-8659.

Any questions regarding this Application should be directed to: Jerry Schafer, Rio Grande LNG, LLC, 1000 Louisiana Street, 39th Floor, Houston, TX 77002, (832) 426-2955, [jschafer@next-decade.com](mailto:jschafer@next-decade.com).

There are two ways to become involved in the Commission’s review of this limited amendment. First, any person wishing to obtain legal status by becoming a party to the proceedings for this limited amendment should, on or before the comment date stated below, file with the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426, a motion to intervene in accordance with the requirements of the Commission’s Rules of Practice and Procedure (18 CFR 385.214 or 385.211) and the Regulations under the NGA (18 CFR 157.10). A person obtaining party status will be placed on the service list maintained by the Secretary of the Commission and will receive copies of all documents filed by the applicant and by all other parties. Only parties to the proceeding can ask for court review of Commission orders in the proceeding.

However, a person does not have to intervene in order to have comments considered. The second way to participate is by filing with the Secretary of the Commission, as soon as possible, an original and two copies of comments in support of or in opposition to this limited amendment. The Commission will consider these comments in determining the appropriate action to be taken, but the filing of a comment alone will not service to make the filer a party to the proceeding.

The Commission's rules require that persons filing comments in opposition to the limited amendment provide copies of their protests only to the party or parties directly involved in the project. Persons who wish to comment only on the environmental review of this limited amendment should submit an original and two copies of their comments to the Secretary of the Commission. Environmental commenters will be placed on the Commission's environmental mailing list, will receive copies of the environmental documents, and will be notified of meetings associated with the Commission's environmental review process. Environmental commenters will not be required to serve copies of filed documents on all other parties. However, the non-party commenters will not receive copies of all documents filed by other parties or issued by the Commission (except for the mailing of environmental documents issued by the Commission) and will not have the right to seek court review of the Commission's final order.

The Commission encourages electronic submission of protests and interventions in lieu of paper using the "eFiling" link at <http://www.ferc.gov>. Persons unable to file electronically should submit an original and 14 copies of the protest or intervention to the Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, D.C. 20426.

Comment Date:

Kimberly D. Bose  
Secretary

**CP21-\_\_\_\_-000**

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 1: General Project Description**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002

SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Provide a detailed description and location map of the project facilities (§380.12(c)(1))	Sections 1.2 thru 1.10
<input type="checkbox"/> 2. Describe any non-jurisdictional facilities that will be built in association with the project (§ 380.12(c)(2))	Section 1.11
<input type="checkbox"/> 3. Provide current original U.S. Geological Survey (USGS) 7.5-minute-series topographic maps with mileposts showing the project facilities; (§ 380.12(c)(3))	Not Applicable
<input type="checkbox"/> 4. Provide aerial images or photographs or alignment sheets based on these sources with mileposts showing the project facilities; (§ 380.12(c)(3))	Not Applicable
<input type="checkbox"/> 5. Provide plot/site plans of compressor stations showing the location of the nearest noise-sensitive areas (NSA) within 1 mile. (§§ 380.12(c)(3,4))	Not Applicable
<input type="checkbox"/> 6. Describe construction and restoration methods. (§ 380.12(c)(6))	Sections 1.4 and 1.5
<input type="checkbox"/> 7. Identify the permits required for construction across surface waters. (§ 380.12(c)(9))	Not Applicable
<input type="checkbox"/> 8. Provide the names and address of all affected landowners and certify that all affected landowners will be notified as required in § 157.6(d). (§§ 380.12(c)(10))	Not Applicable

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Appendix 1.A: Rio Grande LNG Project including CCS Schedule [Privileged Information]

Appendix 1.B: List of Permits and Approvals for the Project

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# Abbreviations and Acronyms

AEP	American Electric Power
AGRU	Acid Gas Removal Unit
CCS	Carbon Capture and Sequestration
CCS Systems	CCS systems to be implemented at the RGLNG Terminal
CFR	Code of Federal Regulations
CO <sub>2</sub>	carbon dioxide
Commission	Federal Energy Regulatory Commission
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
LNG	liquefied natural gas
m <sup>3</sup>	cubic meters
MTPA	million tons per annum
NextDecade	NextDecade Corporation
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NMFS	National Marine Fisheries Service
PCC	Post Combustion Capture
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
Project	RGLNG Terminal
RGLNG	Rio Grande LNG, LLC
RSG	Responsibly Sourced Gas
SCADA	Supervisory Control and Data Acquisition System
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality
Terminal	RGLNG's natural gas liquefaction and liquefied natural gas export facility
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers



USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

# Resource Report 1: General Project Description

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the Federal Energy Regulatory Commission (FERC)-approved site and design of the RGLNG's natural gas liquefaction and liquefied natural gas export facility (Terminal). Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquefied at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to a nearby underground geologic formation permitted by the U.S. Environmental Protection Agency (EPA) and relevant Texas agencies via EPA's underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems."

RGLNG has prepared this Resource Report 1 in compliance with the requirements of the FERC regulations for authorization under Section 3 of the Natural Gas Act (NGA) to site, construct, own, and operate the Project. As authorized by the Commission in the Authorization Order, and as modified by Commission Staff's August 13 Letter Order, the RGLNG Terminal will be located on an approximately 1,000-acre site on the northern embankment of the Brownsville Ship Channel in Cameron County, Texas, and features the following approved facilities:

- five natural gas liquefaction trains, each with a nominal capacity of 5.4 MTPA, for a total nominal capacity of 27 MTPA;
- four full-containment LNG storage tanks, each with a net capacity of approximately 180,000 cubic meters (m<sup>3</sup>);
- two LNG carrier loading berths and one 1,500-foot-diameter turning basin;
- truck loading and unloading facilities; and
- appurtenant facilities including but not limited to administrative buildings, a central control building, a workshop, a warehouse, and electrical equipment enclosures.

In the Authorization Order, the Commission found that construction and operation of the RGLNG Terminal was not inconsistent with the public interest, and approved its construction and operation, subject to conditions as provided in the Authorization Order. On August 13, 2020, Commission staff

issued the August 13 Letter Order approving certain changes to the design of the RGLNG Terminal to allow RGLNG to reduce the number of liquefaction trains from six to five, and increase the capacity of the remaining trains to maintain the RGLNG Terminal's previously approved total export capacity of 27 million tonnes per annum (MTPA).

Resource Report 1 provides a description of the Project and its purpose and need from both national and regional perspectives, as well as a specific description of the Project facilities and certain non-jurisdictional facilities. The proposed method of construction for the CCS Systems is also addressed in this report.

Resource Report 1 also provides an update of the applicable regulatory approvals and coordination with the respective federal and state agencies (see Appendix 1.A for a summary of regulatory approvals).

## **1.1 Purpose and Need**

RGLNG seeks authorization to modify the Commission-approved design of the RGLNG Terminal to incorporate the CCS Systems. Doing so will enable RGLNG to voluntarily capture the vast majority of the RGLNG Terminal's CO<sub>2</sub> emissions. For more than two years, RGLNG's parent company, NextDecade, has been intensely focused on the development of methods to significantly reduce the emissions impact of the RGLNG Terminal, as a direct result of (1) global market demand for LNG with a less intense carbon footprint produced from responsibly sourced natural gas (RSG); (2) RGLNG's desire to be a responsible, environmentally engaged leader in south Texas, while at the same time providing thousands of good-paying jobs for communities suffering under high unemployment and lack of development. The CCS systems apply proprietary processes to existing carbon capture technology allowing for cost efficient, large-scale capture of CO<sub>2</sub> emissions.

Through incorporation of the CCS Systems, NextDecade and RGLNG will be able to provide world markets with a cleaner, domestically produced source of energy with an absolute minimum of CO<sub>2</sub> emissions and climate change impacts.

As proposed, the CCS Systems not only meet the need of NextDecade to utilize their capital and LNG industry expertise in a climate-conscious enterprise, but also serves the fundamental needs of the United States to:

- Address the global climate crisis;
- Expand its economy;
- Provide jobs for its citizens;

- Provide opportunities to increase the wealth of the nation through constructive deployment of capital;
- Provide an avenue for companies to benefit from the bountiful supplies of economically recoverable natural gas in North America;
- Promote a stable and robust natural gas industry;
- Stimulate the economies of its trading partners; and
- Improve national and world security.

The implementation of the CCS Systems will also result in the following benefits, all of which are consistent with the public interest:

- Stimulate the local, regional, and national economies through the creation and preservation of construction and permanent jobs in addition to those already required for the RGLNG Terminal;
- Provide an environmentally friendly and economically stimulating outlet to producers of domestic natural gas;
- Facilitate the ability of foreign nations to displace less desirable energy sources (e.g., higher cost and less environmentally friendly fuels) with less carbon-intensive, responsibly sourced natural gas;
- Improve ambient air quality in foreign nations by displacing fuels that have higher carbon content, mercury emissions, and particulate emissions;
- Increase economic trade and ties with foreign nations authorized to receive LNG exports from the United States.

## 1.2 Project Description - Overview

Generally, RGLNG's CCS Systems consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

In addition, RGLNG's CCS Systems will include the following specific components and equipment:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

The CCS Systems are configured to be efficiently collocated within the process trains and utility areas of the Terminal. RGLNG has previously developed a master plan with a plant layout and infrastructure that allows for continuous construction activities centered around the successive construction of the five liquefaction trains, with supporting utilities and infrastructure (including CCS) being added in support of the stepped increased liquefaction capacity. Though construction of the five liquefaction trains is anticipated to be continuous, the construction process will take place in five stages, with the start of each train and associated CCS systems construction ideally occurring between six to nine months after the previous train's commenced construction. RGLNG developed a staged construction schedule to avoid an excessive manpower peak and thereby reduce local impacts. This proposed configuration of the Terminal and CCS Systems will allow a portion of the Project to come online (subject to FERC approval) and start producing LNG and capturing CO<sub>2</sub> while construction continues on the later-stage facilities.

RGLNG intends to voluntarily apply CCS Systems to the Terminal and for these systems to be operational for most of the time. However, there will be situations when RGLNG Terminal emissions will revert back to the current permitted TCEQ values. These situations include commissioning and start-up, safety system overrides, as well as shutdowns and maintenance.

### **1.2.1 CCS Systems**

While the CCS Systems are not NGA-jurisdictional, as they do not relate to the liquefaction and export of LNG, the CCS Systems will tie-in to FERC-jurisdictional facilities, be incorporated into the overall design of the RGLNG Terminal and be largely located within its footprint. In fact, the CCS Systems will be collocated within the RGLNG Terminal, with the exception of the CO<sub>2</sub> sequestration pipeline, which will extend from the Terminal to a nearby (within 10 miles) site for geologic sequestration via an EPA-regulated Class VI injection well.

The stages of construction and installation for the Terminal have already been detailed, reviewed and approved by FERC Staff previously. With the exception of the non-jurisdictional CO<sub>2</sub> pipeline, all CCS

systems will be constructed and installed simultaneously with the Terminal. PCC and AGRU components and equipment will be installed simultaneously with their respective train, and common CCS systems, such as the sequestration compressor, will be installed in parallel with other Terminal utilities.

Temporary laydown areas within the Terminal will be used for staging of components and equipment for both the Terminal and CCS Systems.

The Terminal and collocated CCS Systems design will comply with the requirements of National Fire Protection Association (NFPA) Standard 59A, regulations of the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) at 49 CFR 193, and all other applicable standards. The Terminal and CCS Systems will be surrounded by a security perimeter fence with gated access to ensure control over site access.

### **Electric Power Supply**

In close cooperation with American Electric Power (AEP – the local transmission system operator), RGLNG has determined that the current and planned AEP electricity grid distribution system in the Port of Brownville area is of sufficient capacity and reliability to support the Terminal with the CCS Systems included.

Back-up power for essential Terminal loads will remain unchanged from the current permit. RGLNG remains committed to purchasing net zero power for all of the Terminal electrical power requirements.

### **Water Supply**

No additional water supply is required for construction and operation of the CCS Systems.

### **Firewater System**

While the CCS Systems do not involve any additional flammable liquids, the Terminal firewater system demand scenarios have been re-analyzed and were determined to be adequate for the inclusion of CCS.

### **Lighting**

Outdoor lighting for the CCS Systems will be in accordance with FERC Order Conditions 22 and 98.

### **Communication**

As with the Terminal, the CCS Systems will be controlled via the RGLNG Control Room Building using a Supervisory Control and Data Acquisition System (SCADA) system.

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## 1.3 Land Requirements

### 1.3.1 CCS Systems

With the exception of the non-jurisdictional CO<sub>2</sub> sequestration pipeline, all components and equipment will be collocated within the approved Terminal boundaries. The eastern and western buffer areas will not be disturbed by CCS. No additional land use is required.

## 1.4 Construction Schedule and Employment

### 1.4.1 CCS Systems

RGLNG anticipates construction of the Terminal to begin in Q1 2022. After approximately nine months of site preparation, CCS Systems construction and installation will commence in concert with construction of the Terminal. The original construction schedule for the Terminal is not expected to be impacted by the inclusion of the CCS Systems or the permitting and construction of the non-jurisdictional CO<sub>2</sub> sequestration pipeline.

Aside from where the CCS Systems would tie-in to the RGLNG Terminal's facilities, no modifications to previously authorized facilities are proposed, and incorporation of the CCS Systems would have no adverse impacts on construction or operation of the RGLNG Terminal. The construction process will take place in five stages, with the start of each train's construction and associated CCS systems ideally occurring between six to nine months after the previous train's commenced construction. RGLNG has developed a staged construction schedule to avoid an excessive amount of pre-investment in supporting utilities and infrastructure that will only be needed when later constructed trains and CCS systems come into operation, which will also reduce peak manpower requirements and thereby reduce environmental impacts. With an average monthly workforce during construction of approximately 600 dedicated to the CCS Systems, it is estimated that approximately 30% will be locally sourced from the historically underserved counties of Cameron, Willacy, and Hidalgo. At full build-out with five liquefaction trains, operation of the CCS Systems will require the employment of approximately 30 additional permanent operations workers, not including outside servicing contractors. This permanent workforce will consist primarily of operations workers, maintenance workers, and managers assigned to duties directly relating to running, monitoring, and maintaining CCS operations. A smaller percentage will consist of health, safety, security, environment workers, and general support staff. Local labor will be hired to the maximum extent practicable. A significant number of operational employees are expected to be hired from the local labor pool.

In accordance with Order Conditions 7, 25 and 26, RGLNG will conduct environmental, safety, and specialized training for all construction personnel during onsite project training sessions. This training will consist of a minimum of general awareness training to ensure the proper field implementation of the Project-Specific Plan and Procedures, regulatory conditions, and other mitigation measures.

Appendix 1.A: Rio Grande LNG Project including CCS Schedule provides a high-level construction and commissioning timeline for the RGLNG Terminal with CCS Systems incorporated.

## **1.5 Construction Procedures**

### **1.5.1 CCS Systems**

Except where otherwise authorized, the CCS Systems will be designed and constructed simultaneously with the Terminal in accordance with all applicable federal, state, and local regulations, permits, and industry-recognized standards. Applicable federal regulations include 49 CFR 193, Liquefied Natural Gas Facilities: Federal Safety Standards; 49 CFR 192, Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards; and 18 CFR 2.69, Guidance. Codes and standards are in accordance with RGLNG's filing for Order Condition 61 (Accession No. 20210115-5107), which has been reviewed by FERC Staff.

The non-jurisdictional CO<sub>2</sub> Class VI injection well(s) will be permitted, constructed and operated in accordance with the EPA's UIC Class VI injection well program.

Materials and equipment received onsite will be placed in storage and protected from theft, weather, and damage, as required. Adequate protection will be provided, consisting of proper ventilation, dunnage, purges, heaters, rust preventatives, etc. The site material manager will determine the storage requirements for all materials and equipment using a matrix that lists all of the various categories of material to be received.

## **1.6 Operation and Maintenance Procedures**

### **1.6.1 CCS Systems**

During operations, the inclusion of the CCS Systems is expected to employ an additional approximately 30 permanent plant workers. All Project operations and maintenance staff will be trained to perform their assigned tasks and responsibilities properly and safely, and the recruitment process will ensure most of the new staff are available approximately one year prior to loading the first LNG into a vessel. This will allow the new staff to become familiar with the new installations, undergo classroom and field

training, attend training by key equipment/system vendor representatives, assist the Project team in finalizing and inspecting the Terminal and CCS Systems as they near mechanical completion and enter pre-commissioning and commissioning stages, and assist the main contractor in executing the commissioning and testing phase before reaching Substantial Completion, at which point the RGLNG team will take over all operational and maintenance responsibilities.

Operators and maintenance staff will be trained in the proper operation of all equipment related to CCS Systems. All training will be completed in a manner that meets or exceeds the requirements of the PHMSA, U.S. Department of Transportation (USDOT), U.S. Coast Guard (USCG), and other applicable regulatory agencies. All of the training received by staff members will be integrated into a human resource planning tool that maps the progression of employees and the delegated responsibility levels fitting their individual capabilities and skill sets.

CCS Systems operations will be duly documented in design drawings and manuals that will be accessible via an electronic document management system that ensures only the latest revisions of relevant documents are used. A rigorous "management of change" procedure will safeguard that any contemplated change is duly evaluated and documented before implementation.

The Terminal and CCS automation systems will include many pre-engineered routines and automated actions to allow the panel operators to function more in a "monitoring" role, and less in an "active interference" role. A suitably developed alarm management system will help to manage undesired events and incidents.

All main CCS equipment and Terminal sections will be recorded in equipment record cards/files and maintained electronically to allow tracking of the condition and executed maintenance activities over time. For planning and execution of maintenance and the management of spare parts inventories, tailored maintenance management software will be used.

Terminal and CCS Systems inspections and maintenance will follow the principles of "risk-based inspection" and "condition-based maintenance," as far as practical to enhance the overall reliability of the installation in a most efficient manner.

All post-commissioning work in the Terminal and CCS Systems will be subject to a rigorous "Safety Permit to Work" system controlled by the operations team and audited by the Terminal maintenance and safety staff. Lessons learned while operating and maintaining the CCS Systems and re-training of staff to embed new insights and learn from past events will also be firmly embedded into daily routines onsite, as will be the rigorous reporting on all parts of the Terminal's actual performance.

In order to ensure the operations staff is familiar with and understands its tasks, RGLNG will develop an Operational Procedure Plan, capturing the above, and aiming to align the operational and safety requirements of the staff with expectations of management. The Operation Procedure Plan will provide functional requirements for the control and safeguarding of CCS Systems. This will include addressing topics such as emergency shutdowns, operational shutdowns, spills and other routine operational procedures.

The Terminal's permanent maintenance staff will be tasked to conduct or plan/manage/supervise all standard maintenance and overhauls. Any specialized maintenance and/or overhauls needed will be completed by outside professionals trained to perform the specialized task. All maintenance records, both scheduled and unscheduled, will be maintained through the use of a computerized maintenance tracking system.

## **1.7 Safety and Security**

### **1.7.1 CCS Systems**

The safety of LNG worldwide is the result of high industry standards, effective regulations, and the industry's commitment to rigorous risk management. There are multiple layers of protection implemented to minimize the likelihood of an LNG release. The inclusion of the CCS Systems will in no way compromise the safety mechanisms in place at the Terminal.

#### **1.7.1.1 Siting and Design**

The siting and design considerations for the Terminal with CCS Systems incorporated include, among others, the following aspects:

- Meet the requirements of NFPA 59A, USCG regulations, 33 CFR 127, PHMSA regulations, 49 CFR 193, and other standards for safety and fire protection applicable to LNG terminals;
- Be laid out so that the spacing and design of pipes and equipment are adequate to prevent escalation of a hazard event to other parts of the site;
- Be divided into fire zones to facilitate accurate hazard detection and deploy appropriate active fire protection responses;
- Pipes containing pressurized flammable liquids or gases and passing through non-hazardous areas will be of fully welded construction without flanges or similar leak sources; and
- A design process inclusive with detailed hazard identification and operability reviews, followed by strict Management of Change procedures to guarantee the presence of proper Terminal and CCS Systems documentation.

## 1.8 Future Plans and Abandonment

At this time, RGLNG has no future plans of abandonment or expansion of the CCS Systems. If an expansion of the facilities is ever envisioned for the future, RGLNG will seek appropriate authorization from all relevant federal, state, and local agencies. RGLNG envisions at least a 20-year life span for the Terminal facilities and associated CCS Systems but will design and maintain the Terminal and CCS Systems in such a manner that substantial life extension is feasible to reach up to 40 or 50 years, if so required to meet world market demands for less carbon-intensive LNG. Regardless of the duration of utilization for the Project facilities, RGLNG will obtain the necessary permissions to abandon the facilities in accordance with regulations and landowner requirements that exist at the time of abandonment.

## 1.9 Permits and Approvals

Construction, operation, and maintenance of the CCS Systems will be in accordance with all applicable permits and approvals.

### 1.9.1 CCS Systems

The major permit and approval actions for the CCS Systems are (1) FERC approval of RGLNG's application to amend its NGA Section 3 authorization for the Terminal to incorporate the CCS Systems; and (2) an EPA UIC Class VI injection well permit for construction and operation of the CO<sub>2</sub> injection well. Appendix 1.B provides the status of all required permits and approvals.

## 1.10 Stakeholder Outreach

RGLNG has already performed substantial stakeholder outreach regarding construction and operation of the RGLNG Terminal; given the comparatively small scale of construction required by the CCS Systems, and that the vast majority of all CCS Systems components will be within the footprint of the RGLNG Terminal, additional stakeholder outreach is not necessary. However, further stakeholder outreach shall be performed prior to the start of construction as well as during construction of the Terminal and CCS Systems.

## 1.11 FERC Non-Jurisdictional Facilities

Pursuant to 18 C.F.R. 380.12(c)(2)(ii), FERC employs a four-part test to determine whether an environmental review is required for project-related non-jurisdictional facilities:

- 
- (A) Whether or not the regulated activity comprises 'merely a link' in a corridor type project (e.g., a transportation or utility transmission project).
- (B) Whether there are aspects of the non-jurisdictional facility in the immediate vicinity of the regulated activity which uniquely determine the location and configuration of the regulated activity.
- (C) The extent to which the entire project will be within the Commission's jurisdiction.
- (D) The extent of cumulative Federal control and responsibility.

While the CCS Systems are non-jurisdictional, as they do not relate to the liquefaction and export of LNG, the CCS Systems will tie-in to FERC jurisdictional facilities, be incorporated into the overall design of the FERC-jurisdictional RGLNG Terminal and be largely located within its footprint. Commission approval therefore is needed for construction and operation of the CCS Systems.

### 1.11.1 CCS Systems

With regard to the FERC's four-part test:

- (A) The CCS Systems is not a link in any existing corridor type project.
- (B) As previously stated, the CCS Systems collocated with the RGLNG Terminal will tie-in and be incorporated with the overall design of the Terminal, which means these elements will require environmental review by the FERC. However, the CO<sub>2</sub> sequestration pipeline (where it leaves the geographical boundaries of the Terminal site) as well as the Class VI injection well will remain non-jurisdictional elements.
- (C) The construction and siting of CCS Systems collocated with the Terminal are within the FERC's jurisdiction. The CO<sub>2</sub> sequestration pipeline (where it leaves the geographical boundaries of the Terminal site) as well as the Class VI injection well are outside of the FERC's jurisdiction.
- (D) The EPA is tasked by the federal government with regulation of the nation's UIC program, including the Class VI injection well(s) related to the CCS Systems. Control and responsibility for the CCS Systems collocated with the RGLNG Terminal remain with the FERC.

Based on the above-described circumstances, FERC must conduct a review of any environmental impacts associated with the inclusion of the CCS Systems at RGLNG Terminal.

## 1.12 Cumulative Impacts

The inclusion of the CCS Systems with the RGLNG Terminal will not result in any increase in cumulative impacts above what Commission Staff already considered, and in fact is likely to result in improved conditions for the region. Therefore, an additional cumulative impacts assessment is unnecessary.

# Appendix 1.A: Rio Grande LNG Project including CCS Schedule

**Appendix 1.A has been designated as Privileged Information**

**and is being submitted under separate cover**

**pursuant to 18 CFR § 388.112.**

# **Appendix 1.B: List of Permits and Approvals for the Project**

## Appendix 1.B: List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
<b>Federal</b>			
Federal Energy Regulatory Commission (FERC)	NGA - Section 3(a) - Authorization for construction and operation of liquefaction facility	Application filed on May 5, 2016. FERC Order received on November 22, 2019	Amendment Application filed on November 17, 2021
Department of Energy (DOE)	Authorization to export LNG by vessel to FTA and non-FTA nations	Application filed on December 23, 2015 FTA Authorization received on August 19, 2016 Non-FTA Authorization received on August 19, 2016	Completed
U.S. Army Corps of Engineers (COE)	Permit application pursuant to the CWA Section 404 / RHA - Section 10	Permit application filed on July 27, 2016 Permit received on February 21, 2020 Permit Modification Request submitted on September 22, 2020 Permit Modification received on September 22, 2021	Completed
	Real Estate Outgrant	Application filed on April 12, 2018 Outgrant received on March 17, 2020	Completed
U.S. Coast Guard (USCG)	LOR as to the suitability of waterway for LNG marine transit	LOI submitted March 18, 2015. Follow-on WSA submitted on December 17, 2015. Annual renewal continues	Completed
Department of Transportation (DOT) Pipeline and Hazardous	49 CFR 192 Consultation (standards for natural gas pipelines)	Original LOD received on March 26, 2019	Completed

## Appendix 1.B: List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
Materials Safety Administration (PHMSA)	49 CFR 193, Subpart B	Updated LOD reflecting 5-train design received on October 15, 2020	
Environmental Protection Agency (EPA)	UIC Class VI Well Operating Permit	Permit application pending.	TBA
	CWA Section 402 – NPDES - Hydrostatic Test Water Discharge Permit; Construction Waste Water Discharge Permit, and Operational Waste Water Discharge Permit	Permit application pending.	TBA
U.S. Fish and Wildlife Service (USFWS)	ESA Section 7 Consultation	USFWS issued the Biological Opinion and Incidental Take Statement to FERC on October 1, 2019 (amended on October 8, 2019) for the ocelot and Gulf Coast jaguarundi. Concurrence with the eastern black rail determination received on January 25, 2021. Consultation under Endangered Species Act for species under USFWS purview is complete.	Completed
	Fish and Wildlife Coordination Act Consultation	Technical Assistance Request Submitted on March 27, 2015. Multiple follow-up meetings through 2019.	Completed
	MBTA Consultation	Submitted Migratory Bird Conservation Plan Rev 1 on July 12, 2019; USFWS approved plan on August 28, 2019.	Completed
	ESA Section 7 Consultation	NMFS issued a letter to FERC on August 8, 2019 stating that consultation under Endangered	Completed

## Appendix 1.B: List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
National Marine Fisheries Service (NMFS)		Species Act for species under NMFS purview is complete.	
	MMPA Section 101(a)(5) - Consultation, in conjunction with FWS, for potential impacts on federally protected marine mammals	Received Incidental Harassment Authorization on June 29, 2020, expired on June 30, 2021. New permit application pending.	TBA
	Fish and Wildlife Coordination Act Consultation MSFCMA Consultation	Technical assistance request Submitted on March 27, 2015. Follow-up meetings in 2017 and 2018. FERC submitted a final EFH Assessment to NMFS for review on February 14, 2019, and NMFS concurred on February 15, 2019.	Completed
National Park Service (NPS)	Consultation on potential impacts on cultural resources and pursuant to Section 106 of the NHPA	SHPO concurrence sent to NPS on January 14, 2020 (NPS responded on 1/21/20 stating 106/110f complete)	Completed
Federal Aviation Administration (FAA)	FAA Determination of Hazard or Determination of No Hazard pursuant to 14 CFR 77	Notice of Proposed Construction or Alteration (FAA Form 7460-1) filed on June 21, 2018.  FAA Determination of No Hazard to Air Navigation for Temporary Structure received on July 3, 2018	Completed
<b>State</b>			
Texas Commission on Environmental Quality (TCEQ)	CAA; New Source Review - Prevention of Significant Deterioration (PSD) permits	PSD Permit (Construction) Application filed on May 12, 2016.  PSD Permit Application – Revision 1 filed on Nov 30, 2016.  PSD Permit Application – Revision 2 filed on Mar 22, 2017.	Completed

## Appendix 1.B: List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
		Final Air Quality Analysis Modeling Report for Terminal filed on Jun 26, 2017.  TCEQ Order granting the application and issuing the PSD Permits received on Dec 17, 2018.	
	Title V Operating Permit	Anticipated permit application submittal: one year prior to Operation.	TBA
	Temporary Water Use Permit  Title 2, Texas Water Code – Section 11.138	Permit application pending.	TBA
Texas Department of Transportation (TxDOT)	Form 1058, Permit to Construct Access Driveway Facilities on Highway Right-of-Way pursuant to Texas Administrative Code (TAC), Part 1, Chapter 11, Subchapter C: Access Connections to State Highways Rule 11.56: delegation of Access Permit Authority to Municipalities of Eligible Counties	Permit application pending.	TBA
Texas Parks and Wildlife Department (TPWD)	Consultation pursuant to Title 5, TPWD Code- Chapters 67, 68, and 88 and Title 31, TAC – Section 65	Technical assistance request submitted on March 27, 2015. Follow-up meetings through 2021. Consultation is ongoing.	Completed
Texas Historical Commission (THC) – State Historic	Letter of approval on assessment and protection of historic properties pursuant to Section 106 of	Phase I cultural survey report submitted on May 8, 2015; SHPO concurred with the findings on May 15, 2015.	Completed



Appendix 1.B: List of Permits and Approvals for the Project

Agency	Permits, Approval, or Consultation	Status	Anticipated Approval Date
Preservation Officer (SHPO)	the NHPA; Title 9, Texas Natural Resources Code- Chapter 191 "Antiquities Code of Texas"	Phase I cultural survey for offsite facilities associated with the LNG Terminal submitted in October 2016; SHPO concurred with the findings on December 1, 2016.  Approval of the Project Unanticipated Discovery Plan received on November 10, 2016.  Concurrence with the viewshed and noise assessments on potential impacts to the Palo Alto and Palmito Ranch Battlefields on March 19, 2018.	
Railroad Commission of Texas (RRC)	CZMA Section 307 - Coastal Use Permit Coastal Zone Management Consistency Determination.	Consistency Determination received on February 14, 2020.	Completed
	CWA Section 401 - Water Quality Certification Title 16, TAC - Section 3.93.	Water Quality Certification received on February 14, 2020.	Completed
	Title 2, Texas Water Code - Section 26.131 - Hydrostatic Discharge Permit	Permit application pending.	TBA
	Title 2, Texas Water Code- Section 26.131(b) - Operations Discharge and Surface Water Management Permit	Anticipated Operations Discharge and Surface Water Management Permit application submittal prior to Operations.	TBA

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# Rio Grande LNG Project with Carbon Capture and Sequestration

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## Resource Report 2: Water Use and Quality

November 17, 2021

Prepared by:



1000 Louisiana St., Suite 3900  
Houston, TX 77002

SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Identify all perennial surface waterbodies crossed by the proposed project and their water quality classification. (§ 380.12(d)(1))	Not Applicable
<input type="checkbox"/> 2. Identify all waterbody crossings that may have contaminated waters or sediments. (§ 380.12(d)(1))	Not Applicable
<input type="checkbox"/> 3. Identify watershed areas, designated surface water protection areas, and sensitive waterbodies crossed by the proposed project. (§ 380.12(d)(1))	Not Applicable
<input type="checkbox"/> 4. Provide a table (based on NWI maps if delineations have not been done) identifying all wetlands, by milepost and length, crossed by the project (including abandoned pipeline), and the total acreage and acreage of each wetland type that would be affected by construction. (§§ 380.12(d)(1 & 4))	Not Applicable
<input type="checkbox"/> 5. Discuss construction and restoration methods proposed for crossing wetlands, and compare them to staff's Wetland and Waterbody Construction and Mitigation Procedures; (§ 380.12(d)(2))	Not Applicable
<input type="checkbox"/> 6. Describe the proposed waterbody construction, impact mitigation, and restoration methods to be used to cross surface waters and compare to the staff's Wetland and Waterbody Construction and Mitigation Procedures. (§ 380.12(d)(2))	Not Applicable
<input type="checkbox"/> 7. Provide original National Wetlands Inventory (NWI) maps or the appropriate state wetland maps, if NWI maps are not available, that show all proposed facilities and include milepost locations for proposed pipeline routes. (§ 380.12(d)(4))	Not Applicable
<input type="checkbox"/> 8. Identify all U.S. Environmental Protection Agency (EPA)- or state-designated aquifers crossed. (§ 380.12(d)(9))	Not Applicable

The inclusion of CCS Systems does not implicate any new water use and quality issues beyond those identified, considered and reviewed in the original authorization.

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 3: Vegetation and Wildlife**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002

SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Classify the fishery type of each surface waterbody that would be crossed, including fisheries of special concern. (§ 380.12(e)(1))	Not Applicable
<input type="checkbox"/> 2. Describe terrestrial and wetland wildlife and habitats that would be affected by the project. (§ 380.12(e)(2))	Section 3.1.1
<input type="checkbox"/> 3. Describe the major vegetative cover types that would be crossed and provide the acreage of each vegetative cover type that would be affected by construction. (§ 380.12(e)(3))	Not Applicable
<input type="checkbox"/> 4. Describe the effects of construction and operation procedures on the fishery resources and proposed mitigation measures. (§ 380.12(e)(4))	Not Applicable
<input type="checkbox"/> 5. Evaluate the potential for short-term, long-term, and permanent impact on the wildlife resources and state-listed endangered or threatened species caused by construction and operation of the project and proposed mitigation measures. (§ 380.12(e)(4))	Section 3.2
<input type="checkbox"/> 6. Identify all federally listed or proposed endangered or threatened species that potentially occur in the vicinity of the project and discuss the results of the consultations with other agencies. Include survey reports as specified in § 380.12(e)(5)	Section 3.2
<input type="checkbox"/> 7. Identify all federally listed essential fish habitat (EFH) that potentially occurs in the vicinity of the project and the results of abbreviated consultations with NMFS, and any resulting EFH assessments. (§ 380.12(e)(6))	Not Applicable
<input type="checkbox"/> 8. Describe any significant biological resources that would be affected. Describe impact and any mitigation proposed to avoid or minimize that impact. (§§ 380.12(e)(4 & 7))	Not Applicable

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# Abbreviations and Acronyms

AEP	American Electric Power
AGRU	Acid Gas Removal Unit
CCS	Carbon Capture and Sequestration
CCS Systems	CCS systems to be implemented at the RGLNG Terminal
CFR	Code of Federal Regulations
CO <sub>2</sub>	carbon dioxide
Commission	Federal Energy Regulation Commission
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
LNG	liquefied natural gas
m <sup>3</sup>	cubic meters
MTPA	million tons per annum
NextDecade	NextDecade Corporation
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NMFS	National Marine Fisheries Service
PCC	Post Combustion Capture
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
Project	RGLNG Terminal
RGLNG	Rio Grande LNG, LLC
RSG	Responsibly Sourced Gas
SCADA	Supervisory Control and Data Acquisition System
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality
Terminal	RGLNG’s natural gas liquefaction and liquefied natural gas export facility
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers



USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

# Resource Report 3: Vegetation and Wildlife

## 3.1 Introduction

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquified at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems".

RGLNG has developed and improved the design of the Terminal to incorporate CCS systems, which allow for the capture of at least 90% of the CO<sub>2</sub> emissions from the facility during the liquefaction process. These CCS systems broadly consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

Specific components and equipment related to these CCS systems include:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

Once full site preparation is complete (as approved by FERC in the letter dated March 6, 2020), construction of the CCS Systems will occur concurrently with the RGLNG Terminal.

Resource Report 3 provides a description of fisheries, vegetation, and wildlife resources, including protected species, which may be directly or indirectly affected by construction and operation of the CCS Systems.

### **3.1.1 Wildlife and Migratory Birds**

Construction and operation of the CCS Systems does not involve additional impacts to wildlife and migratory birds nor ground disturbance outside of the already authorized RGLNG Project.

Lighting for the CCS Systems will be consistent with the previously authorized lighting plans approved by the U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD), as well as in accordance with FERC Order Conditions 22 and 98. The CCS Systems and Terminal site are situated between a high-speed, multi-lane, state highway and an active navigation channel that currently produce vehicle and vessel noise, respectively. Baseline noise generated by high-speed vehicles on typical highways ranges from 70 to 80 decibels (dB) at 50 feet (FHWA 2015) while recreational marine vessels range from 72 to 109 dB at 50 feet (PWIA 2015). As presented in Resource Report 9, "Air and Noise Quality," site preparation and facility construction noise levels of the Terminal and CCS Systems would be less than 55 decibels (dBA) at 50 feet, which is less than the already authorized RGLNG Project and less than baseline noise levels created by vehicle and vessel traffic. Therefore, while the CCS Systems would create construction and operations-related noise, it would be much less than what has already been evaluated for construction and operation of the RGLNG Terminal. As such, with addition of the CCS Systems, there would be no additional impacts on wildlife beyond the already authorized RGLNG Project.

## **3.2 State and Federally Listed Species**

The April 2019 final environmental impact statement described the state and federally listed species that could be impacted by the RGLNG Project, and the potential impacts on those species. The addition of the CCS Systems to RGLNG would not result in additional ground disturbing activities, vegetation removal, or impact species or their habitats beyond what was described for the RGLNG Project. As discussed above (Section 3.1.1, Wildlife and Migratory Birds) impacts to state and federally listed species from construction and operation of the CCS Systems would not result in additional impacts on species beyond the already authorized RGLNG Project.

Additionally, the USFWS provided a Biological Opinion for the RGLNG Project on October 1, 2019 (amended on October 8, 2019) and on January 25, 2021, provided concurrence to FERC that the RGLNG

Project “*may affect but is not likely to adversely affect,*” the eastern black rail. As stated above, the addition of the CCS Systems would not result in new or additional impacts on state or federally listed species or their habitats.

### 3.3 References

Federal Highway Administration (FHWA). 2015. Public Roads. Accessed November 2015. <https://www.fhwa.dot.gov/publications/publicroads/03jul/06.cfm>.

Personal Watercraft Industry Association (PWIA). 2015. Sound Level Comparisons. Accessed November 2015. <http://www.pwia.org/sound/level.aspx>

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# Rio Grande LNG Project with Carbon Capture and Sequestration

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## Resource Report 4: Cultural Resources

November 17, 2021

Prepared by:



1000 Louisiana St., Suite 3900  
Houston, TX 77002

SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Initial cultural resources consultation and documentation, and documentation of consultation with Native Americans. (§§ 380.12(f)(1)(i) & (2))	Not Applicable
<input type="checkbox"/> 2. Overview/Survey Report(s). (§§ 380.12(f)(1)(ii) & (2))	Not Applicable

The inclusion of CCS Systems does not implicate any new cultural resources beyond those identified, considered and reviewed in the original authorization.

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 5: Socioeconomics**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002



SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. For major aboveground facilities and major pipeline projects that require an EIS, describe existing socioeconomic conditions within the project area. (§ 380.12(g)(1))	Section 5.2
<input type="checkbox"/> 2. For major aboveground facilities, quantify impact on employment, housing, local government services, local tax revenues, transportation, and other relevant factors within the project area. (§§ 380.12(g)(2-6))	Sections 5.2, 5.3, 5.4, 5.5 and 5.6

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# Abbreviations and Acronyms

AEP	American Electric Power
AGRU	Acid Gas Removal Unit
CCS	Carbon Capture and Sequestration
CCS Systems	CCS systems to be implemented at the RGLNG Terminal
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
CO <sub>2</sub>	carbon dioxide
DOE	U.S. Department of Energy
EIR	Environmental Information Request
EJ	Environmental Justice
EJSCREEN	EPA's Environmental Justice Screening and Mapping Tool
EPA	U.S. Environmental Protection Agency
EPH	Environmental Public Health
ERP	Emergency Response Plan
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
GMS	Grievance Management System
LNG	liquefied natural gas
m <sup>3</sup>	cubic meters
MTPA	million tons per annum
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NextDecade	NextDecade Corporation
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NMFS	National Marine Fisheries Service
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
Project	RGLNG Terminal
RGLNG	Rio Grande LNG, LLC

RSG	Responsibly Sourced Gas
SCADA	Supervisory Control and Data Acquisition System
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality
Terminal	RGLNG's natural gas liquefaction and liquefied natural gas export facility
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

# Resource Report 5: Socioeconomics

## 5.1 Introduction

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquified at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems".

RGLNG has developed and improved the design of the Terminal to incorporate CCS Systems, which allow for the capture of at least 90% of the CO<sub>2</sub> emissions from the facility during the liquefaction process. These CCS Systems broadly consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

Specific components and equipment related to these CCS Systems include:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

Once full site preparation is complete (as approved by FERC in the letter dated March 6, 2020), construction and installation of the CCS Systems will occur concurrently with the RGLNG Terminal.

Given the minor scope of impacts anticipated from construction and operation of the CCS Systems compared to the larger RGLNG Terminal which Commission Staff has previously reviewed, only a limited number of resource reports require revision from those submitted for the RGLNG Terminal. Resource Report 1, "General Project Description" provides a more in-depth Project overview and Resource Report 10, "Alternatives," includes a discussion of the CCS Systems and the alternatives considered. Resource Report 9, "Air and Noise Quality" includes a discussion of the impact CCS Systems will have in reducing a range of air pollutants.

Past filings established the baseline socioeconomic conditions and projected impacts from the RGLNG Terminal in the jurisdictions near the Project area. Socioeconomic resources that have the potential to be impacted include population, employment and economy, housing, public services, transportation and traffic, and tax revenues. This resource report expands on the previous analyses to more closely explore how RGLNG Terminal socioeconomic impacts have been further mitigated through the incorporation of the CSS Systems. Past filings have quantified the economic and job contributions of the RGLNG Terminal and assessed any additional demands on labor supply, housing, public services, or transportation generated by the workforce during construction or operation.

## **5.2 General Employment and Economy**

### **5.2.1 CCS Systems**

#### **5.2.1.1 Existing Conditions**

Existing conditions for the RGLNG Terminal (Terminal Impact Area) have been well-documented in RGLNG's past filings and environmental information request (EIR) responses in the original RGLNG project authorization docket. The addition of the CCS Systems will not significantly impact these previously identified conditions.

#### **5.2.1.2 Construction and Operations Impacts**

##### **Construction**

The addition of the CCS Systems will result in an increase to the average monthly workforce of approximately 600 personnel. As with construction of the Terminal, it is estimated that 30% will be locally sourced from the historically underserved counties of Cameron, Willacy and Hidalgo. An economic impact analysis conducted in 2015 (The Perryman Group 2015) found that there is sufficient available labor in Cameron County and surrounding areas to fill most of the Terminal's labor

requirements. In spite of this, based upon historical Gulf Coast project experience, only 30% of the workers are presumed to be hired from the local population with the remaining 70% from non-local areas. RGLNG anticipates that most of the support personnel, such as security and administrative, will be filled with qualified local workers.

## **Operation**

At full build-out with five liquefaction trains, operation of CCS Systems will employ approximately 30 additional permanent operations workers, not including outside servicing contractors. This permanent workforce (also referred to as payroll staff) will consist primarily of operations and production workers, maintenance workers, and managers assigned duties directly relating to running, monitoring, and maintaining CCS Systems operations. A smaller percentage will consist of health, safety, security, environment workers, and general support staff. Local labor will be hired to the maximum extent practicable. An estimated 60% of operational employees/payroll staff are expected to be hired from the local labor pool.

## **5.3 Housing**

The purpose of inventorying and analyzing housing stock in the Project region is primarily to determine whether the number and type of existing housing units would be sufficient to house the Project workforce. Some workers would be hired locally and would not require new housing. Others, especially workers with specialized skills that may not be available in the local area, would move into the area, either temporarily during construction or permanently during operations. This section addresses what effects could be expected on the general availability of housing if workers increase occupancy rates.

The effect of non-local workers' increased demand on temporary or permanent housing can be estimated by a number of factors, including the non-local workers' percent increase of the local population, the number of non-local workers compared with the number of vacant and temporary housing units, and the estimated influx of seasonal visitors to the region. The site of the RGLNG Terminal and collocated CCS Systems are fairly rural, which avoids construction in proximity to houses. Most non-local workers would seek accommodations in the towns several miles away from their worksites.

### **5.3.1 CCS Systems**

This section addresses existing housing conditions in the Terminal Impact Area and potentially available housing, including rental and for-sale single-family, multi-family, and mobile home units; hotel and motel rooms; and recreational vehicle park sites. Following this is an assessment of potential impacts of non-local workers seeking housing in the area during construction and operation of the CCS Systems.

### 5.3.1.1 Available Housing

Table 5.5-1 provides an inventory of housing units in the Terminal Impact Area and Texas published by the U.S. Census Bureau (2020). Housing types primarily include single-family, multi-family, and mobile home units. Less than one percent of the total housing inventory is made up of boats, RVs, vans, and other miscellaneous units. These units are only included in the inventory if they are claimed to be the primary residence of the occupant. All data are from the U.S. Census Bureau’s 2020 DEC Redistricting Data (PL 94-171) or the 2019 American Community Survey (ACS) 1-Year Estimates.

**Table 5.3-1: Existing Housing Conditions, Terminal Impact Area**

Geographic Area	Total Housing Units	Occupancy Rate	Owner-Occupied Units	Renter-Occupied Units	Median Owner-Occupied Home Value (dollars)	Median Rent (dollars)
State of Texas	11,589,324	90.5%	6,179,278	3,805,848	172,500	1,045
<b>Terminal Impact Area</b>	<b>456,322</b>	<b>86.3%<sup>1</sup></b>	<b>256,875</b>	<b>125,758</b>	<b>97,756<sup>2</sup></b>	<b>733<sup>3</sup></b>
Cameron County	154,019	84.0%	84,071	45,236	121,200	733
Hidalgo County	294,902	87.7%	168,726	78,818	87,100	734
Willacy County	7,401	78.1%	4,078	1,704	55,300	664

Source: 2019 ACS 1-Year Estimates

<sup>1</sup> Value is weighted average of occupancy rates in counties based on total housing units.

<sup>2</sup> Value is weighted average of median owner-occupied home values in counties based on total owner-occupied homes.

<sup>3</sup> Value is weighted average of median rent in counties based on total occupied units paying rent.

The total housing occupancy rate in the impact area is slightly less than in the state of Texas. One contributing factor is likely the high number of seasonal, recreational, or occasional use units categorized as “vacant” in the impact area, discussed in more detail below. The ratio of owner-occupied units to renter-occupied units in the impact area and the state are similar at approximately 2:1. In total, the impact area’s quantity of owner-occupied units and renter-occupied units exceed 250,000 and 120,000, respectively, and roughly 35% of these units are in Cameron County.

The estimated median rent paid in the impact area, a weighted average of median rents in the counties, is 70% of the median rent in Texas. The estimated median owner-occupied home value in the impact area, a weighted average of median values in the counties is approximately 57% of the median value of owner-occupied homes in Texas. In Willacy County, the median home value is even lower, approximately 32% of the state median value of owner-occupied homes in the state.

### 5.3.1.2 Construction and Operation Impacts

#### Construction

Approximately 70% of the construction labor force working on the CCS Systems will consist of skilled workers who move in temporarily from outside the impact area. Many are anticipated to live in Cameron

County, while a smaller number would likely find feasible accommodations in towns or areas within Hidalgo and Willacy counties that are within a reasonable commuting distance. The total workforce will gradually build up, peak, and then start to decline over the course of the RGLNG onsite construction period. Over the entire construction period, the average non-local workforce for the CCS Systems is expected to number approximately 420 workers.

Given the existing housing inventory in the impact area, RGLNG expects its out-of-town workers would find a sufficient quantity of housing options among the existing supply. Additionally, new construction is expected to supplement the existing supply of apartments in the impact area.

When inclusive of all potential housing options for construction workers in the three-county region, the Terminal Impact Area's housing supply is large enough to absorb the demand of temporary, non-local CCS Systems construction workers with only minor potential impacts during peak construction. During peak construction, worker demand could exceed 4% of unoccupied accommodations in the impact area and could create minor-to-moderate pricing and competition impacts. However the temporary period of higher demand would not likely exert irreversible impacts on the local housing and accommodations markets. This analysis takes a conservative approach and assumes that added competition from workers for more than a few percentage points of available housing and accommodations units could have noticeable impacts on the markets ranging from minor to moderate to significant. In the scenario with an adjusted impact area that excludes accommodations in South Padre Island, Port Mansfield, and several towns in Hidalgo County over 65 miles away, the vacant housing supply is also sufficient to absorb non-local construction workers' housing needs with only minor-to-moderate impacts on the housing and accommodations markets. In this scenario, non-local workers' demand could result in upward pressure on the housing and accommodations markets, but given that, on average, their demand would represent less than 5% of vacant housing units, their impact would generally be minor and reversible on most housing types.

The total available units estimate in the adjusted impact area is somewhat conservative. During peak construction, workers may seek housing in some of the Hidalgo County towns excluded from the adjusted impact area, or even in Port Mansfield, if the prices are more competitive. It is common for many transient construction workers to share housing and thereby reduce the overall impact on the housing market. Nevertheless, if non-local workers seek available housing only in the communities inventoried in the adjusted impact area, their impact overall would not be expected to be a significant negative impact on housing availability in the region. For example, the occupancy of RV and mobile home parks by seasonal visitors to the region is already accounted for in the inventory, and, given the remaining supply, workers would not be expected to displace this important seasonal visitor group.

Also, peak construction would be temporary, and market conditions would be expected to return to current conditions after the peak subsides.

Of note, RGLNG designed the staged construction schedule, in part, to minimize peak construction levels. Although this design extends the total construction period, it lessens impacts by the workforce, including workers' potential impacts on housing. Given the RGLNG construction period involves a gradually increasing and decreasing workforce, workers' impact on the housing market would likely have a positive economic impact, in balance, to the impact area. RGLNG has begun establishing relationships with area realty agencies and will continually monitor housing availability and new housing projects throughout the construction period.

### **Operation**

Operation of the CCS Systems is expected to employ up to 30 additional workers. Given the small number of non-local workers compared to the current number of vacant housing units in Cameron County and the impact area, impacts on housing from these workers would be negligible.

#### **5.3.1.3 Displacement of Residences**

No residences would be displaced as a result of construction or operation of the CCS Systems. The Terminal site is in a rural location, such that construction in proximity to residences is largely avoided. The nearest residences from the Terminal property line are approximately 2.2 miles away, northeast of the site in Port Isabel.

## **5.4 Public Services**

The original analysis of public services in previous filings by RGLNG were intended to identify any local services that could be overburdened by construction or operations of the proposed Project or by the workers associated with the Project. To the extent that such analysis revealed the potential for the Project to have a significant, detrimental impact on the quality of public services, RGLNG's mitigation steps to be taken to ameliorate such impacts were also described and reviewed by FERC Staff.

### **5.4.1 CCS Systems**

The inclusion of CCS Systems does not place any significant new burdens on local public services beyond those identified, considered and reviewed in the original authorization.

## 5.5 Transportation and Traffic

Transporting of workers, materials, and equipment during construction of the Terminal and CCS Systems will temporarily increase traffic and add vehicles to nearby roadways. In previous filings by RGLNG the existing transportation conditions in the impact areas were established and potential traffic impacts from construction and operation of the Project components were identified.

### 5.5.1 CCS Systems

Based on the integration of the CCS Systems construction with the RGLNG Terminal construction, the inclusion of CCS Systems does not implicate any impactful new transportation or traffic issues beyond those identified, considered and reviewed in the original authorization. There will be an additional requirement for personnel, but peak staffing will still remain below the maximum workforce of 5,225 noted in the Final Environmental Impact Statement (FEIS)(Section 4.9.1.1). The construction workforce staffing curve will lengthen due to CCS Systems, but the peak will not be exceeded.

## 5.6 Government Taxes and Revenues

Tax revenues are one of the primary mechanisms for funding local governments and maintaining services and infrastructure at an adequate level to serve the population. Persons and operations associated with construction and operations of the CCS Systems would utilize existing local infrastructure and some services. Also, indirectly related economic activity stimulated by the CCS Systems, such as increased orders of materials needed for the CCS Systems or hiring by secondary suppliers, or increased spending on consumer goods by employees, would generate additional tax revenues in the local communities.

### 5.6.1 CCS Systems

The inclusion of CCS Systems does not implicate any new government taxes and revenues beyond those identified, considered and reviewed in the original authorization.

## 5.7 Environmental Justice

Executive Order 12898 (59 Federal Register 7629) established a federal policy under which federal agencies must identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations. The U.S. Environmental Protection Agency's (EPA) "Final Guidance for Incorporating Environmental Justice Concerns in EPA's National Environmental Policy Act (NEPA) Compliance Analyses" (1998) was developed to provide federal agencies a process for identifying environmental justice communities and

addressing potential impacts on them. The basic components of an environmental justice assessment should include the following:

- A demographic assessment of the affected area to identify minority and low-income populations that may be present; and
- An integrated assessment to determine whether any adverse impacts would disproportionately affect minority and low-income populations.

More recently, Executive Order 14008 (86 Federal Register 7619) reemphasized the need for agencies to make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.

As stated, previous filings established the baseline socioeconomic conditions and projected impacts from the Terminal in the jurisdictions near the impact area, which is considered Cameron, Willacy and Hidalgo counties. Past filings have included a demographic assessment of the affected area to identify minority and low-income populations that may be present. Additionally, an assessment to determine whether any adverse impacts would disproportionately affect minority and low-income populations was included. To be conservative, this environmental justice analysis considered all non-white populations recorded by the U.S. Census Bureau to be minority, including "some other race" and "two races."

As established in previous filings, the nearest residences to the Terminal site are approximately 2.2 miles away in the direction of Port Isabel. During the application phase and in accordance with the National Environmental Policy Act (NEPA) process, RGLNG completed an analysis of air quality to ensure all criteria pollutants were within the National Ambient Air Quality Standards (NAAQS). As stated in the FEIS, this analysis extended to a 31-mile radius around the Terminal. RGLNG completed air dispersion modeling in coordination with the Texas Commission on Environmental Quality (TCEQ) on stationary source emitters at the Terminal site, as well as cumulative modeling of RGLNG along with additional nearby stationary and mobile sources (LNG carriers). While concurrent maximal operations of the three (3) LNG facilities originally proposed for the Brownsville Ship Channel (Texas LNG, Annova LNG and RGLNG) would have resulted in increased concentrations of air pollutants in the immediate vicinity of the facilities, the Project's emissions were expected not to result in a significant impact on regional air quality, nor would any exceedance of the NAAQS occur in a populated area. On April 15, 2021, FERC granted Annova LNG's request to vacate its authorization to construct and operate the project, which will result in a further reduction in potential cumulative impacts.

## 5.7.1 EJSCREEN Analysis

Since 1994, the EPA has been engaged in a variety of research and analytic efforts related to environmental justice, to support both regulatory analysis and screening efforts. The original Environmental Justice Screening and Mapping Tool (EJSCREEN) efforts were guided by Plan EJ 2014, which was released in September 2011. EPA released new versions of EJSCREEN with updated data and an improved interface in 2016, 2017, 2018 and 2019. More recently, the EJ 2020 Action Agenda (EJ 2020), EPA's strategic plan for advancing environmental justice from the years 2016-2020, builds on the foundation established by EPA's Plan EJ 2014 as well as decades of significant environmental justice practice by the Agency, communities, and their partners.

The EPA has shared the EJSCREEN Environmental Justice Mapping and Screening Tool with the public to be more transparent about how they consider environmental justice in their work. This has allowed stakeholders to make informed decisions about pursuing environmental justice and created a common starting point between the agency and the public when looking at issues related to environmental justice.

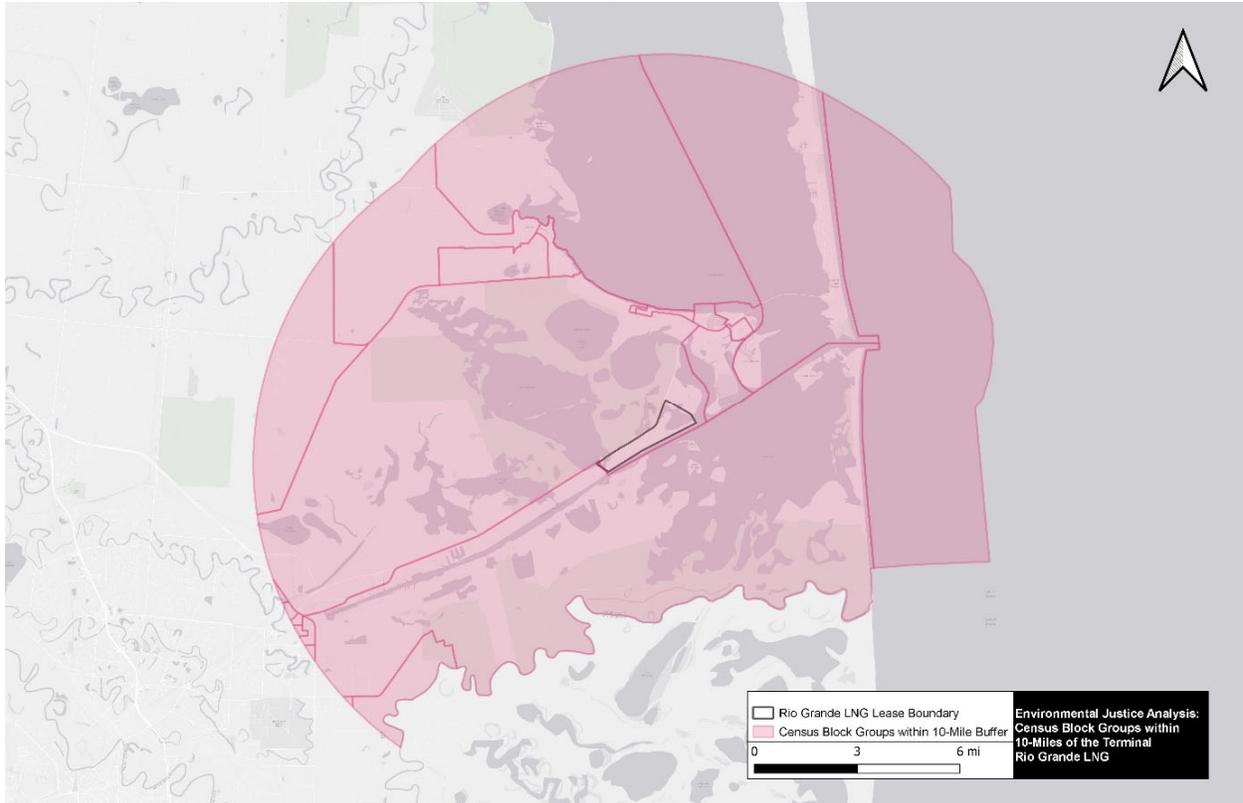
While the air dispersion modeling detailed in the RGLNG FEIS demonstrates that the Terminal would not cause or significantly contribute to any potential NAAQS exceedance out to 31 miles, RGLNG has taken this opportunity to expand upon the environmental justice analysis completed to date by applying EJSCREEN out to a range of ten (10) miles from the Terminal. An assessment at this stage will also account for the 5-train design development and other project improvements that have taken place since issuance of the FERC Authorization Order on November 22, 2019.

### 5.7.1.1 EJSCREEN Limitations

Like all screening tools, the EPA recommends that EJSCREEN should be used for a "screening-level" look as a useful first step in understanding or highlighting locations that may be candidates for further review. Screening-level results do not, by themselves, determine the existence or absence of environmental justice concerns in each location, nor do they provide a risk assessment. There is no mandate or guidance expressed or implied that state governments or other entities should use the tool or its underlying data.

### 5.7.1.2 EJSCREEN Methodology

To build on and update the environmental justice analysis previously completed, EJSCREEN has been applied out to a radius of ten (10) miles from the Terminal as indicated in Figure 5.7-1 below.



**Figure 5.7-2 Census Block Groups within ten miles of RGLNG**

EJSCREEN uses maps and reports to present three kinds of information: environmental indicators, demographic indicators and EJ Indexes. An EJ Index summarizes how an environmental indicator and demographics come together in the same location. The EPA’s National Air Toxics Assessment (NATA) provides several environmental indicators that are used in EJSCREEN.

The following pages include the EJSCREEN Census 2010 Summary Report, EJSCREEN ACS Summary Report and the National Environmental Public Health (EPH) Tracking Network data snapshots for Cameron County on several relevant topics.



## EJSCREEN Census 2010 Summary Report



Location: User-specified polygonal location

Ring (buffer): 10-miles radius

Description: RGLNG with CCS Systems

Summary	Census 2010
Population	14,200
Population Density (per sq. mile)	86
People of Color Population	10,575
% People of Color Population	74%
Households	4,515
Housing Units	5,707
Land Area (sq. miles)	165.64
% Land Area	65%
Water Area (sq. miles)	88.35
% Water Area	35%

Population by Race	Number	Percent
Total	14,200	-----
Population Reporting One Race	13,962	98%
White	12,122	85%
Black	177	1%
American Indian	49	0%
Asian	152	1%
Pacific Islander	7	0%
Some Other Race	1,455	10%
Population Reporting Two or More Races	238	2%
Total Hispanic Population	10,214	72%
Total Non-Hispanic Population	3,986	28%
White Alone	3,625	26%
Black Alone	134	1%
American Indian Alone	24	0%
Non-Hispanic Asian Alone	143	1%
Pacific Islander Alone	6	0%
Other Race Alone	10	0%
Two or More Races Alone	44	0%

Population by Sex	Number	Percent
Male	7,393	52%
Female	6,807	48%

Population by Age	Number	Percent
Age 0-4	1,166	8%
Age 0-17	3,893	27%
Age 18+	10,307	73%
Age 65+	1,649	12%

Households by Tenure	Number	Percent
Total	4,515	
Owner Occupied	2,893	64%
Renter Occupied	1,623	36%

**Data Note:** Detail may not sum to totals due to rounding. Hispanic population can be of any race.

**Source:** U.S. Census Bureau, Census 2010 Summary File 1.



## EJSCREEN ACS Summary Report



Location: User-specified polygonal location  
 Ring (buffer): 10-miles radius  
 Description: RGLNG with CCS Systems

Summary of ACS Estimates		2014 - 2018
Population		13,376
Population Density (per sq. mile)		81
People of Color Population		10,002
% People of Color Population		75%
Households		4,614
Housing Units		6,121
Housing Units Built Before 1950		45
Per Capita Income		17,900
Land Area (sq. miles) (Source: SF1)		165.66
% Land Area		65%
Water Area (sq. miles) (Source: SF1)		88.33
% Water Area		35%

	2014 - 2018 ACS Estimates	Percent	MOE (±)
<b>Population by Race</b>			
Total	13,376	100%	714
Population Reporting One Race	13,313	100%	1,175
White	12,631	94%	736
Black	38	0%	35
American Indian	22	0%	20
Asian	115	1%	86
Pacific Islander	0	0%	19
Some Other Race	507	4%	279
Population Reporting Two or More Races	63	0%	53
Total Hispanic Population	9,609	72%	732
Total Non-Hispanic Population	3,767		
White Alone	3,374	25%	260
Black Alone	28	0%	35
American Indian Alone	0	0%	19
Non-Hispanic Asian Alone	115	1%	86
Pacific Islander Alone	0	0%	19
Other Race Alone	227	2%	258
Two or More Races Alone	23	0%	24
<b>Population by Sex</b>			
Male	6,297	47%	373
Female	7,079	53%	503
<b>Population by Age</b>			
Age 0-4	1,062	8%	280
Age 0-17	3,212	24%	407
Age 18+	10,164	76%	454
Age 65+	2,409	18%	221

**Data Note:** Detail may not sum to totals due to rounding. Hispanic population can be of any race.

N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS) 2014 - 2018



## EJSCREEN ACS Summary Report



Location: User-specified polygonal location

Ring (buffer): 10-miles radius

Description: RGLNG with CCS Systems

	2014 - 2018 ACS Estimates	Percent	MOE (±)
<b>Population 25+ by Educational Attainment</b>			
Total	8,915	100%	352
Less than 9th Grade	1,396	16%	225
9th - 12th Grade, No Diploma	1,056	12%	180
High School Graduate	2,866	32%	235
Some College, No Degree	1,995	22%	192
Associate Degree	562	6%	96
Bachelor's Degree or more	1,603	18%	162
<b>Population Age 5+ Years by Ability to Speak English</b>			
Total	12,314	100%	564
Speak only English	5,619	46%	406
Non-English at Home <sup>1+2+3+4</sup>	6,695	54%	560
<sup>1</sup> Speak English "very well"	3,664	30%	456
<sup>2</sup> Speak English "well"	1,094	9%	170
<sup>3</sup> Speak English "not well"	1,259	10%	228
<sup>4</sup> Speak English "not at all"	677	6%	201
<sup>3+4</sup> Speak English "less than well"	1,936	16%	280
<sup>2+3+4</sup> Speak English "less than very well"	3,030	25%	327
<b>Linguistically Isolated Households*</b>			
Total	671	100%	156
Speak Spanish	654	97%	155
Speak Other Indo-European Languages	17	3%	28
Speak Asian-Pacific Island Languages	0	0%	19
Speak Other Languages	0	0%	19
<b>Households by Household Income</b>			
Household Income Base	4,614	100%	188
< \$15,000	1,013	22%	144
\$15,000 - \$25,000	673	15%	131
\$25,000 - \$50,000	1,116	24%	144
\$50,000 - \$75,000	668	14%	98
\$75,000 +	1,145	25%	120
<b>Occupied Housing Units by Tenure</b>			
Total	4,614	100%	188
Owner Occupied	3,158	68%	173
Renter Occupied	1,456	32%	154
<b>Employed Population Age 16+ Years</b>			
Total	10,411	100%	448
In Labor Force	5,003	48%	390
Civilian Unemployed in Labor Force	178	2%	79
Not In Labor Force	5,408	52%	367

**Data Note:** Detail may not sum to totals due to rounding. Hispanic population can be of anyrace.

N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS)

\*Households in which no one 14 and over speaks English "very well" or speaks English only.



## EJSCREEN ACS Summary Report



Location: User-specified polygonal location

Ring (buffer): 10-miles radius

Description: RGLNG with CCS Systems

	2014 - 2018 ACS Estimates	Percent	MOE (±)
<b>Population by Language Spoken at Home*</b>			
Total (persons age 5 and above)	12,314	100%	564
English	5,619	46%	450
Spanish	6,430	52%	572
French	126	1%	19
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	12	0%	19
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	91	1%	86
Chinese	8	0%	19
Japanese	N/A	N/A	N/A
Korean	0	0%	19
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	0	0%	19
Other Asian	9	0%	19
Tagalog	0	0%	19
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	7	0%	19
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	7	0%	19
Total Non-English	6,695	54%	722

**Data Note:** Detail may not sum to totals due to rounding. Hispanic population can be of any race.

N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2014 - 2018.

\*Population by Language Spoken at Home is available at the census tract summary level and up.

### **5.7.1.3 EJSCREEN Census 2010 Summary Report and ACS Summary Report – Analysis**

The Demographic Indicator values in the EJSCREEN Report for the census block groups of interest are expanded upon in the Census 2010 Summary Report and American Community Survey (ACS) Summary Report generated by EJSCREEN. Specifically, the indicator for “Linguistically Isolated Population” on the EJSCREEN Report can be examined more closely on the ACS Summary Report.

Consistent with information presented in past filings, most of these additional census block groups within ten miles of the Terminal include very high percentages of residents who do not speak English well, or who are linguistically isolated. As noted in the application phase for the RGLNG Project, several public open houses were held for RGLNG and materials were provided in Spanish as well as English, plus Spanish-speakers were present to converse one-on-one with stakeholders in attendance. Specifically, three (3) open houses were held initially in 2015:

1. May 19, 2015, at the Helen Kleberg Community Center, 230 West Yoakum Avenue in Kingsville, Texas (Kleberg County);
2. May 20, 2015, at the American Legion Hall, 211 West Hidalgo Avenue in Raymondville, Texas (Willacy County); and
3. May 21, 2015, at the International Technology, Education and Commerce Center, 301 Mexico Street in Brownsville, Texas (Cameron County).

After the Draft Environmental Impact Statement (DEIS) was issued by FERC, three (3) additional open houses were held to solicit feedback from the public:

1. November 13, 2018, at Texas A&M, 700 University Blvd., Kingsville, TX
2. November 14, 2018, at La Quinta, 128 N Expressway 77, Raymondville, TX
3. November 15, 2018, at Port Isabel Convention Center, 309 E. Railroad Ave., Port Isabel, TX

RGLNG made the commitment to continue to meet with interested individuals through the FERC process and to have Spanish-speakers available at such times. RGLNG has developed the “Rio Grande LNG Community Engagement and Communications Plan” (the “Plan”). The purpose of this internal document is to provide a framework for the strategies and tactics for how RGLNG engages with residents and the community in the Rio Grande Valley. The Plan also identifies RGLNG’s target audiences, provides key messages, and outlines an overall communication plan with the goal of creating an environment conducive to the project’s success and contribution to the world’s need for clean-

burning natural gas. "Inclusion" is listed among the philosophies and values stated in the Plan, which has the following corresponding principles:

- Remove barriers to participation in planning and decision-making for all unengaged groups and under-resourced communities.
- Use bi-directional, culturally, and linguistically appropriate engagement tools and strategies.

RGLNG has developed and distributed printed materials tailored to address the questions and concerns of stakeholders in both English and Spanish to accommodate the local population. Fact sheets and FAQ documents have been distributed through direct mail, at the open house meetings, at individual meetings, by canvassing and by request. E-mail updates, in English and Spanish, have and will continue to be sent to community leaders and stakeholders at appropriate project milestones.

In accordance with the Plan, RGLNG has held more than forty (40) outreach engagements since June 2019 with members of local businesses, schools, youth centers, city councils and chambers of commerce – all while providing Spanish-speakers to address any concerns from members of EJ communities. RGLNG has also participated in numerous local cultural events and festivals, while again providing Spanish-speakers to address any concerns from members of EJ communities. Additionally, a media tour from March 5-7, 2018, was conducted to provide project information to nearby EJ communities by way of local Spanish newspapers (El Heraldo Newspaper), radio stations (KMBH Public Radio News) and television channels (Telemundo TB KTLN News).

Of note, the LNG Roadshow event, which took place October 21-23, 2019, in the towns of Brownsville, Mercedes, Weslaco and Los Fresnos, Texas, allowed RGLNG to engage with a wide range of local community members through an entertaining and educational presentation on the physical properties of liquefied natural gas, plus an explanation of the many benefits of LNG as an energy source. Spanish-speakers were provided to address any concerns from members of EJ communities at these events.

Another key internal component of the Plan is RGLNG's "Grievance Management System for the RGLNG Project" (the "GMS"). One of several principles guiding the development and implementation of the GMS is the following:

*Ensure stakeholders face no barriers to accessing and using the GMS: The process will be well known and understood by stakeholders and the user will not incur costs, significant effort, or any fear of reprisal, as these factors could have the result of deterring use of the process. Use of the GMS will not impede access to any other existing legal recourse available to stakeholders. The*

*process must also take into account potential cultural, linguistic, physical, and literacy barriers, and seek to eliminate these in its design.*

The GMS includes mechanisms for reporting public complaints by telephone hotline and email.

RGLNG has also made several EJ-related commitments with FERC during the process of receiving approval to begin site preparation activities on March 6, 2020. In response to a FERC data request issued on December 11, 2019, during construction RGLNG committed to conduct new hire / site orientations in both English and Spanish, which reinforces the commitment to support effective environmental regulatory compliance with a bi-lingual construction workforce. In response to another FERC data request issued on January 8, 2020, RGLNG committed to develop a public pamphlet / trifold as an extension of the Terminal Emergency Response Plan (ERP). This trifold would provide preliminary evacuation instructions and maps of evacuation routes as public information to be distributed to residences, institutions, commercial establishments, and recreational areas located within areas potentially exposed to a hazard in the unlikely event of an incident adjacent to the Terminal and along the LNG carrier route. In a subsequent FERC data request issued on February 25, 2020, RGLNG was requested to develop, publish and distribute this trifold in Spanish due to the large population of native Spanish-speakers in Brownsville and the surrounding areas. RGLNG committed to do this and to ensure portions of the ERP relevant to local emergency responders would also be available in Spanish.

The recently updated NextDecade company website ([www.Next-Decade.com](http://www.Next-Decade.com)) includes English and Spanish links to the company's Human Rights Policy, which includes this commitment to Community and Stakeholder Engagement:

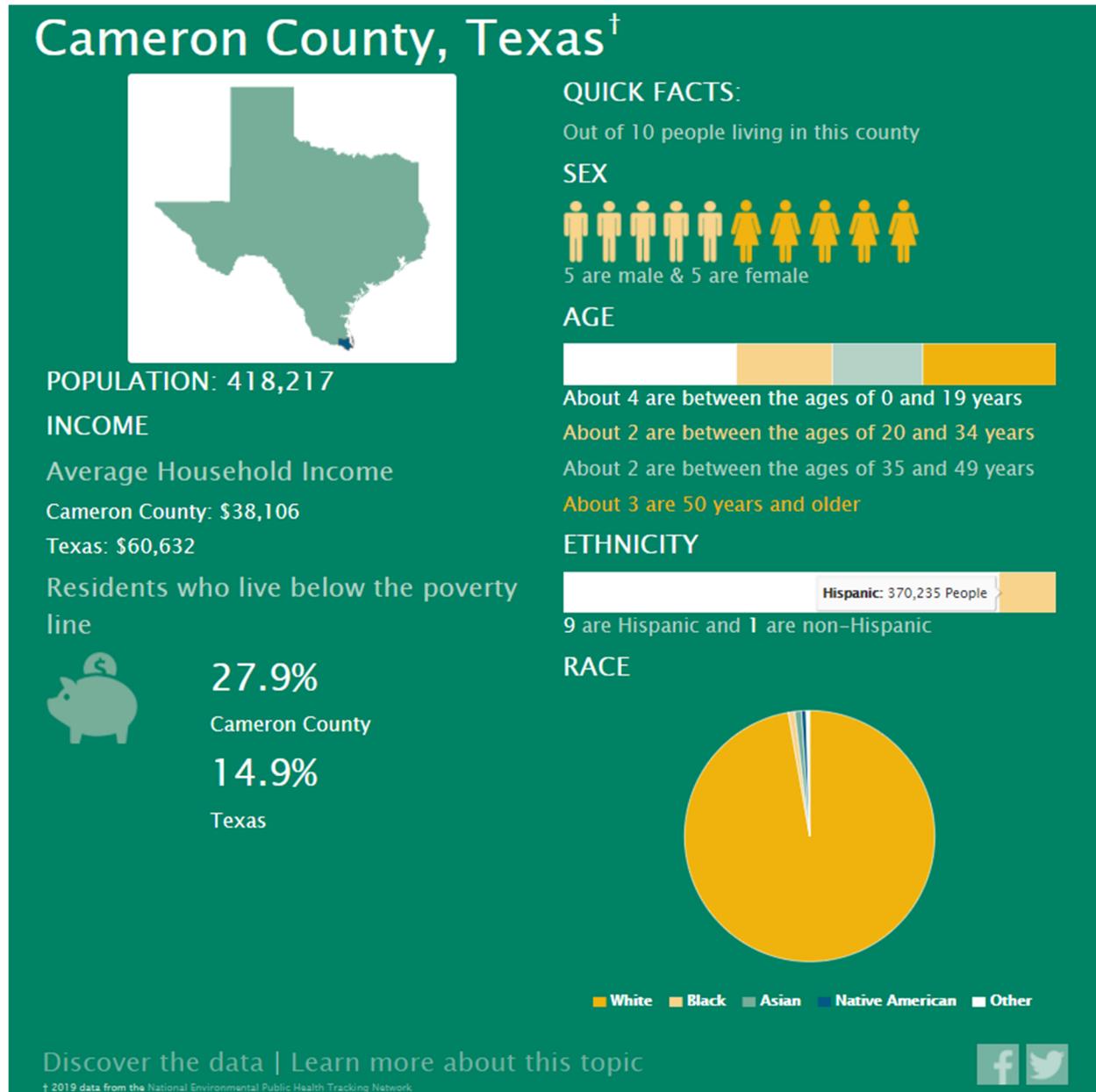
*We recognize that we are part of the communities in which we operate. We engage with communities on human rights matters that are important to them such as land rights, access to clean air and clean water. We also engage with people in those communities, including indigenous peoples as well as other vulnerable and disadvantaged groups. Our aim is to ensure through dialogue that we are listening to, learning from and considering their views as we conduct our business. We believe that local issues are most appropriately addressed at the local level.*

RGLNG have maintained a Brownsville presence with Spanish-speaking communication and/or community engagement professionals since 2015.

#### **5.7.1.4 National EPH Tracking Network – Data Snapshots Analysis**

The following National Environmental Public Health (EPH) Tracking Network data snapshots have been generated by EJSCREEN for Cameron County, TX, based on the three census block groups of interest

originally input. Analysis is provided below each snapshot to indicate how the RGLNG Terminal with the inclusion of CCS Systems relates to the data.



Discover the data | Learn more about this topic

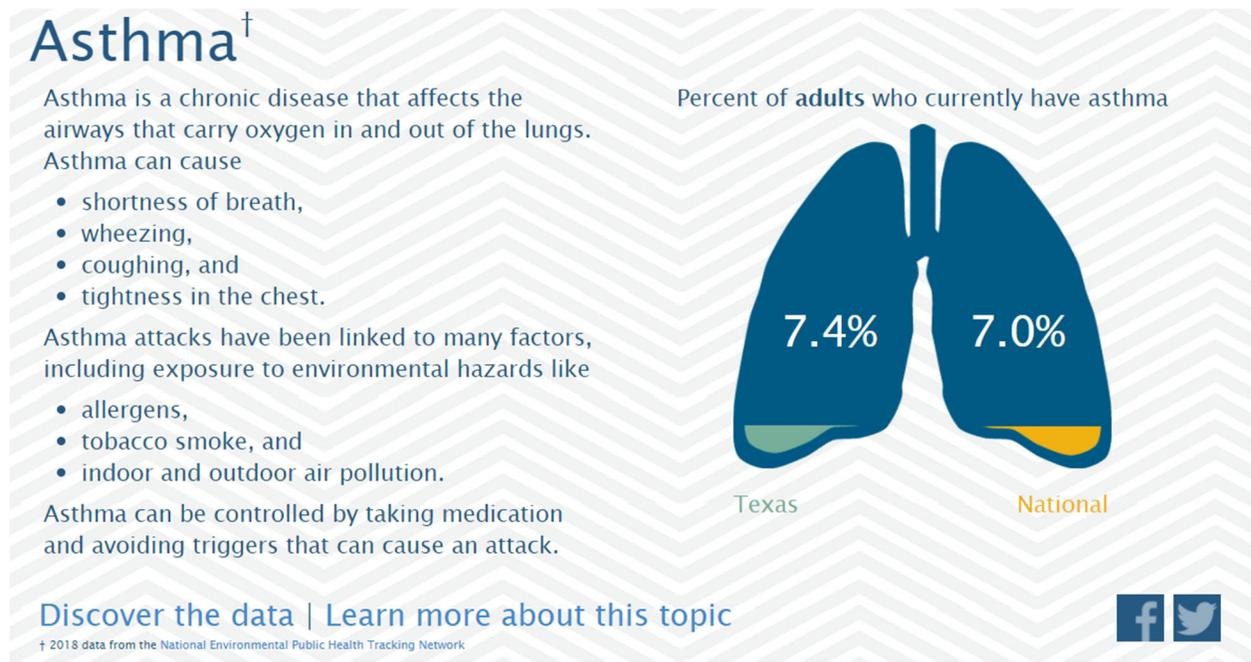
† 2019 data from the National Environmental Public Health Tracking Network

As indicated in previous filings, the three census block groups surrounding the RGLNG Terminal all have poverty rates that exceed 20%. This snapshot uses 2019 data to indicate the poverty rate in Cameron County is 27.9%, which is consistent with previous filings and the "Low Income Population" demographic indicator in the EJSCREEN Report. The social and economic benefits resulting from construction and operation of the RGLNG Terminal with CCS Systems are expected to be consistent with those originally

contemplated for local residences and communities. These benefits include a significantly increased local tax base and the creation of numerous well-paying jobs in this region.

Importantly and as a direct result of the proposed CCS Systems, by capturing at least 90% of the CO<sub>2</sub> emitted by RGLNG Terminal, any climate change impacts from RGLNG are greatly mitigated and will not disproportionately burden these traditionally underserved communities.

The ethnicity metric on the snapshot indicates a high People of Color Population and Linguistically Isolated Population in Cameron County. As mentioned in Section 5.7.1.3 above, RGLNG has made commitments to continue accommodating the local population by ensuring public outreach efforts are provided in both English and Spanish, in addition to conducting bi-lingual new hire / site orientation briefings for locally sourced workers.



As discussed in Resource Report 9, the RGLNG Terminal with CCS Systems allows for a significant reduction in multiple criteria air pollutants, which translates to a reduction in overall outdoor air pollution in the region and less potential for triggering or exacerbating asthma among members of the nearby EJ communities.

## Air Quality: Ground-Level Ozone<sup>†</sup>

Ozone occurs naturally in the sky and helps protect us from the sun's harmful rays. But ground-level ozone can be bad for your health and the environment. Ground-level ozone is one of the biggest parts of smog.

When ozone levels are above the national standard, everyone should try to limit their contact with it by reducing the amount of time spent outside.

**Cameron County** residents were exposed to unhealthy levels of ozone for **0 Days** in 2016.

Check the EPA's Air Quality Index (AQI) at [AirNow.gov](http://AirNow.gov) to see the current air quality conditions for your location. You can use the AQI to plan your daily activities to reduce exposure to ozone.



**Cameron County** residents were exposed to unhealthy levels of ozone for **0 Days** in 2016.

Discover the data | Learn more about this topic

<sup>†</sup> 2016 data from the National Environmental Public Health Tracking Network



While this snapshot indicates ground-level ozone is not a problem in Cameron County, the RGLNG Terminal with CCS Systems design has reduced emissions of NOx as indicated in Resource Report 9, which further reduces the likelihood of ground-level ozone forming in this region.

## Air Quality: Particulate Matter<sup>†</sup>

Air pollution is a leading environmental threat to human health. Particles in the air like dust, dirt, soot, and smoke are one kind of air pollution called particulate matter. Fine particulate matter, or PM<sub>2.5</sub>, is so small that it cannot be seen in the air. Breathing in PM<sub>2.5</sub> may

- lead to breathing problems,
- make asthma symptoms or some heart conditions worse, and
- lead to low birth weight.

The national standard for annual PM<sub>2.5</sub> levels is **12.0µg/m<sup>3</sup>**. When PM<sub>2.5</sub> levels are above 12, this means that air quality is more likely to affect your health.

In 2016, the annual level of PM<sub>2.5</sub> in **Cameron County** was **9.5µg/m<sup>3</sup>**. \*

\* Micrograms per cubic meter (µg/m<sup>3</sup>)

ANNUAL AMBIENT CONCENTRATION OF PM<sub>2.5</sub>

**9.5µg/m<sup>3</sup>\***

Cameron County, Texas

**12.0µg/m<sup>3</sup>\***

Annual National Standard

\*Micrograms Per Cubic Meter (µg/m<sup>3</sup>)

Discover the data | Learn more about this topic

<sup>†</sup> 2016 data from the National Environmental Public Health Tracking Network



This snapshot indicates the Cameron County annual level of PM<sub>2.5</sub> is below the 12.0 µg/m<sup>3</sup> threshold, which means the air quality is less likely to affect the health of the population in this region. Nonetheless, the RGLNG Terminal with CCS Systems provides a reduction in PM<sub>2.5</sub> of 49.2%, as discussed in Resource Report 9.

## Heart Attacks<sup>†</sup>

The environment is one of **several factors** that can lead to an increased risk for heart disease. High levels of air pollution and extreme hot and cold temperatures have been linked to increases in heart disease and deaths from heart attacks. A heart attack happens when a part of the heart muscle dies or gets damaged because of reduced blood supply.

In 2019, there were

- **217 deaths** from heart attacks in Cameron County.
- **8,732 deaths** from heart attacks in Texas.



Discover the data | Learn more about this topic

† 2019 data from the National Environmental Public Health Tracking Network

The significant reduction in projected levels of multiple criteria air pollutants, discussed in Resource Report 9, means the potential for heart attacks is reduced or not negatively impacted by the RGLNG Terminal with CCS Systems installed and operating.

### 5.7.1.5 EJSCREEN Key Takeaways

The EPA's EJ 2020 Action Agenda has served as inspiration for RGLNG in undertaking and completing this new analysis. By independently applying the EJSCREEN tool, RGLNG has created an up-to-date high-level screening of a significantly larger geographic area than the area originally assessed in the FEIS, so that further understanding of impacts on EJ communities in reference to the latest Terminal and CCS Systems design can be better understood using the latest tools and techniques.

EJSCREEN has validated past efforts and reinforced the need for ongoing RGLNG commitments to accommodate the local people of color, low-income and linguistically isolated populations. RGLNG has met this commitment since 2015 by providing Spanish-speakers at open houses and subsequently at a multitude of outreach events for the local community. A Community Engagement and Communications Plan has been developed by RGLNG, which includes a Grievance Management System to account for any potential cultural, linguistic, physical, and literacy barriers. The NextDecade company website includes a hotline telephone number as well as English and Spanish versions of the company Human Rights Policy. Moving forward, new hire / site orientations will be conducted in English and Spanish. The public trifold being developed referenced above, which will provide evacuation information to the public in case of a Terminal or LNG carrier incident, also will be published in both English and Spanish.

As described in the FEIS, the economic benefits to this region remain valid for the Terminal with CCS Systems included. The substantially reduced climate change impacts, increased local tax base and numerous new well-paying jobs will produce meaningful benefits for members of the EJ communities in proximity to RGLNG.

## 5.8 Cumulative Impacts

The inclusion of CCS Systems does not implicate any new cumulative impacts beyond those identified, considered and reviewed in the original authorization.

## 5.9 References

The Perryman Group. 2015. The Potential Impact of the Proposed Rio Grande Liquefied Natural Gas (LNG) and Rio Bravo Pipeline Facilities on Business Activity in Cameron County, Texas, and the United States. Prepared November 2015. Waco, TX.

U.S. Census Bureau. DEC Redistricting Data (PL94-171) <https://data.census.gov/cedsci/table?q=texas%20vacant%20housing&tid=DECENNIALPL2020.H1>. Accessed November 15, 2021.

U.S. Census Bureau. Quickfacts. Cameron County, Texas <https://www.census.gov/quickfacts/fact/table/cameroncountytexas/PST120219>. Accessed November 15, 2021.

U.S. Census Bureau. Quickfacts. Hidalgo County, Texas <https://www.census.gov/quickfacts/fact/table/hidalgocountytexas/PST120219>. Accessed November 15, 2021.

U.S. Census Bureau. Quickfacts. Willacy County, Texas <https://www.census.gov/quickfacts/fact/table/willacycountytexas/PST120219>. Accessed November 15, 2021.

Federal Register. Executive Order 14008 of January 27, 2021. <https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad>.

EJSCREEN Environmental Justice Mapping and Screening Tool. EJSCREEN Technical Documentation. September 2019 [https://www.epa.gov/sites/default/files/2021-04/documents/ejscreen\\_technical\\_document.pdf](https://www.epa.gov/sites/default/files/2021-04/documents/ejscreen_technical_document.pdf)

NextDecade Human Rights Policy <https://nextdecade.gcs-web.com/static-files/5157cbe7-cdd4-4b03-ab1f-46e02d312640>

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 6: Geological Resources**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002



SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Identify the location (by milepost) of mineral resources and any planned or active surface mines crossed by the proposed facilities. (§§ 380.12(h)(1 & 2))	Not Applicable
<input type="checkbox"/> 2. Identify any geologic hazards to the proposed facilities. (§ 380.12(h)(2))	Not Applicable
<input type="checkbox"/> 3. Discuss the need for and locations where blasting may be necessary in order to construct the proposed facilities. (§ 380.12(h)(3))	Not Applicable
<input type="checkbox"/> 4. For LNG projects in seismic areas, the materials required by "Data Requirements for the Seismic Review of LNG Facilities," NBSIR84-2833. (§ 380.12(h)(5))	Not Applicable
<input type="checkbox"/> 5. For underground storage facilities, how drilling activity by others within or adjacent to the facilities would be monitored, and how old wells would be located and monitored within the facility boundaries. (§ 380.12(h)(6))	Not Applicable

The inclusion of CCS Systems does not implicate any new geological resources beyond those identified, considered and reviewed in the original authorization.

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 7: Soils**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002



SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Identify, describe, and group by milepost the soils affected by the proposed pipeline and aboveground facilities. (§ 380.12(i)(1))	Not Applicable
<input type="checkbox"/> 2. For aboveground facilities that would occupy sites over 5 acres, determine the acreage of prime farmland soils that would be affected by construction and operation. (§ 380.12(i)(2))	Not Applicable
<input type="checkbox"/> 3. Describe, by milepost, potential impacts on soils. (§ 380.12(i)(3,4))	Not Applicable
<input type="checkbox"/> 4. Identify proposed mitigation to minimize impact on soils, and compare with the staff's Upland Erosion Control, Revegetation, and Maintenance Plan. (§ 380.12(i)(5))	Not Applicable

The inclusion of CCS Systems does not implicate any new soils issues beyond those identified, considered and reviewed in the original authorization.

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 8: Land Use, Recreation, and Aesthetics**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002

SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Classify and quantify land use affected by: (§ 380.12(j)(1)) <ul style="list-style-type: none"> <li>a. Pipeline construction and permanent rights-of-way (§ 380.12(j)(1));</li> <li>b. Extra work/staging areas (§ 380.12(j)(1));</li> <li>c. Access roads (§ 380.12(j)(1));</li> <li>d. Pipe and contractor yards (§ 380.12(j)(1)); and</li> <li>e. Aboveground facilities (§ 380.12(j)(1))</li> </ul>	Not Applicable
<input type="checkbox"/> 2. Identify by milepost all locations where the pipeline right-of-way would at least partially coincide with existing right-of-way, where it would be adjacent to existing rights-of-way, and where it would be outside of existing right-of-way. (§ 380.12(j)(1))	Not Applicable
<input type="checkbox"/> 3. Provide detailed typical construction right-of-way cross-section diagrams showing information such as widths and relative locations of existing rights-of-way, new permanent right-of-way, and temporary construction right-of-way. (§ 380.12(j)(1))	Not Applicable
<input type="checkbox"/> 4. Summarize the total acreage of land affected by construction and operation of the project. (§ 380.12(j)(1))	Not Applicable
<input type="checkbox"/> 5. Identify by milepost all planned residential or commercial/business development and the time frame for construction. (§ 380.12(j)(3))	Not Applicable
<input type="checkbox"/> 6. Identify by milepost special land uses (e.g., sugar maple stands, specialty crops, natural areas, national and state forests, conservation land, etc.). (§ 380.12(j)(4))	Not Applicable
<input type="checkbox"/> 7. Identify by beginning milepost and length of crossing all land administered by Federal, state, or local agencies, or private conservation organizations. (§ 380.12(j)(4))	Not Applicable
<input type="checkbox"/> 8. Identify by milepost all natural, recreational, or scenic areas, and all registered natural landmarks crossed by the project. (§§ 380.12(j)(4 & 6))	Not Applicable
<input type="checkbox"/> 9. Identify all facilities that would be within designated coastal zone management areas. Provide a consistency determination or evidence that a request for a consistency determination has been filed with the appropriate state agency. (§§ 380.12(j)(4 & 7))	Not Applicable
<input type="checkbox"/> 10. Identify by milepost all residences that would be within 50 feet of the construction right-of-way or extra work area. (§ 380.12(j)(5))	Not Applicable
<input type="checkbox"/> 11. Identify all designated or proposed candidate National or State Wild and Scenic Rivers crossed by the project. (§ 380.12(j)(6))	Not Applicable
<input type="checkbox"/> 12. Describe any measures to visually screen aboveground facilities, such as compressor stations. (§ 380.12(j)(11))	Updated Key Observation Point Illustrations Included in Section 8.2
<input type="checkbox"/> 13. Demonstrate that applications for rights-of-way or other proposed land use have been or soon will be filed with Federal land-managing agencies with jurisdiction over land that would be affected by the project. (§ 380.12(j)(12))	Not Applicable

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# Abbreviations and Acronyms

AEP	American Electric Power
AGRU	Acid Gas Removal Unit
CCS	Carbon Capture and Sequestration
CCS Systems	CCS systems to be implemented at the RGLNG Terminal
CFR	Code of Federal Regulations
Commission	Federal Energy Regulatory Commission
CO <sub>2</sub>	carbon dioxide
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FEIS	Final Environmental Impact Statement
GHG	greenhouse gas
LNG	liquefied natural gas
KOP	key observation point
m <sup>3</sup>	cubic meters
MTPA	million tons per annum
NextDecade	NextDecade Corporation
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NMFS	National Marine Fisheries Service
PCC	Post Combustion Capture
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
Project	RGLNG Terminal
RGLNG	Rio Grande LNG, LLC
RSG	Responsibly Sourced Gas
SCADA	Supervisory Control and Data Acquisition System
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality
Terminal	RGLNG's natural gas liquefaction and liquefied natural gas export facility



UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

# Resource Report 8: Land Use, Recreation, and Aesthetics

## 8.1 Introduction

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquified at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems".

RGLNG has developed and improved the design of the Terminal to incorporate CCS systems, which allow for the capture of at least 90% of the CO<sub>2</sub> emissions from the facility during the liquefaction process. These CCS systems broadly consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

Specific components and equipment related to these CCS systems include:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

Once full site preparation is complete (as approved by FERC in the letter dated March 6, 2020), construction of the CCS Systems will occur concurrently with the RGLNG Terminal.

Resource Report 8 evaluates the visual resource impacts on the existing environment, which may be caused by the addition of the proposed CCS Systems.

## 8.2 Visual Resources

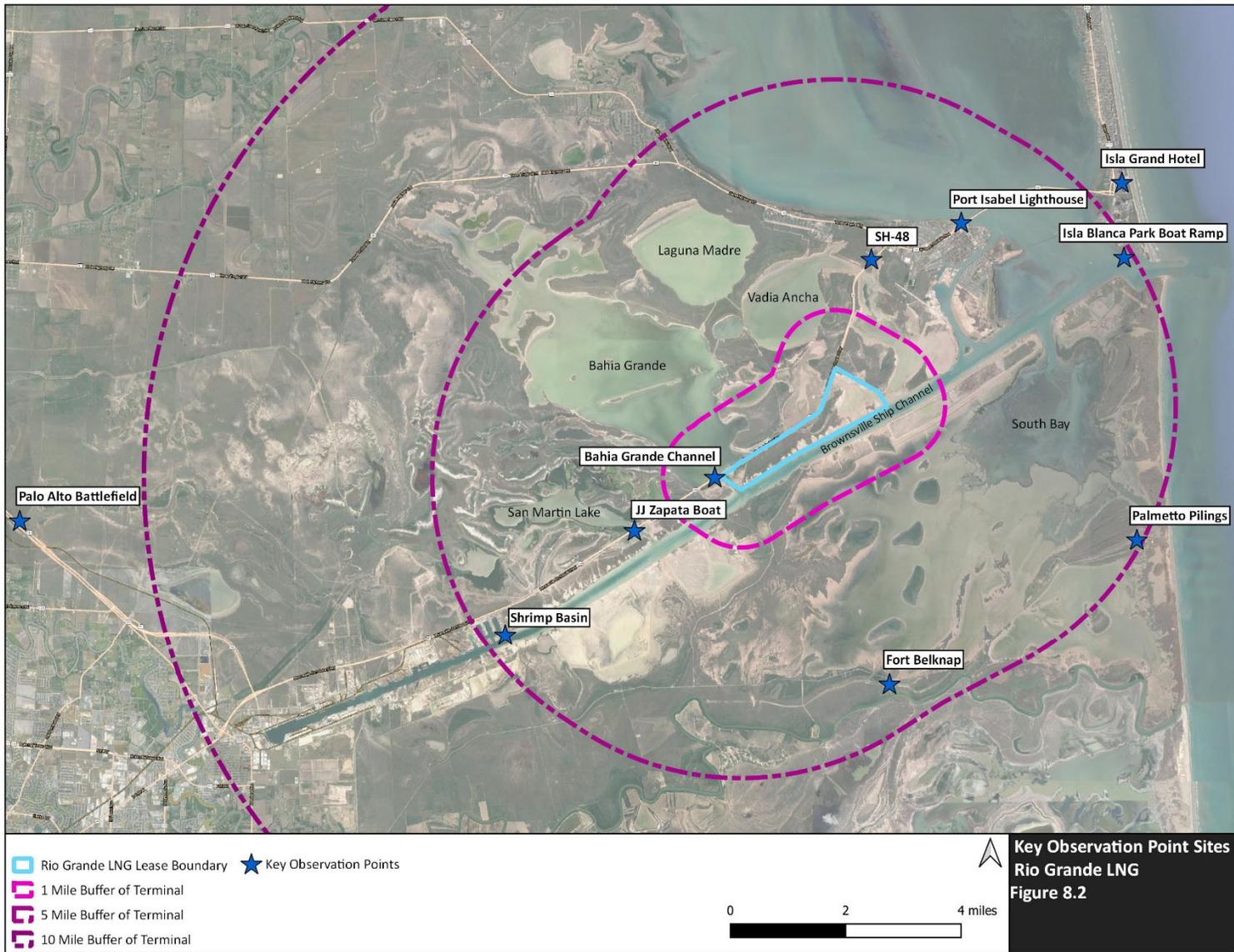
Construction and operation of the CCS Systems does not involve additional impacts to visual resources outside of the already authorized RGLNG Project. As described in the April 2019 FEIS, the most prominent visual feature at the LNG Terminal site would be the four LNG storage tanks, each of which would be 275 feet wide and 175 feet in height. Upon construction of the CCS Systems, the LNG storage tanks would remain the most prominent visual feature at the LNG Terminal. Additionally, lighting for the CCS Systems will be consistent with the previously authorized lighting plans approved by the U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD), as well as in accordance with Conditions 22 and 98 of FERC’s Authorization.

To support the visual resources evaluation, the key observation points (KOPs) evaluated in the April 2019 FEIS were refreshed to include simulated views of the CCS Systems and the LNG Terminal. Table 8.2 identifies the KOPs analyzed and Figure 8.2 illustrates the locations of the KOPs in relation to the CCS Systems and Terminal site.

**Table 8-1: Key Observation Points**

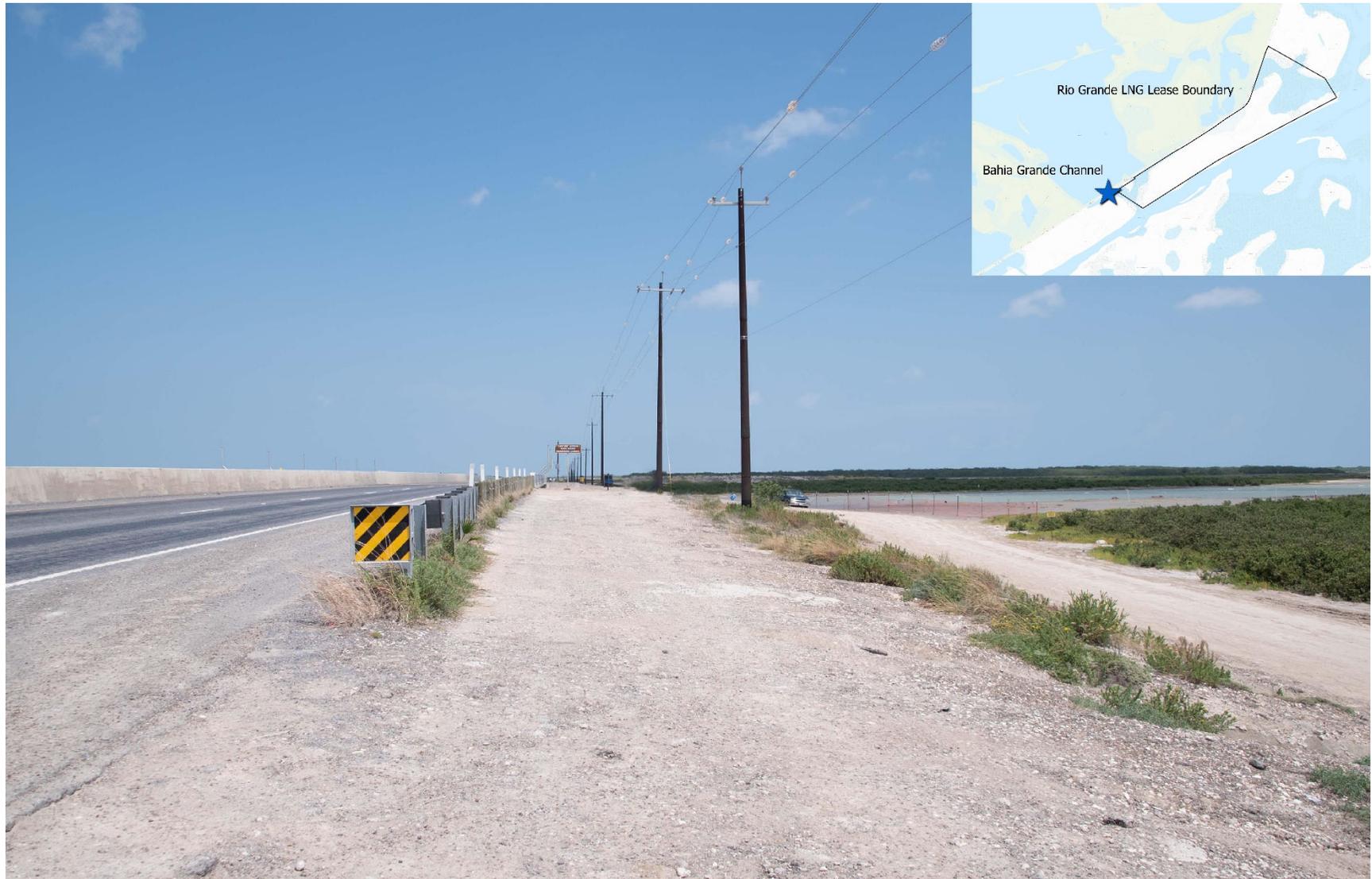
Key Observation Point	Distance (miles)	Direction (at the nearest point) from the Terminal
Bahia Grande Channel	0.2	West-Southwest
SH-48	2.6	North-Northeast
Jaime J. Zapata Memorial Boat Ramp Fishing Pier and Kayak Launch Pad	1.7	Southwest
Port Isabel Lighthouse	4.0	Northeast
Shrimp Basin	4.8	Southwest
Isla Blanca Park Boat Ramp	4.8	Northeast
Isla Grand Hotel	6.3	Northeast
Palmetto Pilings	4.9	Southeast
Palo Alto Battlefield	12.0	West
Fort Belknap	4.1	South-Southwest

Figure 8-1: Key Observation Point Sites



The following photographs for all ten KOPs were refreshed and taken during daylight hours, with two of the KOPs (Bahia Grande Channel and SH-48) selected for nighttime simulations, as illustrated in the April 2019 FEIS.

Bahia Grande Channel (0.2 mile west-southwest of the property boundary) – Existing



Bahia Grande Channel (0.2 mile west-southwest of the property boundary) – Daytime Simulation



Bahia Grande Channel (0.2 mile west-southwest of the property boundary) – Nighttime Simulation



SH-48 (2.6 miles north-northeast of the property boundary) – Existing



SH-48 (2.6 miles north-northeast of the property boundary) – Daytime Simulation



SH-48 (2.6 miles north-northeast of the property boundary) – Nighttime Simulation



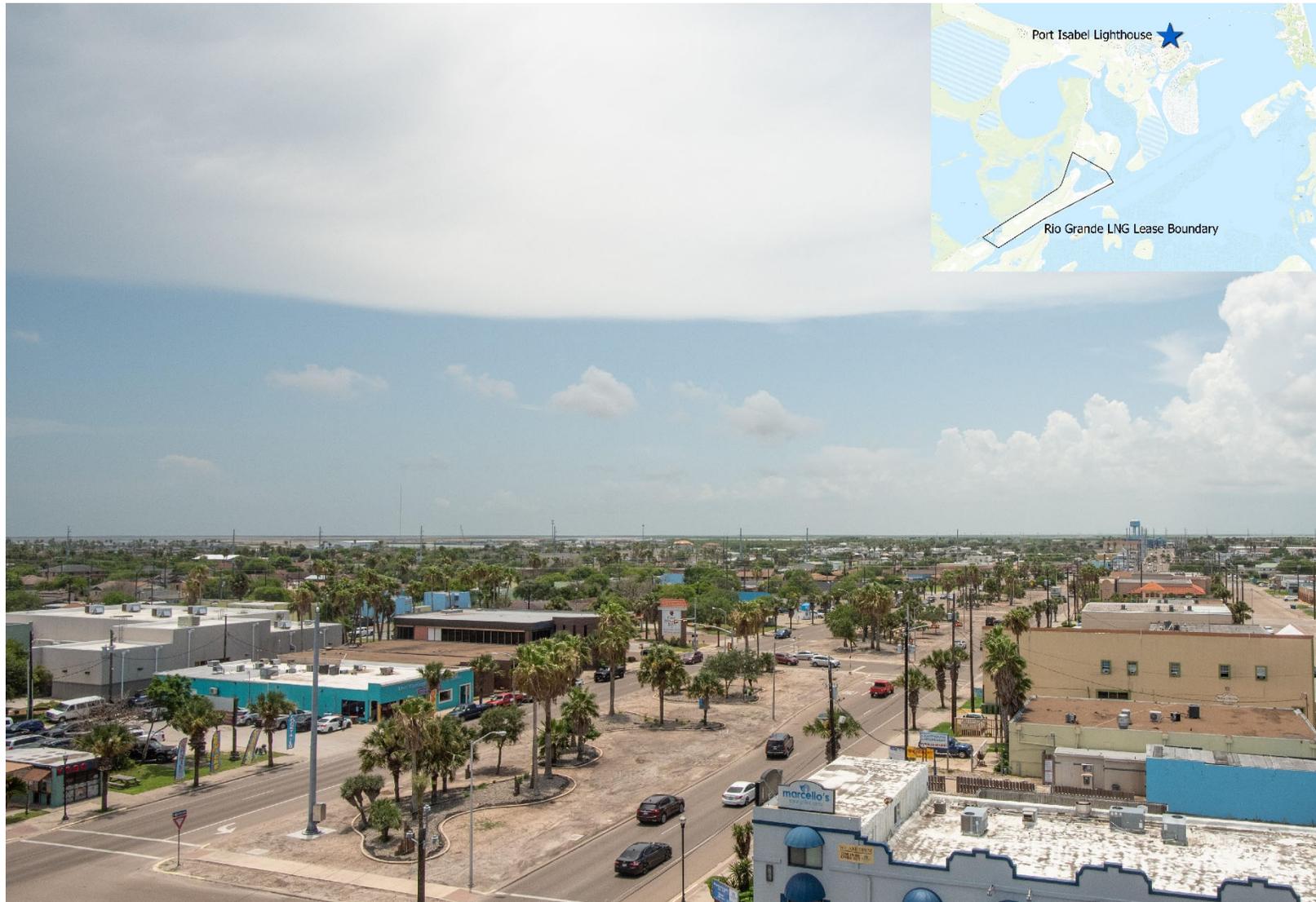
Jaime J. Zapata Memorial Boat Ramp, Fishing Pier, and Kayak Launch Pad (Zapata boat launch) (1.7 miles southwest of the property boundary)  
Existing



Jaime J. Zapata Memorial Boat Ramp, Fishing Pier, and Kayak Launch Pad (Zapata boat launch) (1.7 miles southwest of the property boundary)  
– Daytime Simulation



Port Isabel Lighthouse (4.0 miles northeast of the property boundary) – Existing



Port Isabel Lighthouse (4.0 miles northeast of the property boundary) – Daytime Simulation



Shrimp Basin (4.8 miles southwest of the property boundary) – Existing



Shrimp Basin (4.8 miles southwest of the property boundary) – Daytime Simulation



Isla Blanca Park Boat Ramp (4.8 miles northeast of the property boundary) – Existing



Isla Blanca Park Boat Ramp (4.8 miles northeast of the property boundary) – Daytime Simulation



Isla Grand Hotel (6.3 miles northeast of the property boundary) – Existing



Isla Grand Hotel (6.3 miles northeast of the property boundary) – Daytime Simulation



Palmetto Pilings (4.9 miles southeast of the property boundary) – Existing



Palmetto Pilings (4.9 miles southeast of the property boundary) – Daytime Simulation



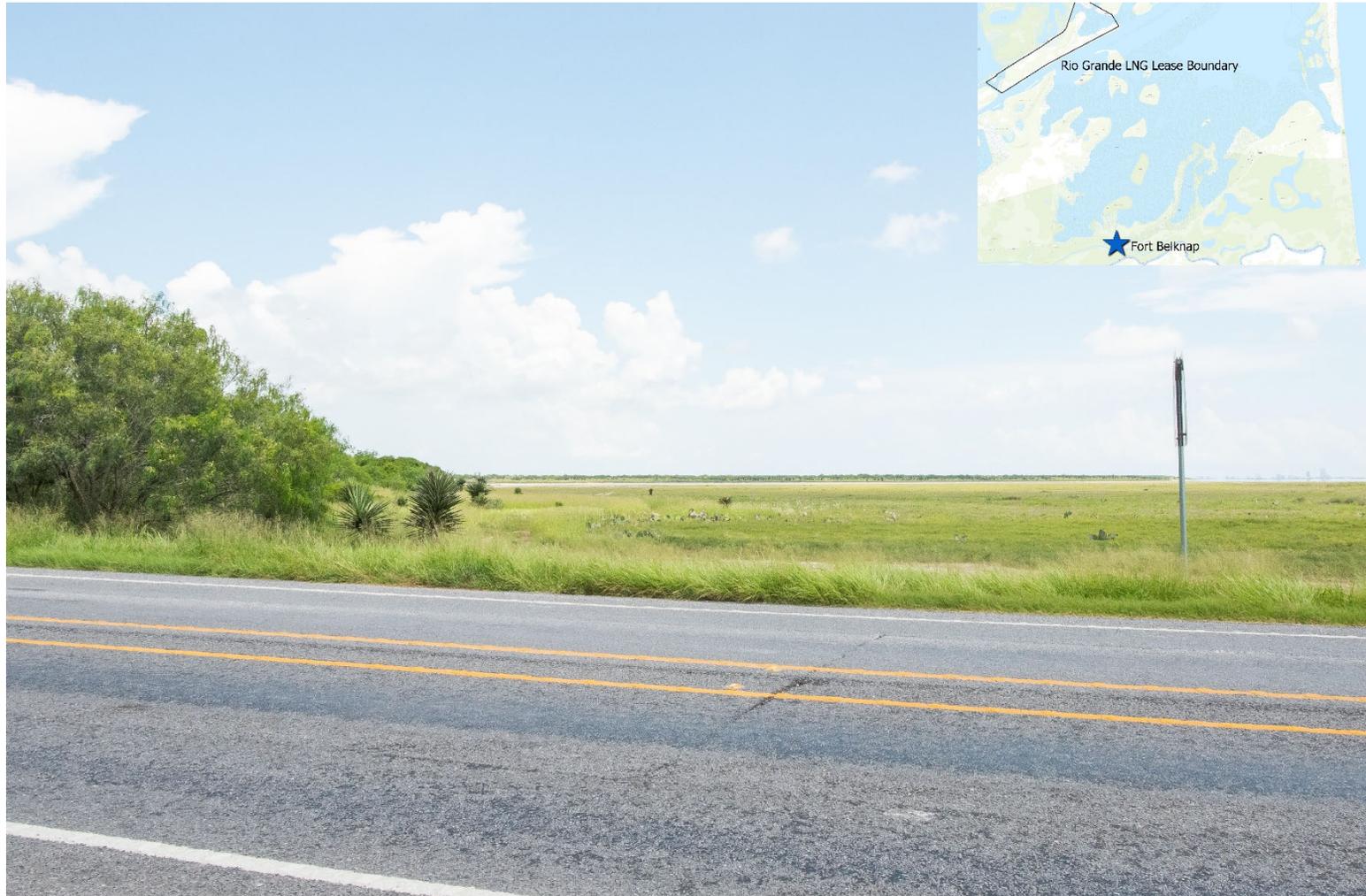
Palo Alto Battlefield (12.0 miles west of the property boundary) – Existing



Palo Alto Battlefield (12.0 miles west of the property boundary) – Daytime Simulation



Fort Belknap (4.1 miles south-southwest of the property boundary) – Existing



Fort Belknap (4.1 miles south-southwest of the property boundary) – Daytime Simulation



**CP21-\_\_\_\_-000**

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 9: Air and Noise Quality**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002

SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Describe existing air quality in the vicinity of the project. (§ 380.12(k)(1))	Not Applicable
<input type="checkbox"/> 2. Quantify the existing noise levels (day-night sound level (Ldn) and other applicable noise parameters) at noise-sensitive areas and at other areas covered by relevant state and local noise ordinances. (§ 380.12(k)(2))	Not Applicable
<input type="checkbox"/> 3. Quantify existing and proposed emissions of compressor equipment, plus construction emissions, including nitrogen oxides (NOX) and carbon monoxide (CO), and the basis for these calculations. Summarize anticipated air quality impacts for the project. (§ 380.12(k)(3))	Section 9.2.3
<input type="checkbox"/> 4. Describe the existing compressor units at each station where new, additional, or modified compressor units are proposed, including the manufacturer, model number, and horsepower of the compressor units. For proposed new, additional, or modified compressor units include the horsepower, type, and energy source. (§ 380.12(k)(4)).	Not Applicable
<input type="checkbox"/> 5. Identify any nearby noise-sensitive area by distance and direction from the proposed compressor unit building/enclosure. (§ 380.12(k)(4))	Section 9.3.2
<input type="checkbox"/> 6. Identify any applicable state or local noise regulations. (§ 380.12(k)(4))	Not Applicable
<input type="checkbox"/> 7. Calculate the noise impact at noise-sensitive areas of the proposed compressor unit modifications or additions, specifying how the impact was calculated, including manufacturer's data and proposed noise control equipment. (§ 380.12(k)(4))	Section 9.3.2

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# Abbreviations and Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
ANSI	American National Standards Institute
AQCR	Air Quality Control Region
Authorization	FERC Authorization Order
BACT	best available control technology
BOG	boil-off gas
BSC	Brownsville Ship Channel
CAA	Clean Air Act
CadnaA	Computer Aided Noise Abatement
CFR	Code of Federal Regulations
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
dB	decibel
dba	A-weighted decibels
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FR	Federal Register
GHG	greenhouse gas
GT	gas turbine
H <sub>2</sub> S	hydrogen sulfide
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid
HAP	hazardous air pollutant
HDD	horizontal directional drilling
hp	horsepower
L <sub>dn</sub>	day-night average sound level
Leq	continuous equivalent sound level
L <sub>max</sub>	maximum sound level during a measurement period or a noise event

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LNG	liquefied natural gas
LwA	maximum sound power level
MMBtu/h	million British thermal units per hour
MOVES	Motor Vehicle Emissions Simulator
MP	milepost
MTPA	million tonnes per annum
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NGL	Natural Gas Liquids
NO	nitrogen oxide
NO <sub>2</sub>	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO <sub>x</sub>	nitrogen oxides
NSA	noise sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
O <sub>3</sub>	ozone
Pb	lead
PM <sub>10</sub>	particulate matter with an aerodynamic diameter of 10 microns or less
PM <sub>2.5</sub>	particulate matter with an aerodynamic diameter of 2.5 microns or less
Project	RGLNG Terminal
PSD	Prevention of Significant Deterioration
PTE	potential to emit
RGLNG	Rio Grande LNG, LLC
RICE	Reciprocating Internal Combustion Engines
RMP	risk management plan
SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
SPL	sound pressure level



TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
Terminal	RG LNG's natural gas liquefaction facility and LNG export facility
tpy	tons per year
U.S.C.	United States Code
VOC	volatile organic compound

# Resource Report 9: Air and Noise Quality

## 9.1 Introduction

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquified at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems."

RGLNG has developed and improved the design of the Terminal to incorporate CCS systems, which allow for the capture of at least 90% of the CO<sub>2</sub> emissions from the facility during the liquefaction process. These CCS systems broadly consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

Specific components and equipment related to these CCS systems include:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)



See Resource Report 1, "General Project Description," for further details about the design, construction, and operation of the CCS Systems.

Resource Report 9 describes air and noise quality conditions that would be directly or indirectly affected by construction and operation of the CCS Systems, identifies affected noise-sensitive areas, and includes discussions of potential impacts on air quality and noise from CCS Systems activities. Existing air quality in the vicinity of the RGLNG Terminal has been addressed in previous filings and responses to environmental information requests in the original Authorization for the RGLNG Terminal. Additionally, federal, state, municipal, and local agency air quality and noise regulations applicable to the RGLNG Terminal were previously addressed and all required air permits have been issued by the Texas Commission on Environmental Quality (TCEQ).

Cumulative impacts, which are the collective result of the incremental impacts of an action that, when added to the impacts of other past, present, and reasonably foreseeable future actions, would affect the same resources, regardless of what agency or person undertakes those actions (40 Code of Federal Regulations 1508.7), have been previously identified, considered and reviewed in the original Authorization. On April 15, 2021, FERC granted Annova LNG's request to vacate its authorization to construct and operate the project, which will result in a further reduction in potential cumulative impacts.

## **9.2 Air Quality**

### **9.2.1 Air Permitting Requirements**

The TCEQ is the lead air permitting authority for the RGLNG Project with CCS Systems and has been delegated authority from the U.S. Environmental Protection Agency (EPA) to administer the federal prevention of signification deterioration (PSD) permit as well as the Title V Operating Permit.

### **9.2.2 National and State Ambient Air Quality Standards**

The Clean Air Act (CAA) is the primary federal statute governing air pollution. The CAA designates seven pollutants as criteria pollutants, for which NAAQS have been promulgated to protect public health and welfare. The seven criteria pollutants are carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), lead (Pb), particulate matter with an aerodynamic diameter of 10 microns or less (PM<sub>10</sub>), particulate matter with an aerodynamic diameter of 25 microns or less (PM<sub>2.5</sub>), and sulfur dioxide (SO<sub>2</sub>). Volatile organic compounds (VOCs) are not considered a criteria pollutant but are evaluated as precursors to ground-level O<sub>3</sub> formation. In addition, emissions of nitrogen oxides (NO<sub>x</sub>), which includes NO<sub>2</sub> and nitrogen oxide (NO), are regulated for contribution to ambient NO<sub>2</sub> and as a precursor to O<sub>3</sub>. Primary and secondary standards are in place for criteria pollutants. Primary standards are designed to

protect human health, and secondary standards focus on the protection of plant and animal life, buildings, and other items in the public interest.

## 9.2.3 CCS Systems

### 9.2.3.2 Air Pollutant Emissions – Construction

Air pollutant emissions that result from the operation of construction equipment, deliveries of supplies, and worker commutes, as well as the generation of fugitive dust during the construction period, have been evaluated for the RGLNG Terminal. Construction of the CCS Systems is not anticipated to significantly increase these emissions or otherwise invalidate previous Terminal evaluations. Construction activities will result in temporary, localized emissions that will last for the duration of the construction period.

#### 9.2.3.3 Air Pollutant Emissions – Operations

Appendix 9.A includes an Emissions Summary Table for RGLNG with CCS Systems. The table is presented in two parts – hazardous air pollutant (HAPs) and greenhouse gases (GHGs). This table is developed from the Emissions Summary Table filed on July 14, 2020 (Accession No. 20200714-5128), which indicated emissions reductions from design optimizations allowed for a reduction from six liquefaction trains to five at the RGLNG Terminal. Three new rows have since been added to the table to illustrate the impact of CCS Systems:

1. "CO<sub>2</sub> Absorbers" which shows the change in emissions as a result of the addition of the CO<sub>2</sub> absorbers;
2. "Combined GT and Absorber" which shows the emissions summed from the gas turbine combined with the absorber. When the CCS Systems are operating, all emissions from GT go through the absorber; and
3. "Sequestration of Thermal Oxidizer" which shows the reduction in emissions due to sequestration of the thermal oxidizer emissions.

The total emissions are the expected emissions with CCS Systems running 100% of the time.

RGLNG intends to voluntarily apply CCS Systems to the Terminal and for these systems to be operational for most of the time. However, there will be situations when RGLNG Terminal emissions will revert back to the current permitted TCEQ values. These situations include commissioning and start-up, safety system overrides, as well as shutdowns and maintenance.

## 9.3 Noise Quality

Noise is defined as any unwanted sound. The acuity of human hearing is not the same at all frequencies. Humans are less sensitive to low frequencies than to mid-frequencies, and so noise measurements are often adjusted (or weighted) to account for human perception and sensitivities. The decibel (dB) is the unit of sound pressure measurement. The most common weighting scale used is the A-weighted scale, which was developed to allow sound-level meters to simulate the frequency sensitivity of human hearing. Sound levels measured using this weighting are noted as dBA (A-weighted decibels, where "A" indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear does). The A-weighted scale is logarithmic; therefore, an increase of 10 dB actually represents a sound that is 10 times louder. However, humans do not perceive the 10 dBA increase as ten times louder, but as only twice as loud.

The following is typical of human responses to changes in noise level:

- A 3 dBA change is the threshold of change detectable by the human ear;
- A 5 dBA change is readily noticeable; and
- A 10 dBA change is perceived as a doubling (or halving) of noise level.

### 9.3.1 Noise Regulations

#### 9.3.1.1 Federal

The environmental sound level contributions from the Terminal and CCS Systems are subject to FERC noise regulations for new stations. Under these regulations, the noise attributable to any new aboveground facility must not exceed an Ldn of 55 dBA at any pre-existing noise sensitive area (NSA). In areas subject to steady noise levels throughout a 24-hour period, the Ldn noise level is about 6.4 dBA higher than the 24-hour  $L_{eq}$  because of the nighttime weighting factor. For a station that is operating continuously, an  $L_{eq}$  noise level of 48.6 dBA is equal to the FERC Ldn noise limit of 55 dBA. The FERC requirements stipulate that, in addition to the Ldn 55 dBA limit, any applicable state or local noise regulations must be identified.

#### 9.3.1.2 State

There are no applicable state regulations in Texas pertaining to noise.

#### 9.3.1.3 Local

There are no applicable town or county regulations within the Project area pertaining to noise.

### 9.3.2 CCS Systems

Noise associated with the CCS Systems will include both facility construction and operation noise.

#### 9.3.2.2 Construction Noise Impacts

The inclusion of CCS Systems does not implicate any new noise impacts due to construction activities at the RGLNG Terminal site beyond those identified, considered and reviewed in the original authorization.

#### 9.3.2.3 Operational Noise Impacts

To identify potential noise impacts resulting from the operation of the CCS Systems, a noise study that included acoustic modeling was conducted and the modeling results were compared with the FERC limit of L<sub>dn</sub> 55 dBA. The study is documented in SLR International Corporation’s Noise Model Update – Carbon Capture and Sequestration System, prepared for NextDecade Corporation, dated November 15, 2021. Acoustic noise modeling of the major Project sources was conducted using the Computer Aided Noise Abatement (CadnaA) acoustic model version 2021 MR 2 (build 187.5163) developed by Datakustik GmbH.

Computer noise modeling predicts that the facility contributions at the NSAs will be below 55 dBA L<sub>dn</sub> after the construction of the proposed facility, including the CCS Systems, as shown below in Table 9-1.

**Table 9-1: Facility Sound Level Predictions**

NSA/ Landmark	Distance from RGLNG to NSA/Landmark, Miles	Direction	Measured Existing Background, dBA	Estimated Contribution of Facility Equipment, dBA		Combined All Sources and Ambient, dBA	Increase Above Existing Condition
			L <sub>dn</sub>	L <sub>eq</sub>	L <sub>dn</sub>	L <sub>dn</sub>	ΔdB
NSA 1	4.3	S	49.2	39.7	<b>46.1</b>	50.9	1.7
NSA 2	3.7	N	54.7	39.0	<b>45.4</b>	55.2	0.5
NSA 3	3.7	NE	54.2	38.4	<b>44.8</b>	54.7	0.5
NSA 4	3.9	NE	54.6	37.9	<b>44.3</b>	55.0	0.4
Palmito Ranch Battlefield	5.4	SW	54.7	33.2	<b>39.6</b>	54.8	0.1
Palo Alto Battlefield	14	W	50.4	24.6	<b>31.0</b>	50.4	0.0

Table 9-1 shows that with the updated five-train model results, along with the CCS Systems and SLR’s ambient survey results, a 0 to 1.7 dBA increase in noise over the existing ambient sound levels is

predicted. As stated previously, any sound less than 3 dBA is considered imperceptible by the human ear.

Table 9-1 also indicates that with the combined facility equipment modeled, the facility contribution will be well below the FERC criterion of 55 dBA L<sub>dn</sub> at all NSAs.

In summary, the Noise Model Update indicates that the additional CCS Systems noise contributions will be below FERC limits of 55 dBA L<sub>dn</sub> or, equivalently, no more than a continuous 48.6 dBA at the surrounding NSAs. The sound level contributions from the RGLNG Terminal with CCS Systems operating are also expected to be well below the FERC limit of 55 dBA L<sub>dn</sub>, based on the equipment sound power levels included in the noise model.

#### **9.3.2.4 Mitigation**

##### **Construction**

The following mitigation measures may be implemented, as needed, to control construction noise:

- Equipment will be operated only when needed;
- Perform construction predominantly during daytime hours; and
- Ensure that all equipment is maintained in proper working order.

##### **Operation**

The following features of the CCS Systems design aid in control of noise emissions:

- Acoustic insulation on compressors, as appropriate;
- Piping and valves designed to reduce noise emissions; and
- Earthen levee surrounding site.

## **9.4 Cumulative Impacts**

The inclusion of CCS Systems will greatly improve previously assessed cumulative air impacts, particularly related to GHGs and global climate change. Cumulative noise impacts, as indicated in Appendix 9.B, will not be significantly different from those previously identified, considered and reviewed in the original authorization.

# **Appendix 9.A: RGLNG with CCS Systems – Emissions Summary Table**

# Appendix 9.A: RGLNG with CCS Systems - Emissions Summary Table

## Hazardous Air Pollutants (HAPs)

Emission Source	27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)	
	NO <sub>x</sub>	NO <sub>x</sub>		CO	CO		SO <sub>2</sub>	SO <sub>2</sub>		H <sub>2</sub> SO <sub>4</sub>	H <sub>2</sub> SO <sub>4</sub>		PM <sub>10</sub>	PM <sub>10</sub>		PM <sub>2.5</sub>	PM <sub>2.5</sub>		VOC	VOC	
	tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr	
Gas Turbines (10)	788.40	788.40	0.00	1,314.00	1,314.00	0.00	1.30	1.30	0.00	0.10	0.10	0.00	244.40	244.40	0.00	244.40	244.40	0.00	78.80	78.80	0.00
CO <sub>2</sub> Absorbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-114.10	-114.10	0.00	-114.10	-114.10	0.00	39.60	39.60
Combined GT and Absorber	788.40	788.40	0.00	1,314.00	1,314.00	0.00	1.30	1.30	0.00	0.10	0.10	0.00	244.40	130.30	-114.10	244.40	130.30	-114.10	78.80	118.40	39.60
Thermal Oxidizers (5)	197.44	197.44	0.00	140.15	140.15	0.00	28.50	28.50	0.00	2.10	2.10	0.00	12.70	12.70	0.00	12.70	12.70	0.00	9.20	9.20	0.00
Sequestration of Thermal Oxidizer	0.00	-197.44	-197.44	0.00	-140.15	-140.15	0.00	-28.50	-28.50	0.00	-2.10	-2.10	0.00	-12.70	-12.70	0.00	-12.70	-12.70	0.00	-9.20	-9.20
Ground Flare System	1.94	1.94	0.00	16.56	16.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.00	0.26	0.26	0.00	0.28	0.28	0.00
Ground Flare System (MSS Worst Case Year)	114.00	114.00	0.00	228.00	228.00	0.00	0.26	0.26	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	390.00	390.00	0.00
Essential Generators	7.68	7.68	0.00	4.20	4.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.00	0.24	0.24	0.00	0.36	0.36	0.00
Emergency Firewater Pumps	0.46	0.46	0.00	0.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.02	0.02	0.00	0.04	0.04	0.00
BOG Vent	2.38	2.38	0.00	20.43	20.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.32	0.00	0.32	0.32	0.00	0.13	0.13	0.00
Terminal Fugitives	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	3.00	0.00
<b>Total</b>	<b>1,112.30</b>	<b>914.86</b>	<b>-17.8%</b>	<b>1,723.74</b>	<b>1,583.59</b>	<b>-8.1%</b>	<b>30.06</b>	<b>1.56</b>	<b>-94.8%</b>	<b>2.22</b>	<b>0.12</b>	<b>-94.6%</b>	<b>257.94</b>	<b>131.14</b>	<b>-49.2%</b>	<b>257.94</b>	<b>131.14</b>	<b>-49.2%</b>	<b>481.81</b>	<b>512.21</b>	<b>6.3%</b>

Note: This represents the reduction in emissions whilst the CCS Systems are in operation. RGLNG intends to voluntarily apply CCS Systems to the Terminal and for these systems to be operational for most of the time. However, there will be situations when RGLNG Terminal emissions will revert back to the current permitted TCEQ values. These situations include commissioning and start-up, safety system overrides, as well as shutdowns and maintenance.

## Appendix 9.A: RGLNG with CCS Systems - Emissions Summary Table

### Greenhouse Gases (GHGs)

Emission Source	27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)		27 MTPA Export (5 Trains)	27 MTPA Export (CCS)	
	CO <sub>2</sub>	CO <sub>2</sub>		CH <sub>4</sub>	CH <sub>4</sub>		N <sub>2</sub> O	N <sub>2</sub> O		CO <sub>2e</sub>	CO <sub>2e</sub>	
	tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr		tons/yr	tons/yr	
Gas Turbines (10)	4,328,224.90	4,328,224.90	0.00	81.60	81.60	0.00	8.20	8.20	0.00	4,332,698.40	4,332,698.40	0.00
CO <sub>2</sub> Absorbers	0.00	-4,111,813.66	-4,111,813.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-4,111,813.66	-4,111,813.66
Combined GT and Absorber	4,328,224.90	216,411.25	-4,111,813.66	81.60	81.60	0.00	8.20	8.20	0.00	4,332,698.40	220,884.75	-4,111,813.66
Thermal Oxidizers (5)	1,926,854.07	1,926,854.07	0.00	3.75	3.75	0.00	0.40	0.40	0.00	1,927,059.70	1,927,059.70	0.00
Sequestration of Thermal Oxidizer	0.00	-1,926,854.07	-1,926,854.07	0.00	-3.75	-3.75	0.00	-0.40	-0.40	0.00	-1,927,059.70	-1,927,059.70
Ground Flare System	902.94	902.94	0.00	0.12	0.12	0.00	0.00	0.00	0.00	4,296.04	4,296.04	0.00
Ground Flare System (MSS Worst Case Year)	149,415.00	149,415.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	149,415.00	149,415.00	0.00
Essential Generators	847.80	847.80	0.00	0.52	0.52	0.00	0.00	0.00	0.00	860.68	860.68	0.00
Emergency Firewater Pumps	80.96	80.96	0.00	0.04	0.04	0.00	0.00	0.00	0.00	82.20	82.20	0.00
BOG Vent	5,179.80	5,179.80	0.00	16.89	16.89	0.00	0.01	0.01	0.00	5,604.48	5,604.48	0.00
Terminal Fugitives	0.00	0.00	0.00	215.34	215.34	0.00	0.00	0.00	0.00	5,383.44	5,383.44	0.00
<b>Total</b>	<b>6,411,505.47</b>	<b>372,837.75</b>	<b>-6,038,667.73</b>	<b>318.26</b>	<b>314.51</b>	<b>-3.75</b>	<b>8.61</b>	<b>8.21</b>	<b>-0.40</b>	<b>6,425,399.94</b>	<b>386,526.59</b>	<b>-6,038,873.36</b>
			<b>-94.2%</b>			<b>-1.2%</b>			<b>-4.6%</b>			<b>-94.0%</b>

Note: This represents the reduction in emissions whilst the CCS Systems are in operation. RGLNG intends to voluntarily apply CCS Systems to the Terminal and for these systems to be operational for most of the time. However, there will be situations when RGLNG Terminal emissions will revert back to the current permitted TCEQ values. These situations include commissioning and start-up, safety system overrides, as well as shutdowns and maintenance.

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 10: Alternatives**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002



SUMMARY OF FILING INFORMATION	
INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> 1. Address the "no action" alternative. (§ 380.12(l)(1))	Section 10.2
<input type="checkbox"/> 2. For large projects, address the effect of energy conservation or energy alternatives to the project. (§ 380.12(l)(1))	Section 10.3.1
<input type="checkbox"/> 3. Identify system alternatives considered during the identification of the project and provide the rationale for rejecting each alternative. (§ 380.12(l)(1))	Section 10.3.1
<input type="checkbox"/> 4. Identify major and minor route alternatives considered to avoid impact on sensitive environmental areas (e.g., wetlands, parks, or residences) and provide sufficient comparative data to justify the selection of the proposed route. (§ 380.12(l)(2)(ii))	Not Applicable
<input type="checkbox"/> 5. Identify alternative sites considered for the location of major new aboveground facilities and provide sufficient comparative data to justify the selection of the proposed site. (§ 380.12(l)(2)(ii))	Not Applicable

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# Abbreviations and Acronyms

AEP	American Electric Power
AGRU	Acid Gas Removal Unit
CCS	Carbon Capture and Sequestration
CCS Systems	CCS systems to be implemented at the RGLNG Terminal
CFR	Code of Federal Regulations
CO <sub>2</sub>	carbon dioxide
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
LNG	liquefied natural gas
m <sup>3</sup>	cubic meters
MTPA	million tons per annum
NextDecade	NextDecade Corporation
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NMFS	National Marine Fisheries Service
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
Project	RGLNG Terminal
RGLNG	Rio Grande LNG, LLC
RSG	Responsibly Sourced Gas
SCADA	Supervisory Control and Data Acquisition System
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality
Terminal	RGLNG's natural gas liquefaction and liquefied natural gas export facility
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation



USFWS

U.S. Fish and Wildlife Service

# Resource Report 10: Alternatives

## 10.1 Introduction

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquified at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the "CCS Systems".

RGLNG has developed and improved the design of the Terminal to incorporate CCS systems, which allow for the capture of at least 90% of the CO<sub>2</sub> emissions from the facility during the liquefaction process. These CCS systems broadly consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

Specific components and equipment related to these CCS systems include:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

See Resource Report 1, “General Project Description,” for further details about the design, construction, and operation of the CCS Systems.

Resource Report 10 describes the Project alternatives that RGLNG have considered to determine the preferred action for the CCS Systems. To identify the best method of accomplishing the Project objectives and give due consideration to the environmental implications of the Project, RGLNG began by considering the broadest feasible range of alternatives to the Project and then eliminating those as currently proposed on the basis of the relative potential environmental, logistical, economic, safety, and engineering costs and benefits of each aspect of the Project. RGLNG considers their current CCS Systems proposal to be the most environmentally acceptable, technologically feasible, and cost-effective option that meets RGLNG’s Project objectives, as set forth in Resource Report 1, “General Project Description,” and summarized below.

## 10.2 No-Action Alternative

This section addresses the consequences of not constructing the proposed CCS Systems. Typically, potential environmental impacts would be avoided under a no-action alternative. However, in this instance, as construction and operation of the RGLNG Terminal has already been authorized by FERC, selection of the no-action alternative would mean the RGLNG Terminal is sited, constructed and operated as currently permitted, without the CCS Systems. Selection of the no-action alternative would not meet the purpose and need of the CCS Systems – to reduce CO<sub>2</sub> emissions from the RGLNG Terminal by at least 90% and substantially mitigate the Project’s impact on global climate change.

As such, the no-action alternative, and preventing RGLNG from capturing 90% of the Project’s CO<sub>2</sub> emissions, is not a viable alternative.

## 10.3 CCS Systems

### 10.3.1 System Alternatives

System alternatives are those alternatives that could replace all or part of the CCS Systems by making use of other existing and/or proposed carbon reduction systems or methods to meet the CCS Systems’ goal of reducing the RGLNG Terminal’s emissions by *at least* 90%. The use of a system alternative could make it unnecessary to construct all or part of the proposed CCS Systems.

RGLNG has assessed the use of blue and green hydrogen in lieu of natural gas as the fuel for the turbines at the RGLNG Terminal. RGLNG concluded that utilizing any amount of blue hydrogen in the turbines did not result in a reduction of onsite or offsite CO<sub>2</sub> emissions because blue hydrogen is

produced by a steam-methane reforming process. In addition, green hydrogen by electrolysis was ruled out due to the significant amount of incremental renewable capacity required to be constructed and deployed in the Texas power market in order to satisfy the volumes of renewable, electrolytic hydrogen that would be required.

RGLNG also considered the use of electric drives as an alternative to gas-fired turbines. However, adoption of electric drives would merely shift onsite CO<sub>2</sub> emissions to offsite. As with green hydrogen, this approach would require a significant amount of incremental renewable capacity to be added to the Texas power market. For these reasons, the use of electric drives, as an alternative to the CCS Systems, was dismissed.

Following substantial technical analysis, including feasibility studies with world renowned carbon capture companies, site visits to large-scale operational carbon capture facilities, and interaction with multiple third-party advisors and suppliers, the CCS Systems were determined to be superior to every carbon reduction alternative for the RGLNG Terminal.

### **10.3.2 CCS Systems Layout Considerations**

In developing the plant layout for the CCS Systems, strong consideration was given to safety, environmental, and constructability siting criteria, while optimizing land use within the permitted Terminal boundaries.

#### **10.3.2.1 Safety**

The 49 CFR 193 Subpart B Siting Analysis and Letter of Determination (LOD) completed by the PHMSA Engineering & Research Division and issued on October 15, 2020, is not expected to be invalidated by the inclusion of the CCS Systems. On October 4, 2021, RGLNG introduced the CCS Systems to PHMSA Staff and provided engineering and design material for review on October 8, 2021. Discussions and review are ongoing.

#### **10.3.2.2 Environmental**

Environmental siting criteria considered in the CCS Systems plant layout development were:

- Noise – Consideration of onsite personnel noise conditions and offsite noise receptors;
- Emissions – Ensuring that while CO<sub>2</sub> emissions are dramatically reduced, emissions levels of other criteria pollutants stay within National Ambient Air Quality Standards (NAAQS) 1-hour limits; and
- Visual – Developing a CCS Systems and Terminal configuration with as low as practical visibility from remote (residential or recreational) vantage positions.

### 10.3.2.3 Constructability

Constructability siting criteria considered in the development of the CCS Systems layout included:

- Staging of construction and simultaneous operations and building of future CCS systems for trains while adjacent facilities are in operation;
- Access around the site for construction and spare area to move construction materials and equipment, as well as even the largest Terminal equipment packages and modules;
- Ensuring adequate laydown areas for construction, including warehousing, offices, canteens, carparks, material storage, fabrication etc.; and
- Material off-loading facility location and haul roads to construction locations.

Given the criteria used, as well as the need for the CCS Systems to tie-on to the liquefaction trains to allow for carbon capture with the most efficient and safe use of space within the project boundary, RGLNG determined that there were no alternative methods of siting the CCS Systems that would provide an environmentally preferable alternative.

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# **Rio Grande LNG Project with Carbon Capture and Sequestration**

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## **Resource Report 11: Reliability and Safety**

**November 17, 2021**

**Prepared by:**



1000 Louisiana St., Suite 3900  
Houston, TX 77002



**SUMMARY OF FILING INFORMATION**

INFORMATION	SECTION REFERENCE
<b>Minimum Filing Requirements</b>	
<input type="checkbox"/> Describe how the project facilities would be designed, constructed, operated, and maintained to minimize potential hazard to the public from the failure of project components as a result of accidents or natural catastrophes. (§ 380.12(m))	Sections 11.1 through 11.4; see also Resource Report 13, "Engineering and Design Material"

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# List of Appendices

Appendix 11.A: Hazard and Operability (HAZOP) Study Report – Emissions Reduction Carbon Capture Facility (ERCCF) [Privileged Information]

Appendix 11.B: Layer of Protection Analysis (LOPA) Report – Emissions Reduction Carbon Capture Facility [Privileged Information]

# Abbreviations and Acronyms

AEP	American Electric Power
AGRU	Acid Gas Removal Unit
CCS	Carbon Capture and Sequestration
CCS Systems	CCS systems to be implemented at the RGLNG Terminal
CFR	Code of Federal Regulations
CO <sub>2</sub>	carbon dioxide
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ERCCF	Emissions Reduction Carbon Capture Facility
ERP	Emergency Response Plan
FERC	Federal Energy Regulatory Commission
HAZID	Hazard Identification Study
HAZOP	Hazards and Operability Study
LOPA	Layer of Protection Analysis
LNG	liquefied natural gas
m <sup>3</sup>	cubic meters
MTPA	million tons per annum
NextDecade	NextDecade Corporation
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NMFS	National Marine Fisheries Service
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
Project	RGLNG Terminal
RGLNG	Rio Grande LNG, LLC
RSG	Responsibly Sourced Gas
SCADA	Supervisory Control and Data Acquisition System
SHPO	State Historic Preservation Office
TCEQ	Texas Commission on Environmental Quality



Terminal	RGLNG's natural gas liquefaction and liquefied natural gas export facility
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service

# Resource Report 11: Reliability and Safety

## 11.1 Project Description

Rio Grande LNG, LLC (RGLNG) proposes to incorporate Carbon Capture and Sequestration (CCS) systems into the approved site and design of the RGLNG Terminal. Construction and operation of the CCS systems will enable RGLNG to voluntarily capture at least 90% of the carbon dioxide (CO<sub>2</sub>) produced at the RGLNG Terminal. The carbon capture process removes CO<sub>2</sub> from both the feed gas to be liquified at the RGLNG Terminal and the exhaust flue gas from the main refrigerant compressor gas turbines central to the liquefaction process. Once captured, the CO<sub>2</sub> will be transported via pipeline to an underground geologic formation permitted by the EPA and relevant Texas agencies via its underground injection control (UIC) Class VI permitting regime for geologic sequestration. The CCS systems to be implemented at the RGLNG Terminal will be collectively referred to as the “CCS Systems.”

RGLNG has developed and improved the design of the Terminal to incorporate CCS systems, which allow for the capture of at least 90% of the CO<sub>2</sub> emissions from the facility during the liquefaction process. These CCS systems broadly consist of:

- A Post Combustion Capture (PCC) system for the exhaust flue gas of the Main Refrigerant Gas Turbine Compressors;
- Re-routing of the Acid Gas Removal Unit (AGRU) vent stream from a thermal oxidizer to a sequestration compressor;
- Addition of a sequestration compressor to the combined streams from the PCC and AGRU to meet an interface with a pipeline to sequester the CO<sub>2</sub>; and
- Modifications to the RGLNG utility design to accommodate the additional equipment outlined above.

Specific components and equipment related to these CCS systems include:

- Flue Gas Cooling (heat exchanger(s), pumps, blowers, etc.)
- CO<sub>2</sub> Absorber (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- Amine Regenerator and Reboiler (column, vessels, pumps, heat exchangers, tanks, filters, etc.)
- CO<sub>2</sub> Dehydration (columns, pumps, heat exchangers, etc.)
- CO<sub>2</sub> Compression (compressor(s), vessels, heat exchangers, etc.)
- Hot oil system (Waste Heat Recovery Unit and distribution)

See Resource Report 1, "General Project Description," for further details about the design, construction, and operation of the CCS Systems.

The design will comply with the requirements of National Fire Protection Association Standard (NFPA) 59A (2001) regulations of the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) at 49 Code of Federal Regulations (CFR) Part 193, and all other applicable standards.

Resource Report 11 examines the potential hazards associated with the proposed CCS Systems. The hazards would arise from failure of facility components resulting from accidents or natural catastrophes. The effect of such events on the reliability and safety of the facility is evaluated in this report, and the procedures and design features proposed to reduce potential hazards are described. This report should be read in conjunction with Resource Report 13, "Engineering and Design Material," which provides specific technical details on engineering, design, and materials.

### **11.1.1 Design and Operational Risk Reduction Measures**

As an integral part of the CCS Systems detailed design development and operations procedures development, consideration of risk reduction measures, presented below, are some of the core activities implemented:

- Hazard and operability (HAZOP) reviews;
- Layer of Protection Analysis (LOPA) reviews;
- Safety integrity level (SIL) reviews;
- Ergonomics reviews; and
- Constructability, maintainability and operability reviews.

The HAZOP and LOPA reviews were performed to identify all relevant hazards associated with the CCS Systems (referred to as ERCCF), to determine the adequacy of existing safeguards for select scenarios, as well as to identify and propose any recommended actions to prevent or control potential hazardous scenarios between the CCS Systems and associated tie-ins at the RGLNG Terminal.

The HAZOP Study (included as Appendix 11.A) proceeds sequentially, studying each piece of equipment contained in the process. HAZOP systematically creates a roadmap of key paths that lead to undesired events (hazards or operability issues). The design will be reviewed to identify any potential hazards and ensure that adequate mitigation measures are in place, to prevent impact to the design or operation and consequently prevent harm to individuals, the equipment, or the environment. The output from the HAZOP analysis is a table of potential deviations for further mitigation in the design.

The LOPA study (included as Appendix 11.B) considers each hazard identified and documents the initiating causes and the Independent Protection Layer (IPL) that prevent or mitigate the hazard. The total amount of risk reduction is then determined and the need for more risk reduction is analyzed. If additional protection is to be provided in the form of a Safety Instrumented System (SIS), the LOPA methodology determines the appropriate Safety Integrity Level (SIL) and the required Probability of Failure on Demand (PFD).

Upon completion of the final design, the actions taken to mitigate hazards will again be reviewed to confirm that appropriate emergency response equipment and procedures have been incorporated.

## 11.2 Minimizing Potential Hazards to the Public

### 11.2.1 Corporate Risk Management Framework

RGLNG will develop and implement a program to identify, assess, and manage the design, construction, and operation of the CCS Systems to maximize public safety. The program will facilitate the identification and reduction of potential risks to worker and public health, safety, and the environment. The program also will provide a structured approach to regulatory compliance. The framework for RGLNG's approach to risk management follows.

#### 11.2.1.1 Design and Construction Risk Management Plan

A Project Design and Construction Risk Management Plan (Risk Management Plan) framework will be developed and implemented jointly between RGLNG and their engineering, procurement, and construction contractor. The framework will focus on identifying, classifying, assessing, and prioritizing risks as well as planning and creating mitigation strategies for handling the identified risks.

Risk management procedures will be developed by the engineering, procurement, and construction contractor and will be implemented during the detailed engineering phase of the Project. The procedures will continue to be used throughout the construction and commissioning phases. The procedures will cover the following topics:

- Understanding risk;
- Risk management approaches;
- Risk management definitions;
- Risk management process;
- Definition of risk and related topics;
- Personal approach to risk;

- Types of risks;
- Risk factors; and
- Risks in a construction project environment.

### **11.2.1.2 Content of the Risk Management Plan**

Risk management planning is an important aspect of the Risk Management Plan because it sets the tone for the rest of risk management activities. Planning focuses on the “who, what, where, and when” aspects of risk management. The Risk Management Plan will include policies and procedures for the following:

- Understanding the project environment and project objectives;
- Planning requirements for risk management processes;
- Risk management planning process;
- Schedule and schedule related risk management;
- Quality assessment and quality control;
- Cost risk; and
- Change management.

### **Risk Identification Process**

Risk identification is an interactive process and will involve key stakeholders. Topics that will be covered in the Risk Management Plan will include the following:

- Risk identification;
- Approaches to risk identification, which will include qualitative and quantitative risk assessment techniques;
- Risk statement and developing a risk register;
- Types of risk and risk categories; and
- Practical issues related to risk identification.

### **Strategies for Handling Risks/Risk Response Planning**

The Risk Management Plan will describe tools that will be used to develop strategies that will include the following:

- Steps for developing risk response;
- Information/documentation required to prepare for risk response planning;

- Tools for generating risk response options;
- Strategies for risk response planning;
- Risk response options evaluation; and
- Risk response planning deliverables.

### **Managing Project Risks (Risk Monitoring and Control)**

The Risk Management Plan will describe the mechanisms that will be used to manage project risks throughout the Project's design and construction life cycle. Such mechanisms will include the following:

- Definition and risk management cycle;
- Risk monitoring and control activities;
- Risk documentations;
- Risk communications; and
- Risk monitoring and control tools.

RGLNG will conduct business in a manner to protect the safety and health of their employees, their customers, the public, and others involved in Project operations. The RGLNG Terminal with CCS Systems has been designed and will be operated to meet or exceed applicable safety standards using a systematic approach to identifying and managing health, safety, and environmental risks.

### **11.2.2 General Operations and Maintenance Procedures**

During operations, the inclusion of CCS Systems is expected to employ an additional approximately 30 permanent plant workers. All Project operations and maintenance staff will be trained to perform their assigned tasks and responsibilities properly and safely, and the recruitment process will ensure most of the new staff are available approximately one year prior to commissioning of the CCS Systems. This will allow the new staff to become familiar with the new installations, undergo classroom and field training, attend training by key equipment/system vendor representatives, assist the Project team in finalizing and inspecting the CCS Systems as they near mechanical completion and enter pre-commissioning and commissioning stages, and assist the main contractor in executing the commissioning and testing phase before reaching Substantial Completion, at which point the RGLNG team will take over all operational and maintenance responsibilities.

Operators and maintenance staff will be trained in the proper operation of all equipment related to CCS Systems. All training will be completed in a manner that meets or exceeds the requirements of the PHMSA, USDOT, USCG, and other applicable regulatory agencies. All of the training received by staff

members will be integrated into a human resource planning tool that maps the progression of employees and the delegated responsibility levels fitting their individual capabilities and skill sets.

CCS Systems operations will be duly documented in design drawings and manuals that will be accessible via an electronic document management system that ensures only the latest revisions of relevant documents are used. A rigorous "management of change" procedure will safeguard that any contemplated change is duly evaluated and documented before implementation.

The Terminal and CCS Systems automation will include many pre-engineered routines and automated actions to allow the panel operators to function more in a "monitoring" role, and less in an "active interference" role. A suitably developed alarm management system will help to manage undesired events and incidents.

All main CCS equipment and Terminal sections will be recorded in equipment record cards/files and maintained electronically to allow tracking of the condition and executed maintenance activities over time. For planning and execution of maintenance and the management of spare parts inventories, tailored maintenance management software will be used.

Terminal and CCS Systems inspections and maintenance will follow the principles of "risk-based inspection" and "condition-based maintenance," as far as practical to enhance the overall reliability of the installation in a most efficient manner.

All post-commissioning work in the Terminal and CCS Systems will be subject to a rigorous "Safety Permit to Work" system controlled by the operations team and audited by the Terminal maintenance and safety staff. Lessons learned while operating and maintaining the CCS Systems and re-training of staff to embed new insights and learn from past events will also be firmly embedded into daily routines onsite, as will be the rigorous reporting on all parts of the Terminal's actual performance.

In order to ensure the operations staff is familiar with and understands its tasks, RGLNG will develop an Operational Procedure Plan, capturing the above, and aiming to align the operational and safety requirements of the staff with expectations of management. The Operation Procedure Plan will provide functional requirements for the control and safeguarding of CCS Systems. This will include addressing topics such as emergency shutdowns, operational shutdowns, spills and other routine operational procedures.

The Terminal's permanent maintenance staff will be tasked to conduct or plan/manage/supervise all standard maintenance and overhauls. Any specialized maintenance and/or overhauls needed will be completed by outside professionals trained to perform the specialized task. All maintenance records,

both scheduled and unscheduled, will be maintained through the use of a computerized maintenance tracking system.

### **11.2.3 Education and Awareness Programs**

Public information, awareness, and education programs will be initiated to provide the public, neighboring industries, and government officials with knowledge about the CCS Systems, including their functions, benefits, and environmental and safety. This effort will continue at an appropriate level throughout construction and after operations have started.

## **11.3 Agency Coordination**

### **11.3.1 Emergency Response Plan**

The ERP continues to be developed in accordance with FERC's Draft Guidance for LNG Terminal Operator's Emergency Response Plan dated September 21, 2006 (FERC, 2006) and the requirements of Condition 53 of the FERC Authorization. The ERP will incorporate information relative to the addition of the CCS Systems within the Terminal. In addition, the ERP will establish the procedures for responding to specific emergencies that may occur at the Terminal with CCS Systems installed.

In accordance with FERC's Draft Guidance for LNG Terminal Operator's Emergency Response Plan, RGLNG will continue to consult with local, state, and Federal agencies to develop the ERP for the FERC's approval.

### **11.3.2 Fire Protection**

The CCS Systems will not introduce any new flammable materials. Previous filings and EIR responses in the original Authorization docket have demonstrated, consistent with all relevant regulatory requirements, that the RGLNG Terminal has been designed to minimize the occurrence of events that could result in the release of flammable materials.

### **11.3.3 Military Installations**

The incorporation of CCS Systems will not impact any military installations since there are no known military installations within the relevant potential area of effect.

## **11.4 Marine Analysis**

The incorporation of CCS Systems will not impact the waterway or LNG shipping operations.

# **Appendix 11.A: Hazard and Operability (HAZOP) Study Report – Emissions Reduction Carbon Capture Facility (ERCCF)**

Appendix 11.A has been designated as Privileged Information  
and is being submitted under separate cover  
pursuant to 18 CFR § 388.112.

# Appendix 11.B: Layer of Protection Analysis (LOPA) Report – Emissions Reduction Carbon Capture Facility

Appendix 11.B has been designated as Privileged Information  
and is being submitted under separate cover  
pursuant to 18 CFR § 388.112.

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# Rio Grande LNG Project with Carbon Capture and Sequestration

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## Resource Report 12: PCB Contamination

November 17, 2021

Prepared by:



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SUMMARY OF FILING INFORMATION		
INFORMATION		SECTION REFERENCE
<b>Minimum Filing Requirements</b>		
<input type="checkbox"/>	1. For projects involving the replacement or abandonment of facilities determined to have PCBs, provide a statement that activities would comply with an approved EPA disposal permit or with the requirements of the TSCA. (§ 380.12(n)(1))	Not Applicable
<input type="checkbox"/>	2. For compressor station modifications on sites that have been determined to have soils contaminated with PCBs, describe the status of remediation efforts completed to date. (§ 380.12(n)(2))	Not Applicable

The inclusion of CCS Systems does not involve the replacement, abandonment by removal, or abandonment in place of pipeline facilities determined to have polychlorinated biphenyls (PCBs) in excess of 50 ppm in pipeline liquids.

Document Content(s)

RGLNG CCS Amendment Transmittal, Abbreviated Application.pdf.....1  
Exhibits A through H (1).pdf.....22  
RGLNG Limited Amendment Sample Fed. Reg. Notice.pdf .....60  
Resource Report 1.pdf.....62  
Resource Report 2.pdf.....87  
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