

## EXECUTIVE SUMMARY

### Introduction

Broadwater Energy LLC and Broadwater Pipeline LLC (jointly termed Broadwater<sup>1</sup>) are proposing to construct, install, operate, and maintain a permanently moored, liquefied natural gas (LNG) import, storage, and regasification facility located a minimum of 9 miles from shore, and a new offshore natural gas pipeline to connect to the existing interstate natural gas transmission system in Long Island Sound. Broadwater has filed an application with the Federal Energy Regulatory Commission (FERC or the Commission) for the proposed Broadwater LNG Project (the proposed Project) under Sections 3(a) and 7(c) of the Natural Gas Act (NGA).

FERC staff prepared this draft environmental impact statement (draft EIS) to fulfill the requirements of the National Environmental Policy Act and the Commission's implementing regulations. The purpose of the EIS is to provide the public and the permitting agencies with information about the potential adverse and beneficial environmental impacts of the proposed Project and its alternatives, and to recommend mitigation measures that would avoid or minimize adverse impacts to the maximum extent practical. We<sup>2</sup> prepared this EIS with the assistance of the following cooperating agencies: the Department of Homeland Security, U.S. Coast Guard (Coast Guard); the U.S. Army Corps of Engineers (COE); the U.S. Environmental Protection Agency (EPA); the National Oceanographic and Atmospheric Administration, National Marine Fisheries Service (NMFS); and the New York State Department of State (NYSDOS). The scope of the EIS was developed based on input from many sources, including the Broadwater application; the cooperating agencies; the New York State Department of Public Services<sup>3</sup> (NYSDPS); the State of Connecticut Department of Environmental Protection; the State of New York Department of Environmental Conservation (NYSDEC); the New York State Office of Parks, Recreation and Historic Preservation; open houses and public scoping meetings; letters received from the public; and from our own field inspections, research, and analyses.

### Purpose and Need

The purpose of the Project is to establish an LNG marine terminal capable of receiving imported LNG from LNG carriers, and storing and regasifying the LNG at an average sendout of 1.0 billion cubic feet per day. The terminal would provide a new source of reliable, long-term, and competitively priced natural gas to the Long Island, New York City, and Connecticut markets by connecting to the existing subsea natural gas pipeline system owned by Iroquois Gas Transmission System (IGTS). Broadwater estimates that approximately half of the natural gas sent out from the LNG terminal would be transported to New York City, about 25 to 30 percent would go to Long Island, and the remaining portion would go to Connecticut.

FERC staff evaluated the natural gas and electrical energy supply issues of the area. We found that the demand for natural gas in each of these areas is rising and is projected to generate increasing price pressure and volatility in the future if the supply remains at its current level.

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<sup>1</sup> Broadwater Energy LLC is jointly owned by TCPL USA LNG, Inc. (a subsidiary of TransCanada Corporation) and Shell Broadwater Holdings LLC (a subsidiary of Shell Oil Company). Broadwater Pipeline LLC is owned by Broadwater Energy LLC.

<sup>2</sup> The pronouns "we," "us," and "our" refer to the environmental staff of FERC's Office of Energy Projects.

<sup>3</sup> NYSDPS is the agency tasked by the governor of New York with the overall responsibility for consulting with FERC on siting and safety matters regarding Broadwater's application.

In an environment of increasing natural gas consumption, LNG imports from overseas would provide a needed diversification to currently available natural gas delivered via pipeline from the Gulf of Mexico and Canada. Gas deliveries from those areas account for approximately 85 percent of the gas consumed in the New York City, Long Island, and Connecticut market; production from those areas is projected to decline over the next 20 years. Conversely, energy consumption projections indicate that there will be an increasing need for natural gas in the region, both in the near term and farther into the future. In the past 10 years, electric power generating facilities in the region have increased output by about 5.6 percent per year, and the annual consumption of natural gas by those facilities increased by 100 billion cubic feet. The use of natural gas for electrical generation, rather than coal or oil, is directed toward meeting regional air quality objectives.

In addition, natural gas transmission pipelines originating in the Gulf of Mexico and western Canada terminate in New York and New England. Great distances between natural gas sources and their markets, as is the case with the New York City, Long Island, and Connecticut region, increase the costs of gas while decreasing the reliability of the supply. The proposed Project would reduce the area's future need for new or expanded interstate natural gas pipelines that have been difficult to build in the region, by providing a local supply of natural gas that uses existing distribution facilities.

## **Project Description**

The proposed LNG terminal would be in New York State waters of Long Island Sound, approximately 9 miles<sup>4</sup> from the nearest shoreline of Long Island, and about 11 miles from the nearest shoreline in Connecticut. The terminal would be a floating storage and regasification unit (FSRU) that would be attached to a yoke mooring system (YMS) that includes a mooring tower embedded in the seafloor. LNG would be delivered to the FSRU by LNG carriers, temporarily stored, vaporized (regasified), and then transported in a new subsea natural gas pipeline that would extend from the seafloor beneath the FSRU approximately 21.7 miles to an offshore connection with the existing IGTS pipeline which extends across Long Island Sound.

Natural gas would be routed from the FSRU to the subsea pipeline and into the IGTS pipeline for delivery at an average flow rate of about 1.0 billion cubic feet per day. LNG would be delivered to the FSRU by an estimated total of 118 carriers per year to meet the Project's planned sendout volumes of natural gas. LNG carriers would transit from the Atlantic Ocean to either the Point Judith Pilot Station (northeast of Block Island) or the Montauk Pilot Station (southwest of Block Island). From the Point Judith Pilot Station, carriers would transit Block Island Sound north of Block Island, head generally west to enter Long Island Sound at its eastern end (an area known as the Race), and then proceed to the FSRU. From the Montauk Pilot Station, carriers would head generally northwest to approach the Race, then proceed to the FSRU.

The FSRU would look like a marine vessel and would remain moored in place for the duration of the Project. It would be approximately 1,215 feet long and 200 feet wide, with a draft of approximately 40 feet and the upper deck extending up to 82 feet above the waterline. The YMS would allow the FSRU to pivot or "weathervane" around the YMS, enabling the FSRU to orient in response to the prevailing wind, tide, and current conditions.

In order to accommodate the cryogenic storage tanks, the FSRU would be double-hulled. The main components of the FSRU would include a single berthing and unloading facility for LNG carriers

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<sup>4</sup> Mileage is presented as statute miles except where otherwise noted.

with cargo capacities ranging from 125,000 to 250,000 cubic meters; a total storage capacity of 350,000 cubic meters (approximately 8 billion cubic feet); a closed-loop vaporization system that would heat the LNG using natural gas; and utility systems, crew quarters, and service facilities.

Broadwater has proposed to use existing onshore facilities for support of the Project during both construction and operation. The onshore support facilities would be at either Greenport or Port Jefferson, New York. At both locations, existing office and warehouse facilities would be available, as would docking space with the capacity to berth up to four tugs. During construction, Broadwater would use an existing concrete coating yard outside of the New York/Connecticut area and a pipe storage area within an existing developed area at the Port of New York/New Jersey.

## **Project Schedule**

Broadwater proposes to receive authorization and certification from FERC and all necessary permits and approvals for the Project by mid 2007. At that point, detailed engineering and design studies would begin. Design and fabrication of the FSRU and YMS would require approximately 3 years from the date of authorization for the Project.

As currently planned by Broadwater, pipeline installation would begin with pre-lay surveys that would start in September 2009. In-water work on pipeline installation would begin in October 2009 and would be completed by April 2010. The YMS would be installed from about the middle of September through the middle of November 2010. Connection of the new pipeline to the YMS and to the IGTS pipeline would take place in November 2010, and the FSRU would be connected to the YMS in December 2010. Broadwater anticipates that the Project would be in service in late December 2010.

## **Reviews, Authorizations, and Permits**

FERC is the federal agency responsible for authorizing applications to construct and operate LNG terminals that are onshore or in state waters, and interstate natural gas transmission facilities. The Commission will determine whether or not the Project should be approved. A final approval would be granted by FERC if, after a consideration of both environmental and non-environmental issues, it finds that the proposed Project is consistent with the public interest.

The Coast Guard has regulatory responsibilities for certain aspects of the import terminal (the FSRU) and for the LNG carriers that would deliver LNG to the import terminal. As part of that responsibility, the Coast Guard assessed the potential navigation safety and maritime security risks associated with the Project and identified strategies for managing potential risks. The assessments addressed the suitability of Long Island Sound, Block Island Sound, and Rhode Island Sound to support LNG carrier traffic. The methods used and results of the analysis are presented in the Coast Guard's Waterways Suitability Report (WSR), which is presented in Appendix D of the EIS. Following completion of the Coast Guard's review and our issuance of the final EIS, the Coast Guard Captain of the Port, Long Island Sector would issue a Letter of Recommendation to Broadwater. The Letter of Recommendation would be based on the WSR and would indicate the Coast Guard's final determination of whether or not the waterways are suitable for the Project.

Reviews of the engineering, reliability, and safety aspects of the Project have been shared by FERC and the Coast Guard based on an agreement between the two agencies. This joint review has been in progress since late 2004 when FERC initiated its pre-filing process. FERC has the lead responsibility for review of the proposed subsea pipeline and LNG handling, storage, and regasification on the FSRU. The Coast Guard has the lead responsibility for assessing the safety, and security of the FSRU as a marine

facility, and LNG carrier operations while at berth and in transit to and from the FSRU in U.S. territorial waters.

If FERC authorizes the Project and the Coast Guard issues a Letter of Recommendation indicating that the waterways associated with the Project are suitable for use by the Project, the Coast Guard would establish and enforce safety and security zones around both the FSRU and the inbound and outbound LNG carriers. In the WSR, the Coast Guard has defined safety and security zones for the FSRU and the LNG carriers. For the FSRU, a fixed circular zone with a radius of 1,210 yards (0.7 mile) from the center of the YMS would be established for the duration of the Project. For each LNG carrier, a moving safety and security zone would extend about 2 nautical miles (2.3 miles) in front of the vessel, 1 nautical mile (1.2 miles) to the rear, and 750 yards (about 0.4 mile) to each side of the vessel during transits in both directions between the pilot station and the FSRU. The estimated transit time for the moving safety and security zone past a fixed point would be about 15 minutes.

If the Project is approved and implemented, the Coast Guard would continue to have oversight of the safety and security aspects of the FSRU and the LNG carriers, and would require both aspects of the Project to comply with applicable regulatory and statutory requirements for operations, security, and environmental and operational safety.

The Coast Guard will adopt all or pertinent parts of this EIS to satisfy its own NEPA responsibilities. Some of the potential environmental impacts resulting from LNG vessel activities and transit would not be unique to LNG carriers and may also be addressed by previous Coast Guard NEPA analyses for existing regulations. In accordance with the Coast Guard's NVIC 05-05, all required Coast Guard NEPA analysis and documentation must be complete prior to the issuance of the final Letter of Recommendation.

In addition to FERC and the Coast Guard, other federal agencies have responsibilities for issuing permits or for evaluating compliance with relevant federal laws and regulations. If appropriate, the COE would issue permits under the Rivers and Harbors Act and the Clean Water Act; EPA also has regulatory authority under the Clean Water Act as well as under the Clean Air Act. The U.S. Fish and Wildlife Service (FWS) and NMFS are responsible for reviewing the Project's compliance with Section 7 of the Endangered Species Act. In addition, NMFS is responsible for reviewing compliance with the Magnuson-Stevens Fishery Conservation and Management Act, and the Marine Mammal Protection Act.

Several New York State agencies also have responsibilities for reviewing and permitting the Project. NYSDEC has been delegated the permitting responsibilities under the Clean Water Act and the Clean Air Act; NYSDOS is responsible for reviewing federal agency actions and activities relative to the Coastal Zone Management Act, including the responsibility to ensure that they are consistent with New York's Coastal Management Program and the Long Island Sound Regional Coastal Management Program; and the New York State Office of Parks, Recreation and Historic Preservation is responsible for reviewing the Project's compliance with Section 106 of the National Historic Preservation Act.

As noted above, the governor of New York designated NYSDPS as the state agency that FERC should consult with on safety and siting matters for the Broadwater Project in accordance with the NGA and the Energy Policy Act of 2005 (EPA Act). NYSDPS submitted its February 28, 2006 Safety Advisory Report to FERC. In the report, NYSDPS addressed state and local considerations for the Project and provided comments from NYSDOS, the New York State Emergency Management Office, the New York State Department of Transportation, and the New York State Office of Homeland Security, as well as the comments of local governmental entities (including Suffolk County, the Town of Huntington, the Town of Riverhead, and the Village of Poquott).

The EAct also stipulates that before the Commission may issue an order authorizing an LNG terminal, it must “review and respond specifically” to the safety matters raised by the state agency designated as the lead for the state and local safety matters. Appendix A of the EIS presents the NYSDPS advisory report for the Broadwater Project and FERC’s response to the report.

## Public Scoping

Public scoping of environmental and safety issues was initiated in November 2004, with Broadwater’s submittal of a Letter of Intent to the Coast Guard and with FERC’s acceptance of Broadwater into its pre-filing process. Broadwater conducted public open houses on Long Island and in Connecticut in November and December 2004 and again on Long Island in April 2005. FERC and/or the Coast Guard participated in each of these open houses and provided information to the public on the review process for environmental, safety, and security issues associated with the Project.

On February 10, 2005, FERC formally introduced the pre-filing process to various Project stakeholders by issuing a notice entitled *Pre-filing Process Review, Broadwater Project, Docket No. PF05-4-000*. This Pre-filing Notice was sent to approximately 2,200 interested parties, including federal, state, and local officials; agency representatives; conservation organizations; and local libraries and newspapers. On August 11, 2005, FERC issued its *Notice of Intent to Prepare an Environmental Impact Statement for the Broadwater LNG Project, Request for Comments on Environmental Issues, and Notice of Joint Public Scoping Meetings* (NOI). The NOI explained that FERC and the Coast Guard would be working together to evaluate the Project, assess potential environmental impacts, and address safety and security issues. On August 16, 2005, the Coast Guard issued its *Notice, Request for Comments; Letter of Recommendation, Proposed Broadwater Project, Long Island Sound* in the Federal Register.

The notices issued by FERC and the Coast Guard encouraged Project stakeholders and interested parties to provide input on environmental, safety, and security issues that should be addressed during the Project review process. Both the NOI and the Coast Guard notice requested comments by October 7, 2005; however, both FERC and the Coast Guard accepted comments throughout the time this draft EIS was being prepared. FERC received more than 4,200 comment letters in response to the Pre-filing Notice and the NOI. In addition, the Coast Guard received more than 2,300 letters from concerned parties. The majority of those letters expressed concerns about health and safety, security, public access, and industrialization of the Sound. Based on public and agency input, it is clear that safety and potential environmental impacts are the two primary concerns.

FERC and the Coast Guard conducted joint public scoping meetings at two locations on Long Island and two locations in Connecticut in September 2005: Stony Brook, New York on September 13; Shoreham, New York on September 14; East Lyme, Connecticut on September 20; and Branford, Connecticut on September 21. The primary concerns expressed during the public scoping process were associated with safety, security, and environmental impacts to Long Island Sound. In addition to the public notice and scoping process discussed above, FERC conducted agency consultations, participated in several interagency meetings and conference calls, and met with concerned agencies and non-governmental organizations to identify issues that should be addressed in this EIS.

The Coast Guard participated in many of these meetings and attended numerous other public meetings held by groups of concerned citizens. The Coast Guard coordinated with FERC’s LNG engineering group to review safety and reliability issues of Project design, conducted a Ports and Waterways Safety Assessment workshop on May 3 and May 4, 2005, conducted a Harbor Safety Working Group meeting for the Broadwater LNG Safety Risk Assessment on December 15, 2005, and established a Sub-Committee of the Area Maritime Security Committee to provide input to the Coast Guard’s review of potential risks to maritime security.

## Safety and Security

The Coast Guard conducted an assessment of the Project's effect on the safety and security of the waterways associated with the Project and issued its findings in the WSR dated September 21, 2006. The WSR will support the Letter of Recommendation that the Coast Guard Captain of the Port will submit to Broadwater and FERC after the final EIS is issued. It contains an analysis of potential navigation safety and maritime security risks associated with the proposed facility and LNG vessel transits on the waters of Rhode Island Sound, Block Island Sound, and Long Island Sound. The report also includes potential strategies for managing potential risks associated with the proposed Project.

The WSR is based on an analytic and systematic assessment of potential risks to navigation safety and maritime security associated with the proposed Project. The assessment of potential risks was evaluated in terms of the components of risk – threats, vulnerabilities, and consequences.

Based on the results of the assessment of potential risks to navigation safety and maritime security associated with Broadwater's proposal, the Coast Guard has determined that to make the waterways suitable for LNG vessel traffic and operation of the proposed FSRU, additional measures are necessary to responsibly manage the safety and security risks associated with the proposed Project. The necessary measures are outlined in Section 8.4 (Risk Management Strategies) of the WSR.

The WSR concludes that there are currently no known, credible threats against the proposed Broadwater facility, although periodic threat assessments must be conducted to ensure that the security measures in place remain appropriate. The proposed location of the FSRU has a number of significant safety and security benefits associated with its remoteness, especially with respect to threat and consequence since it would be remote from population centers. The Coast Guard has stated that would serve to lessen the FSRU's attractiveness as a target, but the remote location would create some law enforcement challenges.

Although the proposed addition of LNG carriers transiting to the FSRU would increase foreign-flagged vessel traffic volume by 20 to 30 percent, the overall increase of commercial vessels (such as tugs, barges, and ferries) would be less than 1 percent.

Additional resources would be needed to mitigate safety and security risks associated with the Broadwater LNG Project, if approved. The required security resources, in particular law enforcement, capable personnel, and small boats, are based on existing Coast Guard security policy. Also, additional marine firefighting resources may be required to mitigate fire risks associated with the Broadwater LNG Project, if approved.

An important consideration for assessing the suitability of Long Island Sound, Block Island Sound, and Rhode Island Sound for LNG carrier traffic, as well as the suitability of the proposed location of the FSRU, was establishing the size of the hazard zones associated with a large release of LNG. In addition, establishment of the limits of hazard zones was also a component of calculating the sizes of the safety and security zones around the FSRU and the incoming and departing LNG carriers. The criteria used by Sandia National Labs to define the outer limits of the three hazard zones addressed in their report, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water*, were applied for assessing potential risks associated with the Project. The criterion used to define the outer limits of zones 1 and 2 is "incident heat flux" (thermal radiation) that would be expected from an intense LNG vapor fire. Within hazard zone 1, thermal radiation can cause serious injuries or significant damage to structures. Within zone 2, thermal radiation can cause injuries or some damage to structures. The outer limit of zone 3 is the point where there would not be enough natural gas in the air to burn. The maximum extent of zone 3 is much larger than zones 1 and 2 and assumes that there would not

be an ignition source (such as an explosion) present when the LNG was released. If the gas expanding outward from the spill encounters an ignition source and is at a concentration of 5 to 15 percent, the gas could ignite and thus reduce the actual size of zone 3. Within all three zones, the level of risk is reduced as the distance from the source increases.

If a fire were to occur due to a release from the FSRU, none of the hazard zones (hazard zones 1, 2, or 3) around the FSRU would reach a population center due to the distance between the FSRU and land (the FSRU is 9 miles from the nearest shoreline). Neither hazard zone 1 nor hazard zone 2 for the LNG carriers would extend to land along the proposed transit routes. Hazard zone 3 (an unignited vapor cloud) centered on an LNG carrier could intersect with land only along the portions of the proposed carrier transit route that are in the vicinity of the Race. The size of hazard zone 3 is based on the volume of LNG released from a major spill and the lack of an ignition source. However, it is unlikely that there would be a major release of LNG from a carrier without a major incident • such as an explosion or a collision • and therefore, it is most likely that an ignition source would be present when the release occurred. Thus, it is not likely that a hazard zone 3 would result from a major spill, or if one were present, it would be temporary and would likely not extend outward to the maximum distance calculated.

The Coast Guard considered the sizes of the hazard zones that would be associated with a spill when determining the size of the safety zones for the Project. The area covered by the proposed safety and security zone around the FSRU is approximately one-tenth of 1 percent of the total area of Long Island Sound. The proposed safety and security zone around the LNG carrier while in transit in Long Island Sound would take approximately 15 minutes to pass a given point. The impacts of the moving safety and security zone around LNG carriers on other waterway users could be managed but would require that additional measures be implemented, as discussed in the WSR.

## **Potential Environmental Impacts**

With the exception of the use of existing onshore office, warehouse, and industrial docking facilities, the potential environmental impacts of the proposed Project are largely limited to offshore areas of Long Island Sound during Project construction and operation. Thus, the proposed Project would not be expected to impact sensitive onshore or nearshore resources such as wetlands, terrestrial wildlife and birds, freshwater fisheries, shellfish beds, eelgrass beds, residences, businesses, or county, state, or national parks. Broadwater has developed the proposed siting and design, as well as the construction and operation methods and procedures, in an effort to reduce the potential impacts of the Project. To minimize impacts, all Project construction and operations would be conducted in accordance with applicable laws, regulations, and permits. In addition, we have recommended measures to avoid or further minimize potential impacts to the environment. The magnitude, duration, and types of the remaining potential adverse environmental impacts would differ between Project construction and operation as summarized below.

### *Construction*

During Project construction, the primary impacts would be associated with installation of the 21.7-mile-long subsea pipeline, including physical disturbance of the seafloor/benthic habitat and temporary turbidity and sedimentation associated with the seafloor disturbance. As proposed by Broadwater, Project construction would disturb a total of 2,235.2 acres; the most expansive impacts would be associated with anchor cable sweep (2,020 acres), plowing of the pipeline trench (197.3 acres), and the footprint of the anchors (16.5 acres). We have included a recommendation that Broadwater use mid-line buoys on all anchor lines in a manner that would virtually eliminate seafloor impacts due to anchor cable sweep, thus reducing total seafloor impacts by approximately 90 percent.

Broadwater is proposing to actively backfill approximately 10 percent of the pipeline trench and allow the rest of the trench to backfill naturally. Results from other linear projects in Long Island Sound have indicated that the success and timing of natural backfilling is uncertain. To minimize the potential for continued impacts of an open trench on the benthic habitat and associated biological resources, we have included a recommendation that Broadwater actively backfill the entire trench immediately after pipeline installation. We have also recommended that Broadwater, in coordination with pertinent federal and state resource agencies, develop appropriate post-construction monitoring procedures to assess the success of backfilling. With implementation of the construction measures identified by Broadwater and our recommendations, the seafloor would begin to recover immediately following construction, and the benthic community should recover within 1 to 2 years. Permanent impacts to approximately 7.5 acres of the seafloor would be associated with conversion of the substrate from soft-bottom sediment to hard substrate. That conversion would include imported rock along approximately 2 miles of the pipeline trench (approximately 6.1 acres), concrete mats at utility crossings (0.8 acre), the physical structure of the YMS and associated scour protection (0.3 acre), and rock, sandbags, or other hard substrate at the tie-ins to the IGTS pipeline and the YMS riser (0.5 acre). This conversion would result in permanent adverse impacts to benthic biota that reside in soft sediment but could provide enhanced habitat conditions for biota that prefer rock or hard substrate.

Plowing of the pipeline trench would result in some turbidity in the water column during active construction. Turbidity plume modeling has indicated that any substantial increases in turbidity would be greatest near the bottom, with little observable turbidity beyond 1,600 feet from the area of active plowing. These results also indicate that the increase in turbidity in surface waters would be in compliance with New York State water quality standards (no substantial visible contrast to ambient conditions) and turbidity levels would dissipate within approximately 8 hours of sediment disturbance. In addition, Broadwater has proposed to coordinate with appropriate resource agencies to develop appropriate water quality monitoring methods during construction that would ensure compliance with state water quality standards and any requirements of the New York State Pollution Discharge Elimination System (SPDES) permit.

Construction of the YMS would include pile-driving, with the specific methods to be used to be determined after the completion of more detailed geotechnical surveys. We have included a recommendation that Broadwater coordinate with NMFS to determine the appropriate measures to avoid and minimize noise impacts of pile-driving and other construction and operation activities on biological resources, including federally listed threatened and endangered whales and sea turtles, other marine mammals, and fisheries resources.

Construction vessel collisions could potentially impact sensitive marine resources. Construction vessel traffic would result in a minimal increase in vessel traffic in Long Island Sound. To limit the potential for impacts to sensitive species, Broadwater has proposed to (1) avoid the use of high-speed vessels, (2) use biological monitors onboard construction vessels to assist in avoiding federally listed species, and (3) avoid areas where listed species have been recently reported. Thus, construction vessel operation would result in no significant increase in the risk of vessel collisions with sensitive marine resources.

Other secondary impacts during construction include minor increases in vessel traffic, air emissions, and the risk of vessel collisions or fuel spills. Construction would take place during the fall and winter, when the potential for impacts to most marine resources would be lowest and when recreational boating and fishing would be minimal. In addition, construction activities would be conducted in compliance with pertinent federal and state regulations and permit stipulations. As a result of the mitigation measures proposed by Broadwater, along with our additional recommendations and state

and federal controls, construction of the Project would not result in a significant impact to the environment.

### *Operation*

The primary environmental concerns during operation include potential impacts to water resources, aquatic biota (primarily fish, marine mammals, and federally listed threatened and endangered species), air emissions, and the human environment (such as commercial shipping, recreational boating and fishing, visual resources, and industrialization). Impacts associated with operation would continue for the life of the proposed Project (a minimum of 30 years). Impacts associated with operation of Project, including the impacts of LNG carriers in transit and at berth, are summarized below. The use of carriers to ship LNG to the Project would increase commercial shipping in Long Island Sound by about 1 percent, and the carriers would transit deepwater areas. As a result, LNG carrier operation would have little impact on offshore resources such as bottom sediments, scour, and bottom dwelling biota, or on the shoreline and onshore resources such as shoreline erosion, wildlife, wetlands, threatened and endangered species, cultural resources, residences, and land use. The potential impacts of LNG carrier transit and operations on marine resources were incorporated into our review as described below.

Impacts to water resources would primarily be associated with the intake and discharge of water by the FSRU and LNG carriers. Most of the water taken in by the FSRU would be used for ballast when discharging vaporized LNG. When taking on LNG from the carriers, the ballast water in the FSRU would be returned to the Sound. LNG carriers would take on water primarily for use in cooling and for ballast when LNG is being unloaded. The cooling water would be returned to the Sound, and the carriers would depart Long Island Sound with ballast water that was taken on. LNG carriers would not be expected to discharge any ballast water in Long Island Sound or Block Island Sound.

Annually, the water intake of the FSRU would average approximately 5.5 million gallons per day (mgd), with a maximum daily intake of 8.2 mgd during periods of peak gas sendout. In general, this water would be treated with a biocide. Broadwater has proposed to monitor the concentration of the biocide in the discharge, and discharges would be conducted in accordance with the requirements of the SPDES permit. Assuming that 118 LNG carriers would deliver LNG to the FSRU each year, the carriers' average daily water intake of water from the Sound (based on the total annual intake) would be approximately 22.7 mgd, including ballast and cooling water. Discharges from the carriers would be typical of those from other large cargo vessels and would be conducted in accordance with standard federal and international regulations governing the shipping industry.

Since some water discharges for the LNG carriers would be associated with cooling on-board machinery, water discharged from carriers berthed at the FSRU has been estimated to be an average of 3.6°F warmer than ambient conditions. Based on the open water location of the LNG carriers and the relatively small discharge volume, we anticipate that the discharges would satisfy the New York State water quality standards for thermal discharges into estuaries. In addition, carriers would be discharging at the FSRU approximately 26 percent of the time on an annual basis, and the discharges would not be continuous at the FSRU. As a result, the impacts to water quality would be minor but would occur for the life of the Project.

The primary impact to biological resources associated with operation would be the impingement/entrainment<sup>5</sup> of ichthyoplankton (the eggs and larvae of fish drifting in the water column) due to the intake of water from the Sound. Ichthyoplankton surveys conducted in the general vicinity of

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<sup>5</sup> Impingement/entrainment refers to organisms being taken into the FSRU with the water or being held on the intake screen due to the flow of water through the screen.

the Project in 2002 and site-specific surveys conducted in 2005 and 2006 provided estimates of ichthyoplankton densities throughout the year. Based on these data and the volume of water taken in, the total potential impingement/entrainment of ichthyoplankton would be less than 0.1 percent of the estimated total ichthyoplankton stock in the central basin of Long Island Sound, assuming even distribution of ichthyoplankton throughout the basin. To reduce this potential impact, Broadwater has proposed to locate intake structures at mid-depth (about 40 feet below the surface, where the concentration of ichthyoplankton is expected to be relatively low), limit intake flow velocities to 0.5 feet per second to allow the more mobile larvae to avoid the intake flows, and use small-mesh screen (0.2-inch mesh) on the intakes to prevent many eggs and larvae from being taken in with the water. As a result, there would be a negligible long-term impact on ichthyoplankton and, therefore, on the general fisheries resources of the Sound.

NMFS has designated the seafloor and the water column of Long Island Sound as Essential Fish Habitat (EFH) and has identified 19 fish species as EFH-designated species in the Project area. We are requesting that NMFS consider this draft EIS as notification of initiation of EFH consultation. We have prepared a draft EFH Assessment that provides a detailed description of the EFH-designated resources and potential Project-related impacts (presented in Appendix E of the EIS). EFH would be affected by the temporary to short-term seafloor disturbance and temporary turbidity that would occur during construction (as described above) as well as the limited sediment conversion of the seafloor from soft sediment to hard substrate. However, there would not be significant impacts to EFH resources during construction.

Operation of the Project would result in minor but long-term impacts to the water column due to water intake and discharges. The primary impact to EFH-designated fish species would be associated with impingement/entrainment during water intake. Based on average densities in the central basin, less than 10 percent of the total ichthyoplankton population consists of EFH-designated species. In addition, the eggs and larvae of the EFH-designated fish species that were reported in the ichthyoplankton surveys tend to be located near the surface or near or on the bottom; these early lifestages of EFH-designated species are typically not present at the midwater depth where the FSRU's water intake structures would be positioned. Therefore, the actual impingement/entrainment of EFH-designated species would likely be considerably less than the average densities reported throughout the water column. As a result, the impact to EFH-designated species would be negligible, but long term.

Potential impacts to federally listed threatened and endangered species were assessed in coordination with the FWS and NMFS, and primarily focused on potential increases in the risk of vessel collisions and noise. FWS stated that, except for occasional transient individuals, no threatened or endangered species within its purview occur in the vicinity of the proposed offshore Project.

NMFS identified seven federally listed threatened or endangered species that could occur in the vicinity of the Project, including four sea turtle species and three whale species. The primary potential impacts to these federally listed threatened and endangered species associated with the proposed Project include vessel strikes and noise. In the open waters of the Sound, the increase in vessel traffic associated with the Project would represent a slight increase over current conditions (estimated at approximately 1 percent). Construction vessels, LNG carriers, and support vessels would use existing shipping routes as much as possible and would generally move relatively slowly. As mentioned previously, Broadwater proposes to use biological monitors during construction to avoid contact with observed marine mammals and turtles. To minimize the potential for vessel strikes of federally listed whales and turtles during operation, we recommend that Broadwater adhere to NMFS's Proposed Rule for the protection of endangered right whales, including a speed restriction of 10 knots (maximum) from November through April for vessels 65 feet long or longer in waters up to 30 nautical miles southeast of the entrance to Long

Island Sound. If NMFS revises its rulemaking, Broadwater would be required to adhere to any subsequent revisions.

As mentioned previously, the primary noise impact during construction would be associated with pile-driving activities for the YMS. Broadwater has not provided technical verification of the specific underwater noise levels during Project operations, and we have recommended that Broadwater coordinate with NMFS to identify appropriate measures to minimize potential impacts of underwater noise on marine resources during both construction and operation. In addition, we have recommended that Broadwater complete informal consultation with NMFS, FWS, and NYSDEC to avoid and minimize potential impacts to federally listed or state-listed species. With implementation of these recommendations, the Project would not be likely to adversely affect any federally or state-listed threatened and endangered species. With this draft EIS, we are requesting the concurrence of NMFS and FWS with our determination of effect.

The FSRU air emission levels were determined relative to total output and potential exposure to humans, including people using the offshore waters of Long Island Sound. Air emissions from the FSRU would primarily be generated by burning natural gas to heat the LNG during the vaporization process. The Long Island Sound area has been categorized by EPA as “nonattainment” for two pollutants (ozone and particulate matter with a diameter of 2.5 micrometers or less), which means that additional mitigation may be needed to reduce emissions and offset any impacts of proposed projects. All emissions from construction and operation must be in compliance with air quality permits. With implementation of the mitigation and offsets determined by NYSDEC and adherence to the applicable permit requirements, impacts to air quality during operation of the Project would be negligible but would continue for the life of the Project.

The primary concerns of operation on the human environment are potential impacts to commercial use, recreational use, and visual resources, as well as the potential for the Project to stimulate expanded industrialization of the Sound.

The operation of the proposed Broadwater FSRU poses a potential hazard that could affect the public safety without strict design and operational measures to control potential accidents. Of primary concern are those events that could lead to an LNG spill of sufficient magnitude to impact the public. However, it is important to recognize the stringent requirements for design, construction, operation and maintenance, as well as the extensive safety systems, which would be required of the facility and for the LNG vessel transits.

The proposed facility would incorporate design and engineering components of an LNG import facility, an offshore marine facility, as well as features similar to an LNG carrier. Consequently, FERC and Coast Guard staff have jointly reviewed the proposed engineering design of the FSRU and the YMS based on each agency’s respective expertise. Study and evaluation of the proposed facility focused on the safety of the engineering design as well as projected operational reliability. As a result, a number of concerns identified by FERC and Coast Guard staff have resulted in recommended design changes and considerations to improve the safety of the facility. FERC and Coast Guard staff have also recommended the use of a Certifying Entity for the design, plan review, fabrication, installation, inspection, maintenance, and oversight of the FSRU and YMS in accordance with the Navigation and Inspection Circular 03-05 “Guidance for Oversight of Post-Licensing Activities Associated with Development of Deepwater Ports.”

These measures, in addition to a recommendation that Broadwater maintain classification for the life of the proposed facility, would ensure that the appropriate level of reliability, operability, and safety would be sustained throughout the operational life of the proposed facility.

Commercial and recreational activity would not be allowed within the fixed safety and security zone around the proposed FSRU throughout the life of the Project. The proposed FSRU location has been sited outside typical shipping routes. Consequently, only a few commercial shipping transits would potentially need to adjust their routes slightly to the south of their normal routes. A minor amount of commercial trawling and lobster fishing occurs within the area that would be established as the fixed safety and security zone. Up to 12 fishermen trawl the area and up to five lobstermen set pots in the area; these fishermen would be excluded from using the area for the life of the Project. Broadwater would reduce the economic impact to these fishermen by providing economic compensation. Therefore, impacts to commercial use would be minor, but would continue for the life of the Project.

The Coast Guard indicated in its WSR that the highest density of recreational vessel traffic (fishing and boating) is generally within 3.5 miles of the shore along both coasts of Long Island Sound. The fixed safety and security zone around the FSRU would not be in an area of high recreational use since it is substantially farther than 3.5 miles from shore; in addition, the zone constitutes a very small area of the offshore portions of the Sound. As a result, the safety and security zone around the FSRU would not have a significant impact on recreational use.

Of greater concern is the impact of the safety and security zone around each LNG carrier to recreational boaters in the Race. Anchored or drifting vessels would need to leave the area through which the safety and security zone would extend for the approximately 15 minutes it would take for the safety and security zone to pass by the area. Recreational vessels traveling across the area of the Race may experience these delays. However, recreational vessels traveling through the Race would not be significantly affected since they could travel outside of the safety and security zone. Based on the WSR, the maximum width of the safety and security zone around an LNG carrier would be approximately 1,560 yards (0.9 mile), which includes the width of the carrier, and the width of the Race is approximately 1.4 miles (2,400 yards). As a result, even within the most constricted portion of the Race, there would be room available for use by other vessels when LNG carriers are passing through. The total distance between the edges of safety and security zone and the edges of the channel at its narrowest point would range from about 840 yards (0.5 mile) to 530 yards (0.3 mile), dependent on the angle of approach taken by the LNG carrier. Further, several other passages adjacent to the Race could be used by recreational vessels as alternative routes to transit the area while a carrier is passing through the Race. In addition, most recreational fishing vessels in the vicinity of Race Rock, which is a popular fishing area, would likely be outside of the safety and security zone of the carriers passing through the Race and would not be affected.

The number of recreational vessels affected by the safety and security zone around the carriers would depend upon the season, day, and time of LNG transit. To minimize the effects of the safety and security zone on these vessels, the Coast Guard has indicated that consideration of recreational activity would be a component of transit scheduling. In addition, LNG carriers, and thus the moving safety and security zone around them, would be present in the most constricted portion of the Race less than 1 percent of the year (approximately 60 hours per year). In other areas of Long Island, Block Island, and Rhode Island Sounds, there would be sufficient room for commercial and recreational vessels, including ferries, to avoid the safety and security zone around the carriers with only minor route modifications, at most.

The primary impact to visual resources would be the presence of a 1,215-foot-long FSRU in the central portion of Long Island Sound approximately 9 miles from the nearest shoreline. Based on existing weather patterns, the FSRU could be visible from some shorelines near the central portion of the Sound on about 80 percent of the days. However, at sea level locations more than about 20 miles from the FSRU, the facility would not be visible; and from locations at an elevation of 40 feet, the FSRU would not be visible from distances beyond about 25 miles. When visible from the nearest shoreline, a side view

of the FSRU and a berthed LNG carrier would be most visible and would appear as a small two-dimensional rectangle on the horizon. This image would be about the same size as a standard paper clip held at arm's length (approximately 1 inch long by 0.25 inch high). The primary visual difference between the FSRU and the Sound's existing commercial traffic would be its lack of substantial movement. Broadwater is evaluating color schemes for the FSRU that would minimize its contrast with the water and skyline.

LNG carriers in transit to and from the FSRU would appear similar to other commercial vessels in Eastern Long Island Sound, during both day and night. Because the carriers would increase commercial vessel traffic in the Sound by only about 1 percent; the increase in the number of sightings of commercial vessels would likely not be noticeable to viewers.

Based on a visual resource analysis conducted by Broadwater in accordance with NYSDEC's procedures, the Project would result in a moderate, long-term impact on visual resources in a limited portion of Long Island Sound and the associated shorelines. This impact is not expected to change the public value of the viewshed or alter the value of shorefront property or recreation.

We received and considered comments stating that implementation of the Project could result in widespread industrial development of Long Island Sound, especially the offshore portions of Long Island Sound. We have found nothing to validate this concern. Previous offshore facilities have been built in Long Island Sound to transfer energy supplies with no evident increase in industrialization. It has been over 30 years since the last energy transfer facility was built in the offshore waters of Long Island Sound, and there is little indication that the existence of this facility increased development in the Sound or on shore. Our analysis indicated that the proposed natural gas supplies are needed as a replacement fuel for existing coal- and oil-fired facilities, and to support the future growth already projected by government and private analyses. Any secondary economic activity that would occur in response to Project revenues added to the area or the increased energy supplies provided by the Project is expected to be minor. Further, there would be little or no economic benefit to clustering industrial activity in the immediate vicinity of the proposed Project. We have concluded that it is not likely that approval and implementation of the Broadwater Project would stimulate new types of offshore industrial or commercial developments.

Construction and operation of the proposed Project would require many federal and state permits and approvals, including permits to use submerged lands and for coastal zone consistency. The seafloor below the fixed safety and security zone at the FSRU and along the permanent pipeline easement is held in public trust by the State of New York. Broadwater would apply to the New York State Office of General Services to obtain permission to use these areas, and both NYSDEC and NYSDOS would review the application to make recommendations regarding natural resources and to address coastal zone management issues. In addition, Broadwater has submitted a draft Coastal Zone Management Act consistency determination to NYSDOS, and also submitted a supplemental application that includes the anticipated coastal zone effects associated with implementing the safety and security measures included in the Coast Guard's WSR. NYSDOS is currently reviewing Broadwater's determination, and will decide whether it will accept or reject Broadwater's assertion that the Project is consistent with the New York and Long Island Coastal Management Programs.

As described above, FERC and the Coast Guard evaluated the hazards of LNG carrier operations associated with the proposed Project. There is a potential for an increased risk to public health and safety, but we consider the potential risk to be very low. The anticipated routes are at least 3 miles from the shoreline, except in the vicinity of Fishers Island and Plum Island, where the shoreline is from approximately 1.1 miles (Fishers Island) to 1.3 miles (Plum Island) from the routes. LNG carriers would be subject to Coast Guard requirements that are summarized in the WSR and will be presented in the Letter of Recommendation (if the Coast Guard determines that the waterway is suitable for LNG vessel

traffic), including establishment of a safety and security zone around both incoming and departing carriers. In addition, carriers would be subject to Coast Guard inspection and enforcement practices.

Because LNG is a cryogenic liquid, the greatest threat to aquatic life from an unignited LNG spill would be thermal stress. Any aquatic life that came into direct contact with the LNG would experience a sudden cold shock; depending in what context that contact occurred, the exposure could be lethal. Most motile underwater organisms would detect the temperature change and avoid the area. Wildlife occupying the water's surface near the release could be surrounded by the vapor cloud and suffer asphyxiation. However, the likely duration of such exposure would be short.

Impacts to shoreline habitats and associated wildlife could occur, primarily through the ignition of the vaporized LNG. The potential damage could involve the combustion of both vegetation and wildlife. However, the outer limits of hazard zones 1 and 2, which were calculated for the LNG carrier transit routes and the FSRU, would not reach the shoreline. Portions of hazard zone 3, which only spreads to its maximum possible extent in the absence of an ignition source, could intersect with the shoreline at a few locations, but the exposure period would be short and temporary. Further, based on the extensive operational experience of LNG shipping, the structural design of an LNG vessel, and the operational controls imposed by the Coast Guard and local pilots, the possibility of a cargo containment failure and subsequent LNG spill from a vessel casualty is highly unlikely. The history of LNG shipping has been free of major incidents, and none have resulted in significant quantities of LNG being released.

The events most likely to cause a significant release of LNG are a ship casualty such as collisions, allisions, or groundings. Any event causing a release of LNG would need to involve sufficient impact to breach the LNG ship's double hull and cargo tanks. During the approximately 44,000 voyages that have been completed since the inception of LNG maritime transportation, only ten substantial incidents have involved LNG ships, and none of those incidents resulted in spills due to rupturing of the cargo tanks. The report, *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill over Water*, referred to as the "Sandia Report," included an analysis of potential LNG cargo tank breaches due to accidental causes. Sandia found that accidental groundings, collisions with small vessels, and low-speed collisions with large vessels could cause minor ship damage but would not result in a cargo spill due to the protection provided by the double-hull structure, the insulation layer, and the primary cargo tank of an LNG vessel. We do not believe that these types of accidents would result in significant environmental impacts.

In addition, it is possible that a release could be caused by an intentional act, such as a terrorist attack, although an intentional breach scenario may result in greater thermal radiation, such scenarios are associated with the desire to inflict damage to major infrastructure, population and commercial centers, rather than to environmentally sensitive areas along the vessel route.

In summary, we have determined that, with strict adherence to federal and state permit requirements and regulations, Broadwater's proposed mitigation measures, and our recommendations, the proposed Project would not result in significant impacts to the environment.

## **Cumulative Impacts**

We considered a wide variety of projects and activities in the general area that, in concert with the proposed Broadwater Project, could potentially result in cumulative impacts. Of these projects, we more closely evaluated 12 projects in Long Island Sound, including three natural gas pipelines (two existing and one proposed), five existing subsea telecommunications or electric transmission cables, two offshore oil transfer platforms, and two proposed offshore dredged material disposal sites. We determined that, while other recently constructed and proposed Projects have the potential to contribute cumulative

impacts to water quality, marine biological resources, visual resources, air quality, and marine transportation, only the additive impacts of the Eastchester Expansion Pipeline Project and the future Islander East Pipeline Project could generate cumulative impacts of any significance to the Project area. Incomplete backfilling along the Eastchester route has resulted in the persistence of a trench along the pipeline route. To minimize similar problems with the proposed Project, we have recommended that Broadwater actively backfill the trench and implement post-construction monitoring to assess success in accordance with plans developed in concert with federal and state resource agencies.

Both the proposed Broadwater Project and the Islander East Pipeline Project would be within the same general offshore area. While the actual schedule for construction of the Islander East project is not known, the proposed in-service schedule is 2007. Therefore, construction of the two projects would not overlap unless Islander East was delayed for either 2 or 3 years. The construction methods and associated impacts also would be similar for the two projects. Each of these projects would generally result in temporary and minor effects during construction, but each project would be designed to avoid or minimize impacts to water quality, marine resources, and marine transportation. Additionally, significant unavoidable impacts to sensitive resources resulting from these projects would be mitigated, and mitigation generally leads to the avoidance or minimization of cumulative impacts.

We believe that impacts associated with the proposed Broadwater Project would be relatively minor, and we have included various recommendations in this EIS to further avoid and minimize the environmental impacts associated with the Broadwater Project. The environmental impacts associated with the proposed Broadwater Project and the proposed Islander East Pipeline Project would be minimized by the use of specialized construction techniques, effective vessel scheduling and communication, and appropriate mitigation measures. Consequently, only a small cumulative effect is anticipated when the impacts of the proposed Project are added to past, present, or reasonably foreseeable future projects in the area.

## **Alternatives**

Alternative analyses were completed as part of the Coast Guard review of safety and security and FERC's environmental review.

### *Coast Guard*

The proposed action before the Coast Guard is to consider whether or not to issue Broadwater a Letter of Recommendation that finds the waterways suitable for LNG marine traffic. Alternatives considered by the Coast Guard consisted of the following:

- Issuing a Letter of Recommendation finding that the waterway is suitable without the implementation of additional measures;
- Issuing a Letter of Recommendation finding that the waterway is unsuitable (No-action Alternative); and
- Issuing a Letter of Recommendation finding that to make the waterway suitable, additional measures are necessary to responsibly manage risks to navigation safety or maritime security associated with LNG marine traffic.

Issuing a Letter of Recommendation finding the waterways to be suitable for the Project would allow construction of the Project if Broadwater receives FERC authorization and other required permits and approvals. This would result in meeting the energy needs of the target market for the Project. A determination that the waterways are suitable could be rendered with or without additional measures.

Based on the findings of the WSR, the Coast Guard determined that additional measures would be required to make the waterways suitable for the Project. Therefore, the alternative of issuing a Letter of Recommendation finding the waterways suitable for LNG marine traffic without additional measures is not considered reasonable and was not addressed further.

A reasonable alternative for the Coast Guard would be to issue a Letter of Recommendation that finds the waterways unsuitable for LNG marine traffic. With this alternative, the waterways would continue to be used as it is currently and the environmental impacts associated with issuance of a Letter of Recommendation with specific conditions would be avoided. However, the purpose and need of the Project would not be met and the region's increasing energy demands would not be met.

## *FERC*

In our assessment of alternatives, we reviewed the following types of alternatives:

- No-action and Postponed-action;
- Alternative Energy Sources;
- System Alternatives;
- Alternative LNG Terminal Designs and Locations;
- Pipeline Route Alternatives;
- Pipeline Construction Alternatives;
- Alternative Vaporization Methods; and
- Alternative Onshore Facilities.

With the No-action and Postponed-action alternatives, and the Alternative Energy Sources, the projected energy needs for the New York City, Long Island, and Connecticut markets would not be met. In addition, these alternatives would not provide imported sources of or storage for natural gas, both of which are part of the purpose and need of the proposed Project.

Proposed renewable energy projects in New York State and Connecticut were evaluated including proposed wind and tidal energy projects. In addition, existing renewable energy projects were evaluated such as Connecticut's landfill gas generation and fuel cell programs. It was determined that these proposed and existing renewable energy projects would provide a small increase in the energy supply for the region. In addition, federal, state, and local initiatives promoting renewable energy likely will contribute to an increase in the availability and cost effectiveness of these technologies in the coming years. However, several New York and Connecticut state studies predict that renewable energy sources would offset only a small part of the projected energy demand for the region for the foreseeable future. As a result, use of renewable energy sources would not offset the need for the proposed Project.

For System Alternatives we considered existing, proposed, or planned projects, including 6 existing pipeline systems; 8 proposed pipeline projects; and 20 proposed, new, or expanded LNG terminals between Quebec, Canada and the Delaware River in New Jersey. None of the System Alternatives could meet the energy needs for the target markets without substantial system upgrades or extensive offshore construction that would result in greater environmental impacts than those of the proposed Project. In addition, existing or proposed pipeline systems would not provide a source of overseas gas to diversify the source of natural gas.

In considering alternative types of LNG terminals and alternative locations, we concluded that an FSRU sited in the central portion of Long Island Sound would be the least environmentally damaging alternative that would still meet the purpose and need of the Project. Each of the alternative types of terminals considered in our evaluation, which included both offshore and onshore alternatives, would result in greater environmental impacts than the impacts associated with the proposed FSRU design. In addition, all alternative sites considered in the Atlantic Ocean offshore of Long Island would require a pipeline that would be longer than the proposed subsea pipeline and would extend through sensitive nearshore and onshore areas. In all cases, construction of an FSRU and pipeline in the Atlantic Ocean would result in greater impacts than those of the proposed Project.

An onshore LNG facility along Long Island Sound would be closer to populated areas and would require dredging and construction of berthing and/or pipeline support facilities in sensitive nearshore waters. Construction and operation of an offshore gravity-based system terminal would result in much greater seafloor impacts than an FSRU. A shuttle regasification vessel (SRV) terminal also would result in greater seafloor impacts than those of the proposed Project and would not be feasible within the waters of Long Island Sound due to the lack of deep water in areas suitable for installing a terminal. The nearest area where an SRV system would be feasible due to depth requirements is the Atlantic Ocean. Although the SRV system typically does not provide LNG storage, recent changes in vessel design indicate that an SRV terminal could include a vessel specifically designed to provide LNG storage at one of the two or three mooring buoys that would be part of an SRV terminal. However, even with LNG storage, the impacts of a pipeline associated with an SRV terminal would be greater than those of the Broadwater Project, as described above.

Our evaluation of alternative locations included consideration of other locations in Long Island Sound as well as locations in Block Island Sound and in the Atlantic Ocean offshore of Long Island. An FSRU sited in the central portion of Long Island Sound would maximize the distance of the LNG terminal from the shoreline, thus minimizing visual impacts. Other locations within the Sound would result in greater impacts to sensitive nearshore areas, greater visual impacts, and/or greater conflicts with commercial traffic. Locations in Block Island Sound and the Atlantic Ocean would likely experience more downtime due to weather conditions that exceed the design limits for operation.

The subsea pipeline route was selected based on the desire to balance the need to minimize impacts to the marine environment with the engineering constraints on potential interconnection locations with the IGTS pipeline. Connecting to the IGTS pipeline as proposed would allow the delivery of LNG to the target markets without the need for additional upgrades to the IGTS system and the associated environmental impacts. With an FSRU located in central Long Island Sound, shorter routes to the IGTS pipeline would not provide a substantial environmental advantage but would increase the length of 24-inch-diameter IGTS pipe that gas from the Project would need to pass through on its way to New York City and Long Island Sound. This would reduce the flow-through capacity of gas that could be shipped from the Project as compared to the proposed location of the interconnection with the IGTS pipeline or require additional compression.

Our evaluation of alternative construction methods for the proposed pipeline indicated that use of mid-line buoys on all anchor lines of the lay barge or use of a dynamically positioned lay barge would reduce seafloor impacts by about 90 percent of that which would occur using the conventionally anchored lay barge proposed by Broadwater. Consequently, as part of our recommendation to minimize anchor cable sweep, we recommended that Broadwater either use mid-line buoys on all anchor lines of the lay barge or use a dynamically positioned lay barge. None of the alternatives considered for pipe lowering would result in fewer environmental impacts than those of the Project as proposed.

The Broadwater Project includes a vaporization system that converts LNG into natural gas. In its initial design, Broadwater considered the use of a submerged combustion vaporization system, which would have been less costly to construct and operate than the proposed system. After evaluating the air emissions from the submerged combustion vaporization system and consultation with NYSDEC, Broadwater decided to switch to the currently proposed shell-and-tube vaporization system to reduce air emissions. An alternative approach would be to use a system that uses flow-through seawater during warmer months, and the proposed closed-loop system could be used during cooler months when the water temperature of the Sound is too low to provide sufficient warming for the LNG. Although this approach would be substantially less expensive to operate, Broadwater rejected it to avoid the extensive entrainment and impingement of marine organisms that can occur with the flow-through method. In summary, the proposed vaporization method would result in fewer environmental impacts than the alternative methods.

Overall, the proposed Project would result in fewer environmental impacts than any alternatives considered. This includes consideration of the Project's purpose and need, and the environmental impacts associated with the location, design, and construction methods of the alternatives. However, in the EIS we have included recommendations that would modify the Broadwater proposal to further minimize and avoid impacts.

## **Major Conclusions**

During our environmental review of the Project, we identified procedures that would avoid, minimize, and mitigate environmental impacts that would result from construction and operation of the Project as proposed by Broadwater. We are recommending that these mitigation measures be attached as conditions to any authorization issued by the Commission. If the Project is found to be consistent with the public interest and is constructed and operated in accordance with Broadwater's proposed mitigation methods and the FERC and Coast Guard recommended mitigation measures, we conclude that it would result in limited adverse environmental impacts. The following are the primary reasons for our decision:

- The Project would be located at least 9 miles from the nearest shoreline and would be distant from population centers and sensitive nearshore marine biological resources;
- The proposed Project would result in fewer environmental impacts than any alternatives considered, and many alternatives could not meet the purpose and need of the proposed Project;
- The Coast Guard has determined that, if specific mitigation conditions are implemented, Rhode Island Sound, Block Island Sound, and Long Island Sound could be suitable for use by LNG carriers associated with the Project;
- The Coast Guard would establish and enforce safety and security zones around the marine terminal and the LNG carriers that would minimize the potential for conflict between the Project and current and future usage of the waterways by commercial, recreational, and government marine vessels;
- Design and operation of the Project would include the safety features and procedures required by both the Commission and the Coast Guard;
- Broadwater would develop and implement an emergency response plan that includes involvement by local agencies and jurisdictions and meets the requirements of the Commission, the Coast Guard, and other federal agencies;

- As proposed by Broadwater, construction and operation of the Project would result in a minor environmental impact, and impacts to resources would be avoided or further minimized with incorporation of our recommendations;
- Broadwater would obtain all federal permits and authorizations and would follow the permitting requirements of the State of New York; and
- The environmental inspection and mitigation monitoring program would ensure compliance with the mitigation measures that would become conditions if the Project is authorized by the Commission.